

Tracing the Boundaries of Motivated Reasoning:
How Deliberative Minipublics Can Improve Voter Knowledge

RUNNING HEAD: BOUNDARIES OF MOTIVATED REASONING

Kristinn Már, Ph.D. Candidate

Department of Sociology, University of Wisconsin-Madison
8128 William H. Sewell Social Sciences Bldg., 1180 Observatory Drive
Madison, WI 53706-1393, Email: kristinn.mar@wisc.edu

John Gastil, Professor

Department of Communication Arts & Sciences and Political Science
The Pennsylvania State University, 230 Sparks Bldg., University Park, PA 16802
Email: jgastil@psu.edu, OCID: 0000-0002-0337-1064

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It has become cliché to critique the state of public reason in the United States (e.g., Gore, 2017). The RAND Corporation argues in *Truth Decay* that the mechanism underlying this problem is biased information processing: “Once a person forms a specific belief—whether it is based on fact, disinformation, or misinformation—that belief is likely to endure” (Kavanagh & Rich, 2018). More commonly called “motivated reasoning” (Kunda, 1990), this occurs frequently when people evaluate candidates (Leeper & Slothuus, 2014), ballot measures (Wells, Reedy, Gastil, & Lee, 2009), policy information (Colombo & Kriesi, 2017), or even scientific findings (Hart & Nisbet, 2012) and new technology (Druckman & Bolsen, 2011). Motivated reasoning operates across ideological divides and different levels of cognitive ability, with those more capable of effortful reasoning being the most effective at shielding their biases from disconfirming information (Kahan, 2013).

To understand a phenomenon’s power, however, requires discovering its boundaries—the conditions under which its effect is attenuated, eliminated, or even reversed (Abelson, 1995, p. 143). Biased information processing may be ubiquitous, but its reach must end somewhere. Were the public nothing more than motivated reasoners, opinions would change only in response to new elite cues or—for those lacking ideological moorings—shifting tides of media coverage (Zaller, 1992).

On the contrary, macro-level public opinion often does respond in sensible ways to major events and widely-disseminated information (Page & Shapiro, 1992; Pickett, 2019). At the micro-level, individuals confronted with a stream of incongruent information can reach an affective tipping point after which they feel moved to change their views (Redlawsk, Civettini, & Emmerson, 2010). In well-designed face-to-face discussions, participants readily update their opinions to incorporate new information and perspectives (Barabas, 2004; Gastil, Black, & Moscovitz, 2008; but see Mendelberg, 2002). The outcomes of such small-group deliberation,

however, rarely garner public attention, whatever their “recommending force” might be (Fishkin, 2009, p. 35).

One potential model for bridging small-scale deliberation with a large-scale public is the Oregon Citizens’ Initiative Review (CIR). First established by that state’s legislature in 2009, the CIR convenes two dozen citizens to study a ballot measure for a full week by hearing expert testimony, weighing pro and con arguments, then drafting and revising a one-page Citizens’ Statement (hereafter called simply a “CIR Statement”). In that statement, the CIR panelists summarize their main findings about the measure and list what they consider the best arguments for and against it. What sets the CIR apart from most “deliberative minipublics” (Grönlund, Bachtiger, & Setälä, 2014) is the next step in its process, wherein the Secretary of State mails the CIR Statement to every registered voter. This provides the full electorate with information generated by their peers through a process that might earn voters’ trust and thereby alter their policy-relevant beliefs (Cutler, Johnston, Carty, Blais, & Fournier, 2008; Warren & Gastil, 2015).

In this study, we test the impact that a county-level CIR had on voters’ policy knowledge regarding a ballot measure on genetically modified organisms. Because the CIR Statement was not mailed to voters by a public official, we had the opportunity to conduct a large-sample mail-survey experiment that contrasted the beliefs of citizens in a control group against those who received a copy of the CIR Statement with their survey. Before presenting results, we review prior theory on motivated reasoning and derive contrasting hypotheses. Following Druckman (2012), there are two main expectations. A “directional” motivation prevails when people uncritically resist incongruent (or accept congruent) information due to the stickiness of prior beliefs or group loyalties. As a result, exposure to CIR information could lead to even greater differences between polarized and antagonistic groups. Second, information from a deliberative minipublic might induce an “accuracy” motivation if it prompts people to “consider the available information” and attend to potentially relevant arguments in order to form an evaluation consistent with one’s partisan identity” (Bolsen, Druckman, & Cook, 2014, p. 238). If this motivation prevails, we would observe reduced bias among citizens and perhaps even decreasing divergence between polarized groups. In this paper, we set out to find precisely how well each account performed in the unique context of our research.

Theory and Evidence

Directional and Accuracy Motivations

The concept of motivated reasoning has attracted significant attention in recent years, with a large body of empirical work exploring its causes and effects. Leeper and Slothuus (2014, p. 138) note that “motivated reasoning is often treated as a juggernaut—an unstoppable partisan force that blinds everyone to everything, ruining the hopes for an idealized deliberative politics.” In spite of the widespread experimental evidence that supports motivated reasoning, they suspect that this process may only occur conditionally. Indeed, whereas most work focuses on “directional” motivations, scholars have begun to explore when respondents are motivated to reach an “accurate” conclusion. In this section we briefly review prior work focusing on these two types of motivations.

Research shows that in numerous contexts directional motivation dominates when citizens assess information or reason about an issue. Scholars have shown how prior views, group affiliation, and social identity shape people’s reactions to new information. Preexisting commitments cause citizens to select congruent information (confirmation bias), challenge or dismiss incongruent information (disconfirmation bias), give more weight to supportive information (prior attitude effect), and reinterpret counterarguments as supportive (boomerang effect) (Druckman, 2012; Hart & Nisbet, 2012; Lebo & Cassino, 2007; Redlawsk, 2002; Taber & Lodge, 2006). Party cues often exacerbate biased information processing (Slothuus & de Vreese, 2010; also see Kahan, 2015), especially under conditions of extreme polarization (Druckman, Peterson, & Slothuus, 2013). However, partisan cues should not be conflated with directional motivation, because such “cues” can efficiently work as “information shortcuts” (e.g., Lau & Redlawsk, 2006; Lupia, 2015).

As noted above, directional motivation has been shown to be persistent across numerous contexts (Epley & Gilovich, 2016; Leeper & Slothuus, 2014). As an illustration relevant to the current study, consider how the public processes scientific evidence on policy questions. Hart and Nisbet (2012, p. 701) explain that the “traditional paradigm for science communication ... assumes that increased communication and awareness ... will move public opinion toward the scientific consensus and reduce political polarization around science-based policy.” Empirical research, however, has found that motivated reasoning persists across a variety of policy issues that hinge on scientific information (Hart & Nisbet, 2012; Kahan, Braman, Cohen, Gastil, &

Slovic, 2010; Kahan, Braman, Slovic, Gastil, & Cohen, 2009; Simis, Madden, Cacciato, & Yeo, 2016). One review found persistent “hyperskepticism toward scientific evidence among ideologues” (Kraft, Lodge, & Taber, 2015, p. 122). Other studies found that the problem worsens, rather than improves, for individuals who demonstrate higher levels of political sophistication and cognitive reflection (Kahan, 2013; Slothuus & de Vreese, 2010).

Clearly, under certain circumstances, citizens are motivated to ignore facts and defend preexisting attitudes, but when might they desire to consider carefully new evidence and reevaluate their beliefs? If Redlawsk et al. (2010) are correct that there is an affective point beyond which attitudes often shift, what settings or processes might bring individuals to such a point? To answer these questions, scholars have begun studying individual and contextual variables that moderate biased information processing. For example, Bolsen et al. (2014, p. 235) show how “an explicit inducement to form an ‘accurate’ opinion” can overcome partisan motivated reasoning. When citizens are primed to form accurate views and later justify them, partisan bias is significantly reduced or goes away. These are precisely the conditions deliberative practitioners aim to create, albeit with varying success (e.g., Himmelroos, 2017). Even so, it remains unclear how readily such a motivation might emerge in the wider political world. For instance, people within homogeneous political discussion networks have no need to accommodate incongruent arguments (Bolsen et al., 2014; Druckman, 2012; Huckfeldt, Johnson, & Sprague, 2004). Looking at partisan perception of the US economy in 2008, Meirick (2016) found that “given optimal conditions, even the strongest partisans can update their beliefs and come to agreement on objective facts” (p. 711). However, Meirick (2016) concluded, it might take bipartisan consensus or “pretty undeniable facts for it to work” (p. 699).

In this study, we examine a remedy to the problem of directional motivation that brings the strengths of face-to-face deliberation to macro-level political institutions (Dryzek, 2017; Parkinson & Mansbridge, 2012). Theoretically, citizens may be responsive to information cues that come from deliberative bodies of their peers (Fishkin, 2009; MacKenzie & Warren, 2012; Warren & Gastil, 2015). In the next section, we examine this possibility.

Deliberative Minipublics

Modern deliberative theory began as a normative ideal (Chambers, 2003; Cohen, 1989; Fishkin, 1991; Habermas, 1998) but soon generated empirical research showing that small deliberative bodies can function at high levels, both in terms of reasoned discourse and sound

judgment (Carson, Gastil, Hartz-Karp, & Lubensky, 2013; Nabatchi, Gastil, Weiksner, & Leighninger, 2012; Neblo, 2015; Warren & Pearse, 2008). The concept of a “minipublic” describes those deliberative bodies drawn at random from the larger population and tasked with rendering recommendations, judgments, or decisions on public issues (Grönlund et al., 2014).

The turn toward systemic theories of deliberation shifted the focus away from minipublics’ internal dynamics and toward the purposes they might serve within the larger political process (Curato & Böker, 2016; Lafont, 2017). Herein, we focus on the potential of these bodies to influence the policy-relevant beliefs of an electorate. Minipublics can collect, distill, and redistribute information to wider publics via media coverage, and the organizers of many citizen dialogues have that goal in mind (Goodin & Dryzek, 2006). During elections, a minipublic can discern and translate the information voters need, whereas public officials tend to produce ballot measure descriptions burdened by legal language and indirectness, partly to avoid charges of partisan bias (Gastil, Richards, & Knobloch, 2014; Richards, 2016).

To date, only a handful of studies have measured the impact minipublics can have on public attitudes and beliefs. A study of the British Columbia Citizens’ Assembly found that a legally-authorized minipublic can garner credibility and influence voting choices to the extent that its findings are publicized and voters come to understand its process (Cutler et al., 2008; also see Fournier, van der Kolk, Carty, Blais, & Rose, 2011). Experimental surveys that provide respondents with limited information about minipublics have found that learning a minipublic’s findings can shift public opinion, depending on the issue and audience (Boulianne, 2017; Ingham & Levin, 2018a, 2018b). In the case of the minipublic studied herein, research showed that an earlier iteration of it influenced Oregonians’ voting choices in the 2010 general election (Gastil, Knobloch, Reedy, Henkels, & Cramer, 2018).

Sparking the Motivation to Be Accurate

The question remains how consistently minipublics can overcome directional motivation. One aforementioned study found that partisan counter-cues could overwhelm a minipublic’s influence (Ingham & Levin, 2018b), so this issue remains unsettled.

Our survey experiment does not employ fine-grained measures of participants’ affective and cognitive reactions to reading a minipublic’s report, but we can at least provide a theoretical account of what mechanisms might, under the right circumstances, spark an accuracy motivation that overpowers preexisting biases. This alternative motivation is a drive to discover new or

newly salient information and considerations, along with a readiness to alter one's attitudes accordingly (see Druckman, 2012; Goodin, 2003; Weinmann, 2018). Broadly, there are four types of mechanisms scholars identify: even-handed assessment, social constraint, source legitimacy, and consensus. It is important to note that respondents were not primed to form or later justify accurate beliefs but only to read information generated by a minipublic. That is to say, the experimental design did not directly attempt to induce even-handed assessment or social pressure. That said, exposure to information from a minipublic might still motivate respondents to consider carefully the information given or feel socially constrained to align to the minipublic's views.

Lafont (2017) explains that within a minipublic, participants cue toward deliberative behavior for several reasons: their random selection prompts impartiality, the neutral briefings and voluminous information give them access to knowledge, and the trained moderators follow a rigorous discussion protocol to spur considered judgments. If voters recognize these deliberative features in a minipublic, they might be prompted to themselves consider the evidence carefully and in an even-handed way. Alternatively, they might view it as a legitimate source and be inclined to reexamine their opinions in light of the minipublic's findings. Additionally, in this case, the minipublic's findings were established by a supermajority of panel members. Such consensus could strengthen the minipublic's legitimacy but lead respondents to view the information as beyond specific cleavages (e.g., bipartisan agreement). Lastly, a minipublic supermajority might be perceived as the public view or norm and induce a social constraint.

Whatever the mechanism at work, engendering an accuracy motivation likely hinges on voters' understanding of a given minipublic. Indeed, the influence of the British Columbia Citizens' Assembly was partly conditional on the public's knowledge of its process (Cutler et al., 2008). This held true across the subsequent Ontario Citizens' Assembly and when British Columbia held a revote on its Assembly's proposal (Fournier et al., 2011, p. 131). The same appears to be true for the Oregon CIR (Gastil, Rosenzweig, Knobloch, & Brinker, 2016).

In sum, a voter who obtains new information relevant to a ballot measure from a minipublic might become motivated to consider that information and accurately update her beliefs. If so, it would lead to contrasting outcomes compared to directional motivation. We next lay out our three main hypotheses given extant theory and research.

Context and Hypotheses

Research Setting

The 2014 Citizens' Initiative Review (CIR) pilot test in Jackson County, Oregon provided a suitable setting for testing the relative power of motivated reasoning. The CIR had never been run at the county level, and the Jackson County CIR operated as an unofficial process organized by Healthy Democracy Oregon. Nonetheless, this county-level CIR's design was comparable to that of the Oregon CIR statewide process. Moreover, because a majority of Oregon voters had become aware of the CIR process (Knobloch, Gastil, Feller, & Richards, 2014), the Jackson County study participants who were randomly assigned to receive a copy of the CIR Statement on their county ballot measure were uniquely qualified to understand it as the product of a minipublic.

The Jackson County CIR took place from April 27 to 30 in Medford, Oregon. It reviewed Measure 15-119, which proposed banning the growth of genetically modified organisms in that county. Jackson County Elections described the ordinance as banning "any person from propagating, cultivating, raising or growing 'genetically-engineered' plants in Jackson County."

The measure's proponents spent over \$400,000 to qualify it for the ballot and to campaign on its behalf. (With just over 100,000 registered voters in the county, that amounts to spending nearly four dollars per voter.) Proponents argued that the ordinance was necessary because the strong winds in Jackson County caused genetically modified (GMO) seeds to blow onto the fields of other farmers, who could neither claim their crops were GMO-free nor replant their own seeds, lest they be sued for appropriating proprietary GMO technology. Opponents of the ordinance spent nearly a million dollars and disputed the hazards of GMO seeds and crops, while warning of harm to the local economy should the measure pass. (Ballotpedia.org has compiled this and more information about the campaign in an accessible archive.)

After deliberating on the measure, the Jackson County CIR panelists were surveyed by a team of researchers. By a 14 to 6 margin, the panelists came to support the measure, with that two-thirds majority paralleling the 66% of Jackson County voters who ensured its passage. A lawsuit brought by alfalfa farmers delayed the implementation of Measure 15-119, but a federal court found against the plaintiffs, thereby allowing the measure to go into effect (Anstoetter & McDonough, 2015).

Contrasting Hypotheses

This setting permitted us to test directional reasoning's grasp on citizens who, when faced with a ballot measure, received information generated by a minipublic. By exposing a randomly-selected subset of an online survey sample to a CIR Statement, we could test the impact, if any, of a minipublic's findings on a wider electorate. In effect, we probed the scope conditions of biased reasoning during a direct democratic election (Colombo & Kriesi, 2017).

Directional Motivation Prediction

In this context, prior theory and research leads us to expect that directional motivation prevails among those exposed to the CIR statement. First, disconfirmation bias (Taber & Lodge, 2006) predicts that respondents will resist incongruent claims while accepting congruent ones. In this view, small or null treatment effects would be expected for groups whose baseline beliefs were incongruent with the information given. In our case, individuals or groups who are, on average, factually incorrect are more likely to resist the correct information.

Second, the prior attitude effect (Taber & Lodge, 2006) predicts that information supporting prior beliefs is weighted more heavily. As a result, individuals or groups who are, on average, factually correct are likely to accept the correct information. In the current study, we would expect large treatment effects for groups whose baseline beliefs were congruent with the information given.

Third, expressive partisan identity theory (Huddy, Mason, & Aarøe, 2015) or "identity-protective cognition" (Druckman & McGrath, 2019; also see Kahan, 2015; Slothuus & de Vreese, 2010) predicts that information congruent with one's partisan identity will yield a strong affirmation effect, as will incongruent information lead to rejection. If this account is correct, the results would show a positive interaction effect between the CIR treatment and party identity when both align.

Taken together, these three mechanisms predict that exposure to the CIR statement will have large effects for groups who receive congruent information. There also would be small, non-significant, or even reverse ("boomerang") effects on those who receive incongruent information.

In addition, the "expressive utility" account of motivated reasoning (Kahan, 2013, p. 410) posits that biasing effects would be stronger for those with greater political engagement or cognitive ability, since effortful message processing can worsen bias. For instance, even a study

hoping to demonstrate the power of “open-minded thinking” found that one’s general scientific knowledge only had a positive association with recognizing human factors in climate change for strong liberals, whereas moderate to strong conservatives had an inverse relationship between the same two variables (Stenhouse et al., 2018).

Accuracy Motivation Prediction

Alternatively, a deliberative minipublic might induce an accuracy motivation among respondents leading to contrasting hypotheses. First, deliberative minipublics are designed to reveal the perspectives and preferences of citizens after careful reflection and deliberation (Fishkin, 2009; Grönlund et al., 2014; MacKenzie & Warren, 2012). Thus, voters may view the findings presented in a CIR Statement as a deliberative cue to guide their own beliefs (Gastil et al., 2018). At times, voters have placed a good measure of trust in the integrity of a minipublic’s process (Cutler et al., 2008; Fournier et al., 2011; Gastil et al., 2016), so one might expect voters to align their responses to knowledge questions with the claims made by a minipublic.

Second, voters aware of the deliberative qualities of a minipublic might be motivated to arrive at more accurate beliefs on factual policy questions. Since the key motivation of a minipublic is to produce thoughtful and reliable information (Grönlund et al., 2014), exposure to a minipublic’s findings might prime voters to process this new information in a similar manner. Furthermore, whereas directional motivated reasoning theory expects groups with incongruent views to resist contrary claims, an accuracy perspective holds that more biased groups might improve the most since they have more room for correction (cf. Thomas & Douglass, 2009).

Third, if respondents perceived the information to reflect a public consensus, it might motivate them to align their prior beliefs with that consensus (Meirick, 2016; also see Bolsen et al., 2014; Druckman et al., 2013). In this case, the minipublic’s factual findings were endorsed by a supermajority of panelists, which might indeed have led respondents to think the information reflected a broader public agreement. As a result, respondents might either take this signal as a credible cue or submit to the social constraint of the public norm.

Taken together, if a minipublic might induce an accuracy motivation, it leads us to expect large treatment effects across all respondents, with perhaps even larger effects among those with greater prior biases due to having more room for improvement.

Summary

In sum, our study could have yielded different outcomes with different theoretical implications. First, partisan motivated reasoning could widen the gap in empirical beliefs between groups with opposing prior beliefs. This could apply to other groups who have opposing prior beliefs (e.g., due to cultural differences). Second, exposure to a minipublic's findings could overpower the persistent tendency to engage in directional reasoning and supplant it with an accuracy motivation, which brings opposing ideological groups toward a more common and accurate understanding of policy-relevant facts. A third alternative would be a mixed outcome, with the treatment effect of reading the CIR Statement varying in strength across particular factual claims. In this case, an accuracy motivation might overpower some biases but not others, such as if environmental attitudes held sway over voters' beliefs but partisanship or broader ideological commitments did not.

Method

Participants

To survey Jackson County residents, we contracted with MDC Research (based in Portland, Oregon) to draw a sample of 24,775 names from the county's registered voter list. We employed the Tailored Design Method (Dillman, Smyth, & Christian, 2009) to maximize responses, including multiple survey mailings (with postage-paid return envelopes enclosed), postcard reminders, and messages from the Oregon Secretary of State on the outer envelope and in an enclosed letter.

In total, we received 4,582 surveys sufficiently completed for use in analysis, 1,274 in the control group and 3,308 in the treatment group exposed the CIR statement. Using a conservative estimate of 5% of addresses being invalid, the survey had a 19.4% response rate using the RR3 metric standardized by the American Association for Public Opinion Research. This sample was large enough to detect even very small correlations (i.e., $r = .05$) at a high statistical power (.92). Such a high power level was essential because our hypotheses predicted the absence of a moderating effect. About 25% of respondents had previously read or seen the CIR Statement outside of the context of this study (e.g., in the local newspaper). In a robustness section below, we explore if and how prior exposure might affect our findings.

Sample characteristics resembled US census data for Jackson County adults in some respects but overrepresented particular groups. Fifty-two percent of respondents identified as female, which matches the census figure. A majority (51%) of respondents identified as Democrats, 30% as Republicans, and 19% as unaffiliated or other, but the corresponding countywide figures are 32%, 36%, and 32%, respectively. Respondents were more highly educated than the rest of the county as a whole: 60% of the sample had at least a BA or BS, but only 26% of Jackson County adults 25 years of age or older have such a degree. Finally, the survey sample was considerably older than the county's adult population: Only 22% of the adult population in Jackson County is 65 or older, compared to 43% of our survey sample.

Survey Design

The survey packet respondents received included an introductory letter describing the survey, a survey booklet, and—for the treatment group only—a copy of the one-page Jackson County CIR Statement.¹ The cover letter for those receiving the Statement included this paragraph:

Before taking the survey, please read carefully the enclosed CIR Statement produced by the Citizens' Initiative Review that was held in Medford on April 27-30. The Citizens' Initiative Review is an innovative way of publicly evaluating ballot measures to give voters clear, useful, and trustworthy information at election time. The Jackson County Citizens' Initiative Review brought together a panel of twenty randomly-selected and demographically-balanced voters from across the county to evaluate one of the local ballot measures. The panel heard arguments for and against the measure and had extensive question-and-answer sessions with policy experts during its four-day public review.

The survey itself came on an 11 by 17 inch sheet of paper, printed on both sides and folded into a four-page booklet. The first page included background questions and asked how respondents intended to vote on Measure 15-119. The second page asked for respondents' views relevant to the ballot measure, and the third page included multi-item scales measuring broader attitudes and knowledge. The final page included demographics and questions about prior awareness of the CIR. (See Online Appendix for the full CIR statement.)

Measures

To test our hypotheses, we used all eight of the survey's knowledge items as dependent variables. Following a format used in previous research on motivated reasoning (Wells et al., 2009), we asked respondents to assess factual claims using a five-point scale: "definitely false," "probably false," "don't know," "probably true," and "definitely true." We recoded these responses to make a Factual Accuracy variable, which ran from -2 (definitely incorrect) to +2 (definitely correct), with "don't know" as the midpoint. Each item reflected true or false claims made by proponents or opponents and corresponded to verifiable information included in the CIR Statement (see Appendix).

 Insert Table 1 about here

Our analysis of treatment effect variation focuses on two sources of bias—party cues and prior policy-relevant attitudes. To examine whether party cues moderated the CIR Statement's treatment effects, we used a conventional measure of party identification, with our analysis contrasting those who identified with the Democratic Party (0) against those who identified with the Republican Party (1). To analyze the effect of prior attitudes, we used confirmatory factor analysis to create an Environmental Risk Perception variable using four survey items (e.g., rating the danger of "air pollution caused by industry"). This reliable set of items ($\alpha = .85$; varimax rotation) captured respondents' attitudes towards a range of environmental and health risks, including attitudes toward GMOs.

To test whether the impact of prior attitudes or party cues were magnified by political awareness or capacity for effortful reasoning, we included two additional measures. First, we used a conventional measure of whether respondents "followed politics." Second, a factor variable combined true or false responses to four scientifically established facts (e.g., "antibiotics kill viruses as well as bacteria"). The Science Knowledge factor attained modest reliability ($\alpha = .66$) and had been validated previously (Allum, Sturgis, Tabourazi, & Brunton-Smith, 2008; Besley, 2014; Kahan et al., 2012).

We also measured other variables previously theorized as covariates or shown to influence factual accuracy. These included ideology, education, age, and gender. As an additional robustness check, we included as an alternative source of bias the two cultural

cognition factors (Kahan et al., 2009, 2010)—one two-item scale for Hierarchism ($\alpha = .75$) and a similar pair of items for Individualism ($\alpha = .71$). (For more detail on our dependent and independent variables, see Online Appendix B.)

Prior Bias

Since we were interested in if and how bias moderates a treatment effect, we needed to establish that there was good reason to believe that motivated reasoning was at play in this case. Fortunately, a strength of our experimental design was our ability to leverage a real-world election: our voters responded to our survey in the midst of a high-profile local campaign. Thus, we could use our control group to see whether policy knowledge biases were operating at the time of our survey. Indeed, there were clear and consistent patterns of divergence in empirical beliefs across the eight dependent measures. The first four items in Table 1 regarding seed dispersion, selling GMO products, residential restrictions, and hiring regulators were more congenial for Democrats and those anxious about environmental risks but more uncongenial for their counterparts. The opposite applied to the latter four items in Table 1 regarding risk misinformation, frivolous lawsuits, enforcement costs, and scientific consensus, which were more congenial for Republicans and those with low environmental risk perception.

On all eight of our knowledge measures, we found differences for control-group respondents with high versus low environmental risk perceptions (split at the median). Likewise, we found significant differences between Democrats and Republicans on these items. More importantly, these differences were large and meaningful. For example, only a quarter of Democrats were incorrect about residential restrictions; by contrast, about 40% of Republicans were incorrect. On another item, 58% of respondents concerned about environmental risk were incorrect about scientific consensus on GMOs, whereas only 34% among those skeptical of environmental risks were incorrect. Commonly, the difference between Democrats and Republicans in how many responded “definitely” correct and incorrect was 2 to 1. The same held between respondents with high and low environmental risk perception. (For more detail, see Table C1 in Online Appendix C.)

Additionally, we found large disparities in the control-group respondents’ voting intentions across these environmental risk perception groups. The high environmental risk perception respondents intended to vote for the GMO seed ban by a wide margin of 86%, but only 39% of the low risk group planned to do so. Similarly, about 78% of Democrats intended to

vote yes compared to 40% of Republicans. (For more detail, see Table C2 in Online Appendix C.)

Finally, Republicans were split in their vote choice, but their prior biases can be seen by the pattern of their true or false responses in the control group. On those items that Republican respondents answered incorrectly, responses were just as likely to be erroneous for those higher in the distribution of Science Knowledge scores as for those with less scientific acumen (see Online Appendix D).

Results

The GMO seed ban provided a real-world political context for studying bias and a chance to use an experimental treatment generated by an actual minipublic, the design of which Oregon voters have seen at work every two years since 2010. Thus, we begin our presentation of results by noting that, all other variables aside, exposure to the CIR Statement significantly improved overall factual accuracy for five out of the eight true or false statements. Improvements were often substantial, with about 10% fewer incorrect responses and a 20% increase in the proportion of respondents confidently selecting the correct response (see Online Appendix C).

Our hypotheses, however, concerned effect variation. We begin this analysis by looking at the evidence of partisan motivated reasoning. Next, we consider the biasing influence of preexisting environmental attitudes, and before summarizing our findings, we present robustness checks to ensure their consistency using alternative analytic approaches.

Partisanship

Recall that the partisan motivated reasoning account expects partisans to reject CIR Statement claims that run contrary to their biases while readily accepting congruent claims, regardless of their accuracy. An accuracy motivation by contrast predicts a general improvement as a result of reading the minipublic's report, or possibly greater improvement in belief accuracy for those biased toward falsehood, since that group has more room for improvement.

A comparison of the control and treatment groups, broken down by partisanship, showed very little evidence of motivational bias. As Figure 1 shows, the distance between control and treatment groups was often significant—and comparable between the Democratic and Republican subsamples. Moreover, results show that partisans with greater prior bias (i.e., those with lower Factual Accuracy scores in the control group relative to their partisan opposites)

sometimes improved the most. This was true even when partisans were on average incorrect, as was the case for the true or false item about scientific consensus, on which Democrats showed substantially higher Factual Accuracy scores in the treatment group than in the control group. In effect, reading the CIR Statement brought them up to the same Factual Accuracy score as Republicans, who did not vary between treatment and control means.

 Insert Figure 1 about here

Looking across the full set of true or false items, Democrats in the control group were factually more accurate on the first four shown in Figure 1, but Republicans in the control group were more often correct on the latter four (in all cases, t-tests showed significant differences at $p < .05$). Both partisan groups improved on three out of the eight true or false items ($p < .01$). Furthermore, for six out of the eight items, there was a larger average improvement in Factual Accuracy scores among more biased partisans. On the other hand, we found one instance of marginal significance in which more correct partisans had substantially higher means in the treatment condition (frivolous suit, at $p = .07$).

To test more formally whether these differences in treatment effects across partisan groups were statistically significant, we ran a series of ordered probit regressions with interaction terms between treatment and partisanship (see Table 2 for results and modeling). To isolate the effect, we controlled for other variables such as ethnicity, age, gender, ideology, education, political interest, environmental risk perception, and science knowledge. Contrary to partisan motivated reasoning theory, we found no instance in which partisans with greater prior Factual Accuracy scores improved more. In fact, we found one instance in which partisans with greater prior bias improved significantly more, and another two instances of marginal significance (residential restrictions, $p = .06$, and science consensus, $p = .05$).

Finally, previous research showed motivated reasoning to be more pronounced among the politically aware and analytically adept (Kahan, 2013). Thus, we tested whether the same would hold true in this case. Regression analysis yielded no evidence suggesting that more politically aware or knowledgeable partisans were more resistant to treatment effects from reading the CIR Statement. On the contrary, those with higher Science Knowledge scores showed a stronger

treatment effect for the risk misinformation item (see Figure 2), as well as a nearly significant effect for the residential restrictions item (see Figure 3, $p = .06$).

 Insert Figures 2 and 3 about here

Prior Attitudes Effect

Next, we considered the evidence of motivated reasoning due to prior attitudes captured in our Environmental Risk Perception measure. The pattern of predictions was the same as for partisanship: The directional reasoning account expects disconfirmation and confirmation biases, whereas evidence of an accuracy motivation would come from either a general treatment effect or results in which the groups with the most inaccurate beliefs would show the most improvement in response to reading the CIR Statement.

Results showed significant and systematic variation in factual accuracy between high and low environmental risk perception for all eight of the true or false items measuring Factual Accuracy. Respondents who perceived higher environmental risk were more accurate prior to treatment on the first four items (using the same ordering as that of Figure 2), whereas those who perceived lower risk scored better on the latter four items. This time, we expect larger gray bars for the first four and larger black bars for the latter four. We observe a generally significant improvement for the first four items, with asymmetric or no effect for the latter four items.

 Insert Figure 4 about here

Again, we ran a series of regressions to check for significant differences in the treatment effects across those with low versus high risk perception. We found evidence of motivated reasoning due to prior attitudes in one instance (frivolous suit), plus a nearly significant effect at $p = .06$ (residential restrictions). However, we found one case of marginal significance in which those with greater prior bias improved more (seed spread, $p = .07$).

 Insert Table 2 about here

Finally, we tested whether these effects were moderated by Interest in Politics or Science Knowledge. We found no evidence that treatment exacerbated bias; however, we found two interaction effects of marginal significance between treatment, Environmental Risk Perception, and Science Knowledge. Those with greater Scientific Knowledge scores more readily accepted treatment on a congruent item (enforcement costs, $p = .09$). We also found one instance of less pronounced bias due to effortful reasoning (frivolous suit, $p = .06$). (See Online Appendix E for a graphic representation of these results.)

Robustness Checks

The median age of our sample skewed older with a median of 67 years old. Jackson County is roughly five years older than the US average, and our sample was restricted to registered voters, who are an older demographic. Nevertheless, we ran additional analyses to determine whether our sample's age distribution affected our findings. We found only one instance of a significant treatment effect difference across different age groups, with smaller effects for older groups (see Table F1 in the Online Appendix). In fact, our main treatment effect estimates may have been deflated due to the age distribution of our sample.

Another potential source of bias came as a consequence of our experiment taking place in the field, rather than in the more controlled conditions of a lab. Prior to the survey's implementation, about a quarter of control-group respondents reported that they had already read the CIR Statement; this potentially led to a pre-treatment bias, albeit one more likely to deflate our estimates. Indeed, when we reran our estimation of treatment effects by limiting our sample to those who had not previously read the CIR Statement, our findings appeared robust and the coefficients comparable. Additionally, dropping a quarter of control-group respondents and rerunning our analysis did not change the overall story. Again, more often than not, coefficients were somewhat but not significantly larger suggesting that our estimates might have been deflated (see Table F2 in Online Appendix F).

Finally, our main interaction analysis focused on partisanship as a source of motivated reasoning. In doing so, we chose to exclude strong covariates of partisanship to avoid overcontrol bias and multicollinearity issues. To test the robustness of these findings across alternative measures, we repeated our main analyses by replacing partisanship with the two cultural cognition factors of Hierarchism and Individualism. The results were consistent with the overall pattern described herein (see Table F3 in Online Appendix F).

Summary of Findings

We set out to find whether a directional or accuracy motivation prevailed in respondents' processing of information from a deliberative minipublic. Overall, respondents who read the CIR Statement were significantly less likely to be incorrect and more confidently picked the correct answers. Importantly, across all eight factual items, there was no instance in which reading the CIR Statement led to significantly more bias.

We found no evidence of partisan motivated reasoning of any sort. Exposure to the CIR statement improved factual knowledge among both partisan groups on a number of relevant items, although not universally. More importantly, we found instances in which those who if directionally motivated should have resisted the new information the most were in fact those who improved the most. This suggests that the deliberative minipublic's statement induced an accuracy motivation.

Looking across respondents with high and low environmental risk perception, we again found improvements on a number of items. In some instances, previously more biased respondents improved more, whereas in other cases, those who began with more accurate views showed greater improvement. In most instances, both groups' factual accuracy scores improved. Thus, whether the more biased were catching up or the more correct pulling away, it was never the case that factual accuracy worsened. In one instance, however, those respondents who previously were more accurate improved significantly more than their counterparts, who did not improve at all. In another case, those previously more biased improved substantially, whereas those who began with more accurate views did not. In sum, the evidence suggests that respondents with opposite perceptions of environmental risk were often—but not always—motivated to arrive at an accurate belief.

Discussion

Prior work suggests the pervasiveness and power of directional motivated reasoning. This process of biased information processing can lead to dire outcomes (Achen & Bartels, 2017), particularly in a polarized and special-interest driven political system (Gilens & Page, 2014; McCarty, Poole, & Rosenthal, 2016). Given this state of affairs, it is surprising that relatively little work has been devoted to figuring out the boundaries of directional reasoning (Bolsen et al., 2014; Redlawsk et al., 2010). To help fill that gap in the literature, we provided experimental evidence from a real-world case to show how a more reflective motivation can take hold, at least

momentarily. Our results showed that Oregon voters improved their factual policy knowledge on a ballot measure when exposed to a CIR Statement written by a deliberative body of their peers.

Exposure to this distinctive source of information consistently cut through partisan motivated reasoning and improved factual accuracy. Whereas one set of partisans improved significantly more than the other, it was the partisan group with greater prior bias that demonstrated the greater improvement in its views. Our results for environmental risk perception biases were more mixed, however. We observed overall improvements, some evidence of uncritical acceptance of congruent information, but larger improvements among those with stronger prior environmental attitudes. Thus, we found little evidence of disconfirmation bias, though reading the CIR Statement did not have a treatment effect for all eight of the true or false knowledge items across all subgroups of our sample. Moreover, we found no moderating effect of interest in politics and contrary to previous findings those with greater scientific knowledge generally benefited more from reading the CIR Statement.

The results suggest that even in a polarized political setting with significant campaign spending, well-publicized findings generated by deliberative minipublics can help decrease systematic biases among voters. Sometimes, this can reverse mistaken beliefs generated by prior directional reasoning, and in other cases, it can increase policy-relevant knowledge whereas only uncertainty existed beforehand. This finding provides a counterpoint to skepticism about deliberation in what Suiter (2016) calls a “post-truth environment where truth is simply a matter of assertion” (p. 27). Our study appears to provide more evidence of an “accuracy motivation” (Druckman, 2012) that forestalls directional motivated reasoning. If future research can clarify precisely how to trigger that more felicitous motive, it could bring contemporary politics closer to a deliberative ideal in which voters draw more on evidence and reason to reach their judgments (Barber, 1984; Yankelovich, 1991).

Unfortunately, our data did not permit identifying the exact mechanism that improved factual accuracy by cutting through partisan motivated reasoning. Theoretically, we expect that a motivation to hold accurate beliefs might “condition partisan motivated reasoning” (Bolsen et al., 2014, p. 235). The key to activating that alternative motivation may be the perceived legitimacy of a minipublic, owing either to its participants (i.e., a random group of peers) and/or to its deliberative process (Cutler et al., 2008; Fournier et al., 2011; Gastil et al., 2016).

If future research validates this account, it will be important to understand more about the nature of this motivation to form accurate beliefs. Are voters in these circumstances considering new evidence and arguments in hopes of “voting correctly” (Nai, 2015) on ballot measures? Or are respondents who resist directional reasoning impulses trying to impress their peers, or (worse) the researchers? Sorting out these and other potential mechanisms requires more fine-grained psychological measures and experimental designs (see Leeper & Slothuus, 2014).

The key strength of our experiment—its location within a real-world setting—also counted as a second weakness. In this mail-survey experiment, we could not perform detailed information manipulations, including the inclusion of competing cues from different sources. Future research could explore variation in how different cues moderate and interact with different types of information, sources, and processing styles (Mullinix, 2016). Future research could consider the potential impact of minipublics and similar information sources on subjective attitudes instead of on strictly factual claims. A recent study by Nyhan, Porter, Reifler, & Wood (2019) found that “fact-checking” information from media “improved the accuracy of respondents’ factual beliefs ... but had no measurable effect on attitudes.” Even if exceptions exist (Gastil et al., 2018), partisan identity and prior attitudes may generally overwhelm any attitudinal cues given off by minipublics.

As for the particular minipublic studied herein, the Oregon CIR process should continue to provide useful tests of the powers and limits of minipublics as a means of influencing mass public beliefs, attitudes, and voting choices (Warren & Gastil, 2015). Future investigations may be able to discern stable patterns or issue-based variations in the effects across the seven Oregon CIRs held from 2010 to 2016, along with four pilot CIR tests in Arizona, Colorado, and Massachusetts besides the county-level event reported herein. Researchers might come to identify the key features that trigger an accuracy motivation by comparing findings from the CIRs with those generated by other distinct minipublics, such as Citizens’ Assemblies (Fournier et al., 2011) and Deliberative Polls (Fishkin, 2018). Experimental variations in the descriptions of hypothetical minipublics (i.e., their selection and deliberation processes) would complement such real-world comparisons. Whether in the lab or in the field, such investigations should gradually identify precise conditions under which motivated reasoning predominates or recedes.

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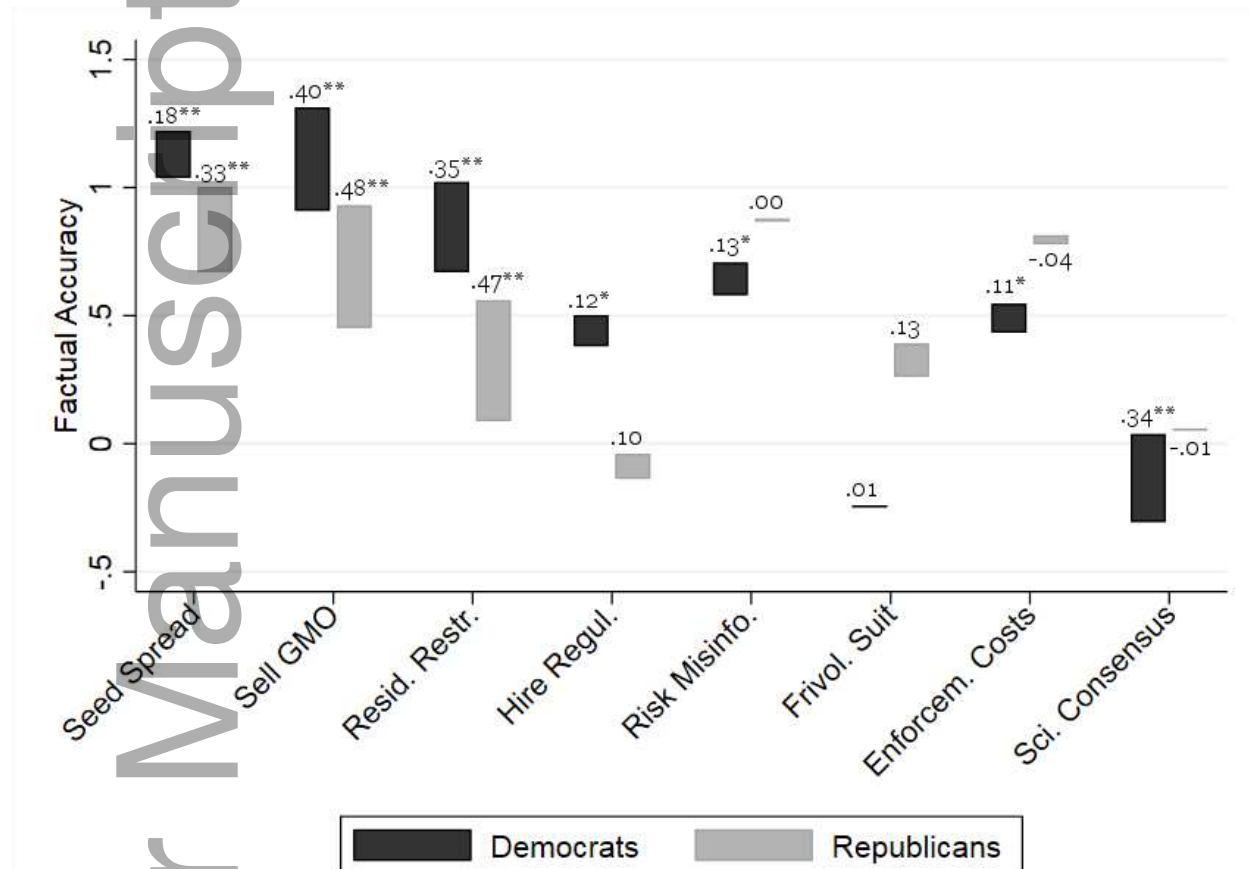
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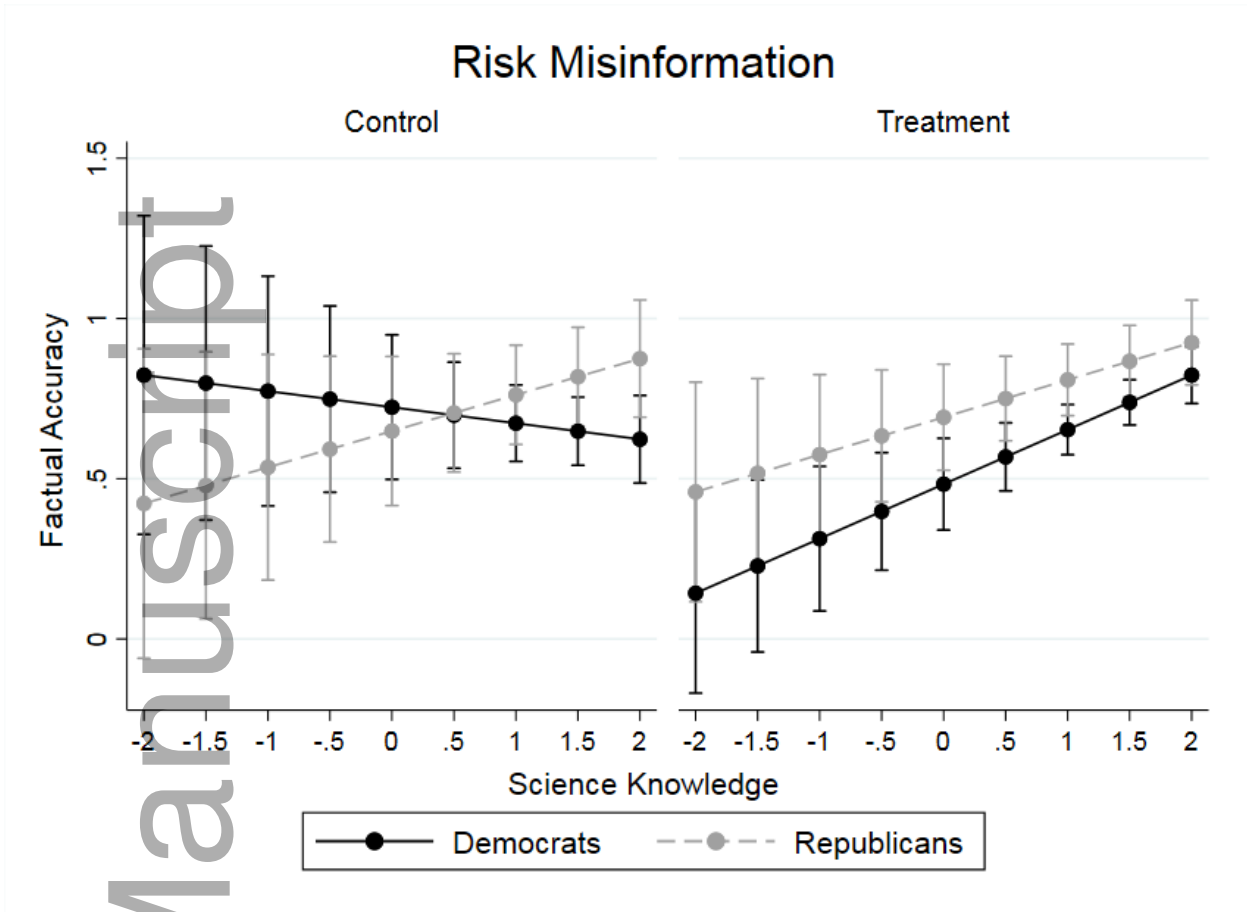
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Figure 1. Differences in accuracy scores between those who read the CIR statement (treatment) and those who did not (control), split by partisan identity.



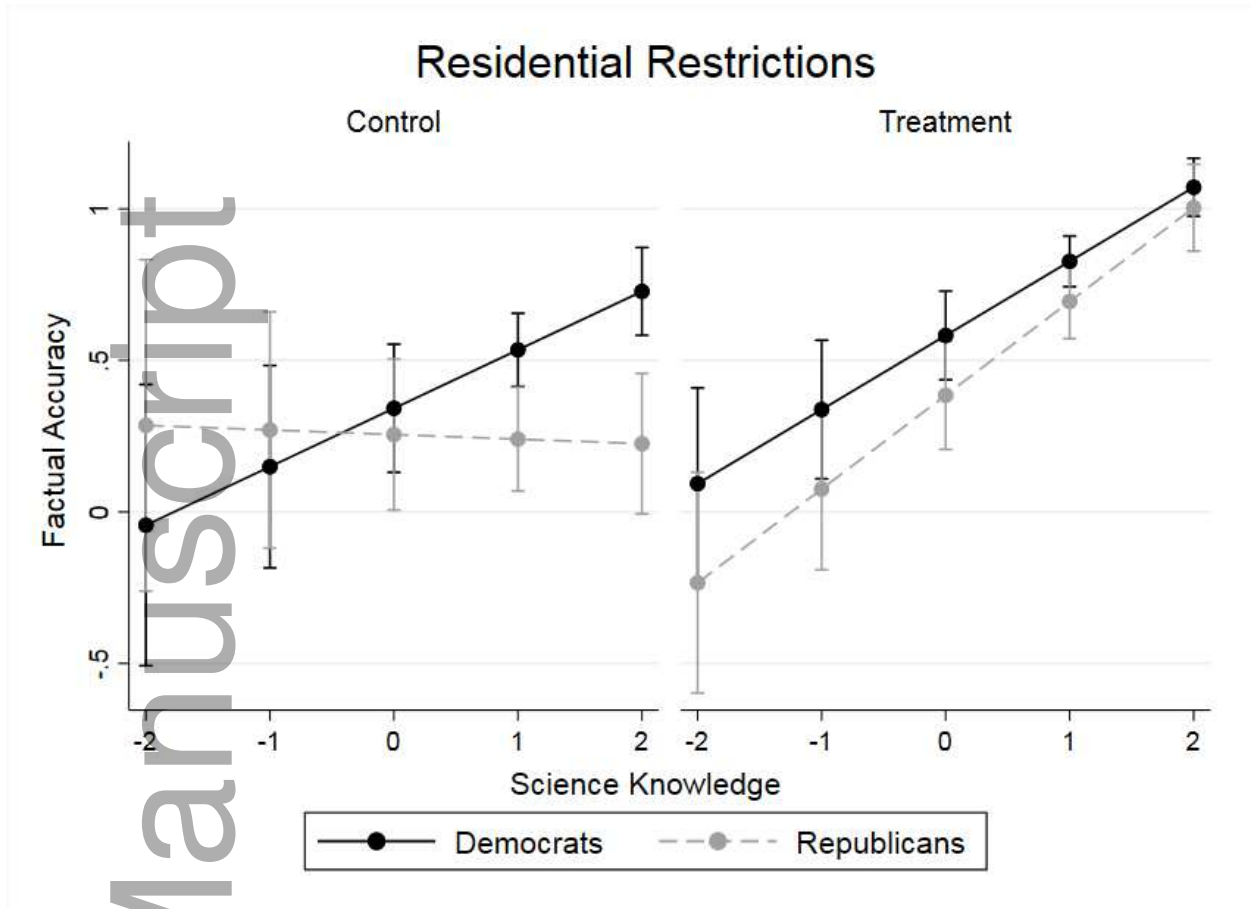
Note. The bottom of each bar corresponds to the mean accuracy score for the control group (N = 1274), with the top of each bar showing the mean for respondents exposed to the CIR Statement (N=3308) (reversed for negative relationships). Factual Accuracy scores ranged from -2 (definitely incorrect) to +2 (definitely correct). Coefficients on the graph show average treatment effects. *p < .05, **p < .01.

Figure 2. Interactions between partisan identity, Science Knowledge, and receiving the CIR Statement (treatment) in predicting Factual Accuracy scores for a true or false item regarding the prevalence of misinformation about GMO risks.



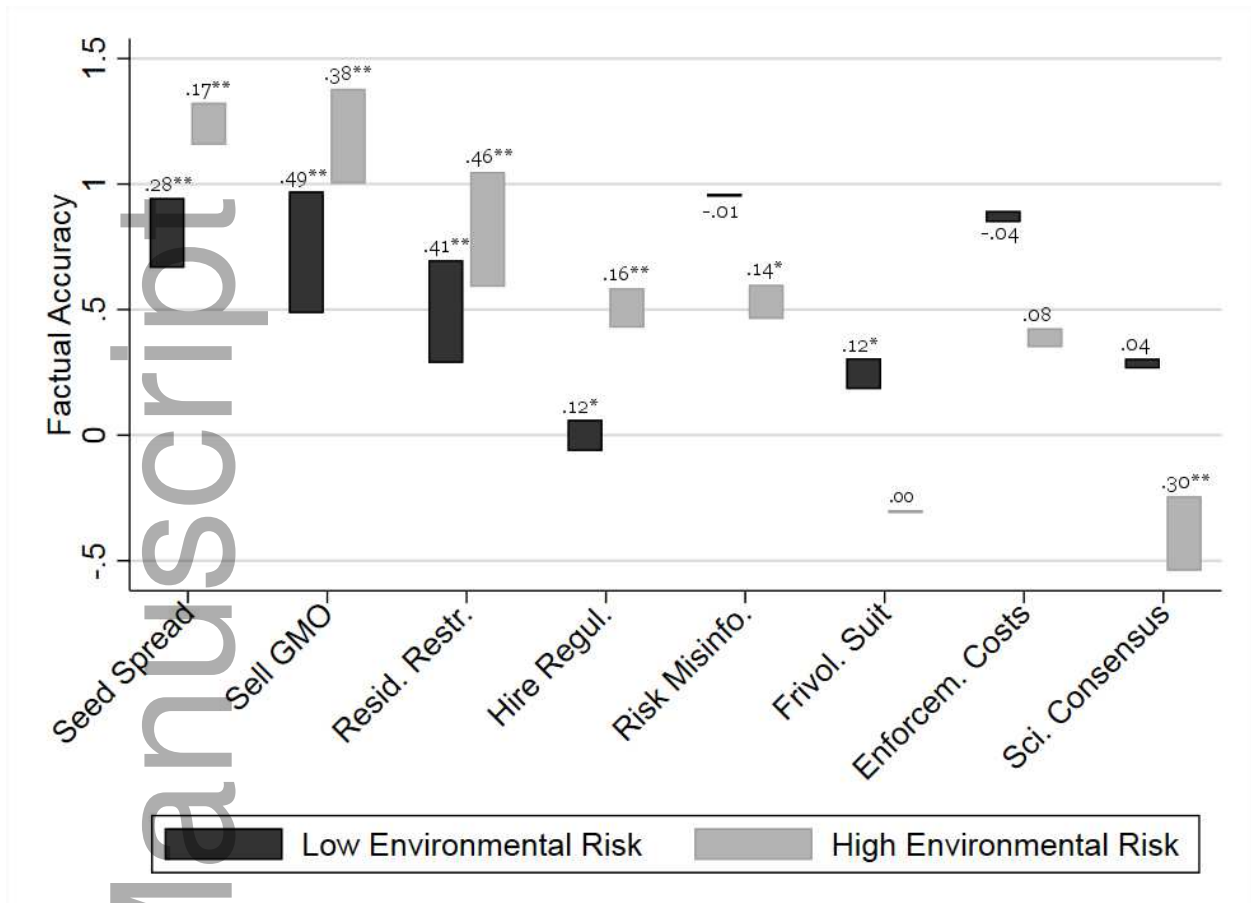
Note. The Factual Accuracy and Science Knowledge scales both ran from -2 (definitely incorrect) to +2 (definitely correct). Error bars show 95% confidence intervals.

Figure 3. Interactions between partisan identity, Science Knowledge, and receiving the CIR Statement (treatment) in predicting Factual Accuracy scores for a true or false item regarding the ballot measure’s impact on residential restrictions.



Note. The Factual Accuracy and Science Knowledge scales both ran from -2 (definitely incorrect) to +2 (definitely correct). Error bars show 95% confidence intervals.

Figure 4. Differences in accuracy scores between those who read the CIR statement (treatment) and those who did not (control), split by high or low environmental risk perception.



Note. The bottom of each bar corresponds to the mean accuracy score for the control group (N = 1274), with the top of each bar showing the mean for respondents exposed to the CIR statement (N = 3308) (reversed for negative relationships). Factual Accuracy scores ranged from -2 (definitely incorrect) to +2 (definitely correct). Coefficients on the graph show average treatment effects. *p < .05, **p < .01.

Table 1
Descriptive Statistics for Each True or False Item

	Definitely Incorrect (-2)	Somewhat Incorrect (-1)	Don't Know (0)	Somewhat Correct (+1)	Definitely Correct (+2)	M	SD
Seed Spread	5.1%	9.2%	6.0%	32.1%	47.6%	1.10	1.16

Sell GMO (True)	2.7%	7.8%	15.8%	28.3%	45.4%	1.10	1.08
Residential Restrictions	6.2%	16.8%	11.2%	26.7%	39.2%	0.80	1.29
Hire Regulators (False)	8.0%	25.1%	18.0%	27.3%	21.6%	0.30	1.27
Risk Misinformation	7.2%	12.2%	11.7%	37.3%	31.7%	0.70	1.22
Frivolous Suit (True)	13.3%	27.5%	19.0%	29.1%	11.0%	-	1.24 0.03
Enforcement Costs (False)	5.2%	14.3%	17.9%	38.9%	23.6%	0.60	1.14
Scientific Consensus	14.4%	29.6%	15.8%	25.8%	14.4%	-	1.31 0.04

Note. Each item corresponds to a true or false claim made by a proponent or opponent of the ballot measure during the campaign (see Appendix). The truthfulness of each of these claims is indicated in parentheses. The CIR statement included correct information regarding each of these claims.

Table 2

Treatment Effect Regression Coefficients (and Standard Errors) for Each True or False Item

Interactions with treatment	Seed Spread	Sell GMO	Resid. Restr.	Hire Regula.	Risk Misinf.	Friv. Suit	Enforc. Costs	Sci. Cons.
Partisanship (Repub. = 1)	.23* (.097)	.01 (.096)	.18† (.095)	.02 (.090)	.04 (.095)	.05 (.092)	-.11 (.095)	-.18† (.093)
Environ. Risk Perception	.10† (.057)	.02 (.056)	.11† (.057)	.08 (.052)	.02 (.059)	-.13* (.052)	.06 (.054)	.04 (.056)

Science	.12*	.14**	.15**	.03	.13*	.06	.09†	.13*
Knowledge	(.057)	(.052)	(.053)	(.054)	(.057)	(.055)	(.054)	(.054)
Interest in	-.11	-.06	-.18**	.02	.03	.00	.02	-.02
Politics	(.073)	(.069)	(.066)	(.063)	(.066)	(.063)	(.065)	(.061)
N	3,284	3,287	3,281	3,272	3,286	3,288	3,272	3,282

Note. Table shows regression coefficients (and standard errors in parentheses) for interactions between treatment variable with control group as reference category and independent variables. Each model included controls for age, gender, education (interacted with treatment variable), and liberal or conservative ideology. Robust standard errors shown in parentheses. See Online Appendix B for variable details. † $p < .10$, * $p < .05$, ** $p < .01$.

Endnotes

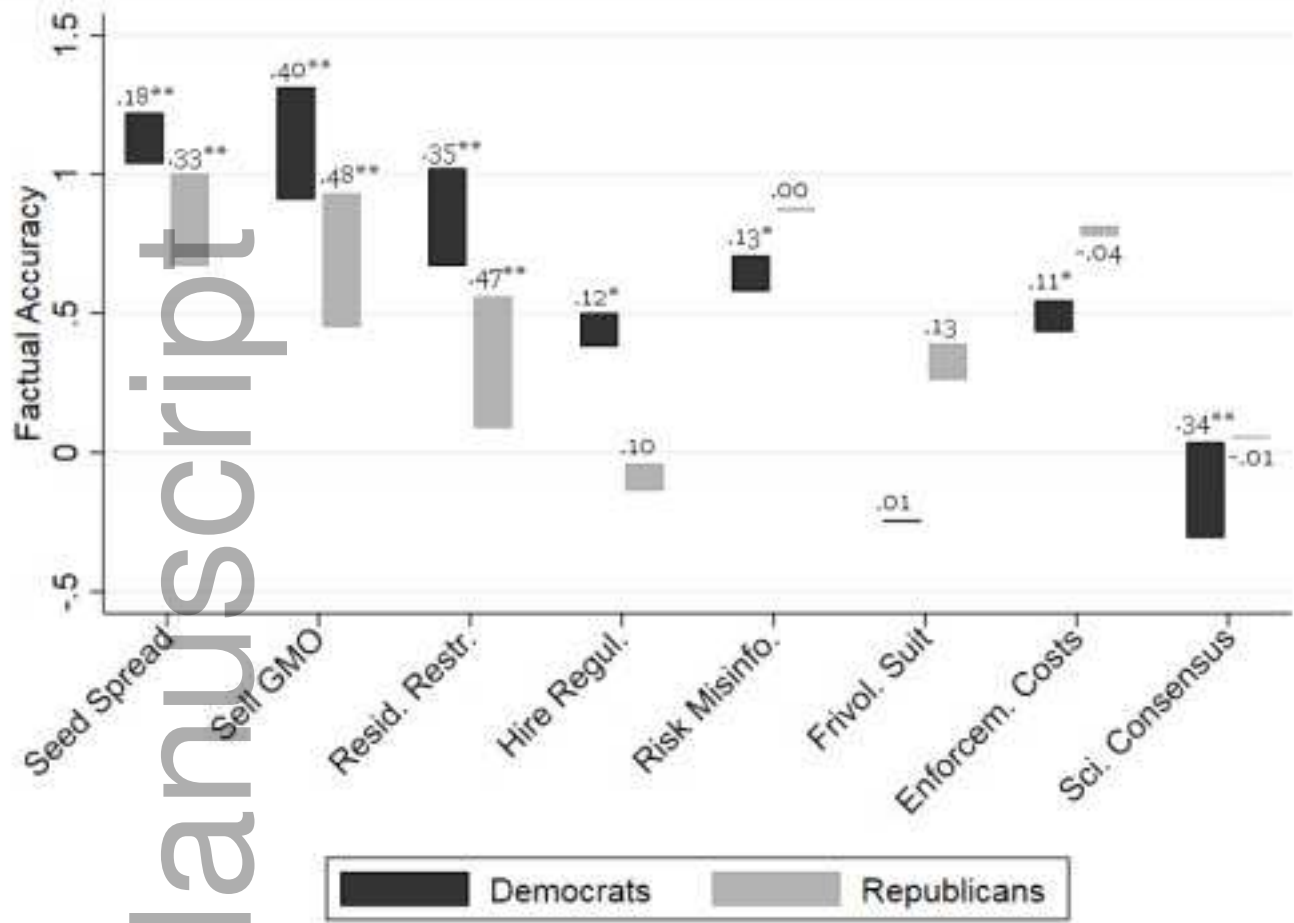
¹ The survey was designed to test three different orderings of pro and con arguments within the right-hand column of the CIR Statement. One version showed pro before con, another con before pro, and a third alternated pro and con arguments. No substantive differences were found among the three different versions, and these were collapsed for the purpose of this study.

Appendix: Factual Statements from Survey

Statement	Type
A. This measure will restrict the seeds that homeowners can use for their lawns, flowers, and household plants.	A. FALSE claim from OPPOSITIONS
B. If the enforcement of this measure was challenged in court, the County would NOT incur any legal costs.	B. FALSE claim from PROPOSITIONS
C. There is NOT any practical way to stop genetically engineered pollen and seeds from spreading onto	C. TRUE claim from PROPOSITIONS

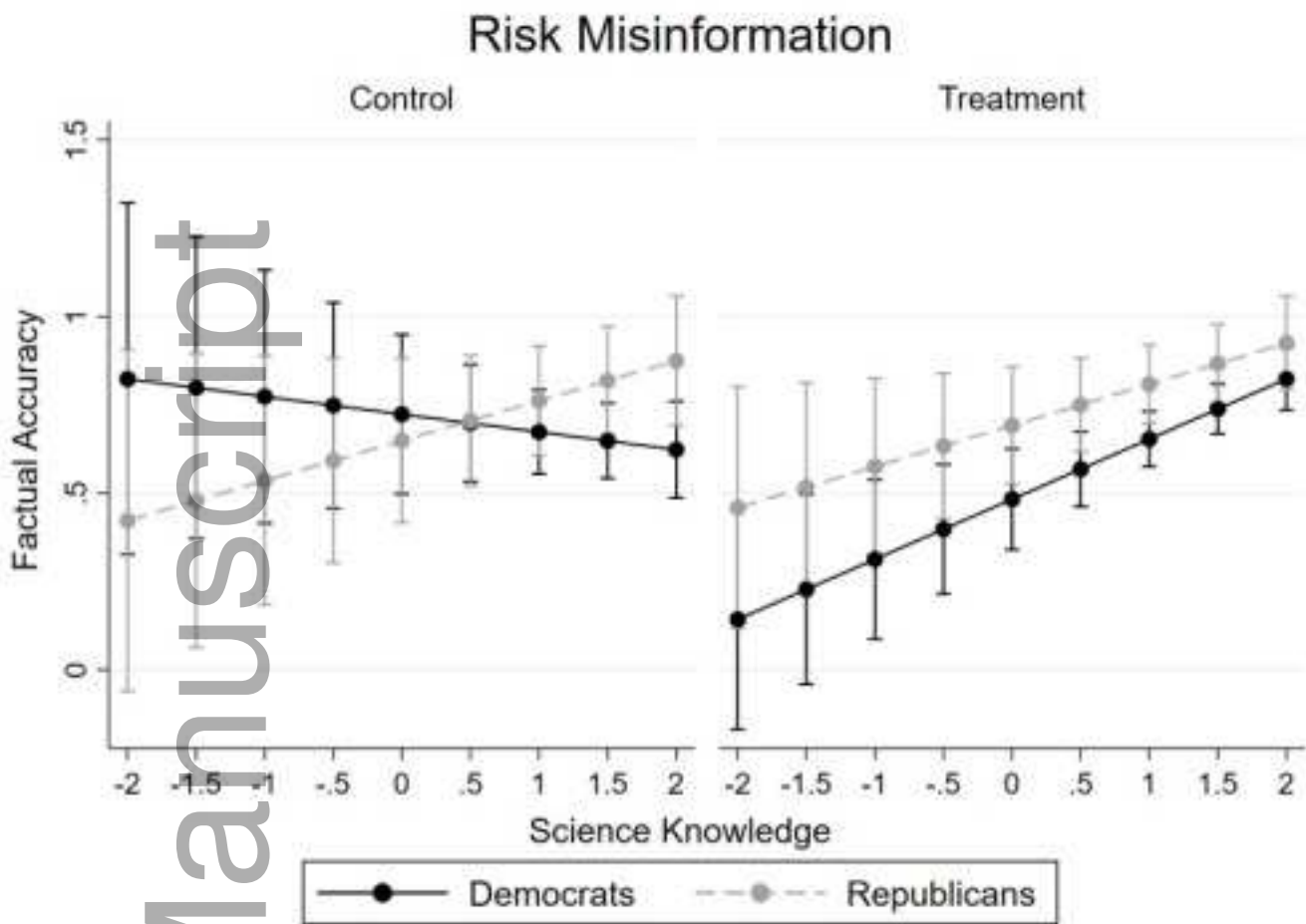
traditional farms nearby.	
D. There has been considerable misinformation about the direct health risks of genetically modified foods.	D. TRUE claim from OPPONENTS
E. This measure requires County commissioners to hire and train new regulators.	E. FALSE claim from OPPONENTS
F. This measure empowers citizens and special interest groups to file lawsuits merely on the suspicion that a farmer is growing genetically engineered plants.	F. TRUE claim from OPPONENTS
G. A farmer cannot save or sell any seeds produced from genetically engineered pollen, even if that pollen drifted onto the farmer's own plants.	G. TRUE claim from from PROPONENTS
H. Most major scientific societies and reports are very skeptical about the public safety of genetically engineered crops.	H. FALSE claim from from PROPONENTS

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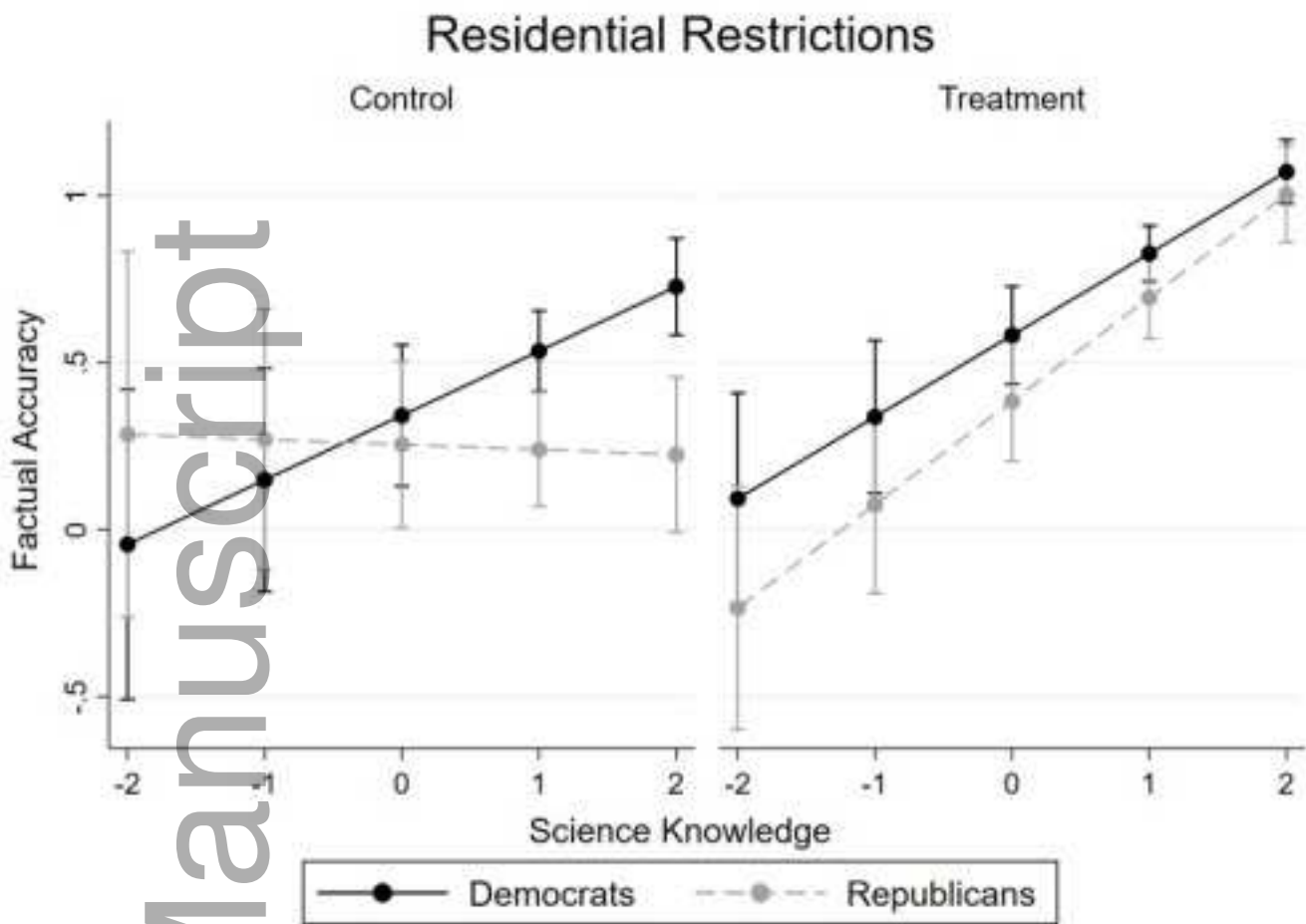
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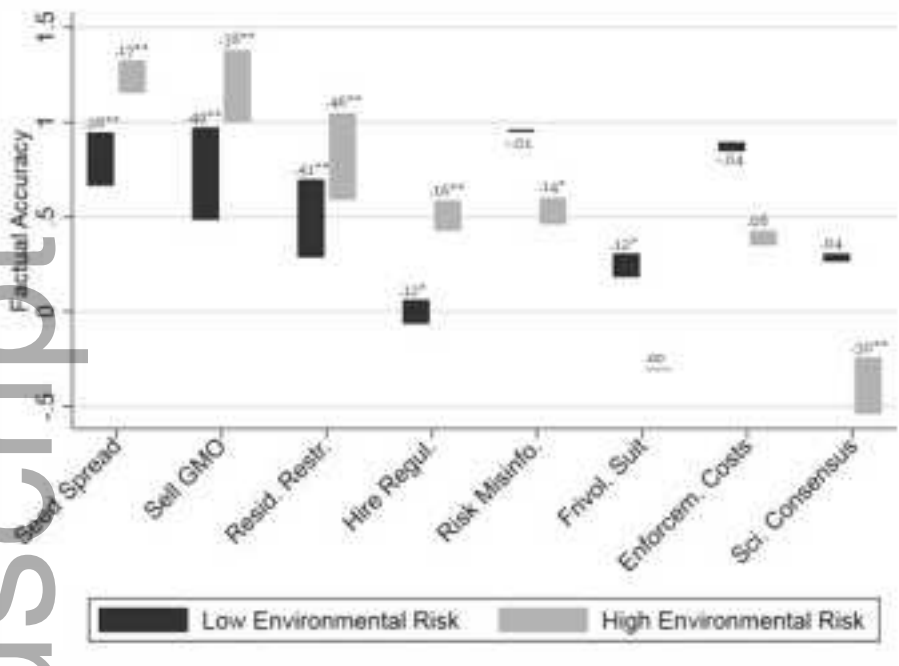


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