

## Finding the Right Value: Framing Effects on Domain Experts

**Amelia C. Andrews**

*California Polytechnic State University*

**Rosalee A. Clawson**

*Purdue University*

**Benjamin M. Gramig**

*Purdue University*

**Leigh Raymond**

*Purdue University*

---

*By defining the essence of a policy problem, an issue frame shapes how individuals think about a political issue. In this research, we investigate framing effects among domain experts, an understudied yet increasingly important set of individuals in the policymaking process. Because domain experts have extensive and highly structured knowledge on a particular topic, they are likely to actively process issue frames to which they are exposed. Consequently, we hypothesize that frames consistent with experts' values will be particularly influential, whereas frames inconsistent with their values will lead to contrast effects. We test our hypotheses on a unique set of domain experts by examining professional farmers' attitudes toward no-till agriculture. Using an experimental design, we find evidence that environmental values interact with frames to influence farmers' interest in no-till, especially when farmers are exposed to a novel frame.*

---

**KEY WORDS:** issue framing, expertise, values, contrast effects, environment

---

Issue frames are persuasive messages that define what policy problems are “really about,” and as a result, they shape how the public understands issues at hand (Gamson & Modigliani, 1987). Frames have a significant effect on the attitudes and behavioral intentions of the public on many issues (Clawson & Waltenburg, 2008; Schwartz, de Bruin, Fischhoff, & Lave, 2015), making them an important factor in decision-making and choice (Gromet, Kunreuther, & Larrick, 2013). At the same time, frames vary in their effect on different citizens, including based on the degree to which a frame is consistent with the audience members' core values and beliefs. In particular, politically knowledgeable individuals have the motivation and ability to assess the consistency between their predispositions and the frame, making their values even more important in determining a particular framing effect (Brewer, 2003; Kam, 2005).

Yet framing scholars have not examined the potentially distinctive influence of issue frames on a group of growing political importance: experts in various policy-relevant subjects. These so-called “domain experts” are increasingly important in politics (Jones & Baumgartner, 2005; Weible, 2008), across a wide variety of areas ranging from healthcare to environmental protection to finance. They also are similar to individuals with high political knowledge in some ways that suggest the potential for greater motivation and ability to actively interpret an issue frame. Yet, the extent to which domain experts—that is, authorities within specific policy fields—internalize and respond to relevant issue frames is unclear.

Based on a theoretical expectation that domain experts will be active receivers who pay greater attention to frames in their area of expertise, we hypothesize that these experts will also respond to issue frames based substantially on how those frames interact with their prior core beliefs and values. Employing a field experiment, we investigate these claims in the context of a distinctive and important class of domain experts: professional farmers. Farmers have faced lengthy efforts to persuade them to adopt new conservation practices, including the “no-till” form of planting crops that limits disturbance of the soil. Despite education campaigns and even material incentives to promote no-till agriculture since its introduction in the 1960s, some farmers remain resistant to the practice (Andrews, Clawson, Gramig, & Raymond, 2013; Gramig, Barnard, & Prokopy, 2013). The failure of material incentives in particular to stimulate interest in conservation tillage has inspired our work to understand how new issue frames might generate more positive attitudes among farmers toward the technique. Our experimental findings indicate that issue frames interact with farmers’ environmental values to influence interest in no-till, consistent with the idea that farmers are actively processing such frames and responding according to their core beliefs.

## How Do Issue Frames Influence Experts?

### *Framing Effects*

Policy actors use issue frames to define “the essence of the issue” (Gamson & Modigliani, 1987, p. 143), identifying what is at stake and the considerations that the public should use to evaluate political issues (Chong & Druckman, 2007b; Gamson & Modigliani, 1987, 1989). Frames are verbal or visual messages that highlight specific dimensions of policy issues to influence individuals’ perceptions of those issues. According to the belief-importance model, frames alter the relative importance of the considerations individuals use to form attitudes toward framed policy issues by creating as well as reinforcing connections between political problems and specific considerations (Nelson, Clawson, & Oxley, 1997; Nelson, Oxley, & Clawson, 1997). For example, individuals tend to weigh considerations of civil liberties more heavily in establishing their support or opposition for a prospective hate-speech rally than those of public order when exposed to frames that discuss the rally as a “freedom of speech” issue (Nelson, Clawson, et al., 1997). The resulting change in attitude toward the issue can be described as a framing effect (Chong & Druckman, 2007a). Elites, therefore, try to harness the potential power of issue frames over public opinion by competing to make their frame dominant in the public discourse and consciousness (Nelson & Kinder, 1996, p. 1058).

### *Issue Frames, Values, and Political Knowledge*

Individuals do not blindly accept issue frames; the extent to which frames influence individuals’ attitudes depends in part on the predispositions that audience members bring to the table (Clawson & Waltenburg, 2003). For instance, individuals may use their values as a basis to judge the strength and

validity of political information, such as issue frames. In doing so, individuals evaluate the compatibility of policies, candidates, or actions depicted in the information they have received with their value system (Feldman, 1988, 2003). Framing an issue or policy in terms of values that are more amenable to frame recipients will typically generate stronger framing effects (Barker, 2005; Marietta, 2008). On this account, frames that are inconsistent with individuals' values are less likely to change recipient attitudes on the issue (Brewer, 2003).

Scholars suggest that in the event the value interpretations presented within issue frames *challenge* those held by audience members, some individuals will defend their own values (Brewer, 2002; Marietta, 2008). As a result, individuals holding values that are inconsistent with the message of the frame may experience no framing effect at all by merely disregarding or counterarguing against the frame without experiencing an attitudinal response (see Arikan & Bloom, 2013; Zaller, 1992). Alternatively, some research suggests respondents may experience a negative change in attitude—one that is contrary to the purpose of the frame—when their own value interpretations are inconsistent with those presented within issue frames (Chong & Druckman, 2007a). In this so-called “contrast effect,” individuals emphasize the difference between their own position and the position of those with whom they disagree (Sniderman, Brody, & Tetlock, 1993, chap. 2). Thus, a frame designed to generate *greater* support for an issue may actually generate *weaker* support due to the information's inconsistency with individuals' values (Marietta, 2008; Petersen, Slothuus, & Togeby, 2010).

This values-driven model of the framing process, however, assumes that individuals have the motivation and ability to actively process the information presented in issue frames. The active evaluation of information is taxing; thus to expend the necessary cognitive energy, individuals must have some incentive, or drive, to think about a particular policy issue (Cacioppo, Petty, Feinstein, Blair, & Jarvis, 1996; Petty, Cacioppo, Sedikides, & Strathman, 1988). Likewise, individuals must have the intellectual capacity to think about and understand policy issues and information (Petty & Cacioppo, 1981, 1984; Petty et al., 1988).

Politically knowledgeable individuals tend to demonstrate this higher level of cognitive motivation and ability, making them more likely to actively process political information in messages such as issue frames (Chong & Druckman, 2007a; Nelson, Oxley, et al., 1997). In many cases, this means that politically knowledgeable individuals respond differently to frames they evaluate as being more or less consistent with their values (Brewer, 2003; Kam, 2005). By contrast, the politically less informed have lower levels of political motivation (Delli Carpini & Keeter, 1996, chap 5; Eveland, 2004) and have relatively low levels of cognitive engagement (Alvarez & Brehm, 2002; Sniderman et al., 1993; Zaller, 1992, chap. 3). As a result, greater political knowledge seems to provide individuals with an edge when it comes to making connections between their values and the arguments presented in an issue frame.

### *Issue Frames, Values, and Domain Expertise*

Although many scholars have examined political knowledge as a moderator of framing effects, there is surprisingly little research on the effect of other forms of knowledge or expertise on the influence of frames. Unlike those who are generally knowledgeable about politics, “domain experts” are individuals with extensive and organized knowledge that emerges from substantial experience and practice *within a particular field* (Hoffman, 1998). This expertise could be produced by both intensive education as well as extensive professional experience in a given area. Such experts are increasingly important in many controversial policy domains such as public health, environment, or foreign affairs, as both the creators and the recipients of different issue frames. Yet framing research has paid scant attention to how this distinctive form of expertise might moderate framing effects.

Domain experts have knowledge structures that allow them to actively process domain-relevant information more efficiently and effectively (Nuthall, 2012; Wiley, 1998), while at the same time enhancing the need to evaluate the practical implications of relevant information. Thus, domain experts' engagement with, and understanding of, specific issue areas creates a heightened motivation and ability to collect and process issue-relevant information. The extent and implications of this engagement are different for domain experts, however, than for merely knowledgeable populations (Cellier, Eyrolle, & Marine, 1997; Wiley, 1998). The strength of domain experts' engagement with a specific issue area makes their knowledge of the issue part of their personal identity (Fiske, Lau, & Smith, 1990). Their direct and personal stake in outcomes within their area of specialization gives experts a high need to evaluate relevant policy issues and options. Moreover, experts retain a heightened awareness of the direct consequences their attitudes and behaviors have on conditions within their area of expertise (Hoffman, 1998; Johnson, 1988). This suggests that, compared to those with general political knowledge, experts may be even more likely to actively process issue frames related to their domain of interest and to reference their values while doing so.

Thus, we hypothesize that domain experts will be active recipients of frames in their area of knowledge and therefore use the values highlighted by a given issue frame when formulating or updating their attitude on that issue, much like politically knowledgeable individuals. This leads us to two specific hypotheses related to expectations of both positive and negative framing effects for this distinctive population:

*H1: Domain-relevant issue frames that emphasize values domain experts accept will lead to positive attitude change, that is, a framing effect.*

*H2: Domain-relevant issue frames that emphasize values domain experts reject will lead to negative attitude change, that is, a contrast effect.*

### *Values, Attitudes, and Environmental Behavior Change*

Attitudes are an important influence on the adoption of new behaviors such as new tillage practices. Prior research shows that attitudes shape environmental and other behaviors, along with factors such as personal values, material costs of the behavior, and social pressures from others (Dietz, Fitzgerald, & Shwom, 2005; Fishbein & Ajzen, 2011; Steg & Vlek, 2009; Stern, 2000; Wegener & Kelly, 2008). The relationship between attitudes and environmental behaviors can often be complex (e.g., Batel & Devine-Wright, 2015; Owens & Driffill, 2008), and other factors such as social norms and high costs will sometimes outweigh positive attitudes to prevent behavioral change (Steg & Vlek, 2009; Stern, 2000). Nevertheless, it is widely accepted that attitudes are often an important determinant of many pro-environmental behaviors, such as the choice to use no-till farming techniques.

In addition, it is important to distinguish the present study from efforts to change attitudes through the "information deficit" model. Unlike research trying to change attitudes by educating individuals with more information or "science" on an issue, this study uses the alternative of issue framing to shape attitudes. Issue framing, as noted above, relies on getting individuals to reconceptualize an issue in terms of alternative considerations, rather than increasing their understanding of the issue. Thus, the present study does not test the discredited "information deficit" model of behavior change (Steg & Vlek, 2009), but rather it tests more relevant questions of how different issue frames may get individuals to consider an issue in terms of different values, thereby changing their attitudes. This research is in the tradition of studies showing that different frames for an environmental behavior, such as labeling an energy-efficient light bulb in terms of its environmental benefits rather than its cost savings, can significantly influence attitudes and behavior (e.g., Gromet et al., 2013).

Finally, the current study also builds on work looking at the role of environmental values in shaping environmental behaviors. Much of this research has established that certain environmental values can themselves influence pro-environmental behaviors (Dietz et al., 2005), perceptions of environmental risks (Bellamy & Hulme, 2011), and even interpretations of environmental science (Kahan, 2010; Kahan, Jenkins-Smith, & Braman, 2011). In many cases, these studies have relied on variations of Cultural Theory (Douglas & Wildavsky, 1982) to generate the relevant values. In addition, some work looks at how values themselves can be changed, leading to new attitudes and behaviors (Raymond, Weldon, Kelly, Arriaga, & Clark, 2014; Steg & Vlek, 2009).

Rather than focusing primarily on how values shape individual beliefs or behaviors directly, however, the current project considers how values moderate the effect of a frame on an individual's attitudes. In particular, we use one of several prominent measures of environmental values promulgated by leading environmental psychologist Wesley Schultz (2001; Schultz et al., 2005), building on the work of Stern and Dietz (1994). According to this particular set of values, *environmental egoists* are concerned about the environment in terms of its potential impact on themselves and their future, *environmental altruists* are concerned about the impact of the environment on other individuals, and *environmental biospherists* favor environmental protection for the sake of other species and ecosystems (Dietz, Stern, & Guagnano, 1998; Schultz, 2001; Stern & Dietz, 1994; Stern, Dietz, Kalof, & Guagnano, 1995). Although these values may seem mutually exclusive, individuals may support more than one of these values at the same time; that is, a person might believe it is important to protect the environment both for the sake of other people and for one's own benefit (Stern & Dietz, 1994). Although other prominent measurements of environmental attitudes exist, such as the New Environmental Paradigm, they are not specifically focused on values in the manner required for this study (Dietz et al., 2005, p. 357; Hawcroft & Milfont, 2010). Hence, we follow other recent studies in relying on Schultz's widely used scale (e.g., Jacobs et al., 2015; Rossi, Byrne, Pickering, & Reser, 2015).

## Research Design

### *Case Selection: Farmers and No-Till Agriculture*

To test our hypotheses, we examine framing effects related to an important issue—farming techniques—among a distinctive population of domain experts—professional farmers. Although scholars have traditionally resisted applying the label of “expert” to farmers, instead reserving the term “agricultural expert” for those with a high level of formal agricultural education, recent scholarship demonstrates that farmers, too, demonstrate expert characteristics (Cerf, Papy, & Angevin, 1998; Morton, 2011; Nuthall, 2012). From this perspective, expertise emerges as farmers incorporate new information and practices to their knowledge as they develop a detailed understanding of the interdependent components of a farming operation. In doing so, experienced farmers cultivate the requisite systems knowledge to incorporate negative feedback and engage in abstract thinking characteristic of expert reasoning (Mauro, McLachlan, & Van Acker, 2009; Nuthall, 2009).

The selection of a tillage method is fundamental to farming operations due to the implications for the long-term management and productivity of agricultural land (Rousse, 2008; Uri, Atwood, & Sanabria, 1999). Farmers have several options for tilling their soil to plant their crops, including the “no-till” crop-management system in which agricultural land is undisturbed between harvest and planting, thereby reducing soil erosion and agricultural runoff while also increasing biodiversity (Horowitz, Ebel, & Ueda, 2010; Lankoski, Ollikainen, & Uusitalo, 2006). As efforts to promote no-till adoption continue, the practice has garnered substantial attention within agricultural as well as policy communities, particularly as a mechanism for carbon sequestration in the fight against climate change (CAGG 2010; Rousse, 2008; Uri et al., 1999). Although most farmers are now familiar with the practice of

no-till, a significant portion of the farming community continues to hold negative attitudes toward the practice (Andrews et al., 2013).

### *Experimental Design*

We conducted a field experiment using random assignment to expose professional farmers to one of three different treatments describing the benefits of no-till farming. Each treatment included an issue frame designed to invoke one of three specific environmental values commonly measured in environmental psychology. Using a pre-/posttest design, we estimated whether frame exposure led to an increased, decreased, or no change in subjects' interest in no-till. To test our first hypothesis, we expected subjects who agreed more strongly with the value emphasized by each frame to experience a positive attitude change toward no-till. For our second hypothesis, we expected subjects who disagreed more strongly with the value emphasized by each frame to experience negative attitude change.

This pre/posttest design was selected to allow for a baseline measure of interest and a postframing measure. The percentage of respondents with no change in interest was 44%; a negative change occurred in 15% of all subjects (exhibiting a contrast effect), and 40% had a positive change consistent with a framing effect. Due to the limited amount of time between pretest and posttest measurements, it is possible that some subjects anchored their posttest response on their pretest response resulting in no change in their level of interest. We are unable to distinguish between instances of anchoring as opposed to genuine lack of change in interest. Although some may consider this a weakness of our experimental design, it provides a more rigorous test of our hypotheses by reducing the likelihood of any attitude change.

Subjects were recruited from a population of experienced row-crop farmers attending the annual Fort Wayne Farm Show in January of 2012 ( $N = 174$ ). Subjects were provided \$20 for participating in the experiment, and all responses were anonymous. Because of our focus on domain experts, we prescreened potential subjects and only accepted individuals for whom farming was their primary occupation and who were either the sole or one of the major decision-makers pertaining to farm-management practices. For other key variables—education, acres farmed, years farming, age, gross receipts from crop sales, race, and gender— $t$ -tests confirmed random assignment to our treatment groups.

Despite the use of a pre-/posttest design and confirmation of random assignment, we include two controls in each statistical model. We included controls because even though assignment to treatments was random, farming experience and trust in trade publications were not known *ex ante* and may influence the response to framing in unknown ways. We include a control for the length (in years) of subjects' farming careers to account for the process of knowledge accumulation and the practice of knowledge application that is the foundation for the development of expertise. Due to presenting our framing manipulation as an article written for a leading farm magazine, we also include a control for subjects' trust in trade journals and magazines. The two controls are jointly significant in Table 3 Model B ( $p = 0.0001$ ).

The experiment began with an initial survey offering a series of questions pertaining to current farming practices, as well as a question designed to measure attitudes toward no-till agriculture: "Some farmers are quite interested in no-till techniques, while others are not as interested. What about you?"<sup>1</sup> Subjects were asked to respond to this question according to a 7-point Likert-scale in which 1 represented "not interested" and 7 represented "very interested."

The initial instrument also asked subjects to respond to a set of questions designed to measure their support for three environmental values: environmental egoism, environmental altruism, and environmental biospherism. We used a 5-point Likert-scale to note how strongly subjects agreed or disagreed with seven different statements designed to correspond with a particular value (following



**Table 1.** Frames and Values

Frame	Argument	Relevant Value
Profit	No-till is able to increase farm profits by decreasing production costs, such as labor, fuel, and machinery costs.	Environmental Egoism
Community	No-till reduces soil erosion and agricultural runoff, thereby increasing water and ambient air quality. This has a positive impact on community members' health.	Environmental Altruism
Stewardship	No-till increases and maintains the long-term productivity of the land, ensuring the viability of use for future generations while also increasing biodiversity.	Biospherism

Schultz, 2001). For example, subjects agreeing with the statement “I am concerned about environmental problems because of the consequences for people in my community” would score high on the environmental altruism scale, whereas those agreeing with the same statement applied to “my future” or “my health” would score higher on the environmental egoism scale.<sup>1</sup> We created a measure of subjects' value support by calculating a mean index of responses for the questions appropriate for each value, as confirmed by a principle component factor analysis. We computed the Cronbach's alpha for the group of questions about environmental altruism ( $\alpha = 0.8313$ ), environmental egoism ( $\alpha = 0.7735$ ), and environmental biospherism ( $\alpha = 0.8298$ ), finding that each scale is reliable.

Once subjects completed the pretest, they returned that section to the researchers and received the next portion of the experiment. Subjects were asked to read a randomly assigned framing treatment designed to evoke a particular environmental value (see Table 1). The frame was administered on a separate page stapled to the second half of the experimental instrument, presented in color and formatted to resemble an article from *Farm Journal*, a well-respected national farm magazine. Each treatment included language that was consistent across all three treatments as well as content that was unique for each frame. The consistent language included a two-paragraph presentation of the basic rationale of no-till farming. The frame was presented in subsequent paragraphs as well as the article header.<sup>2</sup>

Table 1 illustrates the association of each frame with the relevant environmental value. For example, the profit frame highlighted the ability of no-till farming to reduce a farmer's costs in terms of time, labor, and reduced wear on machinery. This frame promotes no-till by presenting the farmer as the ultimate beneficiary of the conservation practice, thereby appealing to environmental egoism values. A second frame emphasized the benefits of no-till for neighboring communities in terms of improvements in air and water quality, in order to elevate environmental altruism. For example, this frame stressed no-till's benefits for swimming and fishing in local waterways due to reduced soil erosion and improving the health of local community members. The final frame invoked the value of environmental biospherism by focusing on stewardship and the role of farmers as the “keepers” of the earth. This frame also cited air- and water-quality improvements in promoting no-till as helping to promote biodiversity and protect the environment for future generations.

<sup>1</sup> The complete set of statements for measuring these values all started with the phrase: “I am concerned about environmental problems because of the consequences for ———” and then concluded with the following terms: “all people,” “future generations,” and “people in my community” (altruism); “my future,” and “my health” (egoism); and “wildlife,” and “ecosystems” (biospherism).

<sup>2</sup> Full text of all experimental treatments is available in the online supporting information.

**Table 2.** Descriptive Statistics

	Mean	SD	min	max	N
<i>Interest in No-Till</i>					
Pretest Level of Interest	4.32	1.49	1	7	171
Posttest Level of Interest	4.74	1.37	1	7	171
<i>Environmental Values</i>					
Mean Index of Environmental Egoism	3.89	0.76	2	5	170
Mean Index of Environmental Altruism	3.98	0.63	1.67	5	171
Mean Index of Biospherism	3.7	0.86	1	5	171
<i>Farmer Characteristics</i>					
Years Farming	25.38	14.26	1.5	65	164
Trust in Trade Journals <sup>a</sup>	3.07	0.75	1	4	168
Highest Degree Earned <sup>b</sup>	3.03	1.07	1	5	152
Average Acres Farmed	960.8	1053.0	20	8012.5	152
Age	45.45	15.13	18	78	152
Gross Receipts <sup>c</sup>	2.13	1.58	1	7	152
Gender (Male = 1)	0.99	0.08	0	1	152

<sup>a</sup>4-point Likert scale where 1 = Not at all; 2 = Not much; 3 = Some; and 4 = A lot.  
<sup>b</sup>5-point scale, where 1 = Grade school or less; 2 = High school; 3 = Some college; 4 = College degree; and 5 = Advanced degree.  
<sup>c</sup>7-point scale, where 1 = Less than \$500,000; 2 = \$500,001–\$999,999; 3 = \$1,000,000–\$1,499,999; 4 = \$1,500,000–\$1,999,999; 5 = \$2,000,000–\$2,499,999; 6 = \$2,500,000–\$2,999,999; and 7 = \$3,000,000 or More.

After exposure to the frame, subjects completed a short set of final questions, including some general demographic questions as well as the same question administered before the treatment about interest in no-till. To assess attitude change due to the framing treatment, we subtracted the pretest level of interest from the posttest level of interest. Given our interest in the direction of change, as opposed to the magnitude of change, as well as the small sample size, we collapsed this variable. Individuals whose pre- and posttest measurements of interest were equal to one another were coded as having “no change” in their interest in no-till. Individuals whose posttest levels of interest were higher than their pretest levels were coded as having “increased” interest in no-till, while those who expressed lower levels of interest posttest were coded as having “decreased” interest. Table 2 summarizes the descriptive statistics for these levels of interest in no-till before and after the framing treatments, as well as support for each environmental value and other important characteristics of the sample.

*Hypothesis Tests*

Due to our theoretical interest in either positive, negative, or no change in attitudes, we use ordered logit for statistical tests of our hypotheses. This allows us to isolate and calculate the predicted probability of experiencing a positive change, no change, or a negative change in interest due to frame exposure. By testing the effects of frames and values on each outcome of our dependent variable, we are functionally able to use the same statistical model to test both Hypothesis 1 as well as Hypothesis 2.

To confirm or reject our hypotheses, we examine the effects of the interactions between frames and values on interest in no-till. We are particularly interested in the relationship between exposure to a given frame and degree of support for that frame’s relevant value in predicting a positive or negative attitude change. Thus, we find support for our hypotheses if an *increase in support for the value* emphasized by an issue frame leads to a greater predicted probability of *increased interest* in no till, or a positive framing effect (H1). Similarly, we find support for our second hypothesis if a *decrease in support for the value* emphasized by an issue frame is associated with a greater predicted probability



**Table 3.** The Effect of Issue Frames and Environmental Values on Farmers' Interest in No-Till

	Model A	Model B	Model C
Stewardship Frame	-0.298 (0.412)	5.126 (3.441)	-3.299 (12.259)
Community Frame	0.311 (0.370)	3.146 (3.488)	-11.533 (11.874)
Environmental Egoism Value	-0.420 (0.262)	0.417 (0.545)	-1.016 (2.715)
Environmental Altruism Value	-0.026 (0.425)	0.040 (0.933)	-1.365 (2.895)
Biospherism Value	0.422 (0.249)	0.332 (0.468)	0.393 (0.473)
Log of Years Farming	-0.124 (0.212)	-0.195 (0.225)	-0.132 (0.230)
Trust in Trade Journals	-0.232 (0.186)	-0.247 (0.203)	-0.314 (0.207)
Stewardship Frame × Env. Egoism		-0.777 (0.669)	1.541 (3.062)
Community Frame × Env. Egoism		-2.361** (0.748)	1.593 (2.942)
Stewardship Frame × Env. Altruism		-0.962 (1.149)	1.267 (3.241)
Community Frame × Env. Altruism		1.728 (1.213)	5.821 (3.262)
Stewardship Frame × Biospherism		0.375 (0.770)	0.347 (0.790)
Community Frame × Biospherism		-0.085 (0.563)	-0.241 (0.561)
Env. Egoism × Env. Altruism			0.359 (0.677)
Stewardship Frame × Env. Egoism × Env. Altruism			-0.592 (0.756)
Community Frame × Env. Egoism × Env. Altruism			-1.034 (0.744)
cut1	-3.146*	-0.313	-5.628
cut2	-0.832	2.146	-3.133
LR X2	10.211	29.554	33.200
Prob > X2	0.177	0.005	0.007
N <sup>a</sup>	162	162	162

Note. Results from ordered logit regression. The profit group represents the reference category for all statistical models. Robust standard errors in parentheses. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

<sup>a</sup>Nine of 171 subjects excluded from analysis due to missing information on some of the required independent variables.

of *decreased interest* in no-till (H2), or a negative framing effect. For instance, we will find support for Hypothesis 1 if higher levels of environmental egoism lead to a statistically significant increase in the predicted probability of an increased level of interest in subjects exposed to the profit frame. By contrast, we will find support for Hypothesis 2 if *lower* (higher) levels of environmental egoism lead to a statistically significant increase in the probability of experiencing a *decreased* (increased) level of interest for subjects exposed to the profit frame. We have no expectations concerning the observation of no change in interest, which is the third level of our dependent variable.

## Results

### *Main Effect of Issue Frames on Expert Attitudes*

Before turning to the empirical tests of our hypotheses, we first consider the independent impact of issue frames on our subjects' interest in no-till (see Model A in Table 3). Overall, issue frames did not directly influence attitudes toward framed policy issues among our experts. Likelihood ratio tests indicate the joint impact of issue frames has little to no influence on farmers' attitudes. Additionally, Model A does not reach conventional levels of overall significance. The statistical significance of the first cut point in Model A, however, warrants a more detailed examination of predicted probabilities.

Table 4 suggests that the community frame is most likely to increase interest in no-till among our farmers. Two-tailed tests of pairwise comparison indicate that individuals are less likely to experience no framing effect ( $p = 0.064$ ) in response to the community frame than the stewardship frame and more likely to experience a positive framing effect ( $p = 0.07$ ). Although statistically insignificant, the

**Table 4.** Predicted Probability of Attitude Change by Issue Frame

	Profit	Community	Stewardship
Positive $\Delta$ (positive framing effect)	0.395	0.469 <sup>+</sup>	0.328 <sup>+</sup>
No $\Delta$	0.467	0.425 <sup>+</sup>	0.495 <sup>+</sup>
Negative $\Delta$ (contrast effect)	0.138	0.106	0.177

*Note.* Results from Model A ordered logit regression. Significance levels are based on pairwise comparisons between treatment groups. <sup>+</sup> $p < 0.10$ .

pattern of results suggests that the community frame elicits more positive attitude change than the profit frame.

*The Conditional Relationship Between Issue Frames, Values, and Expert Attitudes*

Our research hypotheses relate to the interaction of frames with their targeted values. As noted in the research design, testing these hypotheses requires the inclusion of multiplicative interaction terms within statistical models. Although we designed each frame to activate a different environmental value (see Table 1), we allow for the possibility that an individual frame could activate more than one environmental value by including interactions of all three framing treatments and all three environmental values in Model B of Table 3 (with profit as the omitted category). Likelihood ratio tests examining the joint influence of the interaction terms included in Model B relative to Model A suggest that accounting for these interactive relationships significantly improves our ability to explain the impact of issue frames on experts’ attitudes, consistent with our argument that farmers’ values condition the impact of frames.

Due to our use of interactions and ordered logit, to statistically test our hypotheses we calculate the marginal effects of frames and values on the predicted probability of experiencing attitude change. We expect that greater agreement with the value emphasized by an issue frame will lead to a positive attitude change (H1), whereas greater disagreement with the emphasized value will lead to a negative attitude change, or contrast effect (H2). These hypotheses effectively present expectations concerning two of the three levels of our dependent variable. Tests of both hypotheses are dependent on the marginal effect of *specific* environmental values for each frame (see Table 1) and level of the dependent variable. We calculated the marginal effect of environmental values—that is, the average impact of a one-unit increase in subjects’ acceptance of each value—for each frame and type of attitude change (see Table 5).

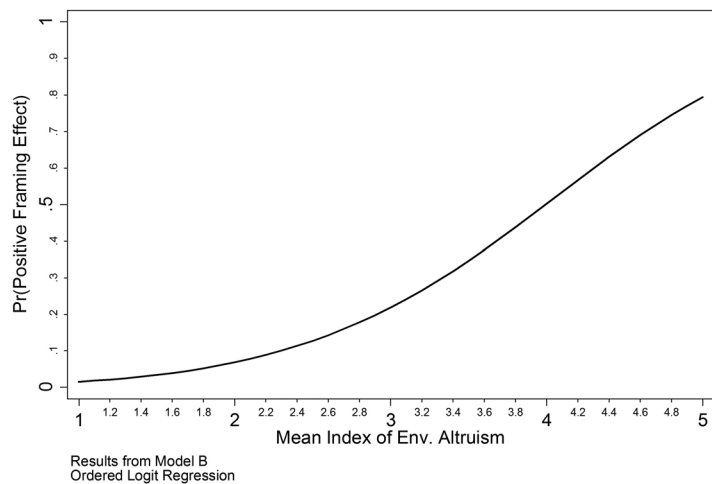
*H1: Value Acceptance and Positive Framing Effects.* Our first hypothesis is supported if the marginal effect of an increase in the environmental value designed to be activated by a given frame has a *positive and significant effect* on the predicted probability of experiencing a *positive attitude change* (see the first three rows of Table 5). We do not find support for this hypothesis in the interactions of environmental egoism with the profit frame, or with biospherism and the stewardship frame, neither of which reaches conventional levels of statistical significance. We do find support for Hypothesis 1, however, in the significant and positive interaction between environmental altruism and the community frame ( $p < 0.01$ ).

Figure 1 illustrates the strength of this relationship: The probability of becoming more interested in no-till in response to the community frame dramatically increases among farmers with greater affinity toward environmental altruism. There is an 80% probability that farmers with the greatest acceptance of environmental altruism (5 out of 5 on the Likert scale) will express greater interest in no-till when presented with the community frame. Conversely, the probability of those with the least support

**Table 5.** Marginal Effect of Environmental Values on Interest in No-Till for Each Frame

	Profit	Community	Stewardship
Positive $\Delta$ (framing effect):			
Egoism	0.092	-0.397***	-0.072
Altruism	0.009	0.361**	-0.185
Biospherism	0.074	0.050	0.142
No $\Delta$ :			
Egoism	-0.046	0.227***	0.022
Altruism	-0.004	-0.206**	0.055
Biospherism	-0.036	-0.029	-0.042
Negative $\Delta$ (contrast effect):			
Egoism	-0.047	0.171***	0.051
Altruism	-0.005	-0.155*	0.129
Biospherism	-0.037	-0.022	-0.099

Note. Results from Model B: ordered logit regression. Shading indicates specific frame-value interactions expected to be significant by our hypotheses. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

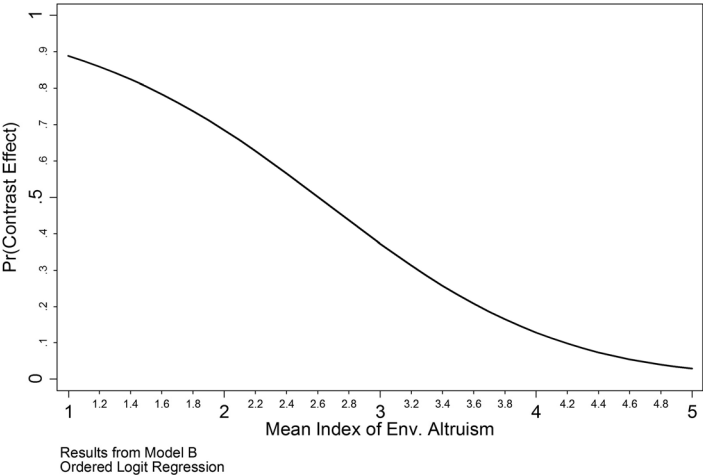


**Figure 1.** Predicted probability of community frame leading to a positive framing effect across environmental altruism.

for the value (1 out of 5 on the Likert Scale) experiencing a positive attitude change in response to the community frame is less than 1%.

*H2: Value Rejection and Contrast Effects.* Similar to tests for Hypothesis 1, we examine the marginal effect of specific environmental values on the probability of experiencing a lower level of interest in no-till as a result of frame exposure to test our hypothesis (H2) regarding contrast effects (see the last three rows of Table 5). As the marginal effect represents the average change in the predicted probability given a unit *increase* in an environmental value, a *negative* marginal effect indicates that those who disagree with or have rejected a value are more likely to experience a *negative* attitude change when exposed to the frame than those who accept the value. Thus, if the marginal effect of activated values is *negative* and significant, we will have found support for Hypothesis 2, a contrast effect.

As with our tests of Hypothesis 1, we find no evidence of environmental egoism or biospherism generating a contrast effect among subjects exposed to the relevant frames. We do, however, find support for Hypothesis 2 when we consider environmental altruism and the community frame ( $p < 0.05$ ). On average, a one-unit increase in farmers' agreement with environmental altruism leads to a substantial decrease in the probability they will respond negatively to the community frame. Figure 2

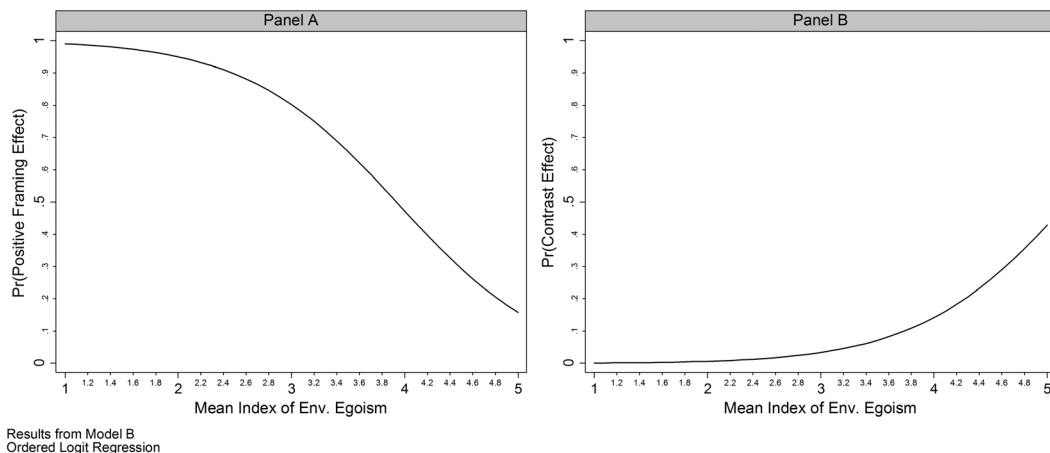


**Figure 2.** Predicted probability of community frame leading to a contrast effect across environmental altruism.

illustrates the strength of the relationship. Here, we see that individuals least supportive of environmental altruism (i.e., those with a score of 1 on our scale) have a 90% probability of experiencing a contrast effect when presented with the community frame, while those with the highest levels of environmental altruism are extremely unlikely (less than 10% probability) of experiencing a contrast effect. These results indicate, then, that the community frame not only fails to resonate among those who have rejected environmental altruism, but also leads many of these individuals to express greater opposition to the practice of no till.

To summarize, our data offer mixed support for both Hypothesis 1 and Hypothesis 2. The direction of the marginal effects of support for environmental egoism and biospherism with each frame is consistent with our hypotheses but fails to achieve conventional levels of statistical significance. More importantly, support for environmental altruism has a significant and substantial effect on the probability of both positive and negative attitude change on subjects exposed to the community frame. These results suggest that there is something unique about the community frame, relative to the profit and stewardship frames. More specifically, farmers appear to use their values when processing the community frame, but not the profit or stewardship frames.

*Interactions Between the Community Frame and Other Environmental Values.* Consistent with the community frame having the largest effect on our subjects, Table 5 also indicates that this frame interacted significantly with other environmental values besides the expected value of environmental altruism. Specifically, we find that support for environmental egoism also has a significant ( $p < 0.001$ ) influence on the impact of the community frame on all three possible types of attitude change. Unlike support for environmental altruism, however, support for egoism significantly *reduces* the probability that farmers will experience a positive framing effect in response to the community frame. Panel A of Figure 3 illustrates this relationship in more detail. Here, we see the probability of experiencing a positive attitude change for subjects exposed to the community frame is only 15% for those with high levels of environmental egoism compared to approximately 99% for those with the lowest level of value acceptance. Table 5 also indicates that greater levels of environmental egoism significantly ( $p < 0.001$ ) *increase* the probability that farmers will respond *negatively* to the community frame. Panel B of Figure 3 illustrates that as farmers' support for environmental egoism rises, so does the probability of experiencing a contrast effect in response to the community frame. For example, an increase from 4 to 5 on the environmental egoism scale leads to approximately a 30-percentage-point increase in the likelihood of responding negatively to the frame.

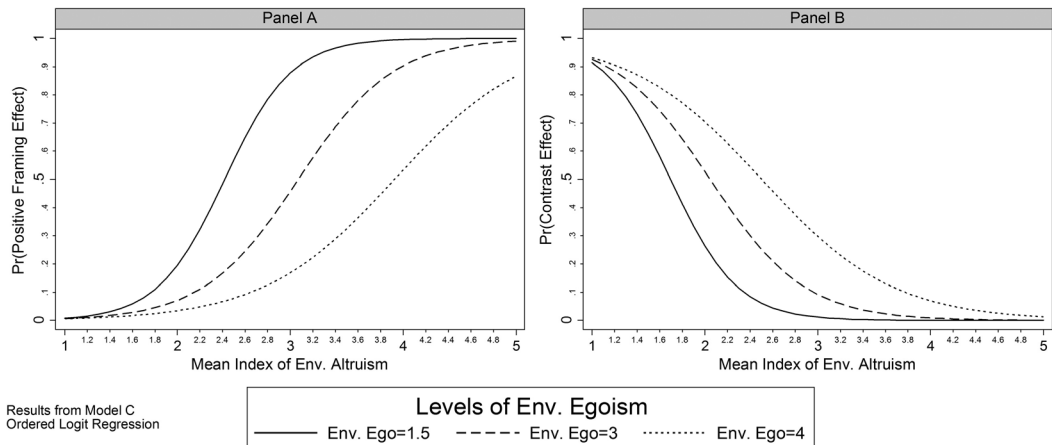


**Figure 3.** Predicted probabilities of community frame leading to framing effects or contrast effects across environmental egoism.

Thus, environmental egoism appears to have a substantial effect on the predicted probability of responding either positively or negatively to the community frame that competes with the effects of support for environmental altruism. Although it is tempting to attribute this result to environmental egoism and altruism being in opposition, it is important to remember that research in environmental psychology identifies environmental egoism and environmental altruism as distinctive values rather than two ends of the same value construct. In other words, individuals may support both values at the same time because the values do not define one another but rather coexist within individuals' cognitions. The significant and clashing impact of environmental altruism and environmental egoism, then, raises the question of how individuals reconcile these competing values when responding to the community frame.

We explore this relationship through Model C in Table 3, which builds on Model B by including a three-way interaction among issue frames, environmental egoism, and environmental altruism. Though the estimated coefficients for these interactions are not significant, some informative marginal effects are. We tested the statistical significance of these marginal effects by calculating the marginal effect of a change in environmental altruism while holding the treatment variable constant for the community frame and allowing environmental egoism to vary. Results indicate that a change in environmental altruism significantly ( $p < 0.05$ ) influences the probability of experiencing both a positive framing effect and a contrast effect in response to the community frame across most of the environmental egoism scale (between 1.4 and 4.8 and between 1 and 4.2, respectively; see Appendix A). Hence, we find that rejection or acceptance of environmental egoism moderates the impact of a unit change in environmental altruism on the probability of experiencing either a positive framing effect or a contrast effect when presented with the community frame. This does not necessarily imply, however, that environmental egoism erases the influence of environmental altruism.

Panel A of Figure 4 shows us that greater agreement with environmental altruism increases the probability farmers will experience a positive framing effect when presented with the community frame across a wide range of support for environmental egoism. Although this effect is stronger among those with low levels of environmental egoism, even those with high levels of egoism still demonstrate a positive relationship between their support for altruism and the probability of a positive attitude response to the community frame. Moreover, those who score equally high (score of 4) on support for environmental egoism and environmental altruism demonstrate a 50% probability of experiencing a positive framing effect in response to the community frame. This is a substantial finding



**Figure 4.** Predicted probabilities of the community frame leading to framing effects or contrast effects across environmental egoism and altruism.

given our use of a three-level dependent variable, implying that these individuals are more likely to experience a positive framing effect than no attitude change or a contrast effect. In terms of a positive attitude change, we again find support for our first hypothesis: Individuals who maintain agreement toward the value emphasized by an issue frame are likely to experience a positive framing effect even when they also support alternative values associated with a weaker response to the frame in question. We find similar results concerning the impact of environmental altruism and the community frame on the probability of experiencing a contrast effect across a wide range of values for environmental egoism (see Panel B of Figure 4). Again, we find that the community frame will likely elicit a contrast effect among individuals who reject the value of environmental altruism across a wide range of support for environmental egoism.

Notably, the responses of farmers with low levels of environmental egoism to the community frame appear to be quite sensitive to variation in levels of environmental altruism. The impact of environmental altruism on the probability expert farmers will respond negatively toward the community frame, however, becomes almost linear with greater prior acceptance of environmental egoism. This supports previous findings concerning the stability of values and their importance to information processing. Individuals' values provide structure and consistency to their cognitions. As a result, those who maintain a high affinity toward a particular value will not completely disregard the value when presented with an issue frame that activates an alternative value. Instead, experts are likely to evaluate issue frames based on values they traditionally use *in addition* to those activated by an issue frame. The value activated by the issue frame, however, does appear to be more influential over the experts' evaluations.

## Conclusion

Despite the growing recognition of the importance of experts in the development and implementation of many types of public policies, we know surprisingly little about how such expertise influences the effectiveness of framing. Building on evidence that political knowledge increases active processing of issue frames, this study investigated two hypotheses regarding the important role of prior values in moderating attitude change for any particular issue frame among a population of subject-matter experts: professional farmers. Our experimental results confirm that domain experts also appear to be active processors of frames, responding differently to a particular issue frame based



on the frame's consistency with their values. In general, frames in our experiment designed to elevate a particular environmental value led to a greater probability of positive attitude change toward a farming technique designed to protect environmental quality among subjects who expressed support for that value and a greater probability of no attitude change or a negative attitude change among those who did not support that value. In addition, this effect persisted even when a frame appears to have elevated more than one value, with experts being more likely to experience a positive attitude change to the degree they supported the targeted value even when they also supported a second value that was associated with a negative response to the frame.

Although we find that issue frames presenting value interpretations consistent with those of audience members tend to have a positive impact, and those that are inconsistent lead to a contrast effect, the magnitude and the statistical significance of these findings varied across framing treatments. One frame in particular was most effective in shifting attitudes according to farmer values: A frame stressing the importance of local community benefits from reduced tillage of the soil. Although it is impossible to know why this particular frame was most effective in changing attitudes, especially among farmers who supported the associated value of environmental altruism, we speculate that this was due to the relative unfamiliarity of the frame. The other two frames in the experiment have been more widely used to promote no-till, making it likely that farmers were more familiar with those messages (Andrews et al., 2013). In this respect, it is possible that the greater influence of the community frame on the probability of attitude change was similar to the effectiveness of "conflict-displacing" frames in other contexts (e.g., Dardis, Baumgartner, Boydstun, De Boef, & Shen, 2008), which get individuals to think of an issue in terms of a new value rather than the same values they have been using previously. By introducing a new value to the issue, such as environmental altruism, the community frame may have generated greater support for no-till among farmers than more familiar frames related to increasing farmer profit or being a "good steward" of natural systems.

These results suggest that various forms of expertise are relevant to our understanding of cognition and framing effects, beyond the basic and widely tested factor of political knowledge. Future work on the psychological mechanisms of framing effects would do well to consider the ways in which the distinctive cognitive processes of experts might affect issue framing beyond simply increasing active processing and also the importance of value consistency.

In addition, these results indicate that new frames stressing community benefits may offer the potential to increase the interest of farmers in no till techniques, even where other strategies have failed to do so. More generally, the results suggest the importance of tailoring issue frames to the specific values of issue experts across multiple policy domains. Many professionals are "expert" in a wide range of policy-relevant areas, ranging from farmers to medical practitioners to educators. As public policies seek to influence the attitudes and behaviors of these policy-relevant communities of experts, it will be important to carefully consider their prior values in any framing messages.

## ACKNOWLEDGMENTS

Research supported by USDA Cooperative Agreement 58-6000-0-0096, through the Economic Research Service's Economics of Markets for Agricultural Greenhouse Gases program. The authors also thank Steve Engleking of Purdue Extension and Andrew Tuholski for their help with data collection. Correspondence concerning this article should be addressed to Leigh Raymond, Department of Political Science, Purdue University, West Lafayette, IN 47907. E-mail: lraymond@purdue.edu

## REFERENCES

- Alvarez, R. M., & Brehm, J. (2002). *Hard choices, easy answers: Values, information, and American public opinion*. Princeton, NJ: Princeton University Press.

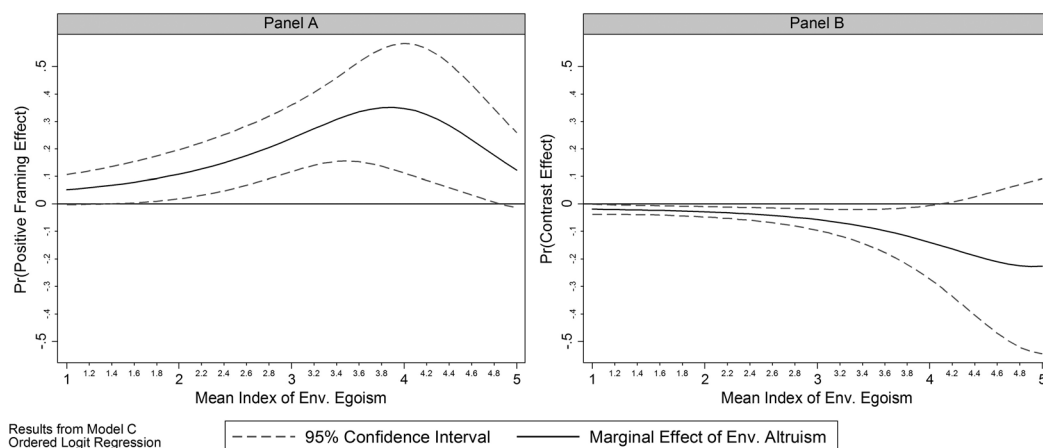
- Andrews, A. C., Clawson, R. A., Gramig, B. M., & Raymond, L. (2013). Why do farmers adopt conservation tillage? An experimental investigation of framing effects. *Journal of Soil and Water Conservation*, 68(6), 501–511.
- Arikan, G., & Bloom, P. B.-N. (2013). The influence of societal values on attitudes towards immigration. *International Political Science Review*, 34(2), 210–226.
- Barker, D. C. (2005). Values, frames, and persuasion in presidential nomination campaigns. *Political Behavior*, 27(4), 375–394.
- Batel, S., & Devine-Wright, P. (2015). Towards a better understanding of people's responses to renewable energy technologies: Insights from social representations theory. *Public Understanding of Science*, 24(3), 311–325.
- Bellamy, R., & Hulme, M. (2011). Beyond the tipping point: Understanding perceptions of abrupt climate change and their implications. *Weather Climate and Society*, 3(1), 48–60.
- Brewer, P. R. (2002). Framing, value words, and citizens' explanations of their issue opinions. *Political Communication*, 19(3), 303–316.
- Brewer, P. R. (2003). Values, political knowledge, and public opinion about gay rights — A framing-based account. *Public Opinion Quarterly*, 67(2), 173–201.
- Cacioppo, J. T., Petty, R. E., Feinstein, J. A., Blair, W., & Jarvis, G. (1996). Dispositional differences in cognitive motivation: The life and times of individuals varying in need for cognition. *Psychological Bulletin*, 119(2), 197–253.
- Cellier, J.-M., Eyrolle, H., & Marine, C. (1997). Expertise in dynamic environments. *Ergonomics*, 40(1), 28–50.
- Cerf, M., Papy, F., & Angevin, F. (1998). Are farmers expert at identifying workable days for tillage? *Agronomie*, 18(1), 45–59.
- Chong, D., & Druckman, J. N. (2007a). Framing public opinion in competitive democracies. *American Political Science Review*, 101(4), 637–655.
- Chong, D., & Druckman, J. N. (2007b). Framing theory. *Annual Review of Political Science*, 10(1), 103–126.
- Clawson, R. A., & Waltenburg, E. N. (2003). Support for a Supreme Court affirmative action decision - A story in Black and White. *American Politics Research*, 31(3), 251–279.
- Clawson, R. A., & Waltenburg, E. (2008). *Legacy and legitimacy: Black Americans and the Supreme Court*. Philadelphia, PA: Temple University Press.
- Coalition on Agricultural Greenhouse Gases (CAGG) (2010). Carbon and agriculture: Getting measurable results (Version 1 ed.). Meridian Institute. [http://c-agg.org/cm\\_vault/files/docs/CAGMR\\_complete.pdf](http://c-agg.org/cm_vault/files/docs/CAGMR_complete.pdf)
- Dardis, F. E., Baumgartner, F. R., Boydston, A. E., De Boef, S., & Shen, F. (2008). Media framing of capital punishment and its impact on individuals' cognitive responses. *Mass Communication and Society*, 11(2), 115–140.
- Delli Carpini, M. X., & Keeter, S. (1996). *What Americans know about politics and why it matters*. New Haven, CT: Yale University Press.
- Dietz, T., Fitzgerald, A., & Shwom, R. (2005). Environmental values. *Annual Review of Environment and Resources* (Vol. 30, pp. 335–372). Palo Alto, CA: Annual Reviews.
- Dietz, T., Stern, P. C., & Guagnano, G. A. (1998). Social structural and social psychological bases of environmental concern. *Environment and Behavior*, 30(4), 450–471.
- Douglas, M., & Wildavsky, A. (1982). *Risk and culture: An essay on the selection of technical and environmental dangers*. Berkeley: University of California Press.
- Eveland, W. P. (2004). The effect of political discussion in producing informed citizens: The roles of information, motivation, and elaboration. *Political Communication*, 21(2), 177–193.
- Feldman, S. (1988). Structure and consistency in public opinion: The role of core beliefs and values. *American Journal of Political Science*, 32(2), 416–440.
- Feldman, S. (2003). Values, ideology, and the structure of political attitudes. In D. O. Sears, L. Huddy & R. Jervis (Eds.), *The Oxford handbook of political psychology*. New York, NY: Oxford University Press.
- Fishbein, M., & Ajzen, I. (2011). *Predicting and changing behavior: The reasoned action approach*. New York, NY: Taylor & Francis.
- Fiske, S. T., Lau, R. R., & Smith, R. A. (1990). On the varieties and utilities of political expertise. *Social Cognition*, 8(1), 31–48.
- Gamson, W. A., & Modigliani, A. (1987). The changing culture of affirmative action. In R. D. Braungart (Ed.), *Research in political psychology* (Vol. 3, pp. 137–177). Greenwich, CT: JAI.
- Gamson, W. A., & Modigliani, A. (1989). Media discourse and public opinion on nuclear power: A constructionist approach. *American Journal of Sociology*, 95(1), 1–37.
- Gramig, B. M., Barnard, J. M., & Prokopy, L. S. (2013). Farmer beliefs about climate change and carbon sequestration incentives. *Climate Research*, 56(2), 157–167.

- Gromet, D. M., Kunreuther, H., & Larrick, R. P. (2013). Political ideology affects energy-efficiency attitudes and choices. *Proceedings of the National Academy of Sciences of the United States of America*, 110(23), 9314–9319.
- Hawcroft, L. J., & Milfont, T. L. (2010). The use (and abuse) of the new environmental paradigm scale over the last 30 years: A meta-analysis. *Journal of Environmental Psychology*, 30(2), 143–158.
- Hoffman, R. R. (1998). How can expertise be defined? Implications of research from cognitive psychology. In R. Williams, W. Faulkner, & J. Fleck (Eds.), *Exploring Expertise* (pp. 81–100). Edinburgh, Scotland: University of Edinburgh Press.
- Horowitz, J., Ebel, R., & Ueda, K. (2010). No-till farming is a growing practice. *Economic Information Bulletin*, 70.
- Jacobs, S., Sioen, I., De Henauw, S., Rosseel, Y., Calis, T., Tediosi, A., . . . Verbeke, W. (2015). Marine environmental contamination: Public awareness, concern and perceived effectiveness in five European countries. *Environmental Research*, 143(Part B): 4–10.
- Johnson, E. J. (1988). Expertise and decision under uncertainty: Performance and process. In M. T. H. Chi, R. Glaser, & M. J. Farr (Eds.), *The nature of expertise* (pp. 209–228). Hillsdale, NJ: Lawrence Erlbaum.
- Jones, B. D., & Baumgartner, F. R. (2005). *The politics of attention: How government prioritizes problems*. Chicago, IL: University of Chicago Press.
- Kahan, D. M. (2010). Fixing the communications failure. *Nature*, 463(7279), 296–297.
- Kahan, D. M., Jenkins-Smith, H., & Braman, D. (2011). Cultural cognition of scientific consensus. *Journal of Risk Research*, 14(2), 147–174.
- Kam, C. D. (2005). Who toes the party line? Cues, values, and individual differences. *Political Behavior*, 27(2), 163–182.
- Lankoski, J., Ollikainen, M., & Uusitalo, P. (2006). No-till technology: Benefits to farmers and the environment? Theoretical analysis and application to Finnish agriculture. *European Review of Agricultural Economics*, 33(2), 193–221.
- Marietta, M. (2008). From my cold, dead hands: Democratic consequences of sacred rhetoric. *Journal of Politics*, 70(3), 767–779.
- Mauro, I., McLachlan, S. M., & Van Acker, R. C. (2009). Farmer knowledge and a priori risk analysis: Pre-release evaluation of genetically modified roundup ready wheat across the Canadian prairies. *Environmental Science and Pollution Research*, 16(6), 689–701.
- Morton, L. W. (2011). Farmer decision-makers: What are they thinking? In L. W. Morton & S. S. Brown (Eds.), *Pathways for getting to better water quality the citizen effect* (pp. 213–227). New York, NY: Springer.
- Nelson, T. E., Clawson, R. A., & Oxley, Z. M. (1997). Media framing of a civil liberties conflict and its effect on tolerance. *American Political Science Review*, 91(3), 567–583.
- Nelson, T. E., & Kinder, D. R. (1996). Issue frames and group-centrism in American public opinion. *Journal of Politics*, 58(4), 1055–1078.
- Nelson, T. E., Oxley, Z. M., & Clawson, R. A. (1997). Toward a psychology of framing effects. *Political Behavior*, 19(3), 221–246.
- Nuthall, P. L. (2009). Modelling the origins of managerial ability in agricultural production. *Australian Journal of Agricultural and Resource Economics*, 53(3), 413–436.
- Nuthall, P. L. (2012). The intuitive world of farmers — The case of grazing management systems and experts. *Agricultural Systems*, 107, 65–73.
- Owens, S., & Driffill, L. (2008). How to change attitudes and behaviours in the context of energy. *Energy Policy*, 36(12), 4412–4418.
- Petersen, M. B., Slothuus, R., & Togeby, L. (2010). Political parties and value consistency in public opinion formation. *Public Opinion Quarterly*, 74(3), 530–550.
- Petty, R. E., & Cacioppo, J. T. (1981). *Attitudes and persuasion: Classic and contemporary approaches*. Boulder, CO: Westview Press.
- Petty, R. E., & Cacioppo, J. T. (1984). Source factors and the elaboration likelihood model of persuasion. *Advances in Consumer Research*, 11, 668–672.
- Petty, R. E., Cacioppo, J. T., Sedikides, C., & Strathman, A. J. (1988). Affect and persuasion: A contemporary perspective. *American Behavioral Scientist*, 31(3), 355–371.
- Raymond, L., Weldon, S. L., Kelly, D., Arriaga, X. B., & Clark, A. M. (2014). Making change: Norm-based strategies for institutional change to address intractable problems. *Political Research Quarterly*, 67(1), 197–211.
- Rossi, S. D., Byrne, J. A., Pickering, C. M., & Reser, J. (2015). “Seeing Red” in national parks: How visitors’ values affect perceptions and park experiences. *Geoforum*, 66, 41–52.
- Rousseau, O. (2008). Environmental and economic benefits resulting from citizens’ participation in CO2 emissions trading: An efficient alternative solution to the voluntary compensation of CO2 emissions. *Energy Policy*, 36(1), 388–397.
- Schultz, P. W. (2001). The structure of environmental concern: Concern for self, other people and the biosphere. *Journal of Environmental Psychology*, 21, 327–339.

- Schultz, P. W., Gouveia, V. V., Cameron, L. D., Tankha, G., Schmuck, P., & Franek, M. (2005). Values and their relationship to environmental concern and conservation behavior. *Journal of Cross-Cultural Psychology*, 36(4), 457–475.
- Schwartz, D., de Bruin, W. B., Fischhoff, B., & Lave, L. (2015). Advertising energy saving programs: The potential environmental cost of emphasizing monetary savings. *Journal of Experimental Psychology-Applied*, 21(2), 158–166.
- Sniderman, P. M., Brody, R. A., & Tetlock, P. E. (1993). *Reasoning and choice: Explorations in political psychology*. Cambridge, UK: Cambridge University Press.
- Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, 29(3), 309–317.
- Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, 56(3), 407–424.
- Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of Social Issues*, 50, 65–84.
- Stern, P. C., Dietz, T., Kalof, L., & Guagnano, G. A. (1995). Values, beliefs, and proenvironmental action: Attitude formation toward emergent attitude objects. *Journal of Applied Social Psychology*, 25, 1611–1636.
- Uri, N. D., Atwood, J. D., & Sanabria, J. (1999). The environmental benefits and costs of conservation tillage. *Environmental Geology*, 38(2), 111–125.
- Wegener, D. T., & Kelly, J. R. (2008). Social psychological dimensions of bioenergy development and public acceptance. *Bioenergy Research*, 1(2), 107–117.
- Weible, C. M. (2008). Expert-based information and policy subsystems: A review and synthesis. *Policy Studies Journal*, 36(4), 615–635.
- Wiley, J. (1998). Expertise as mental set: The effects of domain knowledge in creative problem solving. *Memory & Cognition*, 26(4), 716–730.
- Zaller, J. R. (1992). *The nature and origins of mass opinion*. New York, NY: Cambridge University Press.

## APPENDIX

### Significance Test of the Interaction Between Environmental Egoism and Environmental Altruism Holding the Community Frame Constant



## Supporting Information

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

Full Text of Experimental Framing Treatments