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Hearing From Both Sides: Differences Between Liberal and Conservative Attitudes Toward Scientific and Experiential Evidence

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Two studies examined how political ideology relates to attitudes towards opposing scientific and nonscientific perspectives on apolitical topics. Participants read an article excerpt containing quotes from a researcher debunking a common misconception, such as the existence of lucky streaks in games of chance. They also read the perspective of someone who rejected the researcher in favor of personal experience, either in the form of a quote in the article from a relevant professional (e.g., a casino manager, Study 1) or a comment from a purported previous respondent with no clear expertise (Study 2). In both studies, conservatives, compared to liberals, evaluated the views of the scientist and the person rejecting the science as closer in legitimacy. Differences in evaluation of the science rejecter were mediated by conservatives' heightened intuitive thinking. By spotlighting how partisans evaluate nonscientific perspectives alongside science and by focusing on apolitical topics, these results bring new clarity to the debate on whether conservatives are more biased than liberals in attitudes towards science.

KEY WORDS: ideology, attitudes toward science, reasoning style, reasoning ability, preregistered, intuition

Recently, researchers have bemoaned that scientific controversies are being decided in the court of public opinion rather than scientific expertise (e.g., Lewandowsky, Ecker, & Cook, 2017). Scientists are troubled by media channels that insist on presenting "both sides" of arguments that have already been settled, and online forums allow anyone's voice to be heard as easily as a scientist. While access to high-quality information has theoretically never been easier, it is also being drowned out by "fake news" (Vosoughi, Roy, & Aral, 2018). A clear task for researchers in the "posttruth" era, then, is to examine how people reason through these "debates" between sources of varying scientific legitimacy.

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Ideological conservatives might be especially likely to favor individual experience over rigorous evidence. Andersen (2017), in his sweeping history of America's often loose relationship with the truth, concludes that conservatives are apt to equate what seems true to them with being true in an absolute sense, joining a long tradition of social scientists positing an "asymmetry" wherein conservatives are more ideologically biased than liberals (e.g., Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950; Baron & Jost, 2019; Hofstadter, 1965; Jost, Glaser, Kruglanski, & Sulloway, 2003). Conservatives are less trustful of the scientific community than liberals (Blank & Shaw, 2015; McCright, Dunlap, & Xiao, 2013; Nisbet, Cooper, & Garrett, 2015), and their trust in science has declined steadily since the early 1970s (Gauchat, 2012). Perhaps most salient is that conservatives are more likely to reject the idea of climate change and the evidence for it (e.g., Cook & Lewandowsky, 2016; Kahan et al., 2012; Lewandowsky, Gignac, & Oberauer, 2015).

The "asymmetry" idea and its application to reasoning about science is still controversial. A recent meta-analysis of 51 studies across politically charged topics revealed liberals and conservatives to be equally biased on average (Ditto et al., 2019). Though conservatives are less trusting of science in general, on specific issues where scientific conclusions belie their worldview, liberals report lower trust of science (McCright et al., 2013) as well as rejection of scientific evidence (Bolsen, Druckman, & Cook, 2014; Campbell & Kay, 2014; Nisbet et al., 2015; Washburn & Skitka, 2017). This has led some researchers to argue that the apparent heightened conservative bias towards science could be an artifact of the issues that happen to be in the public discourse (Ditto et al., 2019; Nisbet et al., 2015). However, Baron and Jost (2019) counterargue that studies specifically constructed around issues in partisan blind spots do a poor job of indicating more representative reasoning.

The present investigation aims to bring further clarity to ideological differences in attitudes towards science by providing evidence that conservatives see scientific and nonscientific viewpoints as closer in legitimacy. We address what we see as two important omissions of previous research on politicized attitudes towards science. The first is the tendency of the above-cited research to have people only evaluate scientific findings or scientists (e.g., Baumgaertner, Carlisle, & Justwan, 2018; Cook & Lewandowsky, 2016), sometimes even having people evaluate data (e.g., Kahan, Peters, Dawson, & Slovic, 2017). While theoretically interesting, people who are not researchers rarely have to do such reasoning, and such investigations leave out explicit evaluations of antiscientific viewpoints. This is important because scientific issues are often presented in the media as debates between scientists and nonscientists with relevant experience. Online comment sections and forums also allow anyone to weigh in regardless of expertise.

In our studies, we measured attitudes toward not just scientists but also nonexpert voices, and participants were free to rate one higher than the other or equate "both sides." We contend that looking at how people sort through questions of empirical evidence versus personal experience is more ecologically valid than looking at evaluations of scientific viewpoints or data alone, and therefore our studies are well-equipped to answer questions about ideological (a)symmetry.

The second omission is the tendency to focus primarily on scientific issues discussed in political contexts. Though it is natural that research on politicization would tend to focus on such issues, we argue that this focus paints an incomplete picture of how people reason about scientific conclusions. Perhaps the primary mechanism of most studies on politicized science is the motivated rejection of science (Lewandowsky & Oberauer, 2016), wherein people strive to reach conclusions consistent with their cultural worldview (Kahan et al., 2012). However, this implies that studies on such issues do not reveal much about how people reason about scientific evidence in general (cf. van der Linden, 2015; Shook & Fazio, 2009) since such reasoning is effectively skipped.

This is important because people do have to engage with such reasoning whenever they make decisions where empirical perspectives are relevant, such as decisions about health and financial products. In fact, many people seem to have trouble reaching the same conclusions that scientists do, as evidenced by the decades-long popularity of pseudoscientific products such as alternative

medicine (e.g., Tovey, Easthope, & Adams, 2004) or personality assessments (Stein & Swan, 2019), despite mountains upon mountains of empirical and conceptual arguments against such products (e.g., Shermer, 2011) or the reduction in applications in appropriate contexts (e.g., alternative medicine curriculum in medical schools, Cowen & Cyr, 2015). Integrating such issues into research on politicization of science provides an ideologically neutral testing ground called for by recent debates (Baron & Jost, 2019; Ditto et al., 2019).

The current research therefore focuses on how conservatives and liberals differ in their evaluations of scientific experts and those who reject the science in favor of personal experience, using issues unlikely to ignite politically motivated reasoning. We hypothesize that conservatives will view scientists and science rejecters as closer in legitimacy. Our studies allow us to test whether this manifests as conservatives both giving more credence to the science rejecter while also evaluating the scientist less favorably (a possibility solidly in line with the asymmetry hypothesis), or whether the two ideological groups agree on their evaluation of scientists while conservatives give more credence to the science rejecter (a possibility that might balance the asymmetry and symmetry hypotheses).

A plausible mechanism for why conservatives and liberals differ on attitudes towards science is ideological differences in intuitive thinking. Shtulman (2015, 2017) suggests that people make sense of the world using intuitive theories which are difficult to override, even in the presence of factual evidence. A reasoning style that favors intuitions is linked to endorsing a variety of nonscientific ideas, including conspiracies, alternative medicine, and the supernatural (Oliver & Wood, 2018). Conservatives tend to override intuitions less often than liberals do (Yilmaz & Saribay, 2017) and use intuitive heuristics in judgment more often (Deppe et al., 2015; Iyengar, Hahn, Krosnick, & Walker, 2008). Conservatives also require less data to reach conclusions about scientific issues (Tullett, Hart, Feinberg, Fetterman, & Gottlieb, 2016). These investigations indicate that conservatives are especially apt to view intuitive explanations for phenomena as valid and therefore that conservatives will be relatively unimpressed with empirical evidence while being sympathetic toward evidence from personal experience.

In summary, the goals of the current article are to demonstrate that:

1. Conservatives, compared to liberals, tend to see both scientific and nonscientific perspectives as closer in legitimacy. We test this hypothesis both for nonscientists who have relevant professional experience (Study 1) and "commenters" with no clear expertise (Study 2).
2. These ideological splits will be mediated by conservatives' tendency to grant relatively high status to intuitive thought.

The mediating mechanism could conceivably be either reasoning *ability*, meaning people's capacity to detect and correct for faulty intuitions, typically measured by the Cognitive Reflection Test (CRT; Frederick, 2005), or reasoning *style*, meaning people's meta-beliefs about the correctness of intuitions. For this investigation, because we are measuring people's beliefs about scientists and nonexpert sources rather than measuring ability to spot fallacious reasoning, reasoning style seemed like the more natural fit as a mediator. We also measure reasoning ability as a covariate in our models to test whether ability and reasoning style have dissociable effects on attitudes towards science.

Because scientific communications aim to build the case that there is ample evidence to abandon intuitive theories of the world, we wanted to specifically measure the extent to which people think that gut feelings and intuitions have an unshakeable truth and should be considered on an equal or greater level with objective facts. This idea was most famously parodied by Stephen Colbert in the premiere episode of *The Colbert Report*," in which he coined the term "truthiness" to refer to the Bush administration's (sometimes open) tendency to make decisions based on feelings without regard to known facts or logic.

We created a new scale for this purpose called the "Feelings Are Truth" scale. This scale is conceptually similar to the Faith in Intuition (FI) subscale of the 10-item Rational Experiential Inventory (REI; Epstein, Pacini, Denes-Raj, & Heier, 1996). The REI-FI scale measures the idea that people trust their intuitions. However, it leans toward questions regarding intuitions about people rather than intuitions in general and asks about whether people think that their intuitions *tend* to be correct rather than the more extreme idea that intuitions are inevitably right, even when objective information suggests otherwise. We therefore created a new scale to capture the latter construct. We also included the REI scale as a covariate to ensure that our new measure had distinct effects on evaluations of science.

Study Overview and Hypotheses

Here we present results from two similar preregistered studies, Study 1[1] from May 2018 and Study 2[2] from July 2018. In both studies, participants were initially screened on ideology, then they read a supposed article excerpt where a researcher was quoted as debunking a popular misconception. An alternative viewpoint followed, rejecting the researcher's viewpoint. Participants then evaluated the views of both the researcher and the rejecter and then completed the Feelings Are Truth scale[3] and several covariates.

The Feelings Are Truth scale was comprised of the following five items, each answered on a 1–5 agreement scale (1 = *Strongly Disagree,* 5 = *Strongly Agree*, Cronbach's α = .84 for Study 1 and .82 for Study 2):

1. People know, deep down, what's true and what's not.
2. Some people have intuitive senses of what is true and what is not.
3. A gut belief that something is not true is a good reason to think it's not true.
4. Intuition can reveal more truth about a situation than objective facts.
5. Gut feelings are a kind of truth.

To aid in the validation of the Feelings Are Truth scale, we thought it important to demonstrate that it correlates with prior measures of reasoning style or ability, while also demonstrating its unique contribution to evaluations of science. As a measure of reasoning ability, we used the Pennycook and Rand (2018) seven-item version of the Cognitive Reflection Test, which combines the original three-item Frederick (2005) version plus the four-item version from Thomson and Oppenheimer (2016). We also included the 10-item Rational Experiential Inventory (REI; Epstein et al., 1996) which includes the Need for Cognition (NFC) and Faith in Intuition (FI) scales.

Hypotheses

Here we present the hypotheses tested in Study 1 that we specified in the study preregistration, with preregistration hypotheses numbers in parentheses (hypotheses were reordered for clarity of presentation):

[1]https://doi.org/10.17605/OSF.IO/KHDGF
[2]https://doi.org/10.17605/OSF.IO/FG6C3
[3]The "Feelings Are Truth" scale was included as a subscale with two other new constructs of the authors' creation that were also included in these studies, as specified in the preregistrations. We had additional preregistered hypotheses concerning these other constructs that were largely confirmed, although they were cut from the current article for the purposes of clarity. A brief report of these hypotheses and the related results are in Appendix S4 in the online supporting information, and an earlier version of the full paper containing these hypotheses and their results is available from the authors.

H1: Conservatives, compared to liberals, will show more favoritism for the views of the rejecter. However, the two will not differ on evaluation of the researcher. Thus, here we test a "strong" version of this hypothesis wherein the ideological groups equally agree on attitudes towards the researcher but differ in that conservatives elevate the rejecter (preregistration H5). We started with this strong hypothesis as an attempt to balance the "symmetry" and "asymmetry" ideas wherein the two ideological groups actually agree on the scientist (hence showing symmetry) but disagree on the rejecter (hence showing asymmetry).

H2: The Feelings Are Truth scale scores will be correlated with CRT scores, REI-Faith in Intuition scores, and REI-Need for Cognition scores (preregistration H3). This provides evidence of convergent validity of the new Feelings Are Truth scale, as these are related constructs pertaining to reasoning style and ability.

H3: The Feelings Are Truth scale will mediate the effect of ideology on valuing the "science rejecter," even when controlling for REI-FI, REI-NFC, and CRT scores (preregistration H6). In this hypothesis, we focus on the science rejecter, rather than the researcher. Since the rejecter's viewpoint is grounded more in gut feelings than the researcher's viewpoint, rejecter evaluation fit best as a DV for a mediation analysis.

A caveat regarding causality is necessary. Following recent research on ideological splits (e.g., Baron & Jost, 2019; Ditto et al., 2019; Tullett et al., 2016; Washburn & Skitka, 2017), one of our goals is to investigate how liberals and conservatives might differ on an important, policy-relevant outcome (science evaluation) and propose what trait might aid in accounting for that difference (in our case, Feelings Are Truth). This naturally suggests models that treat ideology as an independent variable, science evaluation as a dependent variable, and Feelings Are Truth as a mediator. However, other causal paths are plausible. Similarly, our mediation models are not definitively causal, as they are cross-sectional rather than longitudinal (Preacher, 2015). So, results presented here should not be taken as definitive statements of causal direction.

STUDY 1

Participants

American participants were recruited via Amazon's Mechanical Turk (mTurk). We considered mTurk suitable because differences between liberals and conservatives on mTurk tend to mirror those in the general population (Clifford, Jewell, & Waggoner, 2015). We used a pretest run prior to Study 1 to help determine sample size. We found that a regression model using our complete set of independent variables and covariates generated an f^2 of .10. A power analysis indicated a sample size of 159 would be necessary to obtain 80% power for an effect of that size. As we are investigating a novel construct, we decided to collect a larger sample size.

Because our hypotheses pertaining to ideological splits compare liberals and conservatives, we decided to primarily collect only those who identify as liberal or conservative. We used quotas to collect the two in comparable numbers, totaling to about 350 (a number we chose that would be large without exceeding budget constraints). We also aimed to collect roughly 50 each of libertarians and unaffiliated people for exploratory purposes.

The final sample size was $N = 448$, which included 184 liberals, 170 conservatives, 39 libertarians, and 55 unaffiliated. Average age was 35.95 years old, and 216 participants were female. Participants were compensated $0.85 USD.

Stimuli and Procedure

Ideology Measures

Participants first filled out a short screener where they provided their age, gender, highest level of education completed, nationality, and political ideology. For ideology, participants were asked which of the four options (Liberal, Conservative, Libertarian, and Other/None) they most closely identified with. This categorical measure was our preregistered main independent variable in both studies.

For exploratory purposes, we also included a measure of policy beliefs. Following Feldman and Johnston (2014), we used questions from the American National Elections Studies (ANES) to measure ideology, including a four-item measure of economic ideology (assessing attitudes towards government spending, medical insurance, assistance to the poor, and government jobs) and a three-item measure of social ideology (assessing attitudes towards adoption by gay couples, abortion, and women's role in society), scaled so higher scores represent more liberal viewpoints.

While most social psychology research has used a 1–7 identification scale to measure ideology (*Very Liberal* to *Very Conservative*), a single dimension has been insufficient to account for Americans' policy views. At minimum, two dimensions are required: economic and social policies (Feldman & Johnston, 2014). Some research suggests that conservative social policy beliefs, but not economic beliefs, predict lower reasoning ability (Yilmaz & Saribay, 2017). However, minimal research has addressed how policy beliefs directly relate to attitudes towards science, so we included policy belief measures as exploratory here.

Importantly, it is actually quite common for people (especially conservatives) to have policy beliefs inconsistent with their ideological label (Ellis & Stimson, 2012), so policy beliefs and ideological identification (the focus of our hypotheses, and most work done in this area) need to be measured separately. A pretest indicated that categorical self-identification accounted for more variance in our dependent measures than a continuous measure, perhaps because the categorical measure is simply easier and many respondents likely do not know exactly where to place themselves on a continuous measure (Zaller, 1992). Therefore, we went with the simpler and ostensibly more effective categorical measure as our main independent variable.

Main Task

The main task and dependent variables followed. Participants were told that we were interested in how people weigh different voices on an issue. Next, participants read one of four (randomly assigned) excerpts from a purported article on scientific research that debunks a popular pseudoscientific idea.

Article excerpts were constructed similarly to how such ideas are reported in the media. The excerpt explained a common pseudoscientific misconception and contained a quote from a researcher that debunked the misconception and a quote from a professional who rejected the views of the researcher in favor of personal experience. In one example, a researcher debunks the possibility of "lucky streaks" in games of chance, while a casino manager says he does not believe the researcher and claims to have seen lucky streaks.

To make the argument against the misconception as complete as possible in a brief space, the quote from the researcher also stated that confirmation bias explains why belief in the misconception persists. The researcher thus debunks the misconception and provides an explanation for why people would resist the debunking. Full text of scenarios used in all studies is in Appendix S1 in the online supporting information.

We chose issues related to important decisions people often make in which pseudoscientific or otherwise scientifically dubious ideas are popular. The four issues were the lack of validity of the Myers-Briggs Type Indicator (MBTI), the inability of managed stock funds to consistently beat the market, the lack of "lucky streaks" in gambling, and the ineffectiveness of magnetic bracelets for pain relief.

Stimuli Pretest

To confirm our chosen issues were viewed as relatively apolitical (meaning not politicized, given the definition below), we conducted a separate study ($N = 107$) wherein participants rated the extent to which, to their knowledge, several scientific issues were politicized on a 1–7 scale (1 = *Not at all politicized*, 7 = *Very politicized*). We defined a "politicized" issue as an issue whereby people become politically active and different stances on the issues get associated with different political groups. We included our four target issues (worded as "whether magnetic bracelet therapy can aid in pain relief," "the role of luck in gambling," "the accuracy of personality tests," and "the performance of managed stock funds relative to the market average") and six issues we thought people would readily identify as politicized ("climate change and its consequences," "pros and cons of vaccination," "the health consequences of eating genetically modified foods (GMOs)," "whether reducing access to abortion decreases demand for abortion," "the validity of evolutionary theory," and "the consequences of tax cuts").

Politicization scores for the latter six items averaged 5.44 ($SD = .93$). Each of the four target issues was, on average, rated quite lower than this politicized average (magnetic bracelets: $M = 2.76$, $SD = 1.93$; luck in gambling: $M = 2.69$, $SD = 1.67$; personality tests: $M = 2.96$, $SD = 1.94$; managed stock funds: $M = 3.81$, $SD = 2.05$; all one-sample ts > 8.00 and ps $< .001$).

Main Dependent Measures

In this study, participants' evaluations of the researcher and professional were measured in two questions: "To what extent do you think the viewpoints of the two sources quoted in the article seem valid?" on a 1–5 scale (1 = *Definitely could not be valid*, 5 = *Definitely could be valid*) and "How credible did you think each of the two sources in the article seemed?" on a 1–5 scale (1 = *Not at all credible,* 5 = *Very credible*). Each source was rated separately on both questions, and these two questions were averaged to create evaluation indices of the researcher ($\alpha = .81$) and rejecter ($\alpha = .89$).

Following the article excerpt and dependent variable questions, participants completed the Feelings Are Truth scale and covariate measures (CRT and REI scales) in a randomized order.

Results

H1: Table 1 displays sample-level descriptive statistics for the key variables of Studies 1 and 2, while Table 2 displays differences between liberals and conservatives on these variables. Average evaluations of the researcher and science rejecter split by scenario condition are displayed in Table 3 and largely mirror results across conditions in Table 2.

As hypothesized, compared to liberals, conservatives evaluate the science rejecter more favorably. However, contrary to our hypothesis, we also found that conservatives also evaluated the researcher less favorably than liberals. Thus the "strong" version of this hypothesis was not supported, and we adjusted this hypothesis for Study 2. Both liberals and conservatives tend to evaluate the researcher more positively than the rejecter on average, though conservatives tend to see them as closer in legitimacy.

Table 1. Sample Descriptive Statistics for Studies 1 and 2

		Study 1 (N = 448)			Study 2 (N = 465)		
	Range	α	Mean	*SD*	α	Mean	*SD*
Researcher evaluation	1–5	.81	4.03	.94	.85	4.15	.82
Rejecter evaluation	1–5	.89	2.80	1.17	.87	2.96	1.21
Feelings Are Truth	1–5	.84	3.09	.89	.82	3.28	.88
Rational Experiential Inventory: Need for Cognition (REI-NFC)	1–5	.83	4.22	1.05	.76	3.98	1.03
Rational Experiential Inventory: Faith in Intuition (REI-FI)	1–5	.91	4.15	1.01	.90	4.21	.99
Cognitive Reflection Test (CRT)	0–1	.75	.50	.31	.78	.46	.32

Note. For Study 1, the "Rejecter" was a manager; in Study 2 the "Rejecter" was a commentator. Higher scores indicate more favorable evaluations. CRT scores are a percentage of questions answered correctly.

To provide an alternate way of viewing the data, we divided respondents into three groups: those who evaluated the researcher more positively than the rejecter (N = 297, 66.4% of the sample), those who evaluated the rejecter more positively than the researcher (N = 76, 16.9% of the sample), and those who gave the two equal ratings (N = 74, 16.4% of the sample).

Looking at liberals and conservatives only, among those who preferred the researcher, 37.0% were conservative, while among those who preferred the rejecter, 77.4% were conservative, and among those who gave equal ratings to both, 59.3% were conservative. Those who did not rate the researcher more positively than the rejecter were especially likely to be conservatives, χ^2 (2, 351) = 35.78, $p < .001$.

As illustrated in Figure 1, among conservatives, 50.6% preferred the researcher, 28.6% preferred the rejecter, and 20.8% evaluated both equally. Among liberals, 79.2% preferred the researcher, 7.7% preferred the rejecter, and 13.1% rated both equally. Viewing the data this way, liberals had a strong preference for the researcher, while conservatives were about equally split between preferring the researcher and not.

H2: We examined the correlations between the Feelings as Truth scale and the REI-FI, REI-NFC, and CRT scales, both for liberals and conservatives only (the subgroups analyzed in H1 and H3), and across the whole sample (including libertarians and unaffiliated). All correlations obtained as hypothesized. For liberals and conservatives only: $r_{(CRT)} = -.27$, $r_{(REI\text{-}NFC)} = -.23$, $r_{(REI\text{-}FI)} = .54$, all ps < .001. For the whole sample: $r_{(CRT)} = -.28$, $r_{(REI\text{-}NFC)} = -.24$, $r_{(REI\text{-}FI)} = .61$, all ps < .001.

H3: We used PROCESS v.3 (Hayes, 2018) to test the hypothesized mediation models. We were primarily interested in the indirect effects of ideology on evaluation of the science rejecter through Feelings Are Truth scores.

We hypothesized that the effect of ideology on evaluation of the science rejecter would be mediated by Feelings Are Truth, even when controlling for REI-FI, REI-NFC, and CRT scores. However, we first present the effect sizes of this mediation model without controls for context, as well as the results of the same model using researcher evaluation as the dependent variable instead of the rejecter evaluation.

The estimated indirect effect of ideology on science-rejecter evaluation through Feelings Are Truth resulted in an effect size of .16 [.07, .22]. By contrast, running the same model with researcher evaluation as the dependent variable resulted in a nonsignificant effect size of −.03 [−.09, .01], thus emphasizing that Feelings Are Truth is more relevant to evaluation of the rejecter than researcher.

Table 2. Liberal Versus Conservative Differences on Evaluations of Researcher and Rejecter, "Feelings Are Truth," CRT and REI scales

		Liberal	Conservative	*t*	*p*	Hedges' *g*
Study 1	Researcher evaluation	4.28 (0.84)	3.72 (0.96)	5.99	<.001	0.62
	Rejecter evaluation	2.47 (1.11)	3.19 (1.11)	−6.16	<.001	0.64
	Abs (Researcher—Rejecter)	2.00 (1.36)	1.25 (1.09)	5.79	<.001	0.60
	Feelings Are Truth	2.90 (0.97)	3.3 (0.71)	−4.42	<.001	0.46
	Cognitive Reflection Test (CRT)	0.54 (0.31)	0.45 (0.30)	3.09	<.001	0.32
	Faith in Intuition (REI-FI)	4.03 (1.12)	4.29 (0.86)	−2.48	0.01	0.26
	Need for Cognition (REI-NFC)	4.26 (1.03)	4.17 (1.07)	0.85	0.40	0.09
Study 2	Researcher evaluation	4.26 (0.8)	4.04 (0.83)	2.61	0.01	0.26
	Rejecter evaluation	2.76 (1.22)	3.17 (1.17)	−3.47	<.001	0.35
	Abs (Researcher—Rejecter)	1.78 (1.38)	1.27 (1.25)	3.86	<.001	0.39
	Feelings Are Truth	3.13 (0.92)	3.42 (0.81)	−3.34	<.001	0.33
	Cognitive Reflection Test (CRT)	0.53 (0.33)	0.39 (0.3)	4.75	<.001	0.47
	Faith in Intuition (REI-FI)	4.09 (1.06)	4.33 (0.91)	−2.41	0.02	0.24
	Need for Cognition (REI-NFC)	4.05 (1.04)	3.91 (1.02)	1.31	0.19	0.13

Note. See Table 1 for ranges of each variable.

Table 3. Liberal and Conservative Average Evaluations of Researcher and Rejecter by Condition in Each Study

		Researcher			Rejecter		
		Liberal	Conservative	Hedges' g	Liberal	Conservative	Hedges' g
Study 1	MBTI	4.05 (0.81)	3.54 (0.83)	0.62	2.64 (1.04)	3.45 (0.84)	0.85
	Managed stock fund performance	4.29 (0.65)	3.79 (0.83)	0.65	2.6 (0.96)	3.19 (1.04)	0.59
	Luck in gambling	4.34 (1.02)	3.85 (0.99)	0.48	2.48 (1.32)	2.8 (1.22)	0.25
	Magnetic bracelets	4.4 (0.77)	3.67 (1.25)	0.75	2.27 (1.04)	3.38 (1.26)	0.98
Study 2	MBTI	4.24 (0.82)	3.99 (0.77)	0.31	2.57 (1.28)	3.13 (1.16)	0.45
	Managed stock fund performance	4.12 (0.8)	3.93 (0.85)	0.23	3.17 (1.22)	3.42 (1.05)	0.22
	Luck in gambling	4.32 (0.89)	4.29 (0.69)	0.05	2.57 (1.27)	2.71 (1.23)	0.12
	Magnetic bracelets	4.31 (0.71)	3.97 (0.94)	0.41	2.78 (1.07)	3.4 (1.12)	0.57

Note. Evaluations are on 1–5 scales, with higher numbers indicating more favorable evaluations.

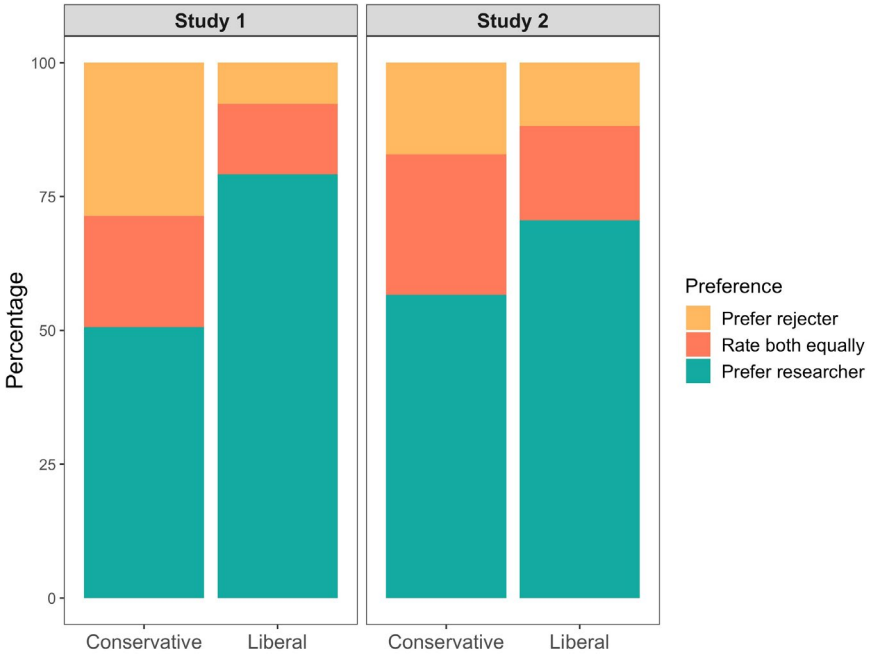

Figure 1. Percentage of preferences for the researcher or commenter/rejecter among conservatives and liberals for Studies 1 and 2.

Figure 2 displays the results of the PROCESS models for each study using ideology as the independent variable, rejecter evaluation as the dependent variable, and Feelings Are Truth as the mediator. Control variables included REI-FI, REI-NFC, and CRT. Though not initially included in our hypothesis, we also controlled for age, gender, and education, as Feelings Are Truth is a new construct and we thought it important to rule out additional confounds. Adding in these demographic control variables does not perceptibly change the results of either study. Here we present only the critical indirect effect of the model; the full results of these PROCESS models are in Table 4.

The critical effect size for this hypothesis is the indirect effect of ideology on rejecter evaluation through Feelings Are Truth. Supporting H3, this effect size was statistically significant, .10 [.04, .20]. The effect of CRT on rejecter evaluation was still significant, indicating in this study that reasoning style and reasoning ability have statistically separate effects on attitudes towards science. Additionally, in this model there was no effect of REI-FI on rejecter evaluation, supporting the idea that the Feelings Are Truth scale is better able to capture variance in the science evaluation measured here.

Policy Belief Measures

For exploratory purposes, we calculated the correlations between both economic and social ideology and our dependent measures, as we felt exploring these relationships would be a natural follow-up. Economic ideology was correlated with evaluation of the researcher (r = .23), rejecter (r = −.28), and with Feelings Are Truth (r = −.19) (all ps < .001; positive correlations indicate more liberal answers are associated with higher numbers). Social ideology was also correlated with those three constructs (r = .13, −.19, and −.12 respectively; Feelings Are Truth, p = .01; other ps < .001), albeit in a smaller magnitude. Additionally, social ideology was correlated with CRT scores (r = .16, p < .001) while economic ideology was not (r = .03, p = .60).

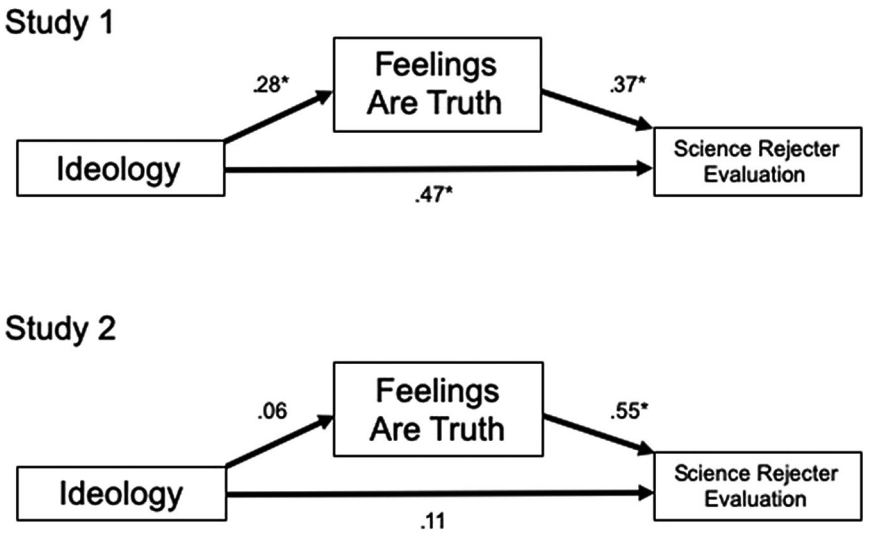

Figure 2. Mediation model results for both studies. REI-Faith in Intuition, REI-Need for Cognition, CRT scores, gender, age, and education (college degree vs. not) are included as control variables in each model. *$p < .001$.

Study 1 thus advances each of the goals of this article, in that there was support for the ideas that (1) conservatives see scientific and nonscientific perspectives as closer in legitimacy to one another and (2) that difference is partially accounted for by differences in seeing intuitions as an infallible source of truth.

STUDY 2

The main purpose of Study 2 was to ensure that our effects were robust to different nonexpert sources. Study 2's procedure was the same as Study 1, except in Study 2 the science rejecter was a commenter (indicated as a prior participant in the study) whose argument was presented after the article excerpt (see Appendix S2 in the online supporting information). We also adapted the DV questions to account for the commenter having no clear source of professional credibility. Participants were asked "To what extent do you think the arguments of the researcher and commenter seem like they could be valid?" on a 1–5 scale (1 = *Definitely could not be valid*, 5 = *Definitely could be valid*) and "To what extent do you think there is value to the arguments of the researcher and commenter?" on a 1–5 scale (1 = *No value,* 5 = *A lot of value*). Both sources were rated separately for each question (researcher Cronbach's $\alpha = .85$, commenter $\alpha = .87$).

We also modified one hypothesis as follows (otherwise hypotheses were identical to Study 1):

H1: Rather than predicting that conservatives and liberals would differ on evaluation of the science rejecter but not the researcher, we adapt a "weaker" and likely more realistic hypothesis closer to the "asymmetry" idea, that conservatives, compared to liberals, favor the rejecter more and the researcher less. To further test that conservatives are more likely to equate "both sides," we also predict that the difference between the evaluations should be closer to 0 for conservatives.

Participants

Recruitment procedure was the same as in Study 1. For Study 2, total sample size was $N = 465$, including 187 liberals, 187 conservatives, and for exploratory purposes, 42 libertarians and 49 "Other."

Table 4. Mediation Model Results for Each Study Estimating the Effect of Ideology on Rejecter Evaluation Through "Feelings Are Truth"

		Outcome: Feelings Are Truth (Mediator)			Outcome: Rejecter Evaluation (DV)		
		Coeff	*t*	*p*	*Coeff*	*t*	*p*
Study 1	Constant	1.07 [.44, 1.69]	3.37	<.01	1.2 [.15, 2.25]	2.26	.02
	Ideology (IV)	.28 [.14, .42]	3.91	<.01	.47 [.23, .7]	3.87	<.01
	Feelings Are Truth				.37 [.2, .55]	4.22	<.01
	CRT	−.26 [−.5, −.03]	−2.21	.03	−.56 [−.95, −.17]	−2.81	.01
	REI-FI	.51 [.44, .58]	14.65	<.01	−.03 [−.18, .11]	−.44	.66
	REI-NFC	−.13 [−.19, −.06]	−3.89	<.01	0 [−.11, .11]	.04	.97
	Age	.01 [−.01, .01]	−1.30	.20	0 [−.01, .01]	.01	.99
	Gender	.18 [.04, .31]	2.58	.01	.07 [−.16, .29]	.59	.56
	Education	.02 [−.05, .08]	.47	.64	.02 [−.08, .13]	.46	.65
					Coeff	*SE*	
	Direct Effect				.47 [.23, .7]	.12	
	Indirect Effect				.10 [.04, .20]	.04	
	Partially Standardized Indirect Effect				.09 [.03, .17]	.04	

		Outcome: Feelings Are Truth (Mediator)			Outcome: Rejecter Evaluation (DV)		
		Coeff	*t*	*p*	*Coeff*	*t*	*p*
Study 2	Constant	1.71 [1.17, 2.24]	6.32	<.01	1.18 [.21, 2.15]	2.38	.02
	Ideology (IV)	.06 [−.07, .18]	.88	.38	.11 [−.11, .32]	.96	.34
	Feelings Are Truth				.55 [.37, .73]	6.07	<.01
	CRT	−.55 [−.76, −.35]	−5.29	<.01	−.99 [−1.36, −.62]	−5.27	<.01
	REI-FI	.55 [.48, .61]	17.33	<.01	.02 [−.12, .17]	.32	.75
	REI-NFC	−.15 [−.21, −.09]	−4.91	<.01	.05 [−.06, .16]	.86	.39
	Age	0 [−.01, .01]	.12	.90	.01 [0, .02]	1.46	.14
	Gender	.09 [−.04, .21]	1.40	.16	−.05 [−.26, .16]	−.47	.64
	Education	−.02 [−.08, .03]	−.80	.42	−.04 [−.14, .06]	−.82	.41
					Coeff	*SE*	
	Direct Effect				.11 [−.11, .32]	.11	
	Indirect Effect				.03 [−.04, .10]	.04	
	Partially Standardized Indirect Effect				.03 [−.03, .08]	.03	

Note. CRT, REI-FI, REI-NFC, age, gender, and education (college degree vs. not) are covariates., CRT = Cognitive Reflection Test, REI-FI = Rational Experiential Inventory-Faith in Intuition, REI-NFC = Rational Experiential Inventory-Need for Cognition.

Average age of the sample was 34.68 years old, and 197 participants were female. Participants were compensated $0.85 USD.

Results

H1: As with Study 1, conservatives, compared to liberals, evaluated the science rejecter more favorably and the researcher less favorably (see Table 2). We also computed the absolute value of the difference between the rejecter and researcher ratings, with lower scores indicating a greater tendency to equate both sides. Across studies, conservatives were significantly lower on this metric than liberals.

As with Study 1, to provide an alternative look at the data, we divided the sample into those who evaluated the researcher higher than the commenter ($N = 300$, 64.5% of the sample), those who evaluated the researcher and commenter equally ($N = 98$, 21.1% of the sample), and those who evaluated

the commenter higher than the researcher ($N = 67$, 14.4% of the sample). Within these groups, among liberals and conservatives, 45.5% of those who preferred the researcher were conservative, while 59.8% of those who equated both and 59.3% of those who preferred the commenter were conservative. So, if a respondent did not prefer the researcher, they were more likely to be conservative than liberal, $\chi^2(2, 374) = 7.81$, $p = .02$.

Again, as illustrated in Figure 1, among conservatives, 56.7% preferred the researcher, 17.1% preferred the commenter, and 26.2% rated both equal. Among liberals, 70.6% preferred the researcher, 11.8% preferred the commenter, and 17.6% rated both equal. So even though both on average preferred the researcher, that tendency was not as strong for conservatives.

H2: As expected, in Study 2 the Feelings Are Truth ($\alpha = .82$) scale was correlated with both REI scales and CRT. All correlations obtained as hypothesized, as in Study 1. For liberals and conservatives only: $r_{(CRT)} = -.35$, $r_{(REI\text{-}NFC)} = -.32$, $r_{(REI\text{-}FI)} = .69$, all ps < .001. For the whole sample: $r_{(CRT)} = -34$, $r_{(REI\text{-}NFC)} = -.29$, $r_{(REI\text{-}FI)} = .68$, all ps < .001.

H3: In Study 2, and across studies, there is clear support for the hypothesis that conservatives are higher than liberals on Feelings Are Truth (see Table 2). As in Study 1, we used PROCESS v.3 to estimate the indirect effects of ideology on evaluation of the science rejecter through Feelings Are Truth scores with CRT scores, REI-FI, REI-NFC, gender, and education as controls (see Table 4). Notably, the indirect effect estimated without controls was .19 [.07, .31], and as with Study 1, this effect was larger than if the researcher evaluation is used as a DV, −.05 [−.10, −.01]. Without including covariates, the Feelings Are Truth scale works as a mediator (see Figure 2).

However, Hypothesis 3 was not fully supported in Study 2, as the indirect effect of ideology on evaluation of the rejecter through Feelings Are Truth with controls was .03 [−.04, .10]. This appears to be due to CRT scores explaining ideological splits on Feelings Are Truth (the first step of the mediation model). So, in Study 2, differences in reasoning *ability* between liberals and conservatives appear to account for differences in reasoning *style*.

However, these data combined with the results of Study 1 suggest that perhaps a more realistic model is one that allows both CRT and Feelings Are Truth to mediate the effects of ideology on science evaluation in parallel, thus allowing reasoning ability and beliefs about reasoning to have separate statistical effects on science evaluation, while also modeling the effects of CRT on Feelings Are Truth (that is, modeling the assumption based on the results of Study 2 that learning reasoning skills decreases beliefs that Feelings Are Truth). We ran this model for exploratory purposes, in order to provide more context for our results and the premise that reasoning style and ability are dissociable. As this model is speculative, we will mention it only briefly, but results of both studies do support this model. In both studies, this model yielded a significant indirect effect of ideology through CRT (Study 1: .05, [.01, .12]; Study 2: .13, [.06, .21]), on ideology through Feelings Are Truth (Study 1: .16, [.08, .26]; Study 2: .17[.06, .28]), and on ideology through CRT and then through Feelings Are Truth (Study 1: .02, [.003, .04]; Study 2: .03, [.01, .06]). Alternate analyses of Studies 1 and 2 that include evaluations of both the researcher and the manager/commenter in the same model as two dependent variables, and that model CRT both as a covariate and parallel mediator, are included in Appendix S3 in the online supporting information and are largely consistent with results presented here.

Policy Belief Measures

Contrary to Study 1, in Study 2 social ideology was more strongly correlated with the dependent measures than economic ideology. Social ideology was correlated with evaluation of the researcher

(r = .17), rejecter (r = −.26) and with Feelings Are Truth (r = −.24) (all ps < .001). For economic ideology, correlations were .09 (p = .05), −.11 (p = .02), and −.11 (p = .02). For CRT scores, the correlation with social ideology was r = .25 (p < .001) and for economic ideology the correlation was r = .13 (p = .004).

Thus, although economic and social ideology maintain correlations with our constructs of interest in both studies, the strength of correlations between the two ideologies was different between Studies 1 and 2. That ideological label produces more consistent effects than policy beliefs fits with the perspective that policy beliefs are crude proxies for ideological label (Ellis & Stimson, 2012).

General Discussion

When evaluating the views of researchers and science rejecters on apolitical issues, two studies found that conservatives, compared to liberals, tend to evaluate the rejecter more favorably and the researcher less favorably. We also find that these differences are mediated by conservatives' more intuitive thinking. Importantly, both conservatives and liberals, on average, evaluated the researcher more positively than the rejecter, indicating that both groups overall see the value in science and, at least on these issues, tend to think the scientific perspective is more likely to be the correct one. However, conservatives were more likely to see the researcher and rejecter as closer in legitimacy, and those that did not prefer the researcher to the rejecter (especially in Study 1) were likely to be conservatives.

By having people evaluate both scientific researchers and science rejecters, and by focusing on apolitical scientific topics, these studies contribute to ongoing debates about ideological biases in attitudes towards science (Baron & Jost, 2019; Ditto et al., 2019). Keeping the topics apolitical stresses that the political differences we observed were less due to culturally motivated cognition about the issue itself and more due to differing views on the nature of truth. The results also underscored the importance of measuring attitudes not only towards scientists, but also towards science rejecters, as differences in intuitive thinking mediated the effects of ideology on evaluations of the rejecter more so than the scientist. While prior investigations have shown that conservatives have less understanding or interest in the process of data collection (Shook & Fazio, 2009; Tullett et al., 2016), our studies push the debate forward by spotlighting differences in how the two ideologies value experiential evidence that has ostensibly been invalidated by research. Given conservatives' clear tendency to see scientific and experiential evidence as closer in legitimacy than liberals, the idea that the two are equally biased on average, at least in the realm of attitudes towards science, seems increasingly untenable.

These results also shed new light on arguments, often in the media, that shoddy-sounding perspectives should be given equal weight to scientific ones. This idea has been invoked in debates around evolution with calls to "teach the controversy" (Center for Inquiry, 2007) and around climate science with calls to give equal amounts of time to supporters and detractors (Sullivan, 2014). Classically, conservatives' calls to hear "both sides" has been thought to result from motivated reasoning protecting them from the psychological consequences of being incorrect (Kahan et al., 2012). This is quite likely true. However, our studies suggest that it might not be the whole story, as the desire to hear "both sides" might additionally stem from honest beliefs that nonscientific experiential evidence is an equally legitimate source of truth as scientific evidence.

These studies also suggest that future research is needed to examine how reasoning style differs from reasoning ability. While recent investigations have focused on political differences in ability (e.g., Pennycook & Rand, 2019; Yilmaz & Saribay, 2017), we focused on reasoning style and found the most support for models that treat the two as separate influences on our dependent measures. It makes clear sense that the two are related, and, as we suggested in Study 2, that as people's reasoning ability becomes better, they will also adapt a reasoning style that grants less status to intuitive

thought. However, the two can dissociate, as those with the ability to reason do not always do so (Mercier & Sperber, 2011), and the literature on motivated cognition in attitudes towards science has shown that cognitive reflection can lead to doubling down on, rather than correcting from, intuitive thought (Kahan et al., 2012). Given the wealth of outcomes that intuitive thinking has been linked to, greater clarity in how reasoning ability and style differ is needed.

Limitations

We contend here that using apolitical issues limits the extent to which culturally motivated cognition explains our results because, unlike issues like climate science, there is no culturally salient political split on, for example, the validity of MBTI. Instead, we argue that our results speak to ideological splits on how people view the validity of empirical and experiential evidence. However, it could be argued that our results were caused by motivated cognition more broadly, perhaps because science itself might be threatening for conservatives who endorse religious, supernatural, or magical explanations for phenomena (Oliver & Wood, 2018). Though this might be possible for some people, this explanation does not seem to fit our data. We think if this were the best explanation, more conservatives would have rejected the researcher outright. Moreover, of the issues included, the one most relevant to magical beliefs was the "lucky streaks" in gambling issue. If conservatives were trying to protect a supernatural worldview, on this issue they would side with the scientist least. However, on this issue, conservatives sided with the scientist the most (see Table 3). Relatedly, though the issues themselves were apolitical, perhaps results are driven by conservatives in the moment viewing scientists as part of a distrusted powerful elite. Again, though this might be true for some participants, general favoritism towards the scientist (and identification of reasoning style as a mechanism) seems to speak against this.

Another caveat is that we cannot fully discount that there might be certain circumstances in which liberals might find "both sides" arguments especially appealing. We believe we have clear evidence for a difference in the nature of truth that explains a conservative bias against science that is less prevalent in liberals. Liberals are more egalitarian than conservatives (Ellis & Stimson, 2012), so a desire for fairness could, under certain circumstances, lead liberals to be especially favorable towards nonscientific points of view. However, given the results here, for such a result to be obtained in a study, the methodology would likely have to obscure from respondents that the issue at hand is one that involves scientific reasoning (e.g., the framing of economic policy issues as having more to do with philosophy than social science).

Conclusion

The current results help highlight how people balance different sources of knowledge. Though science education could lead to a greater appreciation of empiricism, placing high value on the truth of intuitions might still lead people to overvalue the perspectives of science rejecters. In our data, we observed many people, conservatives especially, willing to grant equal or higher status to perspectives that had intuitive value but were already ruled out by evidence. Recent research has relatedly shown that people have moral issues with the use of randomized experiments (Meyer et al., 2019). Combining this investigation with our own, understanding science is as much a reorientation in worldview as it is learning principles of science itself. Though intuitions can often be a basis for productive decisions (e.g., Kahneman & Klein, 2009), the case that intuitive thinking makes empirical understanding difficult (cf. Shtulman, 2017) continues to be clear.

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CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest with respect to their authorship or the publication of this article.

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Supporting Information

Additional supporting information may be found in the online version of this article at the publisher's web site:

Appendix S1. Full text of scenarios used in Study 1

Appendix S2. Full text of scenarios used in Study 2

Appendix S3. Alternate models for Studies 1 and 2

Table S3.1. Coefficients, Standard Errors, and 95% Confidence Intervals for Three Multiple DV Mediation Models in Study 1

Table S3.2. Coefficients, Standard Errors, and 95% Confidence Intervals for Three Multiple DV Mediation Models in Study 2

Appendix S4. Results of all preregistered hypotheses

Table S4.1. Factor Analysis Results for Studies 1 and 2.

Table S4.2. Correlations Between BIFYOTS Sub-scales and Covariates

Table S4.3. Correlations Between Reality is Subjective, Feelings Are Truth, and Evaluation of the Researcher and Science Rejecter

Table S4.4. Partial Correlations Between Reality is Subjective, Feelings Are Truth, and Evaluation of the Researcher and Science Rejecter, with CRT, REI-NFC, and REI-FI Controlled

Table S4.5. Liberal vs. Conservative Differences on BIFYOTS and Dependent Variables

Table S4.6. Liberal and Conservative Average Evaluations of Researcher and Rejecter by Condition in Each Study

Table S4.7. Liberal vs. Conservative Differences on the CRT and REI scales.

Table S4.8. Mediation Model Results for Each Study Estimating the Effect of Ideology on Rejecter Evaluation Through Feelings Are Truth