

# The Impact of a Two-Step Choice Process on Trade-Off Decisions

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Trade-offs between attributes are common when making product choices. Prior research suggests that consumers tend to avoid the extremes and opt for the middle options when they make a trade-off decision between two key product attributes (e.g., tastiness and healthiness of food items) in one step. In this research, we examine how consumers make such trade-off decisions in a two-step choice process in which consumers first choose between product categories competing on two key attributes and then make a final choice within the chosen category. In three studies, we show that when holding the actual choice options unchanged, consumers are more likely to make a more extreme final choice, prioritizing a single attribute rather than compromising when they follow a two-step choice process instead of a one-step process.

*Keywords:* trade-off decisions, two-step choice process, choice extremeness

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Trade-offs between attributes are common in products as the result of either the product nature or product differentiation strategy (Hansen and Helgeson 2001; Johnson, Meyer, and Ghose 1989; Newman, Gorlin, and Dhar 2014). In making a choice between alternative options with trade-off attributes, consumers can either view all options simultaneously and arrive at the final choice in a single step (i.e., one-step choice), or follow a two-step process by first deciding on a subset (e.g., an external category) and then make the final choice from within

the selected category. For example, a person may first decide whether to have a salad or pizza knowing that salads are healthier, but pizzas are tastier before choosing a particular food option from within the chosen category. Similarly, the menu-guided navigation on many websites (e.g., low-fee vs. low-rate credit cards, casual vs. dress shoes, fast-acting vs. long-lasting pain relievers) also facilitates a two-step choice process (see web appendix 1 for examples). In this research, we examine how following a two-step (vs. one-step) choice process affects the extremeness of consumers' final choice.

Ample evidence shows that consumers tend to avoid the extremes and opt for the middle options when choosing from alternatives with a trade-off between two attributes (Simonson 1989; Simonson and Tversky 1992). For example, Lehmann and Pan (1994) show that instead of selecting the extreme options, consumers prefer stocks with moderate annual returns and risk levels, paper towels with reasonable absorption ability and strength, and beverages with balanced taste and nutritional value. These findings, however, have focused mainly on the outcome of the choice while paying less attention to the process of the choice. What remains unclear, therefore, is whether this preference for a compromise option holds when consumers follow a different route to reach their final choice. Would they remain loyal to the same compromise option

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as in a one-step choice when following a two-step choice process?

Based on our findings, the simple answer is “no.” We hypothesize and find that compared with a one-step choice, a two-step choice increases consumers’ preference for extreme options that are superior in one attribute (and inferior in the other). Specifically, in a two-step process, the step of making an initial category (subset) choice reveals the trade-off nature of the attributes and highlights the contrasting relationship between the option subsets. As such, this initial choice forces consumers to declare a preference between the competing attributes and choose the corresponding subset. Importantly, this initial subset choice becomes diagnostic for their attribute preference and, in turn, encourages more consistent actions when choosing from within the subset, resulting in a more extreme final choice. For example, when a person needs to make a choice between a salad, a healthy-but-not-so-tasty category, and pizza, a tasty-but-not-so-healthy category, the initial choice of the category becomes diagnostic of his or her attribute preference (e.g., tastiness or healthiness). This person is then more likely to choose the healthiest (but the least tasty) salad if the initial choice is the healthy set (i.e., salads) or choose the tastiest (but the least healthy) pizza if the initial choice is the tasty set (i.e., pizzas). As such, we expect that compared with a one-step choice, people are more likely to arrive at the extreme options if they follow a two-step process.

This amplification of a preference through a simple change in the decision process highlights the contribution of our study. First, holding the actual choice options unchanged, it is easily assumed that when consumers make trade-off decisions for a single choice, the outcomes are likely to be the middle options (Lehmann and Pan 1994; Simonson 1989) regardless of how the choice is made. Our hypothesis challenges this assumption and suggests that the final choice will instead depend on the route a consumer follows (e.g., one-step or two-step process) when arriving at such a choice. Second, in contrast to prior research that examines behavioral consistency across consumers’ multiple and often, sequential but independent choices (Amir and Levav 2008; Dhar and Simonson 1999), our research focuses on how consumers make a single choice through multiple interdependent decision steps. Our findings add to the existing research on behavioral consistency by identifying an important decision scenario in which consumers actively maintain consistency in their multistep decisions to arrive at a single final choice.

## THEORETICAL BACKGROUND AND HYPOTHESES

### A Two-Step Process in Trade-Off Decisions

Products (e.g., salads vs. pizzas) are commonly categorized by their dominant attributes (e.g., healthiness and

tastiness, Raghunathan, Naylor, and Hoyer 2006), and even if there is no such external categorization, consumers may group the options according to the dominant goals they serve (Ratneshwar, Pechmann, and Shocker 1996; Ratneshwar et al. 2001). In this case, consumers following a two-step choice process would first need to choose between the competing subsets (categories), each with a dominant attribute, and then choose from within the selected subset. We examine how consumers make these trade-off decisions in a two-step process compared with a one-step process in which they arrive at a final choice in a single act.

Past research typically operationalizes a trade-off relationship between attributes by assigning ascending scores to one attribute and descending scores to the other (Kivetz, Netzer, and Srinivasan 2004; Simonson 1989; Simonson and Tversky 1992) or forcing a negative correlation between the scores of the two attributes among the choice options (Huber and Klein 1991). Studies show that such a trade-off relationship between attributes encourages a compensatory decision strategy (e.g., weighted addition) to maximize the expected value of the decision outcome (Bettman et al. 1993; Huber and Klein 1991). Similarly, research also shows that consumers tend to avoid extremes and prefer a product more when it is a middle option than when it is an extreme one (Simonson 1989; Simonson and Tversky 1992).

One core assumption that underlies the utility-based analysis is that when holding the actual choice options unchanged, the decision outcome would be based solely on value maximization and remains unchanged regardless of the process through which people reached the outcome. Our conceptualization suggests otherwise. We hypothesize that when consumers make a trade-off decision between two negatively correlated attributes, the choice outcome may depend on the decision route they follow when making this choice. Specifically, all else being equal, consumers who follow a two-step choice process should end up with an option that is more extreme on one of the attributes than consumers who follow a one-step choice process. We suggest that this elevated preference for more extreme options occurs because a two-step choice process amplifies consumers’ preference displayed in their initial subset choice.

### Preference Amplification in a Two-Step Process

Decisions that involve trade-off attributes require consumers to identify their preference for one attribute or the other. Previous research examining consumers’ attribute preferences in multiple independent decisions shows a pattern of either preference consistency or preference balancing (Fishbach and Dhar 2005; Huber, Goldsmith, and Mogilner 2008). In the preference-consistency pattern, consumers repeatedly choose options emphasizing one of

the trade-off attributes (Amir and Levav 2008; Koo and Fishbach 2008). For example, research on dynamics of goal-based choice suggests that trade-off attributes represent conflicting consumption goals, and an initial goal-consistent product choice can be interpreted as a commitment to the goal, resulting in consistent subsequent product choices (Dewitte, Bruyneel, and Geyskens 2009; Koo and Fishbach 2008). In a similar vein, research on preference learning suggests that consumers learn about (or construct) their attribute preference through choices and decisions, and this learned preference is carried through to make similar subsequent decisions (Amir and Levav 2008). Consumers may even develop a mechanized mindset in which, after they devise a strategy that successfully solves an initial problem, they will persist in adopting the same strategy for later problems even though there are better ways to solve the problems (strategy stickiness, Evangelidis and Levav 2013; Levav, Reinholtz, and Lin 2012).

In the preference-balancing pattern, consumers alternate between two trade-off attributes in multiple choices (e.g., choose a healthy appetizer and then a tasty, less healthy main dish) either because they believe the complete neglect of one attribute (goal) will “spoil the satisfaction” derived from fulfilling the other goal (Dhar and Simonson 1999) or they may believe that an earlier choice focusing on a virtue attribute (e.g., healthiness) licenses them to (or depletes their self-control not to) indulge in the other vice attribute (e.g., tastiness) (Khan and Dhar 2006; Kivetz and Simonson 2002; Muraven and Baumeister 2000).

In our research context, although the multiple steps a consumer takes to arrive at a final decision in a two-step process are reminiscent of the sequential, independent choices that prior studies have examined, we suggest that they are fundamentally different for two important reasons. First, a two-step choice, by definition, involves two distinguishably separate steps to arrive at a single final outcome. However, unlike independent choices, these steps, while taken sequentially, are restricted by the consequences of the previous choice and are, in reality, not independent. Second, although a person may make multiple choices in a decision task, there is only one choice outcome in the end, and the initial subset choice by itself does not complete the decision task. This interdependence between choice steps in a two-step process should therefore lead to a high level of consistency carried over from the initial to the subsequent choice, resulting in an outcome that is more extreme in the direction of the initial subset choice than in a one-step process. Specifically, the trade-off nature of the attributes creates a dilemma for consumers, since both attributes represent something desirable. A subset choice allows consumers to infer or identify their attribute preference, which, in turn, guides them to make a consistent choice among the remaining options, leading to an amplified preference and,

thus, a more extreme final choice. We label this the *choice extremeness effect*.

Note that in our prediction, we focus on how the overall choice shares of extreme options shift between a two-step process and a one-step process, rather than focusing on the impact of option specifics on consumer choice. It is therefore possible that, depending on the option specifics (e.g., product typicality) and individual preferences (e.g., product liking), the extent of this shift may be more significant at one end of the extreme (e.g., the healthiest option) than at the other end (e.g., the tastiest option), or that the extent of the shift may differ from one choice scenario to another. While these are interesting and important questions to explore, our focus in the present research is on how the procedural change (e.g., two-step or one-step) in a choice process increases consumers' overall likelihood of choosing the more extreme options, regardless of whether the shift mainly occurs at one end of the extremes or the other. We hypothesize that:

**H1:** In the same set of choice options with a trade-off between two attributes, the overall choice share of the extreme options will be greater in a two-step choice process than in a one-step choice.

## The Mechanism of the Choice Extremeness Effect

Past research shows that when making a decision, consumers often do not have stable, well-understood preferences, and they construct preferences within the decision context (Bettman, Luce, and Payne 1998; Huber, Payne, and Puto 1982; Payne, Bettman, and Johnson 1993; Slovic 1995). According to self-perception theory (Bem 1972), whenever there is a need to identify their preference, people do so partly by inferring from their own behaviors (Schnall and Laird 2003). After this inference is made, it is likely to induce consistent attitudes and subsequent behaviors (Ariely and Norton 2008; Baca-Motes et al. 2013; Schrift and Parker 2014). For example, consumers infer from their own decisions that they want to engage in an effortful search for an additional alternative given that the previously known alternatives are less attractive, resulting in an elevated preference for the newly found alternative (Ge, Brigden, and Häubl 2015).

In a similar vein, we propose that when engaged in a two-step choice process, while consumers may not have a strong preexisting preference for one attribute or the other (Bettman et al. 1998), they, nevertheless, need to start the decision process by making an initial subset choice. For these consumers, a subset choice, when made, serves as a behavioral signal to identify their attribute preference, however fluid or ambiguous the preference may be. The identified attribute preference will lead to consistency in subsequent decisions and, as a result, a more extreme final

choice. We reason that if the subset choice signals attribute preference for one attribute over the other in a two-step process, consumers should exhibit an enhanced preference for the attribute that the selected subset signals than for the other attribute (e.g., a choice of pizza over salad signals a preference for tastiness over healthiness). This is also in line with the notion that people change their beliefs after the action from which they infer their belief (Sharot, Velasquez, and Dolan 2010). Formally:

**H2:** In a two-step choice process, consumers who do not have a preexisting attribute preference will develop a stronger preference for the attribute prioritized in the selected subset than for the other attribute once they make a subset choice.

Past research also suggests that a behavior is indicative of one's preferences only when the behavior cannot be explained by strong external causes (Fazio, Herr, and Olney 1984; Sharot et al. 2010). If our conceptualization holds, when consumers can easily attribute their subset choice to an external factor rather than their own internal preference, the choice extremeness effect should be attenuated. For example, if consumers attribute their subset choice of a salad (over a pizza) to an external reason (e.g., salads are on sale, pizzas are cold, or another person made the choice for them), they should not infer an attribute preference (for healthiness) from the subset selection, hence attenuating the choice extremeness effect. Formally,

**H3:** The choice extremeness effect will be attenuated when consumers can easily attribute the subset choice to an external factor rather than their own preference.

In the following sections, we report three studies to test our hypotheses. Study 1 examines the main effect (hypothesis 1) in a number of different contexts. In studies 2 and 3, we test the underlying mechanism (hypotheses 2 and 3) by measuring the changes in the attribute preference before and after a subset decision and by manipulating how consumers attribute an initial subset decision to their own preference or external influence.

## STUDY 1

This initial study aims to demonstrate the basic choice extremeness effect with a simple design. Building on previous research showing that tastiness and healthiness are negatively correlated (Raghunathan et al. 2006), this study explores how consumers make a trade-off decision between tasty and healthy food items in a one-step versus two-step choice process.

### Procedure

A total of 172 undergraduate students (51.16% female,  $age_{\text{mean}} = 19.80$ ,  $SD = 1.22$ ) from a large Australian

university completed the study (three students did not finish the entire survey and were omitted from the dataset) during a recess time between their tutorials (each tutorial group had 10–20 students). The sample size was all we could recruit from the same cohort of students. Participants were randomly assigned to a two-cell (choice process: one-step vs. two-step) between-subject design based on their tutorial session to avoid manipulation contamination between conditions. We selected food stimuli from the pretests to ensure that there was an increasing trend in healthiness and a decreasing trend in tastiness in the range of food items. The stimuli used in the study were almonds (whole natural almonds and salted roasted almonds) and chips (multigrain chips and classic chips) (see web appendix 2—study 1 for study design illustration). All participants were first asked to take part in an unrelated filler study to earn a reward (i.e., a snack). Participants were told that there were a few snack options and were asked to mark their choice on a voucher for ease of administration. In the one-step condition, participants opened a sealed voucher listing the four snack options that were available in a local supermarket at a similar price (\$5.5–\$6.5). The order of the four snack options was counterbalanced in eight different versions of the vouchers, which were distributed randomly to participants. In the two-step condition, participants first chose between two sealed vouchers, one labeled “almond snacks” and the other labeled “chip snacks” on the cover. They then opened the selected voucher to mark their choice. The order of the two snack options in each snack category was counterbalanced in two versions of the vouchers, again randomly distributed to participants. To calibrate our stimuli for the expected trade-off relationship between the focal attributes, after submitting the marked voucher, participants were asked to fill out a survey measuring their perception of the food's healthiness and tastiness (“how healthy/tasty do you think each of the following food item is?” 7 = very healthy/tasty). This measure showed that the four selected food items (whole natural almonds [A], salted roasted almonds [B], multigrain chips [C], and classic chips [D]) had an increasing trend in tastiness but a decreasing trend in healthiness, showing a trade-off relationship between the two attributes (see web appendix 2—study 1 for results on stimuli calibration). Next, participants answered questions about their frequency of consumption, along with demographic details and their assumed study purpose. No one guessed the purpose of the study, and none of the control variables affected the pattern of our results. Later, each participant received a \$7 voucher to redeem at a local supermarket for their chosen snack.

### Results

*Choice.* The results of a chi-square test showed that the choice shares of the options differed significantly between the one-step and two-step conditions ( $\chi^2(3, 172) = 19.89$ ,

$p < .001$ , Cramer's  $V = .34$ ). To examine the key hypothesis that the choice share of the middle options (B and C) shifts to the extreme options (A and D) in the two-step condition versus the one-step condition, we analyzed the choice share of the options using two-sided  $z$ -tests (see also Chakravarti, Janiszewski, and Ülkümen 2006). The results showed a significant increase in the choice share of the extreme options (A, D) (75.23%) in the two-step condition, compared with the one-step condition (42.86%;  $Z = 4.25$ ,  $p < .001$ , Cohen's  $h = .67$ ), in support of hypothesis 1. Table 1 reports the changes in choice shares for individual options.

## Discussion

Study 1 provides initial support for the proposed effect using two options in each category. We conducted three follow-up studies to further test our key hypothesis that a two-step choice process would lead to a more extreme final choice than a one-step process.

In the follow-up study A (see web appendix 3—study 1 follow-up A for study details), we used a similar design as in study 1 but with a different set of stimuli (drink options A to D: tomato juice, green tea, orange drink, and milk bubble tea) with real consumption. The results further supported hypothesis 1 and showed that consumers were more likely to choose extreme options in a two-step (vs. one-step) choice process.

In the follow-up study B (see web appendix 4—study 1 follow-up B for study details), we used the same two-cell (one-step vs. two-step) between-subject design as study 1 but included six choice options (snack options A through F: whole natural almonds, low-salt roasted almonds, salted roasted almonds, multigrain chips, sea salt chips, and classic chips) with three options in each subset to test whether a two-step (vs. one-step) choice process would make more people choose not just the relatively more extreme options in general (e.g., options A, B, E, F), but the most extreme options (e.g., options A, F). The results supported our hypothesis 1 and showed that the two-step choice process increased the choice rate of the most extreme options.

In the follow-up study C (see web appendix 5—study 1 follow-up C for study details), we examined the proposed choice extremeness effect by keeping the size of the choice set constant between the one-step condition and each subset of the two-step condition. Specifically, past research suggests that the size of a choice set may affect consumers' choice outcome (Chernev, Bockenholt, and Goodman 2015; Sela, Berger, and Liu 2009). For example, in study 1, participants made their choice from four options in the one-step process, while the final choice of the two-step process was made from two options in either of the two subsets (i.e., two options in each subset). We intentionally used this design to mimic how choice options are made in actual consumption scenarios and to keep the total number

of options (four) constant between the two conditions. However, in a two-step process, the reduced number of choice options in a subset (vs. the number of choice options in the one-step process) may affect how participants make the final choice. In follow-up study C, we kept the number of options constant between the one-step process (e.g., three options) and each of the subsets (e.g., three options in each subset) in the two-step process to control for this possible impact. Our results showed that even when participants viewed exactly the same options in the one-step condition and each subset of the two-step condition, we still observed a choice extremeness effect as predicted in hypothesis 1.

Together, study 1 and its follow-up studies demonstrate the proposed choice extremeness effect (hypothesis 1) in different contexts, using both hypothetical and real choices. We argue that this effect occurs because a two-step decision process, by inserting an initial subset decision, allows consumers to infer their attribute preference from their initial subset decision. We examine this proposed psychological mechanism in study 2.

## STUDY 2

The purpose of study 2 aims to test the following: if indeed consumers learned their preference through the subset choice, those in the two-step process should exhibit a stronger preference for the corresponding attribute after they make the subset choice, even if they do not have a preexisting attribute preference (hypothesis 2).

### Procedure

This study employed a two-cell (decision process: one-step vs. two-step) between-subjects design (see the web appendix 6—study 2 for study design illustration). Using G\*Power (alpha = .05, power = 0.90) and the effect size that we found in study 1 and the follow-up studies, we calculated the average necessary sample size to be 130 participants with a minimum of 50 per cell. We aimed to recruit 300 respondents from Mturk; 287 participants completed the study (44.60% female, 11.15% were 18–24 years old, 47.74% were 25–34 years old, 21.60% were 35–44 years old, 12.89% were 45–54 years old, 6.62% were over 55 years old) for payment within the allocated timeframe (30 minutes; the study took about 5 minutes to complete). In this study, participants were asked to indicate their attribute preference twice: once prior to making a subset choice (in the two-step condition) or completing a filler choice task (in the one-step condition), and then again after they made the subset choice or completed the filler choice task. We employed this design such that we would be able to compare, in the two-step condition, whether making a subset choice would influence participants' relative preference between the two focal product attributes (e.g., volume

**TABLE 1**  
CHANGE OF CHOICE SHARE FOR INDIVIDUAL OPTIONS (STUDY 1)

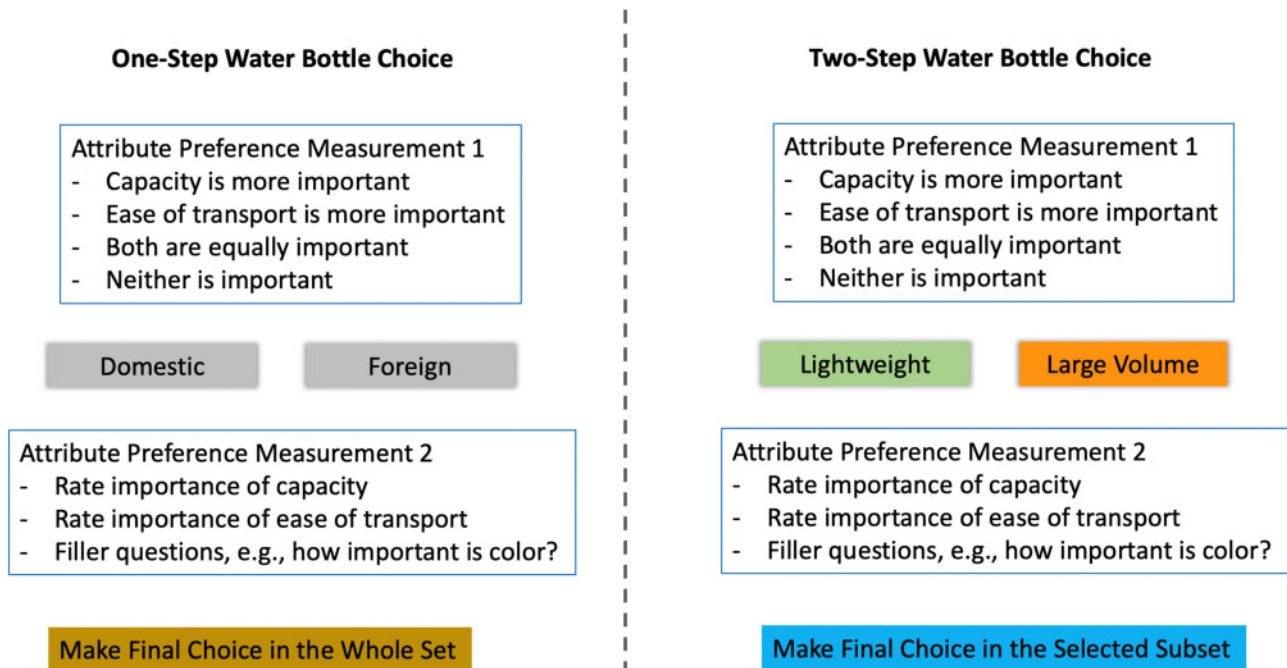
Choice share (sample size)	Whole natural almonds (option A)	Salted roasted almonds (option B)	Multigrain chips (option C)	Classic chips (option D)
One-step choice	19.05% (12)	30.16% (19)	26.98% (17)	23.81% (15)
Two-step choice	26.61% (29)	16.51%** (18)	8.26%*** (9)	48.62%*** (53)

\*\*The change of choice share compared with one-step choice is significant at the 5% level.

\*\*\*The change of choice share compared with the one-step choice is significant at the 1% level.

**FIGURE 1**

VISUAL ILLUSTRATION OF EXPERIMENTAL PROCEDURE (STUDY 2)



capacity and portability) in a way that is consistent with their subset choice. See [figure 1](#) for a visual illustration of the experimental procedure.

First, participants in both the one-step and two-step choice conditions were asked to choose a water bottle for everyday use. They were asked to read the descriptions of two water bottle attributes (liquid capacity and portability). For example, the “liquid capacity” attribute was described as a water bottle with enough capacity to avoid frequent refills. The “portability” attribute was described as being “compact and light” and “easy to carry around.” Next, participants reported their attribute preference by answering the question, “When it comes to choosing a water bottle, which of the two aspects is more important to you?,” and made their choice from four options (liquid capacity is more important, ease of transporting is more important,

both aspects are equally important, and neither aspect is important). This measure served as participants’ baseline attribute preference before the subset choice.

Next, in the two-step condition, participants were asked to imagine that they were purchasing a water bottle and the salesperson asked them about their preference between the two types of water bottles in stock: a bottle with greater volume or a lightweight one. After the participants made a choice between the two sets, they were told that since there were still many options to choose from, it would be helpful if they would answer a few more questions to further help with the purchase. They were then presented with six questions in randomized order, among which there were two focal questions that constituted the second measurement of participants’ attribute preference. We used a different scale to minimize the potential consistency effect. Specifically,

TABLE 2  
CHANGE OF CHOICE SHARE FOR INDIVIDUAL OPTIONS (STUDY 2)

Choice share (sample size)	16 oz. capacity; 6 oz. weight (option A)	24 oz. capacity; 10 oz. weight (option B)	32 oz. capacity; 14 oz. weight (option C)	40 oz. capacity; 18 oz. weight (option D)
One-step choice	5.80% (8)	41.30% (57)	33.33% (46)	19.57% (27)
Two-step choice	22.82%*** (34)	20.13%*** (30)	9.40%*** (14)	47.65%*** (71)

\*\*\*Change of choice share compared with one-step choice significant at the 1% level.

we asked participants to rate the importance of the two focal attributes [i.e., volume capacity and portability, e.g., “How important is a water bottle’s liquid capacity (e.g., large volume) to you?”] on a 7-point scale (7 = very important), together with four filler questions. The four filler questions asked participants to rate the importance of different product attributes (e.g., price, brand name, material, color) [e.g., “How important is a water bottle’s material (e.g., stainless steel, plastic) to you?”]. Next, participants who had previously chosen the high-volume set were presented with two choices of water bottles (32 oz. capacity and 14 oz. weight, and 40 oz. capacity and 18 oz. weight, see web appendix 6—study design illustration for the stimuli), between which they made their final choice. Similarly, participants who had previously chosen the lightweight set were presented with two choices of water bottles (16 oz. capacity and 6 oz. weight; 24 oz. capacity and 10 oz. weight) and made their final choice.

In the one-step condition, participants followed a similar set of procedures as that in the two-step condition and responded to both attribute preference measures and the filler questions. The difference was that instead of making a subset decision as participants did in the two-step condition, participants in this condition made a filler choice (“Do you prefer a domestic or foreign brand for the water bottle?”) before rating the importance of the same six attributes as in the two-step condition: price, brand name, material, color, volume capacity, and portability. Next, participants made a choice from all four water bottle options (e.g., 16–40 oz. capacity and 6–18 oz. weight) presented in randomized order.

Finally, to calibrate our stimuli for the expected trade-off relationship between the focal attributes, participants in both conditions were asked to rate the four water bottles on each of the two focal attributes (capacity and portability) (“How do you rate each of the following items in terms of how easy they are to transport around/liquid capacity?” not at all easy to transport/very easy to transport; very low liquid capacity/very high liquid capacity). This measure showed that the four water bottles (A–D) were perceived to have an increasing trend in storage capacity and a decreasing trend in portability, showing a trade-off relationship between the two attributes (see web appendix 6—study 2 for results on stimuli calibration).

## Results

*Choice.* We first analyzed the choice shares of different options in the two-step versus one-step process. The results showed a significant increase in the choice share of the extreme options (A, D) (70.47% vs. 25.36%;  $Z = 7.64$ ,  $p < .001$ , Cohen’s  $h = .94$ ) in the two-step (vs. one-step) condition. Table 2 presents individual choice shares.

*Perceived Attribute Importance.* Recall that in both the one-step and two-step conditions, we first asked the participants to indicate their attribute preference by answering which attribute was more important. The result of a chi-square test showed no difference in participants’ initial attribute preference between the two conditions,  $\chi^2(2, 287) = 0.56$ ,  $p = .755$  (no one indicated neither attribute was important). Please see table 3 for preference distribution in the two conditions. In addition, there is a similar percentage of participants who indicated that both attributes were equally important in the one-step (46.38%) and in the two-step (50.34%) ( $Z = 0.73$ ,  $p = .465$ ) condition.

To test our hypothesis 2, we first ran a mixed analysis of variance using the full sample ( $n = 287$ ) with ratings on the two attributes (capacity and portability) as the within-subject factor, and decision process (two-step vs. one-step) as the between-subject factor. Subset choice is a nested factor within each decision process in a way that participants in the two-step condition made a choice between a high-volume or lightweight water bottle, whereas participants in the one-step condition chose between domestic or foreign brands (filler choice). In the two-step condition, we expected that, overall, participants would rate the attribute that is prioritized in their chosen subset as more important than the other attribute. In the one-step condition, however, participants only made a filler choice (i.e., between domestic vs. foreign brands) and this choice should not impact how they rated the two attributes.

Our results confirmed this expectation: the results showed a significant interaction between attribute rating and subset choice nested in decision process ( $F(2, 283) = 44.10$ ,  $p < .001$ ,  $\eta_p^2 = .24$ ). Next, separate analyses on each of the decision process conditions showed that, in the two-step condition, there was a significant interaction between rating difference and subset choice ( $F(1, 147) = 101.06$ ,  $p < .001$ ,  $\eta_p^2 = .41$ ). Participants rated capacity as more important than portability when they chose the high-

**TABLE 3**  
DISTRIBUTION OF INITIAL ATTRIBUTE PREFERENCE (STUDY 2)

Choice share (sample size)	Liquid capacity is more important	Ease of transport is more important	Both attributes are equally important	Neither attribute is important
One-step choice	31.16% (43)	22.46% (31)	46.38% (64)	0% (0)
Two-step choice	30.20% (45)	19.46% (29)	50.34% (75)	0% (0)

volume subset (6.41 vs. 5.15;  $t(84) = 10.04$ ,  $p < .001$ , Cohen's  $d = 1.09$ ), but rated portability as more important than capacity when they chose the lightweight subset (6.14 vs. 5.39;  $t(63) = 4.72$ ,  $p < .001$ , Cohen's  $d = .59$ ). As corroborative evidence, the results also showed that participants rated capacity as more important when they chose the high-volume subset than when they chose the lightweight subset (6.41 vs. 5.39,  $t(147) = 5.81$ , equal variances not assumed,  $p < .001$ , Cohen's  $d = 1.03$ ). Similarly, participants rated portability as more important when they chose the lightweight subset than when they chose the high-volume subset (6.14 vs. 5.15,  $t(147) = 5.38$ ,  $p < .001$ , Cohen's  $d = .89$ ). By contrast, in the one-step condition, where participants performed a filler choice task, the interaction between rating difference and choice was not significant ( $F(1, 136) = 1.76$ ,  $p = .187$ ).

Next, we focused on participants who initially indicated that both attributes were equally important before their subset choice ( $n = 75$ ) in the two-step condition to directly test hypothesis 2. Our key analysis was to examine, in the two-step condition, whether participants who indicated that both attributes were equally important before their subset choice would later rate the two attributes differently after making the subset choice and whether the direction of the difference would depend on the subset choice. If the initial subset choice was indeed used to infer the attribute preference, then the rating of the capacity attribute should be higher than that of the portability attribute for those who chose the high-volume set, whereas the opposite should be true for those who chose the lightweight set. We ran a mixed analysis of variance with ratings on the two attributes (capacity and portability) as the within-subject factor and subset choice (lightweight vs. greater volume) as the between-subject factor. The results showed a significant interaction between rating difference and subset choice ( $F(1, 73) = 27.49$ ,  $p < .001$ ,  $\eta_p^2 = .27$ ). Specifically, participants rated capacity as more important than portability when the subset choice was for the high-volume set (6.54 vs. 5.87;  $t(38) = 4.24$ ,  $p < .001$ , Cohen's  $d = .68$ ) but rated portability as more important than capacity when the subset choice was for the lightweight set (6.08 vs. 5.58;  $t(35) = 3.19$ ,  $p = .003$ , Cohen's  $d = .53$ ). These results support our conceptualization that even if consumers do not hold a preexisting preference for either attribute when coming

into the choice task, when given an opportunity to identify their preference by making a subset choice, they see the corresponding attribute as more important.

*The Mediating Role of Attribute Preference on Choice.* Would the enhanced attribute preference for one attribute over the other impact participants' final choice? To explore this possibility, we conducted an additional mediation analysis by grouping participants' final water bottle choice into extreme options (options A and D) and non-extreme options (options B and C), thus creating a dummy final choice variable. Specifically, if a two-step decision process (in comparison to a one-step process), by inserting a step of making a subset choice, can make participants prioritize one attribute over the other and, in turn, choose a more extreme final choice, then the attribute preference, shown by the absolute value of the rating difference between the two attributes, should mediate the impact of decision process (two-step vs. one-step) on the dummy final choice variable. We ran a mediation analyses ( $n = 287$ ) using the absolute value of the rating difference between the two attributes as the mediator. We found that decision process has a marginally significant influence on rating difference ( $B = 0.23$ ,  $p = .071$ ) and that rating difference mediates the effect of decision process on the dummy final choice variable at the 90% confidence level (effect = 0.076, 90% CI (0.003, 0.173)). Detailed results are presented in web appendix 6—study 2 additional analysis.

## Discussion

In this study, we found that participants who did not have a preexisting preference for either attribute, after making a subset choice between two competing subsets, showed a preference for one attribute over the other. These results suggest that a two-step process gives consumers an opportunity to infer their attribute preference from their initial subset choice and that consumers will, in turn, assert the identified preference in their final choice, leading to a more extreme choice outcome than the common one-step choice. In study 3, we further test the proposed mechanism for the choice extremeness effect by manipulating whether consumers attribute their initial subset decision to their own preference or to an external factor.



### STUDY 3

In study 3, we test hypothesis 3 that if consumers can easily attribute their subset decision to an external factor rather than their own preference, the choice extremeness effect should be attenuated. To manipulate whether people can attribute their initial choice to an external factor, participants in one of the two-step conditions made the subset decision by flipping a coin. We hypothesized that when consumers can easily attribute the subset choice to an external factor (e.g., coin flip), there should be no choice extremeness effect.

Study 3 had two additional objectives. In our previous studies, participants could only view the options within the subset after making a subset choice. This design was in line with the actual search process that is prevalent in online shopping. To eliminate the information disparity between the two conditions, study 3 aimed to test whether our hypothesis still holds when all options are known to participants before the subset decision. In addition, we restricted the four food stimuli to the same category to reduce possible confounding of different categories.

#### Procedure

We aimed to recruit 250 participants on Mturk using the rule of thumb (e.g., about 80 participants per cell for 4 options). A total of 238 (45.80% female, 13.87% were 18–24 years old, 38.66% were 25–34 years old, 25.63% were 35–44 years old, 12.61% were 45–54 years old, 9.24% were over 55 years old) completed the study using a three-cell (decision process: one-step vs. two-step free-choice vs. two-step random-choice) between-subject design (see web appendix 7—study 3 study design illustration). In the one-step condition, participants chose a snack from four varieties of almonds displayed in randomized order: natural raw almonds, low-salt roasted almonds, hone almonds, and chocolate almonds. In the two-step free-choice condition, participants first chose between “original almonds (natural raw almonds, low-salt roasted almonds)” and “almonds with coatings (honey almonds, chocolate almonds)” and then chose from within the selected subset. In the two-step random-choice condition, participants were presented with the same two sets of almonds and were asked to flip a virtual coin to decide on a subset. They then saw the animation of a spinning coin on the screen with a note that said, “Heads—original almonds; Tails—almonds with coatings,” and they pressed a button to flip the coin. The coin-flipping outcome appeared randomly as either “heads” (original almonds category) or “tails” (almonds with coatings category). Next, participants chose a snack from the associated subset. Similar to study 1, to calibrate our stimuli for the expected trade-off relationship between the focal attributes, we asked participants to rate their perception on the food’s healthiness and tastiness (“how healthy/tasty do

you think each of the following food item is?” 7 = very healthy/tasty). This measure showed the four selected food items (natural raw almonds [A], low-salt roasted almonds [B], honey almonds [C], and chocolate almonds [D]) had an increasing trend in tastiness but a decreasing trend in healthiness, showing a trade-off relationship between the two attributes (see web appendix 7—study 3 for results on stimuli calibration). Finally, participants reported their demographics.

#### Results

*Choice.* We first compared the choice share of the options in the one-step condition with that of the two-step free-choice condition. The results showed a significant increase in the choice share of the extreme options (A, D) (58.97% vs. 43.04%;  $Z = 2.00$ ,  $p = .046$ , Cohen’s  $h = .32$ ) in the two-step (vs. one-step) condition, supporting the proposed choice extremeness effect.

Importantly, we also compared the choice ratio in the one-step condition with that in the two-step random-choice condition. The results showed no significant increase in the choice share of the extreme options (A, D) (48.15% vs. 43.04%;  $Z = 0.65$ ,  $p = .516$ ) in the two-step (vs. one-step) condition, confirming the notion that whenever consumers can easily attribute the choice to an external reason, they do not follow up with consistent choices. Please see [table 4](#) for the results of the individual options.

### GENERAL DISCUSSION

Consumers’ product choices often involve making trade-off decisions between attributes. In a series of experiments, we demonstrated that the outcome of these trade-off decisions depends on the process through which these choices are made. Three studies showed that a two-step choice process leads to increased preference for more extreme options versus one-step choices (hypothesis 1). Additional evidence supported that this effect occurs because consumers infer their attribute preference from their subset choice and augment this preference by acting consistently in the final choice (hypotheses 2 and 3).

#### Theoretical and Practical Implications

Broadly, our findings add to the important literature on consumers’ behavioral consistency. A growing body of research shows that people tend to behave in ways that are consistent with their prior acts (Ariely and Norton 2008; Ge et al. 2015; Levav et al. 2012; Schrift and Parker 2014; Sharot et al. 2010). From a cognitive perspective, past behaviors serve as important input for consumers to identify their preferences and values. Inspired by a common marketing practice that categorizes products by their dominant attributes (e.g., healthiness vs. tastiness in food,

**TABLE 4**  
CHANGE OF CHOICE SHARE FOR INDIVIDUAL OPTIONS (STUDY 3)

Choice share (sample size)	Natural raw almonds (option A)	Low-salt roasted almonds (option B)	Honey almonds (option C)	Chocolate almonds (option D)
One-step choice	17.72% (14)	30.38% (24)	26.58% (21)	25.32% (20)
Two-step free choice	32.05%** (25)	24.36% (19)	16.67% (13)	26.92% (21)
Two-step random choice	23.46% (19)	28.40% (23)	23.46% (19)	24.69% (20)

\*\*Change of choice share compared with one-step choice significant at the 5% level.

fast-acting vs. long-lasting in medications), our study adds to this stream of literature by examining how a change in the organization of choice options and decision route may alter their final choice. We show that a simple change from a one-step choice to a two-step choice process can attenuate the robust compromise effect (Simonson 1989) and direct consumers' choice to the more extreme options. We demonstrate that consumers are more likely to choose the extreme options (and are thus less likely to choose the compromise options) in a two-step (vs. one-step) decision process in multiple decision scenarios, going beyond the traditional three-option choice set often examined in many previous studies. Our findings also add to past research (Evangelidis, Levav, and Simonson 2018) that shows that given the same set of choice options, simple interventions (e.g., inserting a subset choice, evaluating attribute importance before a choice) can influence consumers' decision process and subsequently their final choice outcome.

The prevalence of menu-based browsing in the marketplace has led to increased interest in understanding how this decision process affects consumer choices. Specifically, rather than viewing all choice options at once and making the final choice in a single step, consumers often engage in a multistep, hierarchical decision process. Past research on hierarchical decisions (Chakravarti et al. 2006; Diehl, Kornish, and Lynch 2003; Van Zee, Paluchowski, and Beach 1992) has mainly focused on scenarios in which consumers first shortlist options by pre-screening attributes and then use a different set of attributes to make the final choice. In these scenarios, the short-listing decisions often do not involve trade-off considerations between the two sets of attributes (prescreening and post-screening). We extend this line of research by examining decision scenarios in which consumers need to choose between competing attributes from the beginning of the decision process. Our findings suggest that, different from what has been shown in previous research (Chakravarti et al. 2006), whenever consumers make the initial choice between competing attributes in a two-step decision, they tend not to switch to a different attribute than the one they used in the initial (screening) decision. Instead, consumers would focus on the same attribute as in the initial decision and double down in the final choice.

In the context of making choices between trade-off attributes, our study extends the research on consumers' multiple, sequential choices (Amir and Levav 2008; Dhar and Simonson 1999; Fishbach and Dhar 2005). We show an effect that is similar to what is best described as "highlighting" in the goal-based choice literature (Dhar and Simonson 1999); that is, consumers consistently choose to focus on one of the competing goals (represented by a set of trade-off attributes) in multiple choices. Conceptually, however, our effect differs from what has been examined in the past. Previous research explains that consumers may either highlight one of the goals or balance between competing goals in multiple but independent choices (Koo and Fishbach 2008). By contrast, our research examines how a two-step process breaks down a choice into multiple, interdependent decisions to arrive at a single choice. In this case, the initial decision serves as a signal of the attribute preference that prompts a consistent final choice.

Our findings further add to the research that examines how consumers search and choose products in competing product categories. For example, Moorman et al. (2004) examined how subjective knowledge makes people more likely to choose a healthier category and showed that when such a healthier category is chosen, the final choice is likely to be healthier than if people were to choose from the less healthy category. This choice of the healthier category is more likely to occur when consumers have a prior preference for this category. Our research extends this finding by further demonstrating the constructive nature of preferences (Fischer et al. 1999; Payne et al. 1993; Simonson and Tversky 1992; Slovic 1995). We demonstrated that the final choice can be heavily influenced by first making a subset choice, regardless of how ambiguous or fluid the a priori preference may be. For example, as we showed in study 2, even among participants who had initially indicated equal preferences for both attributes, after having made a subset choice between two competing categories, they changed their relative preference in the direction of their selected subset choice.

In practical terms, we show that in these contexts, an initial decision between competing subgroups can serve as important input for later choices in a two-step process and sway people toward a more extreme final choice. In

particular, leveraging the compromise effect is a common practice to extend the product line and make the existing top/bottom offering more popular (Simonson 1989; Sharpe, Staelin, and Huber 2008). We provide an alternative strategy to increase the choice share of the existing extreme options without needing to introduce new (often decoy) products. For example, presenting products in competing subsets and guiding consumers through a two-step decision process in a menu-guided navigation on the company's website could help increase the choice share of the extreme options.

### Limitations and Future Research Directions

Our key hypothesis is about how the overall choice shares of extreme options shift between a two-step and a one-step process. We focus on how a simple change in the procedure of making a choice can result in a shift in the choice share of extreme options and this shift, as our results have shown, may come primarily from either end of the extremes. Although in our current investigation, we are less concerned about the origin of the shift than about the overall magnitude of the shift, it is certainly an interesting path to explore variables that can affect which extreme options are more susceptible to this procedural change. For example, past research has shown that the impact of a decision context may be moderated by product (e.g., familiarity, meaningfulness) and individual (e.g., category knowledge, motivational orientation) level variables (Malaviya and Sivakumar 1998; Ratneshwar, Shocker, and Stewart 1987). Sinn et al. (2007) found that the extent of a compromise effect is stronger when the compromise brand is more familiar. Similarly, Murali, Böckenholt, and Laroche (2007) demonstrated that prevention-focused consumers are more sensitive to the compromise effect. In our context, it is therefore possible that the impact of decision process may be moderated by similar product or individual-level variables. For example, consumers may be more familiar with the product at one end of the extreme than at the other, or products at one end of the extreme are more typical than those at the other end. These variations may lead to an asymmetric pattern of the choice extremeness effect at the two ends of the extreme options. A second possibility is that specific features of a product attribute (e.g., relative importance of an attribute, dispersion of attribute value) may affect how consumers evaluate or react to an extreme option (Chernev 2004; Sheng, Parker, and Nakamoto 2005; Simonson and Tversky 1992). For example, Simonson and Tversky (1992) showed that consumers are more extremeness aversion for quality, but not so for price. Chernev (2004) indicated an extreme option (in a choice set) may be perceived as less so if the attribute values are balanced on this option (e.g., the option has a rating score of 50/100 on both attributes). In our context, it is plausible that the choice extremeness effect is moderated

by the extent of consumers' seeking or aversion to extremeness of a particular attribute or their idiosyncratic evaluation of an extreme option. A fruitful avenue for future research may be the examination of which product, attribute, and individual-level variables can affect the pattern of the choice extremeness effect.

Past research shows that consumers construct their attribute preference in repeated trade-off decisions, and the constructed preference is portable to new decisions (Amir and Levav 2008). We add to this line of research by theorizing that a two-step process breaks a single choice into interdependent, tiered steps in a way that the final choice is a continuation of the initial subset choice. We expect that this continuity makes the attribute preference identified in the initial choice a much stronger decision criterion than in other scenarios in which people also learn their preference, such as making multiple independent choices (Amir and Levav 2008). Future research may examine this difference by, for example, considering situations when consumers encounter new information during the decision-making process. This often occurs when the information was either not initially available or only considered at a later stage (Chakravarti et al. 2006). For example, a consumer may only consider the price of a specific product after deciding which category of products to buy (e.g., pizzas or salads). To illustrate, if a consumer first decides on pizzas (over salads) and then finds out that a healthy pizza (e.g., vegetarian) is on sale, would s/he stick with the same preference identified in the subset decision (e.g., tastiness over healthiness) and choose the tastiest pizza in the final choice, or choose a healthy (and cheaper) pizza instead? By contrast, in independent choices, would consumers who chose pizzas over salads in an earlier choice (e.g., lunch) go for a low-price, healthy option in a subsequent, independent choice (e.g., dinner)? Our conceptualization suggests that when encountering important new information about choice options, consumers in a two-step choice process may be less affected by the new information and stick with their initial direction compared with those who make a series of similar but independent choices. This occurs because although the subset choice in a two-step process identifies an attribute preference (and the underlying consumption goal), the subset choice alone does not satisfy it and propels consumers to follow through with the same preference in their subsequent actions. In independent choices, however, each choice constitutes a completed action and does not necessarily compel continuity in the next choice. Future research that focuses on the difference between multiple choice steps within the same choice versus multiple independent choices may examine how new information affects consumers' decision-making differentially in varying decision-making contexts.

Past research suggests that consumer preferences are often constructed (Bettman et al. 1998; Payne et al. 1993; Tversky and Simonson 1993) and that the context in which

these preferences are constructed affects preference strength/stability (Amir and Levav 2008; Yoon and Simonson 2008). In a two-step choice process, we show that consumers identify their attribute preference from the initial subset choice and then amplify this preference by choosing a consistent, more extreme option. Future research may examine the strength of a preference identified in a two-step choice process by looking beyond the decision scenarios examined here. For example, past research on goal dynamics in sequential choices shows that consumers may employ either a highlighting or balancing strategy (Dhar and Simonson 1999; Fishbach and Dhar 2005) depending on a number of contextual factors. However, decisions in such studies were mainly made in a one-step process. It would be interesting to test whether the contextual factors that lead to a highlighting or balancing strategy may still hold when consumers employ a two-step choice process. For example, if a consumer employs a two-step process in making each of the two sequential, separate choices (e.g., choose an appetizer and a main course), would the preference identified in the appetizer choice remain as a factor to impact the subsequent choice? Answers to these questions would shed further light to our understanding of how consumers make choices when conflicting forces are present in decision scenarios.

## DATA COLLECTION INFORMATION

The first author supervised the data collection for study 1 by research assistant (RA) A at the University of Melbourne in autumn 2015 and jointly analyzed the data with RA A. The first author collected the data for study 2 in spring 2018 (Mturk) and its *post hoc* study in winter 2021 (Mturk) and analyzed the data. The first author supervised the data collection for study 3 by RA A in autumn 2015 (Mturk) and jointly analyzed the data with RA A. The data are currently stored in a project directory on the Open Science Framework.

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