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Modeling Facts, Culture, and Cognition in the Gun Debate

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Can empirical data generate consensus about how to regulate firearms? If so, under what conditions? Previously, we presented evidence that individuals' cultural worldviews explain their positions on gun control more powerfully than any other fact about them, including their race or gender, the type of community or region of the country they live in, and even their political ideology or party affiliation. On this basis, we inferred that culture is prior to facts in the gun debate: empirical data can be expected to persaude individuals to change their view on gun policies only after *those individuals come to see those policies as compatible with their core cultural commitments. We now respond to critics. Canvassing the psychological literature, we identify the mechanisms that systematically induce individuals to conform their factual beliefs about guns to their culturally grounded moral evaluations of them. To illustrate the strength and practical implications of these dynamics, we develop a series of computer simulations, which show why public beliefs about the efficacy of gun control can be expected to remain highly polarized even in the face of compelling empirical evidence. Finally, we show that the contribution culture makes to cognition could potentially be harnessed to generate broad, cross-cultural* consensus*: if gun policies can be framed in terms that are expressively compatible with diverse cultural worldviews, the motivation to resist compelling empirical evidence will dissipate, and individuals of diverse cultural persuasions can be expected rapidly to converge in their beliefs about what policies are best. Constructing a new, expressively pluralistic idiom of gun control should therefore be the first priority of policy-makers and -analysts interested in promoting the adoption of sound gun policies.*

KEY WORDS: cultural cognition; deliberation; group polarization; gun control.

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1. THREE DEBATES

The "Great American Gun Debate" (Kates and Kleck, 1997) is not really one debate but two. The first is empirical. Gun-control supporters argue that the ready availability of firearms diminishes public safety by facilitating violent crimes and accidental shootings; control opponents reply that the ready availability of guns enhances public safety by enabling potential crime victims to ward off violent predation (Duggan, 2001; Lott, 2000). The second debate is cultural. Control opponents (who tend to be rural, southern or western, Protestant, male, and white) venerate guns as symbols of personal honor, individual self-sufficiency, and respect for social authority. Control supporters (who are disproportionately urban, eastern, Catholic or Jewish, female, and African American) despise firearms, which to them symbolize the perpetuation of illicit social hierarchies, the elevation of force over reason, and collective indifference to the well-being of strangers (Dizard *et al.*, 1999; Hofstadter, 1970; Kahan, 1999; Kleck, 1996; Slotkin, 1998; Tonso, 1982). Conducted in legislative chambers and courtrooms, on street corners and op-ed pages, the gun debate alternates between clashing positions on what guns do and what guns mean.

Our focus is on neither of these two debates but instead on a third: what sorts of arguments are most likely to generate consensus about gun control? In a previous article, we presented evidence to show that cultural worldviews explain variation in individual attitudes toward guns and gun control (Kahan and Braman, 2003a). The normative upshot, we argued, was that policymakers and analysts who desire to resolve the gun debate should focus less on amassing and presenting data on the consequences of gun control and more on formulating gun policies rich enough in social meaning to appeal to a broad range of cultural outlooks.

For this conclusion we were denounced by gun-control empiricists on both sides of the debate.[4] Our reasoning, some asserted, was illogical: "[w]hy can't both culture *and* consequences matter? The fallacy is the same as in the old question: Do you walk to school or carry your lunch?" (Cook and Ludwig, 2003, p. 1329). Indeed, our detractors argued that policymakers and analysts would be amply justified in continuing to focus primarily on the empirical side of the gun debate *notwithstanding* the admitted influence of culture. Presumably, our critics surmised, culture is responsive to empirical data: "[i]f values do not come from facts that we encounter—either through our own experiences, those we learn from other individuals, or from more evidence of a scientific nature—where would they come from?" (Fremling and Lott, 2003, p. 1341). But if not—if cultural valuations of guns are in fact stubbornly resistant to modification—then that's all the more reason for policymakers and analysts to reject our call to attend to social

[4] At least we got them to agree with each other; no one had ever achieved *that*.

meanings and instead steer citizens' attention toward the facts, where agreement is much more likely to be attained: "[o]ver time, a body of empirical research can disentangle thorny issues of causation and lead toward consensus" (Ayres and Donohue, 2003, p. 1256).

We will now defend more systematically our contention that culture is prior to facts in resolving the gun debate. The basis for this position, simply put, is that culture is prior to facts in individual cognition. Through an overlapping set of psychological and social mechanisms, individuals adopt the factual beliefs that are dominant among persons who share their cultural orientations. Far from being updated in light of new evidence, beliefs so formed operate as an evidentiary filter, inducing individuals to dismiss any contrary evidence as unreliable, particularly when that evidence is proffered by individuals of an opposing cultural affiliation. So even accepting—which we do—that individuals care about *both* what guns do *and* what guns mean, it is idle to hope that "consensus" based on "empirical research" can settle the gun debate: individuals simply won't perceive any such consensus to exist so long as cultural conflict over the meaning of guns persists. Indeed, if one hopes—as we do—that one day American gun policy *will* reflect the truth of the matter on what guns do, then it is essential, first, to create an environment in which individuals will be able to reconcile the truth (whatever it might be) with their cultural commitments. And *that* can only happen if policymakers and -analysts first formulate a set of gun control policies compatible with the cultural orientations of those on both sides of the gun debate.

Our argument turns on a particular account of how culture and empirical information interact in the formation and transmission of belief. We will fill out the details of that account—and the extensive research in social psychology on which it rests—by developing a series of models that simulate the formation and transmission of belief. Section 2 will present the "Factual Enlightenment Model," which shows how persuasive empirical proof can indeed generate societal consensus on a disputed issue. Section 3 will present the "Cultural Cognition Model," which shows how various social and psychological mechanisms can generate beliefs that are uniform within and polarized across distinct cultural orientations. Section 4 develops a model—"Truth vs. Culture"—that shows that cultural cognition constrains factual enlightenment when these two dynamics of belief-formation and-transmission are pitted against one another. And finally, in section, we develop a "Breakthrough Politics Model," which shows how persuasive empirical proof *can* dispel culturally influenced states of false belief once policy options are invested with social meanings that make them compatible with diverse cultural orientations.

The models are illustrated with agent-based computer simulations. Representative outputs of these simulations will be presented in the text. The computer simulations, and variations of them, can be accessed and run at http://research.yale.edu/culturalcognition/simulations/.

2. FACTUAL ENLIGHTENMENT MODEL

2.1. Overview

Implicit in the view that empirical data can resolve the gun debate is the familiar idea that truth inevitably defeats falsity in a fair fight (Popper, 1971). Truth is naturally more persuasive because it "has the best of the proof, and therefore wins most of the judgments" in the court of public opinion (Bagehot, 1889, p. 344). Truth is favored, in addition, by forces of natural selection: it outperforms falsity in the "market of ideas" because those who form true beliefs live demonstrably better lives.[5] And finally, truth is persistent: "it may be extinguished once, twice, or many times, but in the course of the ages there will generally be found persons to rediscover it, until some one of its reappearances falls on a time when from favorable circumstances . . . it has made such head as to withstand all subsequent attempts to suppress it" (Mill, 1975, p. 29).

The Factual Enlightenment Model of belief-formation and -transmission, as we will call it, can be seen to rest on two assumptions, one cognitive, the other social. The cognitive assumption is that individuals have the capacity to recognize truth and a disposition to assent to it. "[I]f you let the human mind alone, it has a preference for good argument over bad; it oftener takes truth than not" (Bagehot, 1889, p. 343). The social assumption is that normal human interactions transmit the truth and make it available for adoption. "Certain strong and eager minds" can be counted on to "embrace original opinions," which "they [will] inculcate on all occasions and on every side, and gradually bring the cooler sort of men" to accept (Bagehot, p. 343). The idea that societal discourse propels the truth forward in such a manner supplies a recurring justification for freedom of speech (Schauer, 1982).[6]

2.2. Simulation

These assumptions, as modest as they seem, generate immense practical consequences. Afforded the merest enclave of acceptance, truth will march forward to colonize popular consciousness as it recruits the assent and then the advocacy of an ever-increasing legion of adherents.

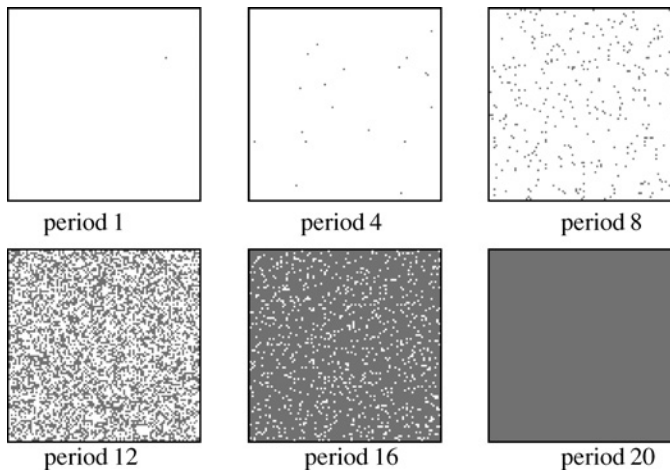
[5] "[T]he best test of truth is the power of the thought to get itself accepted in the competition of the market, and that truth is the only ground upon which their wishes safely can be carried out" (Abrams v. United States, 1919 (Holmes, J., dissenting)). "The history of civilization is in considerable measure the displacement of error which once held sway as official truth by beliefs which in turn have yielded to other truths" (Dennis v. United States, 1951 (Frankfurther, J., concurring)).

[6] International Brotherhood of Electrical Workers v. National Labor Relations Board, 181 F.2d 34, 40 (2d Cir.1950) (Hand, J.) (describing as "orthodoxy" of First Amendment the idea that "truth will be most likely to emerge, if no limitations are imposed upon utterances that can with any plausibility be regarded as efforts to present grounds for accepting or rejecting propositions whose truth the utterer asserts, or denies"), aff'd, 341 U.S. 694 (1951); "Wrong opinions and practices gradually yield to fact and argument; but facts and arguments, to reproduce any effect on the mind, must be brought before it" (Mill, 1975, p. 21).

A simple agent-based computer simulation graphically illustrates this effect (Picker, 1997). For the simulation, we use a 100 × 100 grid to represent a society, whose members are represented by cells in the grid. At any period of time, each member of society or agent holds one of two beliefs—which we'll designate as "true" and "false"—about the consequences of gun control. The particular belief that is held evolves dynamically consistent with this "learning rule": if an agent held the "true" belief in the previous period, then she continues to hold the "true" belief in the next period; if an agent held the "false" belief in the previous period, then the probability that she'll adopt the "true" belief in the next period equals *the number of agents who held the true belief in the previous period* divided by *the total number of agents* in the society.

The design of the simulation corresponds to the cognitive and social mechanisms of the Factual Enlightenment Model. The ability of agents to switch from false belief to true but not vice versa reflects (in admittedly strong terms) the assumption that individuals have a capacity to recognize and assent to truth. The learning rule in the simulation reflects that assumption plus the assumption that normal processes of social interaction transmit the truth. Able to recognize and disposed to accept empirical proof, an agent who holds the false belief switches when she is exposed to truth; her likelihood of being exposed—through conversation, information in the media, or by whatever means "strong and eager minds" use to "inculcate" a new discovery—is a function of how many individuals already hold that belief (Bagehot, 1889, p. 343).

Consider the output of a typical run of the simulation. Agents who hold "true" belief are colored gray, those who hold "false" belief white.[7] In the first period, only *one* agent is assigned the true belief, yet by the end, *everyone* in the society believes the truth.



[7]In the Internet versions of this and subsequent simulations, "true" is coded green and "false" red, respectively.

This result supplies what appears to be a ringing vindication of those who put their faith in the power of empirical evidence to generate consensus in the gun debate.

3. CULTURAL COGNITION MODEL

3.1. Overview

The proposition that social meanings determine individuals' beliefs about gun control rests on what we'll call the "Cultural Cognition Model." The basic idea behind this model isn't that social meanings get more weight than factual beliefs in some process of judgmental computation. Rather it is that factual beliefs about the consequences of gun control are artifacts of the positive or negative meanings assigned to them within individuals' cultural groups.

The culturally derivative status of factual beliefs is the central tenet of the cultural theory of risk (Douglas and Wildavsky, 1982; Thompson *et al.*, 1990). That theory relates variance in risk perceptions to individuals' allegiances to competing clusters of values that construct opposing visions of how society should be organized. The *individualist* vision prizes individual autonomy, free markets, and other forms of private ordering. Those who adhere to this view believe that industrial commerce (which they venerate as an instantiation of autonomous private ordering) risks little danger for the environment, but that regulation of commerce risks potentially ruinous consequences for the economy. The *egalitarian* vision abhors social stratification and favors collective action to equalize wealth, status, and power. Individuals who adhere to this view see industrial commerce (despised as the source myriad inequalities) as posing large environmental risks, and regulation of such activity as posing little danger to economic prosperity. The *hierarchical* vision favors deference to traditional forms of social and political authority and is protective of the roles and status claims that they entail. Individuals of a hierarchical orientation blame deviance (premarital or homosexual sex, recreational drug use, unorthodox ideas) for various societal maladies (disease, crime, subversion)—a risk perception that is scorned by individualists and egalitarians alike (Dake, 1991; Jenkins-Smith, 2001; Jenkins-Smith and Smith, 1994; Peters and Slovic, 1996).

Using the methods associated with the cultural theory of risk, we have charted similar correlations between cultural orientations and beliefs about gun risks (Kahan and Braman, 2003b; Kahan, Braman, Gastil, Slovic, and Mertz, 2005, in manuscript). Consistent with the historic association of firearms with hierarchic social roles (father, protector, hunter) and with hierarchic social institutions (the military, the police), individuals of a hierarchical orientation oppose gun control. So do persons of an individualist orientation, in line with their positive feelings

toward guns as instruments that enable self-reliance (through hunting in the countryside, through personal self-defense in the city). In contrast, individuals who hold a more communitarian vision of the good society support gun control—consistent with their view that private ownership of guns denigrates social solidarity. Belief in the efficacy of gun control is also predominant among individuals of an egalitarian view, to whom guns bear noxious connotations of racism and patriarchy.

The power of opposing cultural orientations to generate opposing sets of factual beliefs can be linked to a series of interconnected cognitive and social mechanisms (Douglas, 1994).[8] One is *cognitive-dissonance avoidance* (Festinger, 1957). It is comforting to believe that what is noble is also benign, and what is base is also dangerous (Akerlof and Dickens, 1982; Slovic, 2000).[9] It is *not* comforting—indeed, it's psychically disabling—to entertain beliefs about what's harmless and what's harmful that force one to renounce commitments and affiliations essential to one's identity.[10]

Affect is another mechanism that harnesses factual belief to cultural value. Emotions play as large a role in individuals' perceptions as any of other faculty of sensation or judgment (Damasio, 1994; Nussbaum, 2001). Perceptions of how harmful activities are, in particular, are informed by the visceral reactions those activities trigger. And whether those reactions are positive or negative is determined largely by cultural values (Slovic, 2000).

Still another mechanism is the cultural partisanship of interpersonal *trust*. When faced with conflicting claims and data—about the health risks of silicone breast implants, the necessity of suspending elements of legal due process to reduce the threat of domestic terrorism, the decreased incidence of violent crime in jurisdictions that adopt "shall issue" laws—individuals are rarely in a position to investigate the facts for themselves. Instead, they must rely on those whom they trust to tell them which factual claims, and which supporting sources of evidence, to take seriously. The people they trust, naturally enough, tend to be the ones who share their worldviews—and who for that reason are likely biased toward one

[8] As Mary Douglas has emphasized, the cultural theory of risk does not rest on any species of methodological collectivism that would assert that individuals form beliefs congenial to their groups *because* those views are congenial to their groups. Rather the theory describes patterns of belief that flow from the shaping and constraining effects of culture on individual cognition.

[9] Slovic, for example, has shown that perceptions of risk and benefit for risky technologies is always inversely correlated, a finding suggesting that risk perceptions are influenced by cognitive dissonance. Akerlof and Dickens suggest that cognitive dissonance deflates demand of workers to be compensated for accepting occupational risks.

[10] "To the extent that information threatens self-worth, or is presented in a manner that threatens self-worth, people may dismiss, deny, or distort in a fashion that serves to sustain their personal feelings of adaptiveness and integrity" (Sherman and Cohen, 2002, pp. 119–120). "Belongingness can affect how people process information about nearly all categories of stimuli in the social world" (Baumeister and Leary, 1995, p. 504).

conclusion or another by virtue of forces such as cognitive-dissonance avoidance and affect (Cohen, 2003; Robinson *et al.*, 1995).[11]

The tendency of individuals to trust only those who share their orientation makes the belief-generative power of culture feed on itself. If a particular factual position starts out with even slightly more adherents than a competing one, arguments in support of that position will necessarily predominate in group discussions, making that position more likely to persuade (Sunstein, 2001). To gain the approval of others in the group, moreover, members who even weakly support what appears to be the dominant view are likely to express unequivocal support for it, while those who disagree will tend to mute their opposition in order to avoid censure. This form of "preference falsification" will in turn reinforce the skewed distribution of arguments, making it even more likely that members of the group will be persuaded that the dominant position is correct—indeed, indisputably so (Kuran, 1995; Sunstein, 2001, p. 78).

The phenomenon of *group polarization* refers to the power of these deliberative dynamics to generate homogeneous beliefs within insular groups. The same dynamics necessarily generate *conflicting* states of opinion *across* insular groups that start out with even weakly opposed states of belief (Sunstein, 2001).

3.2. Simulation

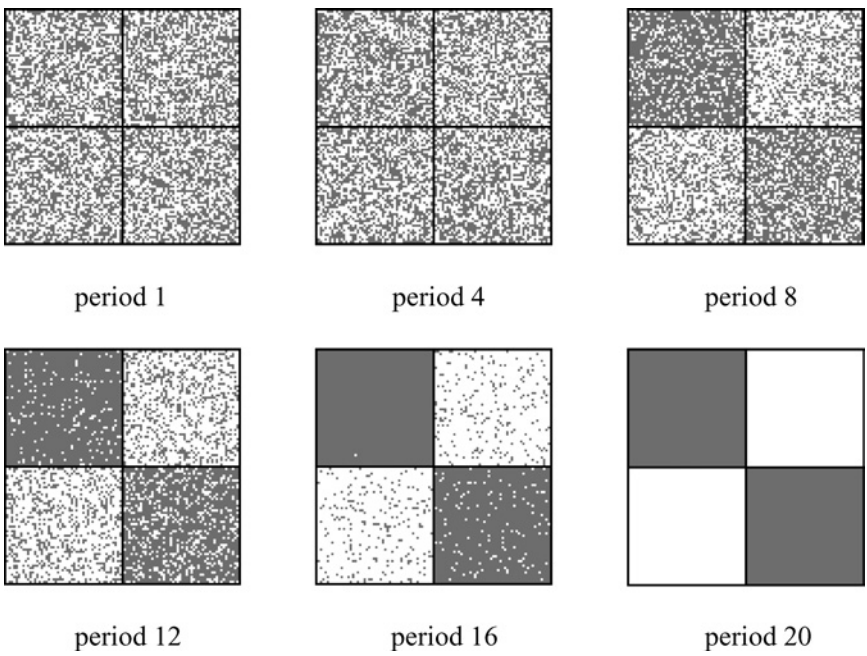
The process by which factual beliefs are formed and transmitted under the Cultural Cognition Model is likewise amenable to a simple computer simulation. Again, we use a 100×100 grid to represent a society of that many agents. The grid, however, is now subdivided into four equal parts, each of which represents a distinct cultural orientation. Agents again hold one of two beliefs about the consequences of gun control, either "true" or "false."

Once more, agents' beliefs evolve. But the learning rule in this simulation is different from the one used in the Factual Enlightenment Model. If in the previous period, an agent held the view that was *numerically predominant* within her cultural-orientation quadrant, then she continues to hold that belief in the next period. If, however, she held the belief contrary to the numerically predominant one in her quadrant, then the probability that she'll switch her belief in the next period is equal to *the total number of agents who hold the predominant belief in her cultural-orientation quadrant* divided by *the total number of agents in that quadrant*.

[11] We emphasize the understandable tendency of ordinary individuals to substitute deference to their cultural peers for personal investigation when facts are disputed. But the same tendency also characterizes the decision-making of individuals who *are* in a position to investigate facts for themselves. Slovic (2000), for example, shows that cultural orientation explains variation in the attitudes of trained toxicologists on whether animal studies reliably generate conclusions of carcinogen risk.

The design of this simulation fits the cognitive and social mechanisms that construct the Cultural Cognition Model. Consistent with the assumption that individuals (because of cognitive-dissonance avoidance, affect, and the cultural partisanship of trust) conform their beliefs to the ones associated with their cultural group, individuals who hold a belief consistent with the one that dominates in their cultural orientation stick to it, while those who hold a contrary belief are prone to switch. The learning rule in the simulation reflects that assumption, plus the cultural insularity of belief transmission. Being disposed to conform to the cultural norm, individuals switch from the minority belief to the dominant belief as they are exposed to it, with exposure again a function of how many other agents of their cultural-orientation quadrant hold the dominant belief. The beliefs of those in *other* quadrants, however, have *no* effect on individuals' beliefs; this is consistent with cultural partisanship of trust and also the dynamics of group polarization.

Consider a typical output from this simulation.



In the first period, beliefs (again color-coded gray for "true" and white for "false") are randomly assigned, with probability 0.5 for each belief, across all members of the entire society. Thus, at the outset, beliefs are almost (but not exactly) evenly divided in each quadrant. But eventually each quadrant is either solidly gray or solidly white. Because the initial distribution of views was not *precisely*

evenly divided, the dominant view in each feeds on itself over successive periods, generating the pattern of homogeneity within and heterogeneity across orientations associated with group polarization. So here we see (not surprisingly) a striking confirmation of the claim that culture determines factual belief.

4. TRUTH VS. CULTURE MODEL

4.1. Overview

So far we have used two models to illustrate how empirically demonstrated truth, on the one hand, and cultural values, on the other, affect belief transmission in isolation of one another. We now develop a model that shows how these sources of belief interact. The "Truth vs. Culture Model" undergirds our contention that advances in scientific understanding of the consequences of gun control *can't* resolve that debate so long as individuals' positions on gun control display the relationship to their cultural orientations described by the cultural theory of risk.

The basic idea behind the Truth vs. Culture Model is that the same psychological and social processes that induce individuals to *form* factual beliefs consistent with their cultural orientation will also prevent them from *changing* their beliefs in the face of contrary empirical data. Cognitive-dissonance avoidance will steel individuals to resist empirical data that either threatens practices they revere or bolsters ones they despise, particularly when accepting such data would force them to disagree with individuals they respect. The cultural judgments embedded in affect will speak more authoritatively than contrary data as individuals gauge what practices are dangerous and which not. And the culturally partisan foundation of trust will make them dismiss contrary data as unreliable if they perceive that it originates from persons who don't harbor their own cultural commitments.

This picture is borne out by additional well-established psychological and social mechanisms. One constraint on the disposition of individuals to accept empirical evidence that contradicts their culturally conditioned beliefs is the phenomenon of *biased assimilation* (Lord *et al*., 1979). Unlike rational Bayesian information-processors, individuals don't update their prior beliefs based on new evidence; instead they evaluate new evidence based on its conformity to their priors, dismissing as unpersuasive evidence that contradicts their existing beliefs. This feature of human decision-making is extraordinarily pervasive and robust; it affects not only ordinary citizens—who presumably are not in a position to evaluate complicated forms of empirical data on their own—but also trained social scientists who clearly are (Kohler, 1993).[12] It is likely to be especially

[12]In Kohler's study, scientists judged the experimental and statistical methods of a fictitious study of the phenomenon of ESP to be high or low in quality depending on whether the study purported

pronounced, though, when the prior belief that is challenged by contrary empirical evidence (e.g., that the death penalty does or does not deter) is strongly connected to an individual's cultural identity, for then the forces of cognitive dissonance avoidance that explain biased assimilation are likely to be most strongly aroused.[13]

A second mechanism that inhibits revision of culturally grounded factual belief is *coherence-based reasoning* (Holyoak and Simon, 1999; Simon, 2003). If after assessing a conflicting body of evidence a decision-maker finds one conclusion even slightly more persuasive than another, she will then reevaluate the body of evidence in a biased fashion, revising upward her perception of the persuasiveness of evidence that supports the favored conclusion and downgrading the persuasiveness of evidence that refutes it. After reevaluating the evidence in this way, the favored conclusion will appear all the more correct, inducing the decision-maker to revise her assessment of the supporting and conflicting evidence all the more dogmatically, and so forth and so on—until she terminates the process without the slightest doubt as to either the correct outcome or the quality of the evidence that supports it. This process, moreover, continues over time and across contexts: any initial leaning toward a particular view will generate a persistent evidence re-evaluation and filtering effect (Simon *et al*., 2001). As a result of coherence-based reasoning, new pieces of disconfirming evidence will not only fail to shake culturally grounded factual beliefs but will fail even to induce in individuals the discomfiting experience of lingering doubt that might trigger reappraisal.

Two additional mechanisms interfere with receptivity to empirical evidence that originates from individuals outside of one's cultural group. The first is *naïve realism*. This phenomenon refers to the disposition of individuals to view the factual beliefs that predominate in their own cultural group as the product of "objective" assessment and to attribute the contrary factual beliefs of their cultural and ideological adversaries to the biasing influence of their worldviews. Under these conditions, evidence of the truth will never travel across the boundary line that separates a factually enlightened cultural group from a factually benighted one. Indeed, far from being admitted entry, the truth will be held up at the border precisely

to refute or confirm the existence of ESP, even though the methods were in fact independent of the conclusion. Consider in this regard the often-heard argument that the economists who find "more guns, less crime" routinely generate studies that support "conservative" policies, and the mirror image complaint that those who find "more guns, more crime" routinely generate studies that support liberal positions. Or consider the reaction to our original study of the influence of cultural orientations on gun-risk perceptions, which was characterized in a workshop as "unpublishable junk" by a protagonist in the statistical "more guns, more/less crime" debate but viewed as justifying a $400,000 grant after review by a National Science Foundation panel consisting of social scientists who accept the premises of the cultural and psychometric theories of risk perception.

[13]If our study demonstrates anything, it surely demonstrates that "social scientists cannot expect rationality, enlightenment, and consensus about policy to emerge from their attempts to furnish 'objective' data about burning social issues" (Lord *et al*., 1979, p. 2108).

because it originates from an alien cultural destination. The second mechanism that constrains societal transmission of truth—*reactive devaluation*—is the tendency of individuals who belong to a group to dismiss the persuasiveness of evidence proffered by their adversaries in settings of intergroup conflict (Ross, 1995).

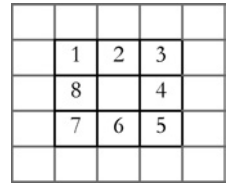
These dynamics discredit the seemingly modest psychological and social assumptions of the Factual Enlightenment Model. At least when their factual beliefs are artifacts of their cultural orientation, individuals *don't* harbor a disposition to recognize and assent to the truth; "if you let the human mind alone," its "preference" is not "for good argument over bad" (Bagehot, 1889) but for arguments that vindicate its culturally conditioned priors. Nor can it be assumed, when states of belief correspond to cultural orientation, that the truth will be transmitted through normal processes of societal discourse (even ones afforded full protection by guarantees of free speech). If the "strong and eager minds" who "embrace original opinions" (Bagehot, 1889, p. 343) reside outside the unenlightened individual's cultural community, their energetic demonstrations and remonstrations will never reach her. If they reside within it, their proselytizing will quickly be snuffed out by the dynamics of group polarization.

4.2. Simulation

The insights of the Truth vs. Culture Model are also amenable to a relatively straightforward simulation. Again, we use a 100×100 grid, divided into four quadrants, to represent a society whose members adhere to one of four distinct cultural orientations. Again, each agent holds a belief, either "true" or "false," on the consequences of gun control.

To accommodate the interaction of cultural influences and empirical evidence of the truth in determining belief, the simulation uses an iterated coordination game. In the game, each agent interacts with the culturally like-minded "neighbors" who occupy the cells that immediately surround hers on the grid (Picker, 1997).[14] In any period, each agent's payoff is a function of two variables. The first

[14]The agent at the center of this swatch of cells thus interacts with the eight agents that surround her.



So that all agents play the coordination game with eight neighbors and so that each of those neighbors shares her orientation, the quadrants of the grid are essentially wrapped onto four independent three-dimensional "toruses" (doughnut-shaped thingies).

is with how *many* of her neighbors she matches or coordinates beliefs. The second is on *which* belief they coordinate: payoffs for matching true beliefs are twice as large as payoffs for matching false ones.[15] Beliefs evolve in this simulation, too: the belief that a player holds in any period is the one held by the culturally like-minded neighbor (from among the cells adjoining hers) who earned the highest payoff in the previous period.

In addition to being a tried-and-true one for assessing the transmission of social norms that variously promote or impede social welfare (Picker, 1997), this construct reasonably captures the mechanisms of the Truth vs. Culture Model (Picker, 1997). But just as appealingly, we think its basic features also structure what amounts to a fair contest between the Factual Enlightenment Model and the Cultural Cognition Model.

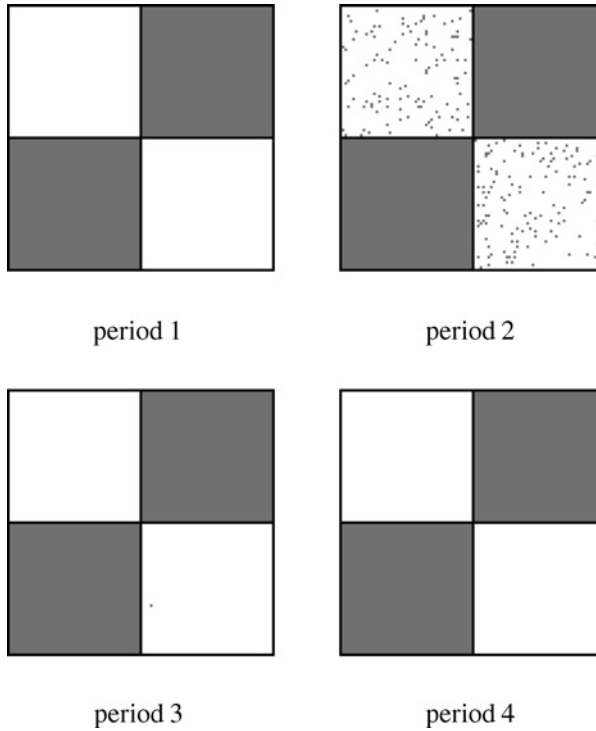
Because it rewards agents for coordinating with others who share their orientations, yet rewards them *more* for coordinating on true rather than false beliefs, the payoff function used in the simulation treats agents as if they value *both* agreeing with their cultural peers *and* knowing the truth. This is exactly the picture of individual attitude-formation that our empiricist critics emphasize when they say attack us for insisting on the priority of reforming the expressive idiom of gun politics.

What we've criticized our empiricist detractors for, in contrast, is ignoring the effect of culture in constraining individual acceptance of evidence that contradicts their cultural commitments. The mechanisms that inform this objection are reflected in the cultural insularity of the learning rule used in the simulation. By virtue of biased assimilation, motivated coherence, naïve realism, and reactive devaluation, individuals won't revise beliefs that they perceive to be held by those with whom they are culturally aligned, or accept new evidence from those to whom they are culturally opposed.

[15] In other words, on the basis of the belief it holds, each agent is playing this game with each of eight neighbors simultaneously: The agent's payoff is the sum of the returns it earns in each of these games.

		Player 2	
		False	True
Player 1			
	False	1, 1	0, 0
	True	0, 0	2, 2

What happens when all these assumptions, mechanisms, and processes are rolled into a single simulation? Consider the following output:



In the first period, beliefs ("true" gray, "false" white) are homogeneous within and heterogeneous across cultures. This is the pattern that one should expect to see as a result of group polarization in a world in which the empirical truth about guns has not yet been discovered. By the second period, however, truth *has* emerged, and 25 agents who hold the true belief—a vanguard of "strong and eager minds" who've "embrace[d] [an] original opinion[]"—are injected into each of the benighted cultural-orientation quadrants. "[I]nculcat[ing] on all occasions and on every side," do they "gradually bring the cooler sort of men" (Bagehot, 1889, p. 343) who inhabit their cultural world into a condition of enlightenment? Unfortunately not. Even though individuals who hold false beliefs do indeed have a "preference for good argument over bad"—they get *twice* as large a payoff in this simulation when they coordinate on true than they do when they coordinate on false belief—the truth doesn't make enough converts quickly enough to overcome the countervailing disposition of individuals to conform to the belief that's dominant among those who share their orientation.

Or at least that's the result in this particular simulation. The results are sensitive to the values we've assigned to key variables. Ratchet up the difference between the coordination payoffs for true and false beliefs—from, say, 2× to 25×—or stipulate a "true believer" vanguard of 500 agents (20% of a cultural-orientation quadrant) rather than 25 (1%), and truth can be counted on to march to victory in the manner envisioned by the Factual Enlightenment Model. But precisely because the playing field has to be tilted that dramatically for truth to win, the simulation makes it easier to see the heroic degree of optimism that's required to think that empirical data can dislodge culturally grounded states of false belief without the assistance of culturally sensitive political intervention.

5. BREAKTHROUGH POLITICS MODEL

5.1. Overview

The Truth vs. Culture Model showed empirical evidence and social meaning at war. We now describe a state of affairs in which the two might peacefully coexist. We will call it the Breakthrough Politics Model.

The Model involves not just a set of mechanisms but also a process consisting of three steps. The first is the devising of policies that satisfy what we call the criterion of "expressive overdetermination." A policy can be said to be expressively overdetermined when it is sufficiently rich in social meanings that individuals of otherwise opposing cultural orientations ("hierarchist" or "egalitarian," "individualist" or "solidarist," to use the types that figure in the cultural theory of risk) can see their way of life affirmed by it. Such affirmation helps to counteract the constraining pressure that cognitive-dissonance avoidance exerts when individuals contemplate revising a position or belief affiliated with their cultural identity. Experimental research shows that where individuals feel self-affirmed they are indeed more open to reconsidering their beliefs on culturally contested issues, including the death penalty and abortion (Cohen *et al*., 2000; Sherman and Cohen, 2002).

The second step involves what we call "identity vouching." Public figures who are associated with competing cultural orientations must be recruited to advocate expressively overdetermined policies.[16] Their participation exploits the culturally

[16]This goal is not unrealistic. Politicians, in particular, abhor cultural polarization, which tends to expose them to high electoral risks, and resent the pressure of extreme ideological interest groups. Offered an alternative to siding with the extremes, then, savvy politicians—including ones who wield considerable influence among ordinary citizens who care about what law signifies about their cultural values—much prefer an in-between option. Indeed, the formation of Americans for Gun Safety, a group that describes itself as a "third way" alternative to the positions advocated by pro- and anti-control advocacy groups and which has enlisted figures like Senators John McCain and Joe Lieberman, is an example of this dynamic in action in the gun debate. (http://www.agsfoundation.com/).

partisan nature of trust; positions that individuals might otherwise have rejected out of hand will be acceptable to them if sponsored who possess high esteem within their cultural or ideological group (Lorge, 1936). It also reinforces the self-affirming effect of expressive-overdetermination insofar as individuals determine what it means to support a policy in part based on the identity of those who are sponsoring it (Cohen, 2003).

The third step we call "discourse sequencing." The adoption of expressively overdetermined policies by identity vouchers can be expected to change the common perception that the outcome of the gun-control debate is a measure of the social status of competing social groups. The dissipation of that perception in turn neutralizes the tendency of individuals to dismiss as biased and disingenuous evidence originating from persons of opposing orientations (Robinson *et al*., 1995). The effects of naïve realism and reactive devaluation having been neutralized, the truth will indeed be empowered to cross-cultural boundary lines and colonize those who previously held false beliefs on the basis of their immersion in their cultural norms. Empirical data thus *does* play a critical role in policy deliberation. But it comes into play only *after* the formation of a new expressively pluralistic regime of gun politics.

For a real-world example of these processes in action, consider the success of abortion reform in France. Decades' long conflict on that issue was quieted when the national legislature adopted a law that conditioned abortion on an unreviewable certification of personal "emergency." Consistent with expressive overdetermination, that policy made it possible for both religious traditionalists, who interpreted certification as symbolizing the sanctity of life, and egalitarians and individualists, who interpreted unreviewability as affirming the autonomy of women, to see their commitments affirmed by the law (Dworkin, 1994; Glendon, 1987). Thereafter, the two sides converged on a set of policies involving counseling and enhanced social support for single mothers, measures that in fact reduced the abortion rate. The evidence that such policies would work in exactly this way existed *before* adoption of the nation's abortion reform law. But it was not until after the law succeeded in achieving a measure of expressive convergence that the two sides trusted one another to believe the evidence and give this consequentialist solution a try (Glendon, 1987).

The fit is less smooth, but the evolution of antismoking laws and attitudes in the United States also bears out the priority of expressive reform to dissemination of empirical data. Scientific evidence of the health dangers posed by smoking began amassing well before the Surgeon General's Report of 1964 (itself merely a synthesis of existing literature) with little effect on behavior, much less on law (Gusfield, 1993; Sloan *et al*., 2002; The Consumers Union Report on Licit and Illicit Drugs). Things began to change only after the moral resonances of smoking changed on the basis of influences that had little to do with the perceived health risks of smoking (Gusfield, 1993). Indeed, the priority of cultural values to factual

beliefs helps to explain continued variance in smoking among individuals,[17] and in smoking regulations across nations, notwithstanding uniform exposure to the scientific data on the health risks of cigarettes (Kahan, 2000; Kahan and Braman, 2003; Kagan and Skolnick, 1993).

5.2. Simulation

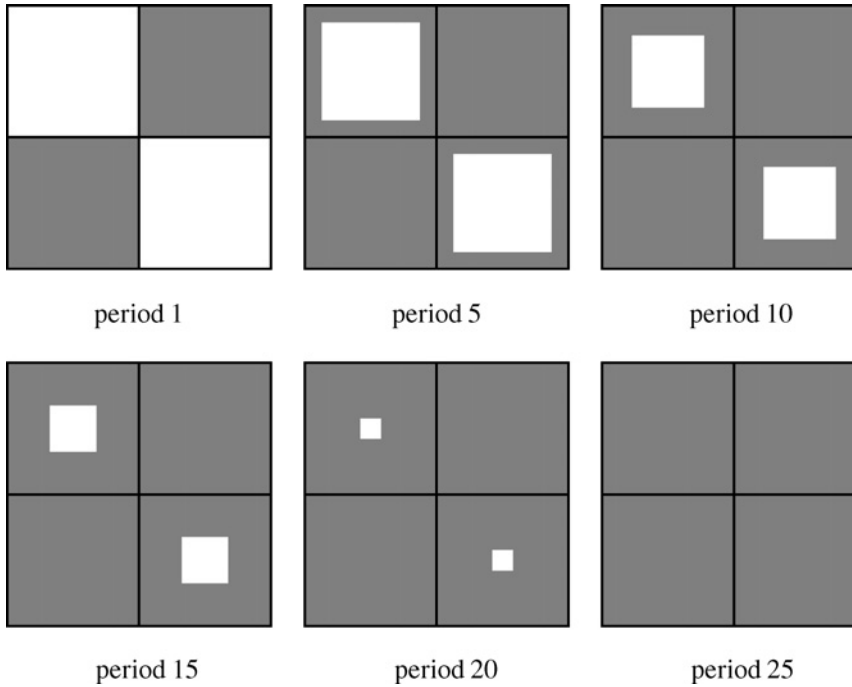
Our final simulation is based on the Breakthrough Politics Model. Like the one used to illustrate Truth vs. Culture, this simulation reflects a coordination game, with asymmetric coordination payoffs for true and false belief, played by agents (in a 100×100 society, divided into four cultural-orientation quadrants) with their culturally like-minded neighbors. But the learning rule—the algorithm used to generate evolution in beliefs—is different. In the simulation used for Truth vs. Culture, agents adjusted their beliefs by considering only the payoffs earned by *culturally like-minded neighbors* in previous periods. In this simulation, however, individuals adopt the belief that generated the highest payoff in any neighboring cell in the previous period, *even if that neighboring cell is inhabited by an agent of a differing cultural orientation* (Picker, 1997).[18]

This simulation accurately reflects how the three steps associated with Breakthrough Politics affect the various mechanisms of individual belief formation. This process does *not* homogenize culture or eviscerate the tendency of individuals to conform to the beliefs that dominate within their cultural orientation (we doubt that these effects could possibly be achieved, even if they were desirable). Accordingly, the payoff rule associated with the simulation still rewards individuals for coordinating only with neighbors who share their distinct cultural orientation. However, as a result of the formation of expressively overdetermined policies accompanied by identity-vouching, individuals no longer perceive that their cultural commitments are under siege in the gun dispute, and thus no longer reflexively dismiss as unreliable information originating from outside their cultural group. The simulation thus allows agents to learn from individuals from outside of their own cultural quadrant.

[17] Discussing significance of evidence that cultural orientation measures explain variation in smoking (Kahan and Braman, 2003).

[18] To achieve this effect, this simulation also employs a slightly different architecture from the one used to illustrate the Truth vs. Culture Model (see footnote 15). Whereas the Truth vs. Culture Model wrapped each quadrant onto a separate three-dimensional torus, the simulation for Breakthrough Politics maps the entire 100×100 society onto a single three-dimensional torus. As a result, some fraction of the agents in each quadrant now adjoin cells located outside their cultural-orientation quadrant. Those cells are included in an agent's "information neighborhood"—the group of cells she inspects to determine the highest payoff in the previous period. However, the agent's "payoff neighborhood"—the cells her coordination with which determines her payoff for holding a particular belief—exclude ones from outside her cultural-orientation quadrant; in other words, agents continue to play the coordination game only with culturally like-minded neighbors.

What happens? Again assume that beliefs ("true" gray, "false" white) in the first period are distributed consistent with the signature patter of group polarization—homogenous within and heterogeneous across cultural orientations. Again assume that the payoff for coordinating on true belief is 2× the payoff for coordinating on false belief. The output of the model is a happy one.



Agents exposed to the true beliefs of agents in adjoining cultural orientations—who, in effect, now see those individuals *living better* as a result of their shared apprehension of the truth—adopt those beliefs themselves.[19] They thereafter form a stable and durable platform for the propagation of that view within their own cultural quadrant. Expressive pluralism has at last made the world safe for empiricism.

[19]It is important to remember that the grid, although it appears two-dimensional, is in fact wrapped around a three-dimensional torus. Accordingly, agents who appear to be at the edges of the grid are in fact located adjacent to other quadrants. It is precisely because agents at the borders of each quadrant are in fact located next to agents in other quadrants—and thus in "information neighborhoods" that include them (see footnote 8)—that the march of the truth is from the borders to the center of the benighted orientation quadrants.

6. CONCLUSION

We have addressed a question of practical importance: on what should policymakers, activists, and commentators who want to *resolve* the American gun debate focus their attention and energy? On making citizens aware of empirical data on the consequences of gun control laws? Or on constructing expressive policies and processes that fit the cultural worldviews of those on both sides of the gun control issue? The latter, we have argued—not because individuals do not care about what guns do but because what they believe about the consequences of gun control is an artifact of what they understand gun control laws to mean.

Our argument is based on what we take to be the best materials that exist on the interplay of culture and empirical evidence in the formation of individual belief. Obviously, the models we have constructed are interpretive, and the computer simulations merely illustrative of conclusions arrived at through such interpretation. But we are confident that the way we have packaged our arguments furnishes a more compelling basis for belief, and for action, than does the collection of anecdotes and exercises in introspection that have until now been presented in the "culture vs. empirical data" debate.

Evolutionary models and simulations are now used in a variety of disciplines, including epidemiology, economics, political science, sociology, and even anthropology (Axelrod, 1984; Boyd and Richerson, 1985; Cederman, 1997; Galvani, 2003; Gintis, 2000; Kollock, 1996). Their function is not to prove anything but to *constrain* proof. Constructing a model forces an analyst to be explicit about what her assumptions are—so that others can evaluate whether those assumptions are behaviorally realistic, and see whether they generate the states of affairs the analyst claims. That is the test we have administered to ourselves with our models.

Those who have a different idea about how the world works—who think that empirical evidence of what guns *do* can generate consensus despite cultural conflict over what guns *mean*—are obliged to administer a similar test to themselves. We are confident that any model they devise will show that the assumptions they are relying on are either behaviorally unrealistic or incapable of generating the process of belief-formation they are defending.

Of course, it is silly to think that individuals never change their minds on culturally contentious issues in response to new empirical evidence. But it is just as absurd to believe that they ever do so at the expense of their cultural commitments. We accept J.S. Mill's observation that truth, "even if extinguished once, twice or many times" is likely "in the course of the ages" to be "rediscovered" and finally to take hold at the point "when from favorable circumstances . . . it has made such head as to withstand all subsequent attempts to suppress it" (Mill, 1975, p. 29). But what we have shown is that *culture* is one of the forces that "suppress[es]" truth. "[C]ircumstances" will therefore become "favorable" for public enlightenment on gun control only *after* the development of an expressively pluralist idiom for

debating guns. Those who want to resolve the gun debate should do everything in their power to fashion that idiom as soon as possible.

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