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The Effects of Message Matching in Climate Change Persuasion

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THE EFFECTS OF MESSAGE MATCHING IN
CLIMATE CHANGE PERSUASION

A Thesis
Presented to
The Faculty of the Department of Psychological Sciences
Western Kentucky University
Bowling Green, Kentucky

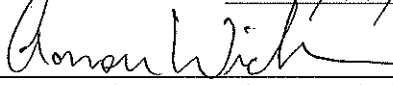
In Partial Fulfillment
Of the Requirements for the Degree
Master of Science

By
Matthew R. Penner

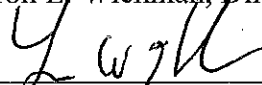
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Date Recommended 4/17/19



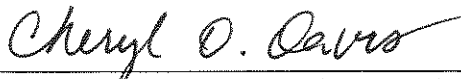
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THE EFFECTS OF MESSAGE MATCHING IN CLIMATE CHANGE PERSUASION

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May 2019

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Directed by: Aaron L. Wichman, Lance W. Hahn, and Andrew S. Mienaltowski

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Public opinions of climate change are not consistent with the reality that climate change is occurring. Effective persuasive messages must be created to ensure that irreparable damage to the environment is prevented. This study investigated the cognitive processes that occur when an individual is exposed to a persuasive message regarding environmental concerns that is matched to an individual's personality characteristics like right wing authoritarianism and purity.

Messages on two environmental topics (solar panels and the Environmental Protection Agency) were created. Each topic was framed in multiple ways to test hypotheses about personality-based message matching. Participants completed a thought listing task after reading about each of the topics, and then indicated their attitudes toward the message topics. Participants were also asked to complete several individual difference scales. Reported attitudes were regressed on individual differences and message frame type in order to determine the effects of message matching on attitudes.

While the results do not support a matching effect for purity, an effect of right wing authoritarianism was found after controlling for environmental apathy. This suggests that individual difference matching effects do exist, although they may be more complex than initially hypothesized.

Keywords: persuasion, message matching, purity, right-wing authoritarianism, RWA, climate change

Introduction

Although the vast majority of climate scientists agree that global climate change is occurring, the general public's opinions on the matter are more divided (Heath & Gifford, 2006). Opinions are largely split between different political ideologies. Here in the United States, conservatives are more likely to deny the existence climate change and liberals are more likely to accept it. This difference can be observed by simply turning on the news. News programs on the conservative Fox network use a more disparaging tone when discussing climate science and interview a greater number of climate change deniers than liberal networks such as CNN and MSNBC (Feldman, Maibach, Roser-Renouf, & Leiserowitz, 2012).

Beyond endorsement of climate science, conservatives and liberals have been found to consistently express differing views on other issues, especially in the realm of social policies. Liberals are more likely to support policies that promote social equality and civil liberties, whereas conservatives are more likely to support policies that promote loyalty and safety from threat (Whitley, 1999). It is possible that whatever cognitive process that governs an individual's acceptance of climate science could also affect their views on other ideological issues. Although the surface effects of this ideological split are easy to spot, observing the cognitive processes that underlie these attitudes requires a bit more effort.

Past research has found several other differences between liberals and conservatives. Liberals have been found to have greater openness to experience than conservatives (McCrae, 1996). Liberals and conservatives also tend to differ in opinions

of what circumstances should be considered when making judgments of morality (Graham, Haidt, & Nosek, 2009).

It has also been found that presenting a message in terms of accepted conservative moral values can lead to more positive attitudes in conservatives (Feinberg & Willer, 2013). This effect is similar to other matching effects: changes in resulting attitudes that occur when a persuasion attempt matches the targeted attitude in some way (Clarkson, Tormala, & Rucker, 2011). For example, if an attitude is affective in nature (such as a positive opinion of a local park because of the fond memories you have for it), a persuasive message that is also affective in nature will cause more persuasion than a persuasive message that is cognitive in nature (Fabrigar & Petty, 1999). Similarly, if an attitude is cognitive in nature (such as a positive opinion of a local park because of the amount of tourism it brings in), persuasive message that is similarly cognitive in nature will cause more persuasion than a persuasive message that is affective in nature.

For the current study, I attempted to find matching effects in the context of two individual difference variables; that is, with the specific moral value of purity, and with right wing authoritarianism (RWA). If an attitude is based in purity, or if purity concerns are especially important to the person evaluating the message, I expected that a persuasive message presented in terms of purity would have a greater effect on resulting attitudes than a message unrelated to purity. Likewise, I expected that the same type of matching effect exists for attitudes based in RWA.

I also investigated the cognitive processes that are occurring when these matching effects are activated. While there is much research looking at when these matching effects occur (e.g. Clarkson et al., 2011; Fabrigar & Petty, 1999), less is known about

how these effects are occurring. I investigate these processes by using a model of persuasion known as the elaboration likelihood model; a model explaining how the amount of thinking a person applies to a persuasive message changes the way their attitudes and behaviors are affected (Petty & Cacioppo, 1986).

In a typical matching study, participants are presented with a message designed to either match or not match elements of those participants' personalities. Afterwards, their attitudes towards the subject of the message are measured and compared to participants who received unmatched messages. In this way, the effect of the matched message on resulting attitudes can be measured (Maio & Haddock, 2007). For example, Edwards (1990) found that when presenting participants with a fictional beverage, affective messages induced more positive attitudes for the beverage in participants with a greater need for affect (the motivation to seek out situations that are emotional in nature), but cognitive messages induced more positive attitudes for the beverage in participants with a greater need for cognition (the motivation to seek out situations that are cognitive in nature). Although these findings are fascinating, one issue that plagues this type of study is the lack of attention to the actual processes that are occurring as the persuasion is happening.

Elaboration Likelihood Model

A model that offers insight into the processes that may be occurring when matched messages are processed is the Elaboration Likelihood Model (ELM). In the field of persuasion, few models have been as generative as this one. This model was first created as a means to organize disparate findings in the field of persuasion (Cacioppo & Petty, 1984). The ELM considers both the delivery of a message and the recipient of that

message in order to make predictions as to how that recipient will process the message and ultimately how their attitudes will be affected (Cacioppo & Petty, 1984).

The elaboration likelihood model states that there are two routes of persuasion; the central route and the peripheral route (Cacioppo & Petty, 1984). Persuasion occurs along the central route when an individual is willing and able to devote cognitive resources to the topic; persuasion occurs along the peripheral route when an individual is either not willing or not able to devote cognitive resources to the topic.

Persuasion will occur along the central route if the individual listening to the message is both motivated and able to process the message (Petty & Cacioppo, 1986). Motivation to process can come from individual difference variables such as need for cognition (Haugtvedt & Petty, 1992), or from how personally relevant the message's content is to that person (Bordia, DiFonzo, Haines, & Chaseling, 2005). Similarly, ability to process can come from factors such as the person's general intelligence, as well as the comprehensibility of the message and whether or not a person is distracted while receiving the message (Petty, Wells, & Brock, 1976).

Central route processing is associated with actively dedicating cognitive resources to processing the message (Petty & Cacioppo, 1986). When central route processing is being used, the resulting attitude change is largely based on the content of the message; specifically, the strength of the arguments it contains. Messages with strong arguments are more likely to cause persuasion in alignment with the direction of the arguments (strong positive arguments causing positive attitude change and strong negative arguments causing negative attitude change). Weak arguments, however, are more likely to cause attitude change in the opposite direction of the argument under central route

processing conditions. For example, when actively processing a positive persuasive message that contains weak arguments, attitudes toward the subject of that argument become more negative (Petty & Cacioppo, 1986). Similarly, when actively processing a negative persuasive message that contains weak arguments, attitudes towards the subject of that argument become more positive. Importantly, attitude change caused by messages that have been processed through the central route will be relatively stable and enduring, and is predictive of behavior (Petty & Cacioppo, 1986).

Persuasion will occur along the peripheral route if the individual listening to the message is either unmotivated or unable to process the message (Petty & Cacioppo, 1986). In this case, attitude change is thought to be largely based on the presence of peripheral cues with little reflection as to these cues' deeper meaning or relevance. Peripheral cues are things such as source characteristics (if the source of the message is an expert in their field or attractive), the number of arguments in the message (with more arguments being seen as stronger evidence in favor of the topic at hand), or simply how the listener is feeling at the moment. As long as positive peripheral cues are present, attitude change is more likely to occur in the direction of the message. This attitude change is volatile, however, and is often unpredictable of behavior (Petty & Cacioppo, 1986).

Although message processing can be divided for simplicity into central and peripheral, this processing actually occurs on a continuum. An individual performs both central and peripheral processing on the same message, though generally in different quantities (Petty & Cacioppo, 1986). Relatively more central route processing leads to greater effects of the arguments on persuasion while relatively more peripheral route

processing leads to greater effect of peripheral cues on persuasion (Petty & Cacioppo, 1986).

Processing route is determined by both motivation and ability. When motivation and ability are high, stimuli are processed differently from when either of these is low (Petty & Cacioppo, 1986). It follows that in a given context, what is processed as a peripheral cue for some may be processed as an argument for others, depending on audience members' levels of motivation and ability. For example, Petty and Cacioppo (1984) manipulated both the contents of a message and the attractiveness of a model in a beauty product commercial. While the arguments in the message being strong or weak only had an effect in those with high issue involvement (and thus, motivation to process), the attractiveness of the model had an effect in both groups of participants. While source attractiveness can be taken as a peripheral cue, it served as a strong argument in favor of the supposed efficacy of the beauty product in this specific case due to the fact that some of the source's physical attractiveness could be attributed to the beauty product.

In the context of the current study, I hypothesized messages that match to elements of an individual's personality would be seen as more personally relevant and thus elicit more central route processing under conditions where all participants have the ability to process the message. For example, if an individual cares about some specific value and reads a message emphasizing the correspondence of some issue with that value, this issue should be seen as more personally relevant to that individual. This should lead to greater use of central route processing, with attendant consequences for persuasion.

Specifically, I hypothesized that participants who received messages matched to their personalities would perceive the message as more personally relevant than those

who received messages that did not match their personalities. This increase in personal relevance should lead these participants to process the message more carefully. I also predicted that participants receiving matching messages would think more about the messages than those who did not receive matching messages, leading to greater amounts of central route processing for those messages.

The messages presented in this study were designed to match participants on the basis of either a specific moral value or an individual difference measure of authoritarianism. The specific moral value in this case was purity as defined in the moral foundations theory (Haidt & Joseph, 2004). The individual difference measure of authoritarianism used for this study was right-wing authoritarianism (Altemeyer, 1996). These, along with several control variables that I measured, are discussed below.

Moral Foundations Theory

Moral foundations theory (MFT) regards the bases of human morality, and was used to operationalize specific moral values. This theory posits that people's moral judgments are based on intuitions that stem from early group-level evolutionary challenges (Haidt & Joseph, 2004). These intuitions have remained a part of us since then, and now also apply to any moral judgments we make. MFT identifies five moral foundations; harm/care, fairness/reciprocity, ingroup/loyalty, authority/respect, and purity/sanctity. Depending on how much or how little a person uses each individual foundation when making a moral decision, one person may come to a very different conclusion than another about the morality of a given topic. These foundations have been found to be related to group judgments (especially political ones) (Graham, Haidt, &

Nosek, 2009; Graham et al., 2011), policy judgments (Koleva et al., 2012), and emotions (Horberg, Oveis, Keltner, & Cohen, 2009; Preston & Ritter, 2013).

The five moral foundations can be split into two groups; the individualizing foundations and the binding foundations (Graham, Haidt, & Nosek, 2009). The individualizing foundations of harm/care and fairness/reciprocity emphasize the rights and well-being of the individual. The binding foundations of ingroup/loyalty, authority/respect, and purity/sanctity instead emphasize the well-being of the ingroup as a whole. Liberals tend to rely more on the individualizing foundations and less on the binding foundations when making moral judgments (Graham, Haidt, & Nosek, 2009). Conservatives tend to use all five moral foundations equally when making moral judgments (Graham, Haidt, & Nosek, 2009). Relative to liberals, conservatives tend to give less weight to the individualizing foundations and more weight to the binding foundations (Haidt & Graham, 2007).

Take, for example, the current political rhetoric regarding immigrants coming in to the United States. Liberals tend to be encouraging of immigrants, while conservatives are more disparaging of them (Kugler, Jost, & Noorbaloochi, 2014). By applying moral foundations theory to this issue, one can get a sense as to why these judgments are being made. For example, perhaps a liberal sees the immigrant's move to the United States as a way to increase that immigrant's safety from other threats. Thus, the liberal makes their moral judgement using the harm/care foundation. On the other hand, the conservative may see the immigrant as a threat to group cohesion, and may make their judgement using the ingroup/loyalty foundation.

It is also important to note that while each individual is predisposed to use certain moral foundations when making judgments, weights given to each foundation are malleable (Graham et al., 2013). The amount of weight a person gives to each moral foundation when making moral judgments can be modified by that person's culture or environment. For example, individuals from Eastern cultures tend to show greater levels of ingroup/loyalty and purity/sanctity based moral reasoning than those from Western cultures (Graham et al., 2011).

Of the five moral foundations, purity is the strongest predictor of "culture war" attitudes, or attitudes towards various social and political issues such as LGBTQ and abortion rights (Koleva et al., 2012). For this reason, I have focused the current study around the effects of purity. Past research suggests that by framing global warming in terms of how it spoils the purity of the environment, the difference between liberal and conservative opinions on the subject of global warming can be eliminated (Feinberg & Willer, 2013).

Specifically, Feinberg and Willer (2013) showed participants a message pertaining to the effects of global warming framed to evoke either harm/care or purity/sanctity concerns. While there were significant differences in attitudes towards global warming between liberal and conservative participants in the harm/care condition (with conservatives reporting more negative attitudes than liberals), there were no significant differences in attitudes between liberal and conservative participants in the purity/sanctity condition, suggesting that the message framing caused conservative participants to adjust their attitudes.

While this research suggests an effect of purity on attitudes in the context of persuasive messages, it does not look into any of the processes that are occurring to make this effect happen. With the current study, I have begun investigation in this direction. Through the lens of the elaboration likelihood model, the current study investigated just how individuals are processing these messages, and how this processing ultimately affects attitudes.

Right-Wing Authoritarianism

Another personality variable that I suspect may be susceptible to matching effects is right wing authoritarianism (RWA). The construct of RWA was developed by Altemeyer (1981). In his work, Altemeyer (1981) sought to understand how people would accept adoption of anti-democratic policies in a democratic society. Altemeyer (1981) put together a survey assessing many different conservative attitude clusters and found that although many of these clusters were orthogonal, three of them consistently covaried. The items gauging these three attitudinal clusters went on to become the RWA scale, and RWA became defined as the covariation of these three clusters:

1. Authoritarian submission – a high degree of submission to the authorities who are perceived to be legitimate in the society in which one lives.
2. Authoritarian aggression – a general aggressiveness, directed against various persons, which is perceived to be sanctioned by established authorities.
3. Conventionalism – a high degree of adherence to the social conventions that are perceived to be endorsed by society and its established authorities (Altemeyer, 1981).

Those high in RWA tend to view out-groups as a threat to their own values and traditions (Altemeyer, 1981). People high in RWA (authoritarians) tend to view the world

as a dangerous place, and believe that adherence to the established authorities is the most effective way to remain safe. This safety is one of their paramount values. Individuals higher in RWA are often willing to allow their government to rescind some of their freedoms in the name of safety (Altemeyer, 1981). Although this submission to authorities is neither blind nor absolute, authoritarians are more likely to adhere to the rulings of authority figures than non-authoritarians (Altemeyer, 1981). This obedience to authority figures holds even if the individual in question does not personally like the authority figure giving the ruling. Accordingly, a right-wing government is not required to command the loyalty of a right-wing authoritarian (Altemeyer, 1981).

Studies have found RWA to be related to many other individual differences, including prejudice toward out-groups (Altemeyer, 1981; Ekehammar, Akrami, Gylje, & Zakrisson, 2004; Whitley, 1999), and self-righteousness (Whitley, 1999). RWA relates negatively with openness (Butler, 2000). RWA also relates negatively to attitudes towards homosexuality and gender differences (Whitley, 1999).

In regards to the proposed study, in addition to the investigation of purity, I attempted to find a matching effect for RWA. Participants were shown a message designed to relate to RWA and that contained either strong or weak arguments. Those high in RWA were hypothesized to find the message more personally relevant than those low in RWA, and were therefore expected to process the message more closely. In this way, the effect of the arguments presented should be stronger for those with greater RWA scores.

Control Variables

In addition to the focal variables of purity and RWA, I included two control variables to account for variance in my analyses that otherwise might contribute to error and reduce power. Specifically, Need for Cognition (Petty & Cacioppo, 1986), and Environmental Apathy (Thompson & Barton, 1994), which I describe below.

Need for Cognition

Some individuals enjoy thinking for the sake of thinking. Cohen, Stotland, and Wolfe (1955) termed this the need for cognition. They defined the need for cognition as, “a need to structure relevant situations in meaningful, integrated ways. It is a need to understand and make reasonable the experiential world” (Cohen, Stotland, & Wolfe, 1955, p. 291). In simpler terms, need for cognition is the desire to think deeply about topics, even when it is unnecessary to do so. Further study supported the finding that need for cognition is a stable individual difference (Cacioppo & Petty, 1982).

In the context of the ELM, a high need for cognition should cause an individual to think more about any topic, including topics that they do not see as highly personally relevant. Greater need for cognition should lead to greater amounts of central route processing, all else equal. I measured need for cognition in this study as a control variable to ensure that increases in processing can be attributed to the personal relevance of the presented message, and not naturally occurring variation in need for cognition.

Environmental Apathy

In the current study, I presented my participants with messages related to various environmental concerns and then asked them to rate their opinions of the presented topics. Given that these messages are heavily focused on environmental issues, it was important

to capture in some way participants' preexisting attitudes toward these issues, in order to control for them. Environmental apathy is a construct that reflects one's perceived value of the environment (Thompson & Barton, 1994). Those high in environmental apathy tend to value the environment less and show less support for conservation than those low in environmental apathy. For instance, those high in environmental apathy show less support for the preservation of wildlands and cultural landscapes (Feinberg & Willer, 2013). I expected that those high in environmental apathy would report less positive attitudes toward environmental topics, regardless of message matching, and that controlling for this variable would increase the power to detect expected effects.

Hypotheses

In the current study I tested three explicit hypotheses. First, I expected that participants who received a purity-focused message regarding solar panels would report more positive attitudes towards solar panels as the participant's purity increases. I did not expect to see the same increase in attitudes for a control message.

Second, I expected that participants would show an increased effect of argument strength for messages that matched their own personalities more strongly. I tested this by using two messages promoting the Environmental Protection Agency (EPA), both designed to match to the RWA, but varying in argument strength. Participants higher in RWA should report more positive attitudes towards the EPA if they receive strong arguments and less positive attitudes towards the EPA if they receive weaker arguments.

Lastly, I hypothesized that participants who received a message matched to their personality would perceive that message as more personally relevant, which would lead to greater amounts of central route processing for that message. When these participants

were asked to list all thoughts they had while reading that persuasive message, they should list more thoughts than those that did not receive a matching message.

Method

Participants

Participants were recruited from students enrolled at Western Kentucky University. Due to the political nature of the study materials, only American citizens at least 18 years of age were allowed to complete the study. Data from 130 participants were gathered. Of those, 17 participants were removed for indicating that their data should not be used in the analysis. Another 4 participants were identified as extreme outliers and removed. The remaining sample consisted of 109 participants (77 female, mean age 19.9 years).

Procedure

Participants signed up to take this study through Western Kentucky University's student research website. They received partial course credit for their participation. Implied consent was gathered in a manner approved by the IRB of Western Kentucky University. Appendix A contains the implied consent document.

Participants read two different messages; one message regarded the use of solar panels as a way to help prevent the negative effects of carbon emission on the environment, and the other regarded the EPA as an authority on environmental issues. For each message, participants were randomly assigned to one of two conditions: a purity or control condition for the solar panels message, and a strong or weak argument condition for the EPA message. Participants listed up to nine thoughts they had about the message and completed attitude measures after each message. Scores on the individual

difference measures were then collected. Participants were debriefed afterwards. A fuller explanation follows below.

Materials

Solar panel frame. Participants who were assigned to the purity frame condition read a message that describes the implementation of solar panels as an issue of purity. It did this by using phrases such as, “Solar panels preserve the natural, wholesome environment, keeping these places pure.” The message was constructed using words from the purity section of Graham, Haidt, and Nosek’s moral foundations dictionary (2009).

Those assigned to the control frame received a similar message. However, all purity-focused words taken from the moral foundations dictionary (Graham, Haidt, & Nosek, 2009) were removed and replaced by neutral words. Please see Appendix B for the complete text of both solar panel messages.

EPA frame. For the second part of this study, participants were randomly assigned to one of two RWA focused EPA frames; a strong argument frame or a weak argument frame. Each frame described the EPA as a widely accepted authority on environmental issues. However, one frame gave strong arguments as to why that authority was deserved (“For instance, the EPA recently prosecuted Volkswagen for lying to consumers and the government about cancer-causing diesel vehicle emissions.”) and one gave weak arguments (“For instance, the EPA recently prosecuted a small company that was installing attic insulation without proper permits.”). Please see Appendix C for the full text of these messages.

Dependent Variables

Thought listing. After reading the arguments, participants were asked to list whatever thoughts came to mind, ignoring grammar or spelling. Each individual thought was then presented back to participants, who rated each thought as positive, negative, neutral, or not related to the message. There were no hypotheses related to these valence ratings, and they were not analyzed. Participants were provided with nine boxes and asked to list as many thoughts in those boxes as they had about the message, with each thought being listed in a separate box. The number of thoughts listed provides an index of message elaboration, with more thoughts being indicative of higher elaboration (Petty & Cacioppo, 1986).

Attitude index. After the thought listing, participants were then asked seven items gauging their attitudes and attitude certainty toward the subject of each message. Four of these items assessed attitudes on the topic (e.g. “Overall, how positive or negative would you say solar panels are?”) and three assessed attitude certainty (e.g. “How sure are you that your opinion on solar panels is right?”). Attitude certainty items were not central to my hypotheses and were therefore not analyzed. Participants were also directly asked how important each issue was to them personally. Please see Appendix D for a complete list of all items. The same items were used for both the solar panels and EPA messages.

Moral foundations questionnaire. The moral foundations questionnaire (Graham et al., 2011) assesses how much weight an individual gives to different moral foundations when making moral judgments. I used the short-form version of the questionnaire in this study, consisting of 20 total items. Participants were asked to rate 10 statements (2 for each moral foundation) that pertain to what information is relevant

when making moral judgments on a 5-point scale, from not relevant at all to extremely relevant. Then, participants rated 10 moral statements (again, 2 for each moral foundation) on a 5-point scale from strongly disagree to strongly agree (e.g., I would call some acts wrong on the grounds that they are unnatural). Ratings for each item measuring the same moral foundations were averaged to form a composite score for that foundation, resulting in 5 different composite scores, of which the purity component was of theoretical interest. See Appendix E for a complete list of items.

Right-wing authoritarianism. RWA was measured using the 6 items from Altemeyer's (1996) RWA scale which were used by Dunwoody and McFarland (2018). Participants rated statements regarding authority figures and civil rights (e.g., "It is always better to trust the judgment of the proper authorities in government and religion than to listen to the noisy rabble-rousers in our society who are trying to create doubt in people's minds.") on a 5 point scale, ranging from strongly disagree to strongly agree. Scores on these items were averaged to form a composite score. See Appendix F for a complete list of items.

Environmental apathy. Environmental apathy was measured using the environmental apathy scale (Thompson & Barton, 1994). Participants rated statements regarding environmental issues and conservation efforts (e.g., "I find it hard to get too concerned about environmental issues.") on a 5-point scale, ranging from strongly disagree to strongly agree. Scores on these items were averaged to form a composite score. See Appendix G for a complete list of items.

Need for Cognition. The need for cognition scale measures an individual's desire to think deeply about topics (Cacioppo & Petty, 1982). The short form of this scale

consists of 18 items chosen from the original 34 item scale (Cacioppo & Petty, 1982) based on the strength of their factor loadings (Cacioppo, Petty, & Feng Kao, 1984). Participants were asked to rate items such as, “I find satisfaction in deliberating hard and for long hours.” and, “I feel relief rather than satisfaction after completing a task that required a lot of mental effort.” on a 9-point scale. Scores on these items were averaged to form a composite score. See Appendix H for a complete list of items.

Results

Composite scores for each construct were calculated by taking the average of scores on each individual item measuring that construct. Means, standard deviations, and Cronbach’s alphas for attitude measures and individual difference measures can be found in Tables 1 and 2, respectively.

Table 1

Attitude Measures Across Conditions

	<i>M</i>	<i>SD</i>	<i>α</i>
Solar Attitude	9.04	1.19	0.85
Solar Certainty	4.80	1.39	0.91
EPA Attitude	8.31	1.55	0.95
EPA Certainty	4.24	1.58	0.95

Table 2

Individual Difference Measures

	<i>M</i>	<i>SD</i>	<i>α</i>
Environmental Apathy	1.87	0.64	0.69
RWA	2.29	0.83	0.79
Purity	2.91	0.78	0.54
Need for Cognition	5.67	0.94	0.82

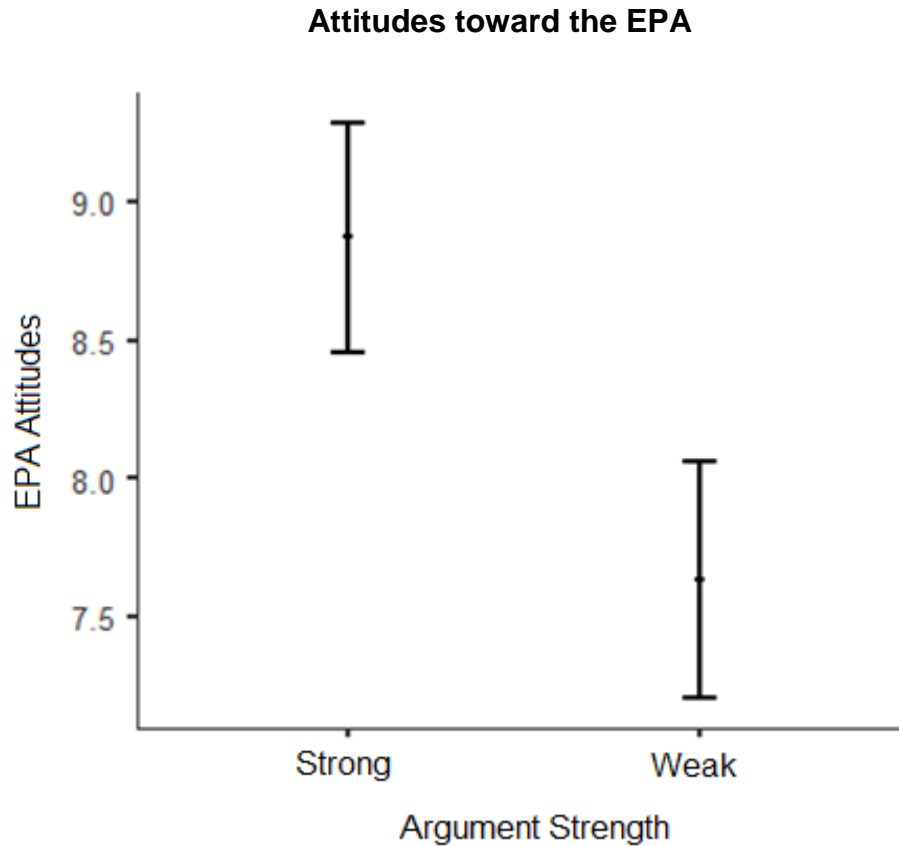
Preregistered Analyses

To test the hypothesis that purity would affect attitudes differently for the purity-framed solar panels message and the control message, attitudes towards solar panels were regressed on standardized purity score and framing condition, including their interaction term. Neither the relationship between purity and attitudes ($p = 0.489$) nor condition and attitudes ($p = 0.89$) was significant. These two variables further did not interact to predict attitudes ($p = 0.43$).

To test the hypothesis that RWA would lead to a greater effect of argument strength for EPA messages, attitudes towards the EPA were regressed on standardized RWA score and framing condition, including their interaction term. Participants in the strong argument condition ($M = 9.05$, $SD = 1.06$) rated the EPA as significantly more positive than participants in the weak argument condition ($M = 7.70$, $SD = 1.49$, $p < 0.01$). This effect can be seen in Figure 1. RWA, however, had no effect on attitudes to these messages ($p = 0.97$). The interaction between RWA and condition was also non-significant ($p = 0.20$).

To test the hypothesis that matched messages would lead to an increased number of listed thoughts, the number of thoughts listed in response to the solar panels message was regressed on standardized purity score, standardized need for cognition, and framing condition, along with all interaction terms. As noted, need for cognition was included as a control variable to increase power to observe the expected positive relationship between purity and number of thoughts listed. While need for cognition was found to positively predict number of listed thoughts ($p < 0.01$), neither purity nor framing condition, or any interaction term, had a significant effect (p 's > 0.05).

Figure 1



To further test this hypothesis, number of thoughts listed in response to the EPA message was regressed on standardized RWA score and need for cognition, along with their interaction term. As both of the possible messages were designed to match to RWA, framing condition was not considered in this analysis. The hypothesized effect would be found if higher RWA was associated with more thoughts listed. Once more, need for cognition was found to positively predict number of listed thoughts ($p = 0.05$). However, neither RWA nor the interaction term had a significant effect (p 's > 0.05).

Exploratory Analyses

The link between need for cognition and thoughts listed is well-established: any relationship between environmental apathy and attitudes not as much. Therefore,

environmental apathy was included separately in analyses as a control variable for exploratory purposes. Environmental apathy was found to significantly correlate with attitudes towards solar panels ($r = -0.42, p < 0.01$) and attitudes towards the EPA ($r = -0.55, p < 0.01$). To follow up on the significant difference observed between EPA message frames in the preregistered analyses, attitudes towards the EPA were regressed on standardized RWA score, framing condition, and standardized environmental apathy score, including all interaction terms. In this model, argument type continued to predict attitudes ($p < 0.01$), with more positive attitudes reported for the strong argument condition. Environmental apathy also predicted attitudes ($p < 0.01$), with greater levels of environmental apathy leading to lower reported attitudes. These effects were moderated by a three-way interaction between RWA, experimental condition, and environmental apathy ($b = 0.58, t(1, 101) = 2.18, p = 0.03$). For participants relatively high in environmental apathy (+ 1 SD from the mean), increased RWA was not associated with larger message effects, which would be expected if high RWA participants were elaborating more on the message contents. However, among participants relatively low in environmental apathy (-1 SD from the mean), higher RWA predicted larger message effects, as expected if higher RWA participants indeed were processing the messages more carefully. These effects can be seen in Figures 2 and 3, respectively.

Figure 2

Attitudes towards EPA at High (+1 SD) Environmental Apathy

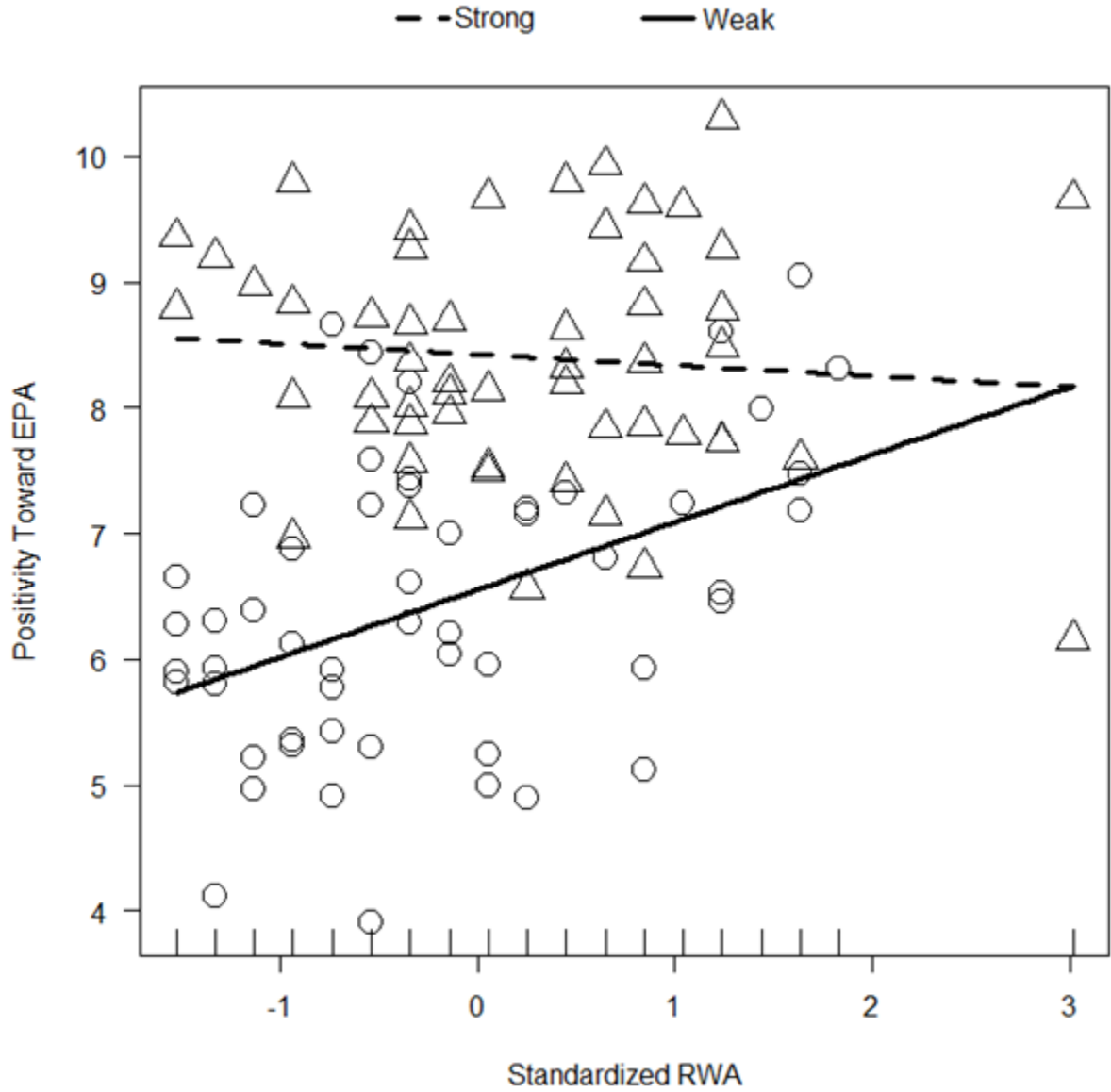
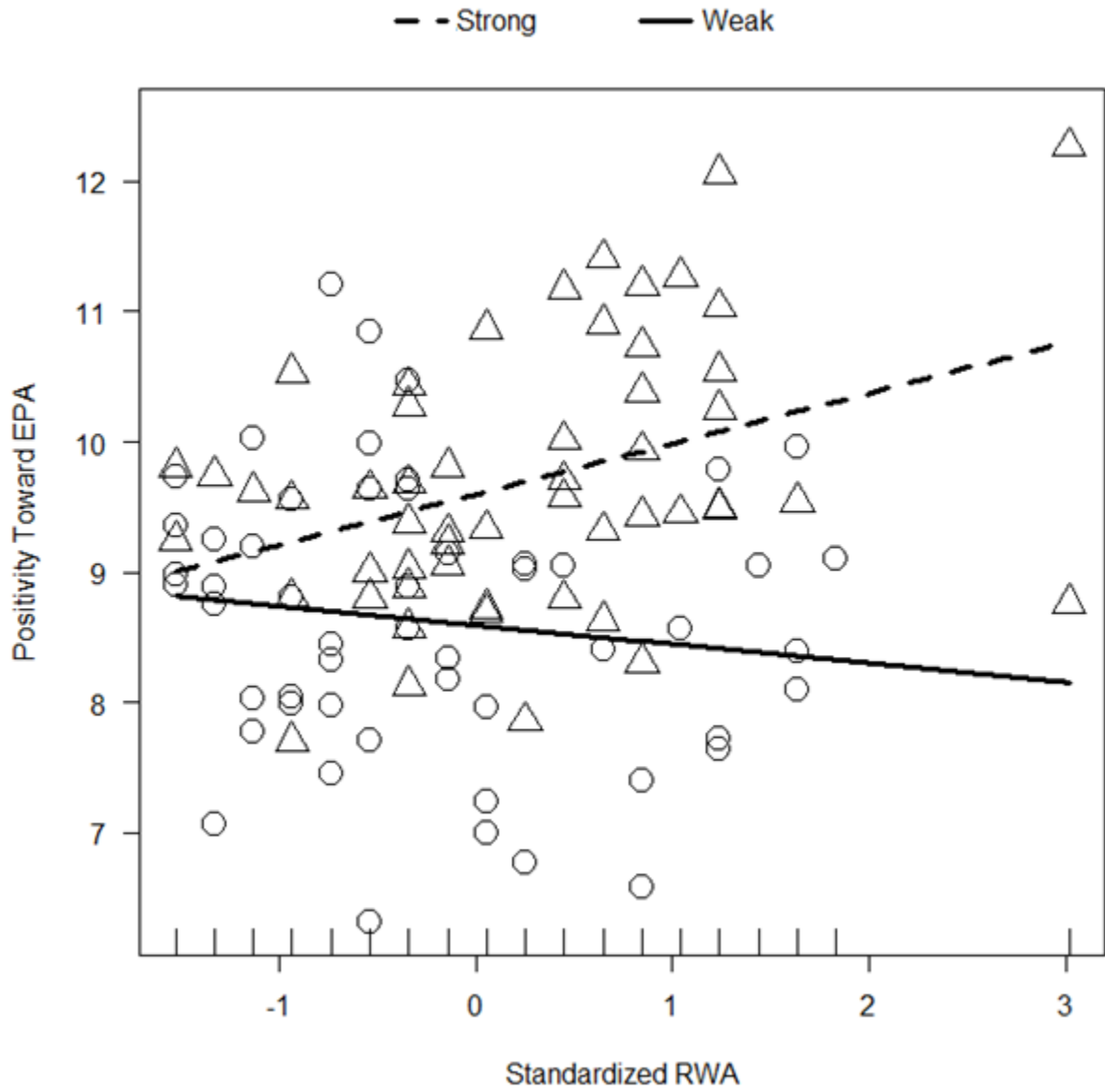


Figure 3

Attitudes towards the EPA at Low (-1 SD) Environmental Apathy



Discussion

For this study, I looked at the way that message framing affected reported attitudes in the context of environmental issues. To my knowledge, this is the first study to examine processing in the context of message matching effects. Participants saw messages in different frames and then rated their attitudes towards the subject in question. These data suggest that a message framing effect exists, and may be related to increased processing, as shown by the increased argument strength effects in response to the EPA messages. However, the framing effect appears more complex than originally thought.

I hypothesized that participants higher in purity would rate solar panels as more positive if they received a purity focused message than if they received a control message. Although the results did not support this effect, this may be due to the construction of the frames themselves. Previous research (Feinberg & Willer, 2013; Koleva et al., 2012) suggests that this effect exists, even if the results did not support the effect in this study. In order to create the two solar panel messages, an initial message was created that detailed various ways that solar panels could help protect and clean the environment. This message used words selected from Graham, Haidt, and Nosek's moral foundations dictionary (2009). The control frame was then created by removing those words from the message and replacing them with neutral words. This process deliberately resulted in messages that differed only slightly in their wording, and which according to my results were not different enough to affect attitudes. Further, given that purity had no effect regardless of condition, it is even possible that neither message appealed to participants based on their purity scores.

Perhaps the context in which an object or event is described is what brings about the relevance of purity in an individual's judgement. For example, explaining how solar panels can help keep the environment clean will activate different moral foundations than explaining how much money solar panels would save consumers, regardless of the specific wording used. If this is the case, the two messages I used to describe solar panels might have been too similar and purity would have no effect between conditions. A replication of this study using more contrasting frames, such as the harm/care and purity/sanctity frames used by Feinberg & Willer (2013), might be able to find an effect of purity.

In examining the data on attitudes toward the EPA, although no effect was found for RWA on its own, the addition of environmental apathy to the model resulted in finding an effect similar to what was hypothesized. In this model, environmental apathy moderated the effect of RWA, which was further moderated by argument strength. Essentially, under conditions of low apathy, my hypothesis received support. When environmental apathy was low, the messages were processed as would be expected if the matching did in fact appeal to participants higher in RWA. However, high levels of environmental apathy seemed to overwhelm any increases in personal relevance and processing that message matching may have otherwise caused. This suggests that in the context of environmental persuasive messages, environmental apathy is a critical variable.

Future research should consider approaching the effects of environmental apathy in other, novel ways. For instance, a future study may wish to examine the possibility of matching messages to environmental apathy and gauging what effects this causes. Could a message appeal to an individual higher in environmental apathy by dismissing

environmental concerns (e.g. “Solar panels would provide us with cheaper electricity, although large scale production of solar panels may cause some short-term environmental damage.”)? This type of message might bypass resistance from that individual, leading to more positive attitudes towards the subject of the message.

One limitation of this study is the sample, consisting of only Western Kentucky University college undergraduates. This sample is younger and less ethnically diverse than the population of Americans as a whole. These results may not generalize to that population. That being said, many political ads and persuasive messages are designed specifically to target younger voters, which comprise a substantial portion of this sample. For those interested in targeting young voters, this sample may lead to more generalizable results than a representative sample of Americans.

This sample was also predominantly made up of women, with 70% of participants being female. Although this may make the results of this study less generalizable, the primary focus of this study was to test the effects of message matching to an individual’s personality variables, not to test for differences between different demographic groups.

Also of note is the relatively low Cronbach’s alpha of the purity measure ($\alpha = 0.53$). In another study of the moral foundations on political attitudes, Koleva and colleagues (2012) reported an alpha of 0.85 for their purity measure. While I used the short-form version of the moral-foundations questionnaire for this study, Koleva used the long-form version. Had I instead used the long-form version of the questionnaire, I may have had a better measurement of purity. This would have given me increased power to find the effect of purity that I was looking for.

With these results, I cannot be entirely sure that message matching causes an increase in personal relevance. Message matching seems to cause increased elaboration, as shown by the increase in argument strength effects characteristic of more central route processing (Cacioppo & Petty, 1984) after environmental apathy is controlled for. However, the elaboration likelihood model predicts that more thoughts also will be associated with more elaboration (Petty & Cacioppo, 1986), yet I did not find this effect.

Although much progress has been made in the creation of environmentally friendly technology and sustainable energy sources, both the general public and policy makers in the government must agree to support them in order to ensure the well-being of our environment. After reviewing the literature, I identified message framing effects as the way in which I could help generate some of this support. I designed this study to further that literature. My results give greater insight into how some persuasive messages are more effective than others. Specifically, these results show how environmental apathy can change the way an environment-related message is processed and how resulting attitude change is affected. Messages that match to an individual's personality characteristics have reliable consequences for processing. I can think of no better application of these techniques.

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APPENDIX

Appendix A



IMPLIED CONSENT DOCUMENT

Project Title: Technology and Environmental Concerns

Investigator: Matthew Penner, Psch Sciences, matthew.penner845@topper.wku.edu

You are being asked to participate in a project conducted through Western Kentucky University. The University requires that you give your agreement to participate in this project.

You must be 18 years old or older to participate in this research study.

The investigator will explain to you in detail the purpose of the project, the procedures to be used, and the potential benefits and possible risks of participation. You may ask any questions you have to help you understand the project. A basic explanation of the project is written below. Please read this explanation and discuss with the researcher any questions you may have. You should keep a copy of this form for your records.

1. **Nature and Purpose of the Project:** To measure public opinion of various environmental concerns.
2. **Explanation of Procedures:** This study will take less than 30 minutes. You will be shown information various environmental topics. We will ask you to rate your feelings towards these topics. We will also ask you to complete a series of questionnaires asking about various political beliefs.
3. **Discomfort and Risks:** There are no anticipated risks associated with this study.
4. **Benefits:** You will learn about some environmental issues and also become more aware of their feelings on this issue.
5. **Confidentiality:** Your name is not associated with your data, which makes it anonymous. No one (including the researcher) will be able to associate any of your answers with you. The data collected may be viewed by more than one researcher. However, no one will know how you, personally, responded to anything.
6. **Refusal/Withdrawal:** Refusal to participate in this study will have no effect on any future services you may be entitled to from the University. Anyone who agrees to participate in this study is free to withdraw from the study at any time with no penalty.

You understand also that it is not possible to identify all potential risks in an experimental procedure, and you believe that reasonable safeguards have been taken to minimize both the known and potential but unknown risks.

Your continued cooperation with the following research implies your consent.

THE DATED APPROVAL ON THIS CONSENT FORM INDICATES THAT
THIS PROJECT HAS BEEN REVIEWED AND APPROVED BY
THE WESTERN KENTUCKY UNIVERSITY INSTITUTIONAL REVIEW BOARD
Robin Pyles, Human Protections Administrator
TELEPHONE: (270) 745-3360

Reference # IRB 19-221

Appendix B

Solar Control

Solar panels absorb energy from sunlight and convert it into electricity. Solar panels have become cheaper and easier to produce. Once panels are installed, solar energy is free to collect, making it much more efficient than energy gained from burning fossil fuels. The process of burning fossil fuels such as coal, natural gas, and petroleum releases large amounts of carbon dioxide. These green-house gasses end up in our atmosphere, and affect all life on Earth.

The use of inefficient technologies causes pollution, which affects the places we call home. Solar panels preserve the environment, keeping these places around. Solar panels allow us to create a better environment for everyone. No person will have to live in an unhealthy place. Solar panels will remove this worry from our lives.

Solar Pure

Solar panels absorb energy from sunlight and convert it into clean electricity. Solar panels have become cheaper and easier to produce. Once panels are installed, clean solar energy is free to collect, making it much more efficient than energy gained from burning fossil fuels. The process of burning dirty fossil fuels such as coal, natural gas, and petroleum releases large amounts of pollutants such as carbon dioxide. These contaminants stain our atmosphere, making it unclean.

The use of inefficient technologies causes pollution, which tarnishes the integrity of the places we call home. Solar panels preserve the natural, wholesome environment, keeping

these places pure. Solar panels allow us to create a decent, better environment for everyone. No innocent person will have to live in a filthy, unclean place. Solar panels will remove contaminants from our lives.

Appendix C

EPA Strong

Since the December 2, 1970, the EPA has reduced our exposure to harmful pollutants. It was established by Republican president Richard Nixon, and has been supported by both Republican and Democratic administrations and legislatures. Although some individuals criticize the EPA, these people generally do so when the EPA stands in the way of their elite financial interests. For most people, having clean air, clean water, and uncontaminated soil are things that are hard to disagree on.

Of course, the cost of these benefits must always be considered, but traditionally, our political leadership has repeatedly shown that it values the EPA and is willing to use its power to fund the EPA's mission. This support continues to the present day. For instance, on May 22, 2018, a high ranking member of President Trump's EPA stated "Americans count on the Environmental Protection Agency every time they turn on the tap. Protecting public health and ensuring the safety of our nation's drinking water is one of the agency's top priorities." A survey of senior leaders in congress has shown strong support for environmental protections. One senior senator was quoted as saying "Just as I expect my staffers to clean up after themselves and not make a mess, I expect our nation's companies to do the same. Nowhere in the constitution does it say that people have the right to make a mess of things and contaminate their environment."

A little known aspect of the EPA is enforcement of laws to protect health and the environment. The EPA has successfully punished a number of serious polluters, and also uncovered and punished criminal behavior. For instance, the EPA recently prosecuted

Volkswagen for lying to consumers and the government about cancer-causing diesel vehicle emissions. Volkswagen even used illegal software to cheat emissions tests. With the administration's support, EPA forced the company to pay a \$2.8 billion criminal fine. Volkswagen also was ordered to pay \$1.45 billion in civil penalties. In general, our leaders believe health and the environment should be protected, and violators should be punished.

EPA Weak

Since the December 2, 1970, the EPA has reduced our exposure to harmful pollutants. It was established by Republican president Richard Nixon, and has been supported by both Republican and Democratic administrations and legislatures. Although some individuals criticize the EPA, these people generally do so when the EPA stands in the way of earning an honest living, not when the EPA is doing its job. For most people, having air to breathe and water for fishing or boating in, as well as access to soil for agribusiness and construction, are things that are hard to disagree on.

Of course, the cost of these benefits must always be considered, but traditionally, our political leadership has repeatedly shown that it values the EPA and is willing to use its power to fund the EPA's mission. This support continues to the present day. For instance, on May 22, 2018, a high ranking member of President Trump's EPA stated "Americans count on the Environmental Protection Agency so that they can have good clean water to wash their cars with. Protecting public recreation so people have clean air to breathe while off-roading and large animals to mount as hunting trophies is one of the agency's top priorities." A survey of senior leaders in congress has shown strong support for environmental protections. One senior senator was quoted as saying "Just as I expect my

staffers to report messes to the janitor, I expect our nation's companies to do the same, for instance by supporting municipal trash collection and selling attractive trash dumpster designs. Nowhere in the constitution does it say that people have the right to litter, or that they must tolerate ugly dumpsters.”

A little known aspect of the EPA is enforcement of laws to protect health and the environment. The EPA has successfully punished a number of serious polluters, and also uncovered and punished criminal behavior. For instance, the EPA recently prosecuted a small company that was installing attic insulation without proper permits. If someone had ingested the insulation, it could have caused cancer. This insulation company had not even double checked with the EPA to get permission to do business. With the administration's support, EPA forced the company to pay a \$280 criminal fine. The company also was ordered to pay \$145 in civil penalties. In general, our leaders believe health and the environment should be protected, and violators should be punished.

Appendix D

Attitude Index

Overall, how positive or negative would you say solar panels are?

To what extent are solar panels good or bad?

To what extent are you in favor of or against solar panels?

How harmful or beneficial do you think solar panels are?

How certain are you about your opinion of solar panels?

How sure are you that your opinion on solar panels is right?

How confident are you in your attitude towards solar panels?

How important is the issue of solar panels to you personally?

Appendix E

Moral Foundations Questionnaire

Part 1

Whether or not someone suffered emotionally

Whether or not someone cared for someone weak or vulnerable

Whether or not some people were treated differently than others

Whether or not someone acted unfairly

Whether or not someone's actions showed love for his or her country

Whether or not someone did something to betray his or her group

Whether or not someone showed a lack of respect for authority

Whether or not someone conformed to the traditions of society

Whether or not someone violated the standards of purity and decency

Whether or not someone did something disgusting

Part 2

Compassion for those who are suffering is the most crucial virtue.

One of the worst things a person could do is hurt a defenseless animal.

When the government makes laws, the number one principle should be ensuring that everyone is treated fairly.

Justice is the most important requirement for a society.

I am proud of my country's history.

People should be loyal to their family members, even when they have done something wrong.

Respect for authority is something all children need to learn.

Men and women each have different roles to play in society.

People should not do things that are disgusting, even if no one is harmed.

I would call some acts wrong on the grounds that they are unnatural.

Appendix F

RWA Scale

Asterisk denotes reverse-scored item

The only way our country can get through the crisis ahead is to get back to our traditional values, put some tough leaders in power, and silence the troublemakers spreading bad ideas.

It is always better to trust the judgment of the proper authorities in government and religion than to listen to the noisy rabble-rousers in our society who are trying to create doubt in people's minds.

Our country will be destroyed someday if we do not smash the perversions eating away at our moral fiber and traditional beliefs.

Our country needs free thinkers who will have the courage to defy traditional ways, even if this upsets many people. *

What our country really needs, instead of more "civil rights," is a good stiff dose of law and order.

Everyone should have their own lifestyle, religious beliefs, and sexual preferences, even if it makes them different from everyone else. *

Appendix G

Environmental Apathy Scale

It seems to me that most conservationists are pessimistic and somewhat paranoid.

I find it hard to get too concerned about environmental issues.

I do not care about environmental problems.

I am opposed to programs to preserve wilderness, reduce pollution and conserve resources.

We need to preserve resources to maintain a high quality of life.

Appendix H

Need for Cognition Scale

Asterisk denotes reversed-scored item

I would prefer complex to simple problems.

I like to have the responsibility of handling a situation that requires a lot of thinking.

Thinking is not my idea of fun.*

I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.*

I try to anticipate and avoid situations where there is likely chance I will have to think in depth about something.*

I find satisfaction in deliberating hard and for long hours.

I only think as hard as I have to. *

I prefer to think about small, daily projects to long-term ones.*

I like tasks that require little thought once I've learned them.*

The idea of relying on thought to make my way to the top appeals to me.

I really enjoy a task that involves coming up with new solutions to problems.

Learning new ways to think doesn't excite me very much.*

I prefer my life to be filled with puzzles that I must solve.

The notion of thinking abstractly is appealing to me.

I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.

I feel relief rather than satisfaction after completing a task that required a lot of mental effort.*

It's enough for me that something gets the job done; I don't care how or why it works.*

I usually end up deliberating about issues even when they do not affect me personally.