

The Politically Motivated Reasoning Paradigm, Part 2: Unanswered Questions

DAN M. KAHAN

Abstract

This is the second in a pair of essays on politically motivated reasoning. The first presented a conceptual model of this dynamic: the “Politically Motivated Reasoning Paradigm” (PMRP). This essay uses PMRP to highlight a set of unsettled issues, including the rationality of politically motivated reasoning; the association of it with ideological conservatism; the power of monetary incentives to neutralize it; and the interaction of it with expert judgment.

INTRODUCTION

This is the second of a pair of essays on *politically motivated reasoning*—the tendency of individuals to selectively credit evidence in patterns that bring their beliefs about policy-relevant facts into alignment with those held by others with whom they share important social ties. It is a leading explanation for the phenomenon of *fact polarization*—intense, persistent partisan contestation over facts that admit of scientific evidence.

The first essay developed a conceptual model of politically motivated reasoning: the “Politically Motivated Reasoning Paradigm” (PMRP). Under PMRP, the signature feature of this form of information processing is the opportunistic adjustment of the *weight*-assigned evidence conditional on its conformity to positions associated with membership in identity-defining affinity groups.

In Bayesian terms, there is an endogenous relationship between the likelihood ratio and a person’s political predispositions. It is this entanglement that distinguishes politically motivated reasoning from a normative conception of Bayesian information processing, in which the weight (likelihood ratio assigned) evidence is determined on the basis of valid, truth-seeking criteria *independent* of an individual’s cultural identity. PMRP

Emerging Trends in the Social and Behavioral Sciences.

Robert Scott and Marlis Buchmann (General Editors) with Stephen Kosslyn (Consulting Editor).

© 2016 John Wiley & Sons, Inc. ISBN 978-1-118-90077-2.

also distinguishes politically motivated reasoning from cognitively biased forms of information processing in which the likelihood ratio is endogenous to some non-truth-seeking influence *other* than identity protection, such as an individuals' priors in the case of confirmation bias.

PMRP can also be used to assess the validity of experimental designs. The best test of politically motivated reasoning is whether study subjects alter the weight they assign *the same piece of evidence* in response to an *experimental manipulation* of the perceived relationship between that evidence and positions that predominate in their cultural group. This experimental setup can be called the *PMRP design*.

The last essay showed that many studies that purport to adduce evidence of politically motivated reasoning employ this design or its equivalent, but that many others do not. This essay uses PMRP to sharpen review of disputed issues relating to the properties of politically motivated reasoning.

TRAGIC RATIONALITY

Politically motivated reasoning is not truth convergent. Whether it therefore evinces a defect in reasoning, however, is complicated.

The case for treating politically motivated reasoning as a form of "bounded rationality" is rooted in the dual-process theory of cognition. On this account, all manner of cognitive miscue—from the "availability effect" to "base rate neglect" to "hindsight bias"—reflects overreliance on preconscious, affect-driven "System 1" reasoning. These biases disrupt the mental operations necessary to engage in truth-convergent Bayesian reasoning, which is associated with conscious, effortful, "System 2" information processing (Kahneman & Frederick, 2005). Politically motivated reasoning diverges from Bayesian information processing in a manner comparable to these biases. It seems logical, then, to attribute it—and the resulting "fact polarization" that pervades contemporary democratic political life—to overreliance on System 1 reasoning, too (Sunstein, 2007; Lodge & Taber, 2013).

But this theoretical gloss on politically motivated reasoning is inconsistent with empirical findings. Far from converging in their evidence assessments, individuals scoring highest on standard measures of System 2 reasoning are the *most* polarized on the existence of climate change, the efficacy of gun control, and other contested risk issues (Bolsen, Druckman, & Cook, 2015; Kahan, Peters, *et al.*, 2012).

Experimental investigations, moreover, have effectively "caught" individuals "in the act" of using advanced reasoning capacities to promote their stake in forming identity-affirming beliefs. Indeed, in one (Kahan, 2013), it was found that individuals who score highest on the Cognitive Reflection test (CRT), the standard measure of System 2 reasoning, were even *more likely* to

"I think the word-problem test I just took [i.e., the CRT test] supplies good evidence of how reflective and open-minded someone is."

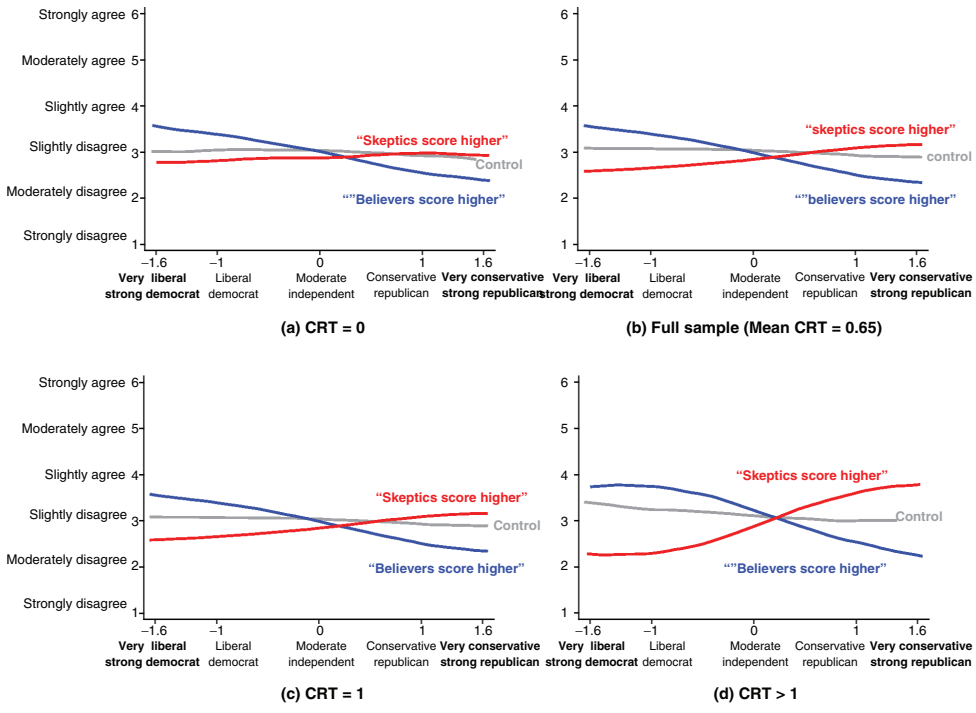


Figure 1 “Symmetric” system 2 politically motivated reasoning. Locally weighted regression. Subjects credited information on the “validity” of the CRT conditional on their impression that people who agreed with their political group’s position on climate change had scored higher. This effect grew as subjects’ CRT scores increased and was symmetric across the political-outlook spectrum (Kahan, 2013).

selectively credit or discount evidence of the validity of the *CRT itself* conditional on experimental manipulation of their perception that a high CRT score was correlated with acceptance or rejection of human-caused climate change (Figure 1).

High numeracy—a quantitative reasoning proficiency that strongly predicts the disposition to use System 2 information processing—also magnifies politically motivated reasoning. In one study, subjects highest in Numeracy more accurately construed complex empirical data on the effectiveness of gun control laws but *only* when the data, properly interpreted, supported the position consistent with their ideology. When the data properly interpreted was inconsistent with their predispositions, they were even more disposed than low numeracy subjects to reject it. If this is how people use their reasoning proficiencies to assess evidence about contested facts in the real world, we would expect to see exactly what observational studies consistently

find: namely, a progressive increase in political polarization as individuals of opposing outlooks become more proficient in critical reasoning (Kahan, Peters, Dawson, & Slovic, 2013).

Far from reflecting *too little rationality*, then, politically motivated reasoning reflects *too much*. On most of the policy-relevant facts that become symbolically linked to membership in competing cultural groups, an ordinary person's "beliefs" are of no *policy* significance. She just does not matter enough as a consumer, voter, participant in public deliberations, and so on, to affect the incidence of the risk in question (say, climate change as a result of human CO₂ emissions) or the adoption of any policy to reduce it (say, enactment of a carbon tax). Accordingly, any "mistake" someone makes in acting on mistaken beliefs about those facts will be costless in that regard.

Given the social meanings that factual positions on these issues convey, however, failing to adopt the stance that signals who she is—*whose side she is on*—could have devastating consequences for a person's standing with others whose support is vital to her well-being, emotional and material. Under these conditions, it is a perfectly rational thing for one to attend to information in a manner that promotes beliefs that express one's identity correctly, regardless whether such beliefs are factually correct (Kahan, in press). And if one is really good at conscious, effortful information processing, then it pays to *apply* that reasoning proficiency to give information exactly this effect.

As rational as this is for individuals, of course, it is a disaster for a democratic society. For when everyone processes information this way at the same time, culturally diverse groups are less likely to converge on the best understanding of policy-relevant evidence essential to the well-being of all. Yet that does not reduce any individual's psychic incentive to keep applying her reason to form beliefs that match the positions that prevail in her cultural group. The *rationality* of politically motivated reasoning breeds the "tragedy of the science communication commons" (Kahan, Peters, *et al.*, 2012).

ASYMMETRY THESIS

The fact polarization associated with politically motivated reasoning is pervasive. However, whether politically motivated reasoning is *uniform* across opposing cultural groups is a matter of considerable debate.

Reviving the classic "authoritarian personality" thesis (Adorno, 1950), one group of scholars has advanced the claim that it is not. Known as the *asymmetry thesis*, their position links biased processing of political information with right-wing political orientations. Their studies emphasize correlations in observational studies between conventional ideological measures and scores on self-report scales such as "need for cognition" and

on personality-trait scales such as “openness to experience” (Jost, Glaser, Kruglanski, & Sulloway, 2003).

The evidence relied on by these researchers, however, supplies only weak support for the asymmetry thesis. First, the reasoning style measures they employ is of questionable validity. It is a staple of cognitive psychology that defects in information processing are not open to introspective observation or control, a conclusion that applies to individuals of high as well as more modest cognitive proficiency (West, Meserve, & Stanovich, 2012). There is thus little reason to believe a person’s own perception of the quality of his reasoning is a valid measure of it.

Indeed, tests that seek to validate self-report reasoning scales consistently find them to be inferior than performance-based measures such as the Cognitive Reflect Test and Numeracy (Liberali, Reyna, Furlan, Stein, & Pardo, 2011). *The latter measures*, when applied to valid general population samples, show no meaningful correlation with party affiliation or liberal-conservative ideology (Baron, 2015; Kahan, 2013).

More importantly, there is no evidence that overreliance on heuristic information processing predicts vulnerability to politically motivated reasoning. On the contrary, as discussed in the last part, evidence suggests proficiency in dispositions such as cognitive reflection, numeracy, and science comprehension *magnifies* politically motivated reasoning.

Ultimately, the only way to determine if politically motivated reasoning is asymmetric with respect to identity-defining commitments is through valid experiments. There are studies that variously purport to show that one or another form of judgment—for example, willingness to espouse counter-attitudinal positions, or form positions while intoxicated—is ideologically asymmetric or symmetric (Brandt & Crawford, 2013; Eidelman, Crandall, Goodman, & Blanchard, 2012). These studies vary dramatically in validity and insight. However, even the very best and genuinely informative ones (e.g., Conway *et al.*, 2015; Crawford, 2012; Liu & Ditto, 2013) are in fact examining a form of information processing *distinct* from PMRP with methods other than the PMRP design.

One study that did use the PMRP design found no support for the “asymmetry thesis” (Kahan, 2013). Discussed in the last section, that study concluded individuals of opposing outlooks displayed perfectly symmetric forms of politically motivated reasoning when evaluating evidence of biased information processing among people who either share or reject their group’s position on climate change (Figure 1). The study thus furnishes a model of the impact of motivated reasoning on people’s assessment of evidence for the asymmetry thesis itself.

It is certainly reasonable to view the status of the “asymmetry thesis” as unresolved. Progress in resolving it, however, will not occur unless studies

use the PMRP design or ones equivalently suited to support inferences consistent with the PMRP model.

MONETARY INCENTIVES

Experiments that reflect the PMRP design are “no stake” studies: the cost of a “wrong” answer and the reward for a “correct” one are both zero. In an important development, researchers have recently reported that offering monetary incentives can reduce polarization when subjects of diverse political outlooks answer questions of partisan import (Bullock, Gerber, Hill, & Huber, 2015 [BGHH]; Khanna & Sood, 2016 [K&S]; Prior, Sood, & Khanna, 2015 [PSK]).

The quality of these studies is uneven. The strongest, Khanna and Sood (2016), uses the PMRP design. K&S found that offering incentives reduces the tendency of high numeracy subjects to supply politically biased answers in interpreting covariance data in a gun-control experiment, a result (Kahan *et al.*, 2013) described in this section.

PSK and BGHH, in contrast, examine responses to factual quiz questions. Because this design does not involve information processing, it does not show how incentives affect the signature feature of politically motivated reasoning: the opportunistic adjustment of the *weight* assigned to new evidence conditional on its political congeniality.

Both K&S and BGHH, moreover, use M Turk samples. M Turk workers are distinguished from members of the general population by a willingness to perform Internet labor for pennies per hour. They are also known to engage in deliberate misrepresentation of their identities and other characteristics to increase their online earnings (Chandler & Shapiro, 2016). Thus, how readily *they* alter their reported beliefs to earn monetary rewards for guessing what they anticipate researchers will regard as “correct” answers furnishes an unreliable basis for inferring how members of the general public form beliefs outside the lab, with incentives or without.

Assuming, as seems plausible, however, that studies of ordinary members of the public will corroborate the compelling result reported in K&S, a genuinely interesting question will be put: what inference should be drawn from the power of monetary incentives to counteract politically motivated reasoning?

BGHH assert that such a finding would call into doubt the external validity of studies finding politically motivated reasoning. Attributing the polarized responses observed in “no stake” studies to the “expressive utility that [subjects] gain from offering partisan-friendly survey responses,” BGHH conclude that the “apparent gulf in factual beliefs between members of different parties may be more illusory than real.”

One could argue, though, that BGHH have things upside down. In the real world, ordinary members of the public *do not get monetary rewards* for forming “correct” beliefs about politically contested factual issues. In their capacity, as voters, consumers, or participants in public discussion, they do not earn even the paltry expected-value equivalent of the lottery prizes that BGHH offered their M Turk subjects for getting the “right answer” to quiz questions.

The only material stake most ordinary people have in the content of their beliefs about policy-relevant facts is the contribution they make to the experience of *being* a particular sort of person. The *beliefs* a person forms about the deterrent effect of concealed-carry laws on violent crime, the contribution of human activity to global warming, and like “facts” reliably dispose her to *act* in ways that signify her identity-defining group commitments to those who will judge her character accordingly. Failing to attend to information in a manner that generates such beliefs can severely compromise someone’s well-being—not because the beliefs she will form in that case will be factually *wrong*, but because they will convey the wrong *message* about who she is and whose side she is on.

On this account, *expressive beliefs* are what are “real” in the psychology of democratic citizens (Kahan, in press). No-stake PMRP designs seek to faithfully model the process by which such beliefs are formed by simulating conditions that excite the affective orientation, and related style of information processing, that signal individuals’ group commitments. The answers survey respondents give in response to monetary incentives are what should be regarded as “artifactual,” “illusory” (Bullock *et al.*, 2015, pp. 520, 523), because such incentives give subjects a reason to form “correct” beliefs that are alien to their experience in the real-world domain of interest.

It would be a mistake, however, to conclude that studies that add monetary incentives to PMRP designs furnish no insight. People are not *merely* democratic citizens, not *only* members of particular affinity groups, but also many other things, including economic actors who try to make money, professionals who exercise domain-specific expert judgments, and parents who care about the health of their children. The style of identity-expressive information processing that protects their standing as members of cultural groups might well be inimical to their interests in these domains, where being *wrong* about consequential facts would frustrate their goals. Understanding how individuals negotiate this tension in the opposing “stakes” they have in forming accurate beliefs and identity-expressive ones is itself an important project for decision science.

If monetary incentives *do* meaningfully reverse identity-protective forms of information processing in studies that reflect the PMRP design, a plausible inference would be that offering such rewards is sufficient to summon the truth-seeking, information-processing style that (at least some) subjects use

outside of domains that feature identity-expressive goals. In effect, the incentives transform subjects from identity protectors to scientific-knowledge acquirers, and activate the corresponding shift in information-processing styles appropriate to those roles (Kahan, 2015a).

Whether this would be the best inference is another matter that merits further empirical examination. However, such inquiry is unlikely to advance knowledge much until scholars abandon the facile precept that monetary incentives are the “gold standard” of experimental validity in decision science rather than simply another device for testing hypotheses about the interaction of diverse, domain-specific forms of information processing.

PROFESSIONAL JUDGMENT

Democratic citizens predictably fail to get the benefit of the best available scientific evidence when their collective deliberations are pervaded by politically motivated reasoning. However, even more disturbingly, politically motivated reasoning might be thought to diminish the *quality* of the best scientific evidence available in a democratic society (Curry, 2013).

Not only do scientists—like everyone else—have cultural identities. They are also highly proficient in the forms of System 2 information processing known to magnify politically motivated reasoning. Logically, then, it might seem to follow that scientists’ factual beliefs about contested social risks are likely skewed by the stake *they* have in conforming information to positions associated with their cultural groups.

A contrary inference, however, would be just as “logical.” Studies linking politically motivated reasoning with use of System 2 information processing have been conducted on general public samples, none of which would have had enough scientists in them to detect whether being one matters. Unlike nonscientists with high CRT or Numeracy scores, scientists use *professional judgment* when they evaluate evidence on policy-relevant facts. Professional judgment consists in habits of mind, acquired through training and experience, distinctively suited to specialized decision-making. For risk experts, those habits of mind confer resistance to many cognitive biases that can distort the public’s perceptions (Margolis, 1996). It is perfectly plausible to believe that one of the biases that professional judgments can protect risk experts from is “politically motivated reasoning.”

To date, however, there are few studies of how scientists might be affected by politically motivated reasoning, and the inferences they support are equivocal. Some observational studies find correlations between the positions of scientists on contested risk issues and their cultural or political orientations (Bolsen *et al.*, 2015; Carlton, Rebecca, Matthew, & Linda, 2015). The correlations, however, are much weaker than ones observed in

general-population samples. In addition, with one exception (Slovic *et al.*, 1995), these studies have not examined scientists' perceptions of facts *in their own domains of expertise*.

This is an important point. Professional judgment inevitably comprises not just conscious analytical reasoning proficiencies but perceptive sensibilities that activate those proficiencies when they are needed. Necessarily preconscious (Margolis, 1996), these sensibilities reflect the assimilation of the problem at hand to an amply stocked inventory of prototypes. However, because these prototypes reflect the salient features of problems distinctive of the expert's field, the immunity from bias that professional judgment confers cannot be expected to operate reliably outside the domain of her expertise (Dane & Pratt, 2007).

A study that illustrates this point examined *legal professionals*. In it, lawyers and judges, as well as law students and members of the public, examined a set of statutory interpretation problems. Consistent with the PMRP design, the facts of the problems were manipulated in a manner designed to provoke responses consistent with politically motivated reasoning. The manipulation had exactly that effect on members of the public and on law students. However, it did not on either judges or lawyers: despite the ambiguity of the statutes and the differences in their own cultural values, those study subjects converged in their responses regardless of their cultural outlooks, just as one would predict if one expected their judgments to be synchronized by professional judgment. Nevertheless, this relative degree of resistance to politically motivated reasoning was confined to legal-reasoning tasks: the judges' and lawyers' respective perceptions of disputed societal risks—from climate change to marijuana legalization—reflected the same identity-protective patterns observed in the general public and student samples (Kahan *et al.*, 2016). Extrapolating, then, we might expect to see the same effect in risk experts: politically motivated divisions on policy-relevant facts *outside* the boundaries of their fields of expertise, but convergence guided by professional judgment *inside* of them.

Or alternatively we might expect convergence not on positions that are true, necessarily, but on ones so intimately bound up with a field's own sense of identity that acceptance of them has become a marker of basic competence. In Koehler (1993), scientists active in either defending or discrediting scientific proof of "parapsychology" were instructed to review a fictional ESP (Enhanced Studies Program) study. The result of the study was experimentally manipulated: half the scientists got a version that purported to find evidence supporting ESP, the other half a version that purported to find evidence not supporting it. The scientists' assessments of the quality of the study's methods turned out to be strongly correlated with the fit between

the represented result and the scientists' existing positions on the scientific validity of parapsychology.

Koehler's study reflects the core element of the PMRP design: the outcome measure was the weight that members of opposing groups gave to one and the same piece of evidence conditional on the significance of crediting it. Because the significance was varied in relation to the subjects' prior beliefs and not their stake in some goal independent of forming an accurate assessment, the study normally is understood to be a demonstration of confirmation bias. However, the "prior beliefs" in this case were also ones integral to membership in opposing groups, the identity-defining significance of which for the subjects was attested to by how much time and energy they had devoted to promoting public acceptance of their respective groups' core tenets. Extrapolating, one might infer that professional judgment can fail to insulate from identity-protective cognition scientists whose professional status has become strongly linked with particular factual claims.

Therefore, we are left only with competing plausible conjectures. That's not unusual. Indeed, it is the occasion for empirical inquiry—which here would take the form of the use of the PMRP design or its equivalent to assess the vulnerability of scientists to politically motivated reasoning inside and outside of the domains of their expertise.

PMRP AND THE "SCIENCE OF SCIENCE COMMUNICATION"

Studies using the PMRP design have been used not just to explain what makes fact polarization happen but also to investigate how to reverse it. The strategy with the biggest impact in lab settings is *self-affirmation*. Individuals primed to reflect on their own positive attributes—typically by writing essays about themselves that features these characteristics—react much more open-mindedly to information hostile to positions associated with their cultural identities. The boost in self-esteem furnished by self-affirmation, it is theorized, blunts apprehension of the negative affective reaction that normally motivates that individual to reject information posing a threat to her group standing (Binning, Sherman, Cohen, & Heitland, 2010; Sherman & Cohen 2002; Cohen *et al.*, 2007).

Using "self-affirmation" to neutralize real-world fact polarization, however, would require orchestrating positive self-reflection on a society-wide scale immediately before citizens are exposed to counterattitudinal information. A technology for achieving this end has yet to have been imagined, much less devised.

Other potential "debiasing" strategies include message "framings" that alter the hostile social meanings that trigger identity-protective affective reactions (Druckman & Bolsen, 2011; Kahan, Hank, Tarantola, Silva, &

Braman, 2015) and the use of culturally identifiable “messengers” to mute the inferences that alternative positions on risk are identified with membership in opposing cultural groups (Kahan, Braman, Cohen, Gastil, & Slovic, 2010). These devices are constrained, however, by their low *operational validity* (Schellenberger, 1974). Such studies tend to be designed in a pristine, stylized manner that maximizes researcher confidence that she is observing and manipulating mechanisms of interest. Precisely because they abstract from the cacophony of confounding influences present in real-world conditions, however, such studies—even when they fully support the inferences drawn from them (internal validity) and faithfully model real-world dynamics (external validity)—will rarely furnish any determinate guidance in the real world (operational validity). Additional studies must be performed, in the field, to test competing hypotheses about how effects observed in the lab can be reproduced in the real world (Kahan, 2014).

Still another response to the inimical effects of politically motivated reasoning takes aim at the incentives that generate the “tragedy of the science communications commons.” Fact polarization is not normal. The number of issues on which culturally diverse citizens converge on the best available evidence—from the benefits of medical X-rays to the harmlessness of cell phone radiation—far exceed the number on which they polarize. On these “normal” societal risks, individuals’ factual beliefs have no particular significance for their group identity or status. As a result, there is no competing stake to compete with the one culturally diverse citizens have in using their reason to form beliefs consistent with the best available scientific evidence. The most effective remedy to politically motivated reasoning would thus be to dissolve the attachment between policy-relevant facts and the antagonistic social meanings that transform facts into badges of membership in competing groups.

That is the objective of science-communication *disentanglement* strategies. These measures are modeled on protocols developed by science-education researchers (Lawson, 1999; Lawson & Worsnop, 1992) to disconnect the identity-defining significance of “disbelief in” evolution from the experience of *learning* what science has discovered about the natural history of human beings and *using* that knowledge to do the practical things, such as practice medicine or do scientific research. In field research, decision scientists have collaborated with local decision-makers to structure deliberative procedures that similarly dispel the conflict between holding beliefs that express diverse citizens’ group identities and acquiring and using knowledge of scientific insights essential for their collective decision-making (Gastil, 2004; Kahan, 2015a, 2015b).

Of far greater utility, however, would be research aimed at identifying means for preempting the “entanglement” of policy-relevant facts and

antagonistic cultural meanings from forming in the first place. The empirical science most likely to protect enlightened democracy is one that enlarges our understanding of the social processes that *normally* enable culturally diverse citizens to share with one another so much more scientific knowledge than any individual (including any scientist) can possibly be in a position to comprehend on his or her own. On the basis of that enlarged understanding, we will then be possible to form plausible conjectures—and to test them by valid empirical means—about how to protect those processes from politically motivated reasoning and the myriad additional influences that can disrupt them.

It is this project, and not any one set of methods, that defines the new “science of science communication” (Kahan, 2015b).

REFERENCES

- Adorno, T. W. (1950). *The authoritarian personality*. New York, NY: Harper.
- Baron, J. (2015). Supplement to Deppe et al. *Judgment and Decision Making*, 10, 2.
- Binning, K. R., Sherman, D. K., Cohen, G. L., & Heitland, K. (2010). Seeing the other side: Reducing political partisanship via self-affirmation in the 2008 presidential election. *Analyses of Social Issues and Public Policy*, 10, 276–292.
- Bolsen, T., Druckman, J. N., & Cook, F. L. (2015). Citizens’, scientists’, and policy advisors’ beliefs about global warming. *The Annals of the American Academy of Political and Social Science*, 658, 271–295.
- Brandt, M.J. & Crawford, J. (2013) Replication-Extension of ‘Not for All the Tea in China!’ Political Ideology and the Avoidance of Dissonance-Arousing Situations’ (Nam, Jost, & Van Bavel, 2013, Plos One), <http://ssrn.com/abstract=2365281> or 10.2139/ssrn.2365281
- Bullock, J. G., Gerber, A. S., Hill, S. J., & Huber, G. A. (2015). Partisan bias in factual beliefs about politics. *Quarterly Journal of Political Science*, 10, 519–578.
- Carlton, J. S., Rebecca, P.-H., Matthew, H., & Linda, S. P. (2015). The climate change consensus extends beyond climate scientists. *Environmental Research Letters*, 10, 094025.
- Chandler, J., & Shapiro, D. (2016, advance on-line publication at <http://www.annualreviews.org/doi/abs/10.1146/annurev-clinpsy-021815-093623>). Conducting clinical research using crowdsourced convenience samples. *Annual Review of Clinical Psychology*.
- Cohen, G. L., Bastardi, A., Sherman, D. K., Hsu, L., McGoey, M., & Ross, L. (2007). Bridging the partisan divide: Self-affirmation reduces ideological closed-mindedness and inflexibility in negotiation. *Journal of Personality and Social Psychology*, 93, 415–430.
- Conway, L. G., Gornick, L. J., Houck, S. C., Anderson, C., Stockert, J., Sessoms, D., & McCue, K. (2015, advance on-line). Are conservatives really more simple-minded than liberals? The domain specificity of complex thinking. *Political Psychology*. doi:10.1111/pops.12304.

- Crawford, J. T. (2012). The ideologically objectionable premise model: Predicting biased political judgments on the left and right. *Journal of Experimental Social Psychology, 48*, 138–151.
- Curry, J. *Scientists and motivated reasoning*. Climate Etc. (2013), at <http://judithcurry.com/2013/08/20/scientists-and-motivated-reasoning/>.
- Dane, E., & Pratt, M. G. (2007). Exploring intuition and its role in managerial decision making. *Academy of Management Review, 32*, 33–54.
- Druckman, J. N., & Bolsen, T. (2011). Framing, motivated reasoning, and opinions about emergent technologies. *Journal of Communication, 61*, 659–688.
- Eidelman, S., Crandall, C. S., Goodman, J. A., & Blanchard, J. C. (2012). Low-effort thought promotes political conservatism. *Personality & Social Psychology Bulletin, 38*, 808–820.
- Gastil, J. (2004). Adult civic education through the National Issues Forums: Developing democratic habits and dispositions through public deliberation. *Adult Education Quarterly, 54*, 308–328.
- Jost, J. T., Glaser, J., Kruglanski, A. W., & Sulloway, F. J. (2003). Political conservatism as motivated social cognition. *Psychological Bulletin, 129*, 339–375.
- Kahan, D. M. (2013). Ideology, motivated reasoning, and cognitive reflection. *Judgment and Decision Making, 8*, 407–424.
- Kahan, D. M. (2014). Making climate-science communication evidence-based—All the way down. In M. Boykoff & D. Crow (Eds.), *Culture, politics and climate change* (pp. 203–220). New York, NY: Routledge Press.
- Kahan, D. M. (2015a). What is the “science of science communication”? *Journal of Science Communication, 14*(3), 1–12.
- Kahan, D. M. (2015b). Climate-science communication and the measurement problem. *Advances in Political Psychology, 36*, 1–43.
- Kahan, D. M. (in press). The expressive rationality of inaccurate perceptions of fact. *Brain & Behavior Science*.
- Kahan, D., Braman, D., Cohen, G., Gastil, J., & Slovic, P. (2010). Who fears the HPV vaccine, who doesn't, and why? An experimental study of the mechanisms of cultural cognition. *Law & Human Behavior, 34*, 501–516.
- Kahan, D. M., Hank, J.-S., Tarantola, T., Silva, C., & Braman, D. (2015). Geoengineering and climate change polarization: Testing a two-channel model of science communication. *Annals of the American Academy of Political and Social Science, 658*, 192–222.
- Kahan, D. M., Hoffman, D. A., Evans, D., Devins, N., Lucci, E. A., & Cheng, K. (2016). 'Ideology' or 'situation sense'? An experimental investigation of motivated reasoning and professional judgment. *University of Pennsylvania Law Review, 164*, 349–439.
- Kahan, D. M., Peters, E., Dawson, E., & Slovic, P. (2013). *Motivated numeracy and enlightened self government*. Cultural cognition project working paper No. 116.
- Kahan, D. M., Peters, E., Wittlin, M., Slovic, P., Ouellette, L. L., Braman, D., & Mandel, G. (2012). The polarizing impact of science literacy and numeracy on perceived climate change risks. *Nature Climate Change, 2*, 732–735.

- Kahneman, D. & Frederick, S. (2005). A model of heuristic judgment. In K. J. H. R. G. Morrison (Ed.), *The Cambridge handbook of thinking and reasoning* (pp. 267–293). Cambridge University Press.
- Khanna K., & Sood, G. (2016) Motivated learning or motivated responding? Using incentives to distinguish between two processes, <http://www.gsood.com/research/papers/partisanlearning.pdf>
- Koehler, J. J. (1993). The influence of prior beliefs on scientific judgments of evidence quality. *Organizational Behavior & Human Decision Processes*, 56, 28–55.
- Lawson, A. E. (1999). A scientific approach to teaching about evolution & special creation. *The American Biology Teacher*, 61, 266–274.
- Lawson, A. E., & Worsnop, W. A. (1992). Learning about evolution and rejecting a belief in special creation: Effects of reflective reasoning skill, prior knowledge, prior belief and religious commitment. *Journal of Research in Science Teaching*, 29, 143–166.
- Liberali, J. M., Reyna, V. F., Furlan, S., Stein, L. M., & Pardo, S. T. (2011). Individual differences in numeracy and cognitive reflection, with implications for biases and fallacies in probability judgment. *Journal of Behavioral Decision Making*, 25, 361–381.
- Liu, B. S., & Ditto, P. H. (2013). What dilemma? Moral evaluation shapes factual belief. *Social Psychological and Personality Science*, 4, 316–323.
- Lodge, M., & Taber, C. S. (2013). *The rationalizing voter*. Cambridge; New York: Cambridge University Press.
- Margolis, H. (1996). *Dealing with risk: Why the public and the experts disagree on environmental issues*. Chicago, IL: University of Chicago Press.
- Prior, M., Sood, G., & Khanna, K. (2015). You cannot be serious: The impact of accuracy incentives on partisan bias in reports of economic perceptions. *Quarterly Journal of Political Science*, 10, 489–518.
- Schellenberger, R. E. (1974). Criteria for assessing model validity for managerial purposes. *Decision Sciences*, 5, 644–653.
- Sherman, D. K., & Cohen, G. L. (2002). Accepting threatening information: Self-affirmation and the reduction of defensive biases. *Current Directions in Psychological Science*, 11, 119–123.
- Slovic, P., Malmfors, T., Krewski, D., Mertz, C. K., Neil, N., & Bartlett, S. (1995). Intuitive toxicology. 2. Expert and lay judgments of chemical risks in Canada. *Risk Analysis*, 15, 661–675.
- Sunstein, C. R. (2007). On the divergent American reactions to terrorism and climate change. *Columbia Law Review*, 107, 503–557.
- West, R. F., Meserve, R. J., & Stanovich, K. E. (2012). Cognitive sophistication does not attenuate the bias blind spot. *Journal of Personality and Social Psychology*, 103, 506.

DAN M. KAHAN SHORT BIOGRAPHY

Dan M. Kahan is the Elizabeth K. Dollard Professor of Law and Professor of Psychology at Yale Law School. His primary research interests (for the

moment, anyway) are risk perception, science communication, and the application of decision science to law and policymaking. He is a member of the Cultural Cognition Project, an interdisciplinary team of scholars who use empirical methods to examine the impact of group values on perceptions of risk and related facts. In studies funded by the National Science Foundation, his research has investigated public disagreement over climate change, public reactions to emerging technologies, and conflicting public impressions of scientific consensus.

RELATED ESSAYS

Models of Revealed Preference (*Economics*), Abi Adams and Ian Crawford
Economic Models of Voting (*Political Science*), Ian G. Anson and Timothy Hellwig

Public Opinion and International Conflict (*Political Science*), Adam J. Berinsky

Coevolution of Decision-Making and Social Environments (*Sociology*), Elizabeth Bruch *et al.*

Mental Models (*Psychology*), Ruth M. J. Byrne

Choice Architecture (*Psychology*), Adrian R. Camilleri and Rick P. Larrick

Culture and Cognition (*Sociology*), Karen A. Cerulo

Misinformation and How to Correct It (*Psychology*), John Cook *et al.*

Cognitive Processes Involved in Stereotyping (*Psychology*), Susan T. Fiske and Sydney H. Dupree

Political Advertising (*Political Science*), Erika Franklin Fowler

Emotion and Decision Making (*Psychology*), Jeff R. Huntsinger and Cara Ray

Genetic Foundations of Attitude Formation (*Political Science*), Christian Kandler *et al.*

Reconciliation and Peace-Making: Insights from Studies on Nonhuman Animals (*Anthropology*), Sonja E. Koski

From Individual Rationality to Socially Embedded Self-Regulation (*Sociology*), Siegwart Lindenber

Implicit Attitude Measures (*Psychology*), Gregory Mitchell and Philip E. Tetlock

Event Processing as an Executive Enterprise (*Psychology*), Robbie A. Ross and Dare A. Baldwin

Stereotype Threat (*Psychology*), Toni Schmader and William M. Hall