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Abstract

We explored the effect of attribute framing on choice, labeling charges for environmental costs as either an earmarked tax or an offset. Eight hundred ninety-eight Americans chose between otherwise identical products or services, where one option included a surcharge for emitted carbon dioxide. The cost framing changed preferences for self-identified Republicans and Independents, but did not affect Democrats' preferences. We explain this interaction by means of query theory and show that attribute framing can change the order in which internal queries supporting one or another option are posed. The effect of attribute labeling on query order is shown to depend on the representations of either taxes or offsets held by people with different political affiliations.

Keywords

attribute framing, constructed preference, consumer choice, political affiliation, query theory

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Leading economists and climate scientists agree that a carbon tax would be the single most effective measure the United States could take to curb carbon dioxide emissions and encourage the development of alternative energy sources (Hansen, Stiglitz, Pachauri, & Rosenzweig, 2008). Yet carbon taxes are seldom mentioned by politicians, presumably because taxes are widely unpopular. At the same time, a carbon-offset industry has sprung up for people wishing to voluntarily pay more for carbon-producing activities, under the premise that carbon emissions will be balanced out by funding alternative energy production or carbon capture.

Does this new industry thrive on the concerns of a small niche of environmental activists, or might political support for a tax be more widespread if the price increase were labeled differently? The literature on attribute framing suggests that labels make a big difference (Levin, Schneider, & Gaeth, 1998). For example, people pay more for a burger described as 75% lean than one described as 25% fat (Levin & Gaeth, 1988) and have more positive attitudes toward medical procedures when they are described by their survival rate rather than mortality rate (Marteau, 1980; McNeil, Pauker, Sox, & Tversky, 1982; Wilson, Kaplan, & Schneiderman, 1987). Almost all attribute-framing studies have treated individual differences as noise, but the effect of framing should depend on peoples' existing representations of attribute labels. Indeed, when Braun, Gaeth, and Levin (1997) labeled chocolate bars

as 20% fat rather than 80% fat free, women paid significantly more attention to the fat content (listing it as a reason for their choice and remembering it) than did men and were more strongly influenced by the framing (choosing the 80% fat-free option much more often than the 20% fat option).

Given the hot-button nature of taxes in U.S. politics, we hypothesized that the framing of a carbon fee as either a tax or an offset would affect Democrats and Republicans differently, because Republicans generally have a more negative representation of taxes (American National Election Studies, 2004). This would be consistent with studies demonstrating strong, reliable individual differences based on political conservatism (for a review, see Jost, 2006) and the differential sensitivity of conservatives to the labeling of financial options (Morris, Carranza, & Fox, 2008).

Whereas previous attribute-framing studies have compared different ways of describing a single attribute (i.e., 75% lean vs. 25% fat), our study examined different ways of labeling a trade-off. In both frames, a price increase is used to fund carbon-reducing measures. Describing this increase as a tax highlights the increased cost required to provide the

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benefit, whereas describing it as an offset highlights the benefit provided by the cost. After reading a description of the tax (or offset) program, participants considered pairs of products, one of which included the fee in its price. We predicted that more participants would prefer the costlier product when the price increase was labeled an “offset” than a “tax” but that this attribute-framing effect would be weaker for self-identified Democrats than for members of other political parties.

To understand the processes that may produce attribute-framing effects, we applied query theory (Johnson, Haubl, & Keinan, 2007; Weber et al., 2007), which assumes that options are evaluated by sequential queries that retrieve different aspects of potentially relevant knowledge about the options. For example, one query might ask why one should choose the cheaper option, and a second query would then retrieve aspects supporting the more expensive option with the tax (or offset). An important prediction of query theory is that because of output interference, the order of queries matters. The first query typically generates a richer set of answers than the second; reversal of query order will therefore result in a different balance of evidence.

For attribute framing, we argue that labels determine query order. In keeping with research on predecision distortions in information search that help to enhance preference for early favorites among options (Russo, Meloy, & Wilks, 2000), we hypothesize that people will first query reasons for picking the more attractive sounding option, followed by consideration of reasons for the other option (Weber & Johnson, 2009). Given the recent dramatic growth of interest in carbon dioxide reduction in the United States (*carbon neutral* was the “Word of the Year” in 2006 according to the *New Oxford American Dictionary*; Oxford University Press, 2006), we predict that most Americans will be attracted by the more expensive carbon-neutralizing option, querying reason for its choice first, when it is framed as a carbon offset. When framed as a carbon tax, the initial appeal of the more expensive carbon-neutralizing option will be much reduced for Americans who consider taxes to be a dirty word, thus equalizing or reversing the order of queries.

The assumptions of query theory have been supported in studies of the endowment effect, where ownership changes the order of queries (Johnson et al., 2007), and in studies of intertemporal choice, where the default date of consumption determines the order of queries (Weber et al., 2007). In both of these applications, thought listings provided by decision makers before their judgments or choices showed that task conditions changed the order in which evidence was retrieved. Resulting differences in the balance of evidence mediated the observed behavioral effects. In our second study, we therefore predicted that trade-off label frames and political affiliation would influence the structure and number of aspects supporting the two alternatives in thought listings provided by participants and that those would predict choices.

Study 1

Method

Participants. We recruited 275 on-line participants through ads for studies on decision making. Participants received \$8 for completing this study and an unrelated study. Five participants who completed the studies in less than 10 min were excluded (average completion time was 30 min). We also excluded data from 25 participants who gave inconsistent responses, indicating lack of attention (i.e., choosing Product A but then preferring Product B in a continuous preference measure). All further analyses concern the remaining 245 participants. Participants (60% women and 40% men) had an average age of 41 years ($SD = 13$). The median household income was \$35,000 to \$49,999; 38% classified themselves as Democrats, 25% as Republicans, and 37% as “none of the above,” whom we label here as Independents.

Procedure. Participants read a one-page explanation of policies that would increase the cost of certain products believed to contribute to global warming through energy use and resulting carbon dioxide emissions. They learned that these price increases would be used to fund programs designed to decrease the level of carbon dioxide in the environment, through funding alternative energies or carbon sequestration. This description was the same for all participants except for a single sentence that described the rationale behind the cost increase and labeled it as either a tax or an offset. In the *tax* condition, participants read, “The goal of a carbon tax, which may or may not be mandatory, is therefore to fund these efforts and ensure that the price of an activity reflects the true cost to society.” In the *offset* condition, they read, “The goal of a carbon offset, which may or may not be mandatory, is therefore to make an activity carbon neutral—meaning that there is no net contribution to global warming.” (Note that although this presents a potential confound between label and justification, this issue was addressed in Study 2.)

Participants subsequently were presented with four pairs of product decisions (i.e., gasoline, airline flights, electricity providers, and computers) that provided them with the identical product or service at two price levels: a cheaper one and a more expensive one, which included a carbon tax (or offset). We used current market prices for the products and determined the price of the tax or offset by averaging the estimates of several on-line carbon-offset providers. For example, one product pair was a round-trip flight from New York to Los Angeles for \$345 or the same flight for \$352, including a carbon tax (or offset). For each product pair, participants indicated their preferred option (dichotomous choice), how strongly they preferred each option (on a 5-point scale ranging from *strongly prefer A*, -2, to *strongly prefer B*, 2), and whether they believed the carbon offset (or tax) should be made mandatory for all products of that type (on a 7-point scale ranging from *definitely not*, -3, to *definitely*, 3). Because product type did not interact with tax/offset framing or political party, we collapse across products in our analyses and figures. Finally, participants provided demographic information, including their political affiliation.

Results

Figure 1 shows that Democrats were equally likely to choose the more expensive product whether the additional charge was labeled as a tax or an offset, whereas Independents and Republicans were more likely to choose the costlier product when the included fee was labeled an offset than when it was labeled a tax. To model the repeated dichotomous-choice data, we used hierarchical linear logistic regression with a random effect of individual.¹ The results confirmed the impression given by Figure 1. There were main effects of frame, $z(241) = 4.1, p < .001$, and party, $z(241) = 3.7, p < .001$. Democrats were relatively unaffected by the attribute label, (.56 vs. .50, $d = 0.13$), Independents were affected (.49 vs. .28, $d = 1.3$), and Republicans showed the biggest difference (.53 vs. .13, $d = 2.0$). Put another way, when participants considered the offset, there were no differences in choices between political parties, but when they considered the tax, there was a strong decreasing trend. We tested this specific hypothesis by an analysis of simple effects, testing whether the acceptance of the added cost would be greatest among Democrats followed by Independents followed by Republicans, separately in each frame condition. This showed no effect for party in the offset condition, $z(241) = 0.7, p > .5$, but a strong decreasing trend in the tax condition, $z(241) = 4.0, p < .001$. The preference-strength data showed the same pattern of results as the choice data and so have been omitted from the results. Respondents' support for making the cost increase mandatory, shown in Figure 2, showed a similar pattern. Although the same effects were significant for supporting mandatory price increases, the effect size of framing among non-Democrats was smaller than for choices ($d = 0.4$).

There were no significant differences between frames and political affiliations on any of the demographic variables we measured. Although parties differed on environmental attitudes,² these did not interact with frame, and the Frame \times Party interaction remained significant when environmental attitudes were added to the model.

Discussion

As predicted, participants were more likely to prefer the more expensive product and were more supportive of regulation when the cost increase was described as a carbon offset than when it was described as a carbon tax. Political affiliation moderated the effect of frame: Democrats were not affected by framing, but Independents and Republicans strongly preferred the offset to the tax. This study showed that attribute framing matters and that its effect depends on party affiliation.

Study 2

Even though the importance of attribute labeling to political discourse and public policy is widely discussed (Weston, 2007), less is known about the cognitive or affective processes that drive these effects. In Study 2, we examined the possibility

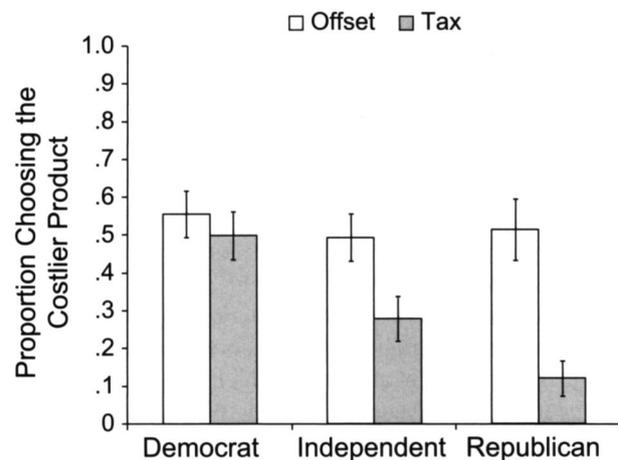


Fig. 1. Proportion of Democrats, Independents, and Republicans who chose the more expensive product, averaged across products, in the offset and tax attribute-framing conditions in Study 1. Error bars represent ± 1 SE.

that the frames lead to differences in how preferences between products are constructed and that these differences explain why frame interacts with party. To do this, we used a concurrent-thought listing, asking respondents to report what went through their mind as they made their choices. In keeping with query theory, we expected the order of queries for reasons supporting each option to differ in the two framing conditions, which in turn (due to output interference) would change the balance of evidence on which the choice would be based.

We expected that Republicans' immediate negative reactions to the tax option would lead them to consider advantages of the cheaper option first, leading to a balance of evidence favoring the cheaper option. In contrast, members of other parties would have less polarized thought orders as a function of

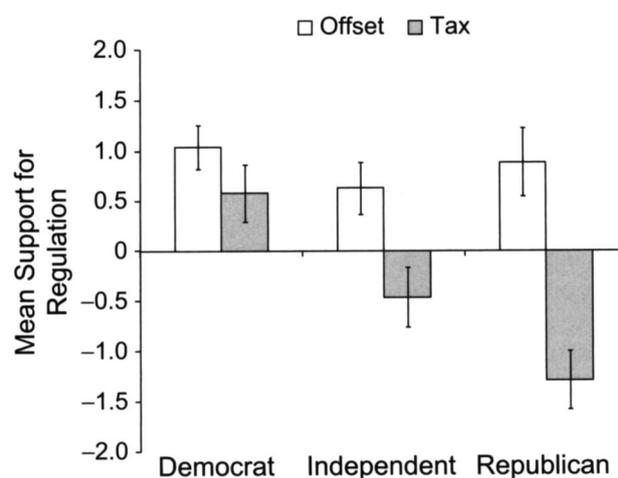


Fig. 2. Participants' mean ratings of whether they believed that the increase in product cost should be mandatory in Study 1. Results are shown separately for Democrats, Independents, and Republicans in the offset and tax attribute-framing conditions. Ratings were made on a 7-point scale ranging from -3, definitely not, to 3, definitely. Error bars represent ± 1 SE.

trade-off framing, leading to a more similar balance of evidence and choices. We also examined an alternative mood explanation, namely, that Republicans have a strong negative affective reaction when the additional charge is described by the word *tax*, which in turn leads them to reject the tax-framed option.

Method

Participants. Participants ($N = 373$) were drawn from the same population and recruited in the same way, and had similar demographics to those of Study 1. We cleaned the data as in Study 1, leaving 337 participants for our analyses.

Procedure. Participants first practiced listing their thoughts and the use of the Web-based interface to do so by describing their thoughts about purchasing a convertible car. This methodology has been used successfully to study cognitive processes in similar tasks (Johnson et al., 2007; Weber et al., 2007). Participants then read an explanation of measures that would increase the cost of certain products and about the use of these proceeds to reduce carbon dioxide emissions. Unlike Study 1, this explanation was precisely the same between conditions with the exception of the word *tax* or *offset*. Next, all participants chose between two airline tickets, one of which was more expensive but included a carbon tax (or offset). Participants then listed their thoughts, one at a time, following the instructions, "Please tell us everything you are thinking of as you consider this decision. . . . We would like you to list any thoughts, both **positive** and **negative**. . . ." Next, participants indicated which airline ticket they would choose and whether the carbon tax (or offset) should be made mandatory for all airline tickets sold in the United States. Subsequently, participants completed the Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988). Participants then viewed their own thought listings and classified each as to whether it supported the ticket with the carbon fee (or opposed the cheaper ticket), supported the other ticket, or neither. Finally, participants provided demographic data.

Results

We replicated the choice and preference results of Study 1. The effect of frame on choice depended on participants' political affiliation, as seen in Figure 3. For Democrats, there was no effect of frame (.64 vs. .62, $d = 0.03$), but for other parties there was a large effect (.63 vs. .37, $d = 0.53$, for Independents and .58 vs. .26, $d = 0.68$, for Republicans). A logistic regression containing the factor frame, and nested separate simple effects of party within each frame, confirmed the impression of Figure 3: a strong effect of party in the tax condition ($\beta = -0.82$, $SE = 0.23$, $p < .001$) and no effect in the offset condition, ($\beta = -0.11$, $SE = 0.21$, $p > .5$).

No significant differences between frames were found on self-reported positive or negative affect for any party (all

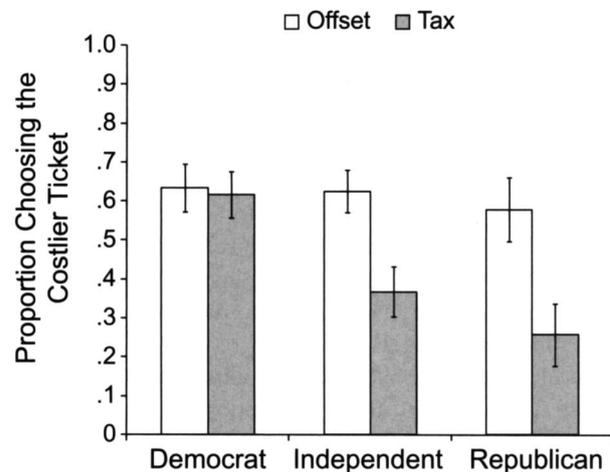


Fig. 3. Proportion of Democrats, Independents, and Republicans who chose the more expensive flight ticket in the offset and tax attribute-framing conditions in Study 2. Error bars represent ± 1 SE.

$p > .15$). As in Study 1, demographic variables did not vary by frame or party.

On average, participants listed 2.7 thoughts ($SD = 1.4$) about the choice, which did not vary by condition. Query theory predicts that in consumer decisions without a default choice or other reasons (like ownership) for favoring one option over the other, decision makers' attention will be attracted by options with positive attributes or unique attributes. Reasons for choosing the initially (more) attractive option (which include reasons against choosing the other option) will be queried first, followed by a query about reasons for the other option. If we assume that Democrats have positive associations to both carbon offsets and carbon taxes, we predict that they should query reasons for choosing the more expensive airplane ticket first, followed by reasons for choosing the cheaper ticket, under both attribute frames. If Independents and Republicans, on the other hand, can be assumed to have negative associations to carbon taxes, but (more) positive associations to carbon offsets, we predict that they should also query reasons for choosing the more expensive airplane ticket first under the offset frame but should query reasons in support of choosing the cheaper ticket first under the tax frame.

The presence of sequential queries and the order of such queries can be inferred from a statistic called the standardized median rank difference (SMRD; see Johnson et al., 2007). We computed the SMRD scores of respondents with different party affiliations and in different attribute-frame conditions using the formula $2(MR_c - MR_o)/n$, where MR_c is the median rank order of thoughts supporting the more expensive option (or opposed to the cheaper option), MR_o is the median rank of thoughts supporting the cheaper option, and n is total number of thoughts listed. SMRD scores can take on values from 1 to -1, with positive scores indicating that reasons supporting the more expensive option were queried first. Observed SMRD scores are shown in Figure 4. In keeping with our hypothesis, we found a shift in the structure of thought going from Democrat to

Independent to Republican in the tax frame, $t(333) = 2.3, p < .05$, but not in the offset frame, $t(333) = 1.2, p > .2$.

If query order changes as a result of attribute frame for non-Democrats, we expect a similar pattern of results in the content of participants' thought listings, with non-Democrats listing relatively more thoughts supporting the environmental fee in the offset than in the tax condition. In accordance with query theory, SMRD scores were highly correlated with the content of thoughts ($r = .68, p < .001$), indicating that participants who listed supportive thoughts earlier also tended to list relatively more supportive thoughts.

We calculated the balance of thoughts as a difference score between the number of thoughts supporting the more expensive option and the number of thoughts supporting the cheaper option. The pattern of results, summarized in Figure 5, resembled the pattern for choices, except for a trend for Democrats to list a relatively greater number of supportive thoughts when considering the tax than when considering the offset, $t(129) = 1.7, p = .09$. As in our analysis of choices, an analysis of simple effects showed a strong effect of party in the tax frame, $t(332) = 4, p < .0001$, but not in the offset frame, $t(332) = 0.5, p > .95$.

The two summary statistics of thought listings predicted choices. A logistic regression including balance of thoughts ($\beta = 1.7, p < .001$) and SMRD scores ($\beta = 2.1, p < .001$), accounted for roughly 50% of the variance in choices (Nagelkerke $R^2 = .52$). Those who listed thoughts supporting the more expensive option relatively earlier and listed a greater number of those thoughts were more likely to choose the more expensive ticket.

Finally, we expected the structure and content of thought listings to mediate the effect of frame. To demonstrate this, we entered both putative mediators into the logistic regression predicting choices based on party affiliation, separately for each frame. This reduced the effect of party in the tax frame, from highly significant ($\beta = 0.82, p < .0001$) to only marginally significant ($\beta = 0.59, p = .054$). This mediation was significant for both content ($p < .001$) and structure ($p < .05$), according to recommended bootstrapping mediation tests (Shrout & Bolger, 2002) with 10,000 replications. The ability of these thought-listing characteristics to both predict choices and mediate the effect of party and frame on choices supports the query theory account of this attribute-framing effect.

Study 3

A third study ($N = 316$) used the same design as Study 2 but explicitly manipulated the order of queries. Half the participants were told to first list thoughts supporting the tax/offset ticket and then list thoughts supporting the cheaper ticket. Query theory and empirical data from Study 2 would suggest that this was the natural order of queries, except for Republicans in the tax frame, for whom this was an unnatural order. The other half of participants were prompted to list thoughts in the reverse order, which would be unnatural for most participants but natural for Republicans in the tax frame.

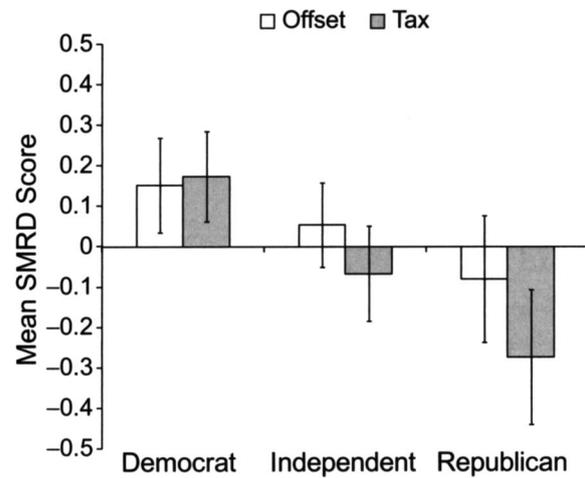


Fig. 4. Mean standardized median rank difference (SMRD) scores for Democrats, Independents, and Republicans in the offset and tax attribute-framing conditions in Study 2. Error bars represent ± 1 SE.

Republicans had a hard time complying with our request to first list thoughts favoring the more expensive option when framed as a tax, with many reverting to their natural tendency to first list arguments against that option. Hence, only 46% of Republicans actually followed directions in the unnatural-order tax condition (as compared with 100% in the natural-order tax condition). Democrats and Independents generally followed task instructions under all framing conditions.

Previous manipulation of query order showed that reversing queries from their natural implicit order to an explicit unnatural order eliminated the endowment effect (Johnson et al., 2007) and the often-observed asymmetry in discounting due to direction (Johnson et al., 2007; Weber et al., 2007). Thus, we expected to replicate the effect of framing and party when queries matched the natural order, but for the effect to be severely

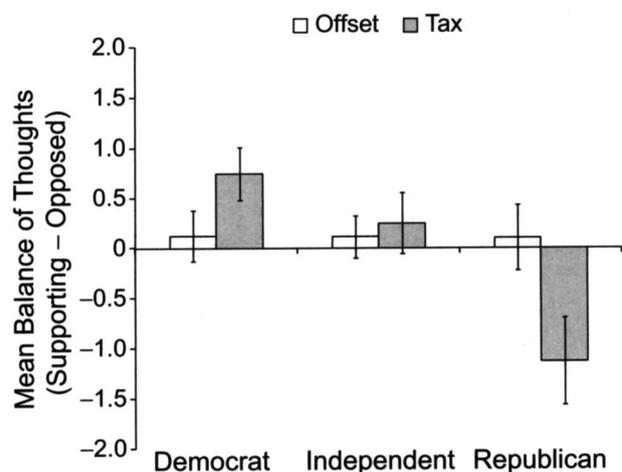


Fig. 5. Mean balance of thoughts regarding the more expensive flight tickets among Democrats, Independents, and Republicans in the offset and tax attribute-framing conditions in Study 2. Balance of thoughts was calculated as the number of thoughts supporting the more expensive ticket minus the number of thoughts supporting the cheaper ticket. Error bars represent ± 1 SE.

attenuated, or to disappear, when the natural order was reversed. As predicted, when participants listed arguments for the two options in the natural order, we saw the same pattern of choice as in Studies 1 and 2. Logistic regression confirmed a decreasing trend of choosing the more expensive option as a function of political affiliation in the tax condition ($\beta = -0.79$, $SE = 0.41$, $p = .05$), but no effect for party in the offset condition ($\beta = 0.19$, $SE = 0.29$, $p > .5$).³ In contrast, when participants listed thoughts in the unnatural order, these effects were eliminated (both $ps > .2$). Together, these results suggest that queries played a causal role in the attribute-framing effect observed.

General Discussion

Attribute framing has been a well-established phenomenon in policy discourse and a frequently exploited one in political practice. Somewhat surprisingly, little attention has been paid to the cognitive or emotional processes that might produce these effects. In three studies, we show that the power of a framing manipulation can depend on participants' preexisting individual differences. Although Democrats didn't differentiate between the tax and offset frames, participants identifying with other parties reacted strongly to frame. We propose that this attribute-framing effect was caused by a difference in the way that respondents constructed their choices, in particular, a difference in the order in which queries supporting either the more expensive or the cheaper option were posed. Due to output interference (with later queries resulting in fewer retrievals), differences in query order result in differences in the balance of support for the two options. Thought listings collected during the process of making a decision showed that decision makers did indeed consider thoughts favoring one or the other option in clusters, which differed in order between conditions, resulting in different balances of evidence. These differences in structure and content predicted choices and mediated framing effects. Due to different political ideologies, framing the cost increase as a tax differentially affected the structure and content of thoughts generated by Democrats and Republicans, leading to different preferences. However, the offset frame minimized differences in query order and thus the balance of evidence, with the result that Republican preferences were much more similar to the preferences held by Democrats.

These results of attribute framing and party affiliation appeared distinct from the effects of environmental attitudes. Furthermore, because our sample showed no party-related differences in demographics or postdecision emotional state, it seems likely that the interactions between attribute framing and party affiliation we observed were due to differences in ideology and related knowledge structures. Finally, our manipulation of thought order demonstrated its causal role in preference construction.

A limitation of the present research is that it only examined preferences and hypothetical choices rather than assessing real consumer behavior and voting patterns. Self-presentation effects can lead participants to overstate their preferences for the more expensive option—wanting to look or feel good, but without having to actually pay for it. Although it is likely that

overall purchase rates for the costlier product would be lower (a main effect) in the real world, the same factors observed to influence choice in our studies would quite likely also influence those (lower) rates.

Future research might explore whether the observed pattern of results could be reversed by using a hot-button word that impacted Democrats but not other parties or whether responsiveness to framing in general covaries with political conservatism. In any case, policymakers (and those who advise them) would be wise to note the differential impact that policy labels may have on different groups. What might seem like a trivial semantic difference to one person can have a large impact on someone else.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interests with respect to their authorship and/or the publication of this article.

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Notes

1. Similar results were obtained using a repeated measures analysis of variance.
2. A subset of 157 participants completed the New Ecological Paradigm (Dunlap, Van Liere, Mertig, & Jones, 2000).
3. These are the data for participants who followed instructions. When we included those who did not follow instructions, the effect in the tax condition was reduced but still significant by a one-tailed test ($\beta = -0.51$, $SE = 0.33$, $p = .06$).

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