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Biased Predecisional Processing of Leading and Nonleading Alternatives

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Abstract

When people obtain information about choice alternatives in a set one attribute at a time, they rapidly identify a leading alternative. Although previous research has established that people then distort incoming information, it is unclear whether distortion occurs through favoring of the leading alternative, disfavoring of the trailing alternative, or both. Prior examinations have not explored the predecisional treatment of the nonleading alternative (or alternatives) because they conceptualized distortion as a singular construct in binary choice and measured it using a relative item comparing the evaluation of both alternatives simultaneously. In this article, we introduce a measure of distortion at the level of the alternative, which allows for measuring whether predecisional distortion favors or disfavors every alternative being considered in choice sets of various sizes. We report that both proleader and antitrailer distortion occur and that the use of antitrailer processing differs between binary choices and multiple-options choices.

Keywords

biases, decision making, predecisional distortion, proleader distortion, antitrailer distortion, preferences

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The tendency for people to see new data as being consistent with their prior beliefs and preferences is one of the oldest, most robust, and well-known phenomena in decision making (Holyoak & Simon, 1999; Nickerson, 1988; Thurstone, 1924). This tendency is central to selective information search (Koriat, Lichtenstein, & Fischoff, 1980), selective hypothesis testing (Sanbonmatsu, Posavac, Kardes, & Mantel, 1998), and biased information evaluations (Brownstein, 2003) because it helps support both chosen alternatives (Festinger, 1957) and alternatives that emerge as preferred before the final choice (Russo, Medvec, & Meloy, 1996). The former type of distortion is typically referred to as *postdecisional distortion* and the latter type of distortion as *predecisional distortion*.

Although there have been many demonstrations of predecisional distortion (Carlson, Meloy, & Russo, 2006; Hope, Memon, & McGeorge, 2004; Meloy, 2000; Russo, Carlson, & Meloy, 2006; Russo et al., 1996; Ruva & McEvoy, 2008; Simon, Pham, Le, & Holyoak, 2001), none of these studies has explored the predecisional treatment of the nonleading alternatives. Distortion was conceptualized and measured as a singular construct and the focus of the bias was assumed to be on the leading alternative. In the study reported here, we introduced a modification to the measurement of distortion that allows researchers to examine how nonleading alternatives are treated in choices involving two or more alternatives.

Experiment 1 tested for the presence of proleader and antitrailer distortion in binary choices. Experiment 2 examined distortion in a six-alternative choice (i.e., one alternative emerges as leader and five emerge as trailers).

Experiment 1: Proleader and Antitrailer Distortion in Binary Choice

Stimuli and measures

Participants were randomly assigned to either a choice condition or a concealed-preference control condition. In

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both conditions, participants chose between either two unfamiliar dry cleaners or two unfamiliar backpacks. Following the stepwise evolution of preference method (Meloy & Russo, 2004), we presented attributes sequentially; specifically, six attributes sequentially described the dry cleaners (e.g., location, turnaround time), and five sequentially described the backpacks (e.g., materials, dimensions). For example, the narrative describing the bottoms of the backpacks read as follows:

> Backpack V is described as having a bottom which is double-stitched and double-lined for durability. The material has been chemically treated to enhance its strength and water repellency while retaining its suppleness. Backpack M is described as having a layer of leather sewn into the bottom of the pack to enhance the integrity of the pack. The leather has been treated with a thin coat of oil for a softer, richer feel. In addition, a layer of water repellent material has been sewn in between the interior layer and the leather exterior.

For each scenario (i.e., backpacks or dry cleaners), the attributes were presented for both alternatives, one attribute at a time.

Choice condition. Three progress measures followed the presentation of each narrative attribute. Participants first evaluated the appeal of each alternative on the basis of the attribute just seen (1 = *very unappealing*, 9 = *very appealing*). They were told to consider only the information that they had just read. Next, to measure tentative preferences, we asked participants to consider all the information they had received thus far and then rank the alternatives. Finally, we asked participants to indicate, on a scale from 50 (*absolute toss-up*) to 100 (*absolute certainty*), their confidence that their leading alternative would be the final choice.

Concealed-preference control condition. Given that valuations of alternatives are influenced both by emerging preferences and by the composition of the consideration set (e.g., Huber, Payne, & Puto, 1982; Simonson & Tversky, 1992), we designed a control condition that would produce a baseline attribute evaluation for each alternative for each attribute that was uninfluenced by emerging preferences. Participants in this control condition first read the following paragraph:

> To make sure that your evaluations of the backpacks are unbiased, we will be hiding the true identity of the backpacks whenever we present a new dimension. We will hide the backpack's identity by randomly replacing Backpacks V&M by Backpacks A&B (or B&A). After you have evaluated scrambled Backpacks A&B, we will then unscramble them for you and tell you which is Backpack V and which is Backpack M. Thus, you will be evaluating new information about Backpacks A&B and then the true identity of the Backpacks (V&M) will be revealed to you. Once you have received the true identities, you can update your overall preference for the backpacks.

In this way, the identity of each alternative was concealed from participants whenever they encountered new information.

After reading these introductory instructions, participants in the concealed-preference control condition evaluated the appeal of each narrative on the basis of the attribute just seen (1 = *very unappealing*, 9 = *very appealing*). They then proceeded to the next screen, where they saw their evaluations for that attribute accompanied by the true identities of the alternatives. Finally, participants provided a tentative preference and confidence in their leading alternative just as participants in the choice condition did. Thus, participants in the control condition received the same information that participants in the choice condition did, but because the true identities of the alternatives were concealed, their emerging preferences could not influence their evaluation of new information.

Calculating distortion

Recall that previous distortion research used a *relative* scale (e.g., 1 = *strongly favors A*, 9 = *strongly favors B*) to measure each individual's attribute evaluation. Thus, previous studies could not discriminate between proleader and antitrailer distortion. For example, let X_{ij} be the relative evaluation of attribute j ($j = 1, \ldots, J$) by individual i ($i = 1, \ldots, N$) , let $I(Rank\mathrm{A}_{i,j-1})$ be an indicator equal to 1 if A is leading after attribute $j - 1$, and 0 otherwise. $I(Rank\mathrm{B}_{i,j-1})$ is calculated similarly. Finally, let Y_j be the average relative evaluation in the control condition for attribute j. Relative distortion (D_{rel}) was then calculated as follows:

$$D_{\mathrm{rel}} = \frac{\sum_{i=1}^{N}\sum_{j=2}^{J}\left[\begin{array}{l}\left(X_{ij} - Y_j\right) \times I\left(Rank\mathrm{B}_{i,j-1} = 1\right) \\ \quad + \left(Y_j - X_{ij}\right) \times I\left(Rank\mathrm{A}_{i,j-1} = 1\right)\end{array}\right]}{\left(J-1\right) \times N}.$$

A value of D_{rel} significantly greater than zero suggested predecisional distortion, but not whether the distortion was caused by favoring the leading alternative or disfavoring the trailing one.

Moving from a single relative attribute-evaluation scale to a single evaluative scale per alternative allowed us to

calculate distortion in favor of or against each alternative based on its relative standing. Let e_{ijk} be individual i's evaluation of alternative k ($k = 1, \ldots, K$) for attribute j. Then, let A_{jk} be the control participants' average (unbiased) evaluation of alternative k for attribute j; let $I(RankA_{i,j-1,k} = m)$ be equal to 1 if alternative k is ranked m by individual i after seeing attribute information $j - 1$, and 0 otherwise. The distortion of the mth-ranked alternative (D_m) can then be calculated as follows:

$$D_m = \frac{\sum_{i=1}^{N}\sum_{j=2}^{J}\sum_{k=1}^{K}\left(e_{ijk} - \mathrm{A}_{jk}\right)\times I\left(Rank\mathrm{A}_{i,j-1,k} = m\right)}{\left(J-1\right)\times N}.$$

A value of D_m significantly greater than 0 suggests that information was biased to favor the previously mth-ranked alternative; a value significantly less than 0 suggests that information was biased to disfavor the previously mth-ranked alternative. For instance, D_1 greater than 0 indicates distortion in favor of the most preferred alternative (i.e., proleader distortion), whereas D_2 less than 0 indicates distortion against the second most preferred alternative (i.e., antitrailer distortion).

Participants and procedure

Two hundred forty participants were recruited from Amazon's Mechanical Turk to participate in a 15-min study for $0.50. Participants were randomly assigned to one condition of a 2 (choice domain: dry cleaners, backpacks) × 2 (experimental condition: choice, concealed-preference control) between-participants design. After examining all of the attributes and answering the progress measures as previously described, participants made a choice. After participants who failed attention checks were eliminated, 180 remained (90 in the choice condition and 90 in the concealed-preference control condition). Demographic data were unrelated to the amount of distortion exhibited.

Results

Analysis revealed both proleader distortion ($D_1 = 0.26$), $t(89) = 2.24$, $p = .03$, and antitrailer distortion ($D_2 = -0.35$), $t(89) = -3.42$, $p = .01$. The magnitudes of the two types of distortion did not differ (paired t test), $t(89) = -0.42$, $p = .41$, and neither proleader distortion $t(88) = -1.26$, $p = .22$, nor antitrailer distortion, $t(88) = -1.70$, $p = .09$, differed across contexts.

We also looked for a relationship between attribute distortion and confidence in the leading alternative immediately before a given attribute was presented. Regressing confidence in the leader on attribute-level proleader and antitrailer distortion revealed that both proleader distortion, $\beta = 2.44$, $t(396) = 4.93$, $p < .01$, and antitrailer distortion, $\beta = 1.27$, $t(396) = 2.97$, $p < .01$, were significant predictors of confidence, although there was a greater contribution from proleader distortion than from antitrailer distortion, $t(396) = 1.93$, $p < .06$.

Discussion

This experiment provides the first evidence for the existence of both proleader and antitrailer distortion. Choice participants evaluated new information about their leading alternative more positively, and new information about their trailing alternative more negatively, than did control participants, whose preferences could not influence their attribute evaluations. Thus, the "distortion" reported in previous work was probably a combination of proleader and antitrailer distortion, and not simply distortion to favor a leader as was previously assumed. Confidence in the leading alternative was influenced more by proleader distortion than by antitrailer distortion, but both types of distortion led to increased confidence in the leader. Next, we explored distortion when there is more than one trailing alternative.

Experiment 2: Distortion with Multiple Trailers

Stimuli and measures

The scenario in this experiment involved six restaurants described by six attributes (e.g., dining area, menu). As in Experiment 1, the narrative attributes were presented one at a time, and each narrative described the given attribute for all six restaurants. Participants evaluated attributes for each restaurant and indicated their cumulative preference. After evaluating all six restaurants on all six attributes, participants made a choice. Because we focus our analyses on distortion, this choice is not discussed further.

Participants and procedure

At a northeastern university, we recruited participants for a decision-making study. They received course extra credit for their participation. To ensure that the restaurant choice options were relatively equivalent in appeal, we collected all of the data for the concealed-preference control condition in the 1st week of the experiment (in case we needed to modify and recalibrate the stimuli), and we collected the data for the choice condition in the 2nd week. There were 121 participants in the choice condition and 83 in the concealed-preference control condition. For each attribute, the information about all six restaurants was presented on a single screen. After reading the information, participants answered evaluation

and progress questions before continuing to the next attribute. Sessions lasted approximately 25 min.

Results

The results, displayed in Figure 1, revealed significant proleader distortion (D_1 = 0.30), $t(120) = 2.66$, $p = .01$, but no distortion for the immediately trailing alternative (D_2 = –0.04), $t(120) = -0.38$, $p = .71$. However, participants distorted information against the trailers in the third position (D_3 = –0.27), $t(120) = -2.59$, $p = .01$; fourth position (D_4 = –0.31), $t(120) = -2.94$, $p < .01$; fifth position (D_4 = –0.31), $t(120) = -2.90$, $p < .01$; and sixth position (D_6 = –0.51), $t(120) = -5.50$, $p < .01$.

We performed a multivariate analysis of variance that rejected the null hypothesis of equal distortion for D_1 through D_6, $F(5, 116) = 12.89$, $p < .01$. A linear within-participants contrast, $F(1, 120) = 43.28$, $p < .001$, revealed that D_m decreased as m increased. Such an increase in the magnitude of antitrailer distortion was surprising; the alternatives far behind the leader did not pose a serious threat, yet they were subjected to large antitrailer distortion.

Discussion

In a choice with six alternatives, we found proleader distortion, no distortion of the second-most-preferred alternative, and increasing antitrailer distortion as preference for the alternatives declined. The predecisional treatment of the trailer nearest to the leader thus depended on the consideration set.

The measurement of distortion that we used requires knowledge of the participants' emerging preference structure, which we obtained by having participants rank the six alternatives. If the ranking caused participants to push up their most-preferred alternative or push down their least-preferred alternative, the between-participants variance in attribute-level attribute evaluations would be higher for a group of participants who ranked the alternatives, relative to a group who did not rank the alternatives.

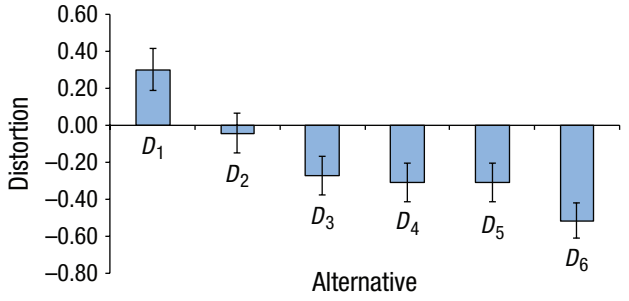

Fig. 1. Experiment 2 results: mean distortion of information in a six-alternative choice (D_1 refers to the most preferred alternative, and D_6 refers to the least preferred alternative on the previous attribute). Positive values indicate distortion that favored the alternative, and negative values indicate distortion that disfavored the alternative. Error bars represent ±1 *SE*.

We examined this possibility in a follow-up experiment. Participants (N = 256) were randomly assigned to either a ranking choice condition (identical to the choice condition in Experiment 2) or a no-ranking choice condition, in which they did not rank the alternatives. For all participants (213 remained after those who did not pass attention questions were excluded), we calculated the average standard deviation of their evaluations for the second through sixth attributes. We failed to find evidence that the average attribute standard deviation differed between conditions (M_{ranking} = 1.52, $M_{\text{no ranking}}$ = 1.44), $t(211) = 1.025$, $p = .31$. Thus, the ranking procedure did not cause participants to push an alternative's attribute evaluations higher if it was leading or lower if it was trailing; rather, the procedure captured participants' true preference structures.

General Discussion

This article establishes that predecisional distortion stems from both proleader and antitrailer processing. In a binary choice, the alternative that leads early is supported by distorting information to favor it, whereas information about the trailing alternative is biased to be less positive than it actually is. In a six-alternative choice, distortion to disfavor the trailing alternatives increases (from none) as the distance behind the leader increases.

These results do not align well with motivational explanations of distortion. Large distortion against the least-preferred alternatives does not help the decision maker select the leader over its nearest trailer. Whereas decision makers use proleader distortion to separate the leader and the next-closest alternative, it is unclear why they use antitrailer distortion to push the bottom of the choice set away from the leader.

The patterns of antitrailer distortion exhibited here have implications for how the choice environment might be managed by, for example, political candidates or product marketers. Leading candidates and marketers representing leading products could encourage decision makers to narrow the set quickly so that distortion helps them see the nearest trailer in the worst possible light. In contrast, second-ranked candidates and marketers who represent the second-most-appealing product might encourage decision makers to keep many alternatives in the consideration set to reduce the antitrailer processing that the runner-up has to bear.

We introduced a new measurement method to capture biased predecisional processing that can be used irrespective of the number of alternatives. Applying this

method to a binary choice and to a six-alternative choice revealed an important pattern in the biased predecisional processing of alternatives.

Author Contributions

All three authors developed the study concept and design. S. J. Blanchard performed testing, data collection, and analysis under the supervision of M. G. Meloy and K. A. Carlson. S. J. Blanchard drafted the manuscript, and M. G. Meloy and K. A. Carlson provided critical revisions. All authors approved the final version of the manuscript for submission.

Declaration of Conflicting Interests

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

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