Mean and Variability Effects in Decision Framing

ABSTRACT

Framing a decision as a rejection can lead consumers to form different preferences than they would if that same decision were framed as a choice. These differences in preferences are called *preference reversals*. This paper extends research in this area, using a sequence of five studies to show that framing can change both *mean preference* and *preference variability*. The first study uses Discrete Choice Experiments to demonstrate the effects of framing a decision as a choice or rejection on decision outcomes. Study 2 uses eye-tracking to highlight that differences in information gathering during the experiment are unlikely to account for this difference. Studies 3 through 5 demonstrate that differences in framing can be reduced through increasing task familiarity. A lack of familiarity with the task of rejecting leads consumers to change their mean preferences and also increases their preference variability for high- and low-preferred products, compared to when they are choosing. These changes in preferences cease to occur when familiarity with rejecting increases, but only when that familiarity is specific to the product context under examination. This demonstrates that framing can be used to influence consumer preferences in two ways.

Keywords: choice, rejection, framing, variance, familiarity

INTRODUCTION

Consumers can select products by choosing or rejecting among alternatives. Choosing is an act of acquisition, seeking a product one wants (e.g. I want that phone). In contrast, rejection is an act of forfeiture, dismissing a product one does not want (e.g. I don't want that other phone) (Dhar and Wertenbroch, 2000). These two types of decisions are commonly seen in real markets, yet our understanding of the impact of framing on the *outcomes* of decisions remains incomplete (Hutchinson, Kamakura and Lynch, 2000; Laran and Wilcox, 2011; Takemura, 2014).

Decision framing can lead to decision outcomes that do not reflect the same underlying product preferences (Dhar and Gorlin, 2013; Kwong and Wong, 2006; Takemura, 2014). For example, if a person chose Phone A over Phone B when asked to *choose* a phone they want, they will not necessarily refuse the opposite phone, Phone B, when asked to *reject* the phone they do not want; even when presented with the same pair of products. These changes in expected outcome due to framing are often referred to as *preference reversals*. Much of the original evidence for the effects of decision framing on the occurrence of reversals arose from observations that preferences are constructed during a decision rather than stored permanently in a person's memory (Bettman, Luce and Payne, 1998; Tversky, Sattath and Slovic, 1988). As a consequence, the framing of a question used to elicit peoples' preferences can influence the nature of the preferences constructed (Payne, 1982; Tversky et al., 1988). The mechanisms underlying this framing effect, and the impact of framing on decisions, continue to be explored (Dhar and Gorlin, 2013).

Much of the framing literature does not acknowledge that preferences (constructed or stored) can be described as having two components. Random utility theory postulates that preferences can have a systematic component and a random component (Hess and Daly, 2014). The systematic component can be described as the mean preferences held by a group of people, and the random component as the variability in that group's preferences (Hess and Daly, 2014). Consideration has been given to the systematic or mean component, but only limited attention has been paid to the fact that the random (or variability) component may also play a role in framing effects. Furthermore, researchers have only speculated about the nature of that role without formally testing it (Hutchinson et al., 2000). The objective of this research is thus to examine how changing the framing of a decision from a choice to a rejection influences the mean preferences held by people *and* variability in those preferences.

DECISION FRAMING AND PREFERENCE DIFFERENCES

It has been demonstrated in the literature that framing a decision task as a choice or a rejection can elicit decision outcomes that do not reflect the same preferences (Chernev, 2009; Dhar and Wertenbroch, 2000; Irwin and Naylor, 2009; Laran and Wilcox, 2011; Meloy and Russo, 2004; Shafir, 1993; Takemura, 2014). Preferences are generally

formed in response to the *need* to make a decision, rather than stored in memory for when a decision arises (Bettman et al., 1998). The nature of the preferences formed can thus be influenced by the framing used to elicit those preferences. This is particularly the case in situations where there are no obviously dominant choice alternatives and when little prior experience has allowed the formation of strong baseline preferences (Bettman et al., 1998; Shafir, 1993).

Research in this area has focused on observing how changes in framing change people's average preferences (Hutchinson et al., 2000). In particular, the impact of framing a decision as a choice and rejection has only been considered in this way (Hutchinson et al., 2000). Our research shows that they should be considered in two ways: changes in average preferences, and changes in preference variability.

THE SYSTEMATIC AND RANDOM COMPONENT OF PREFERENCE

The nature of preferences and how they are actioned by consumers has received different treatments in extant literature (Gilboa, 2009; Lichtenstein and Slovic, 2006). One of the most established is that presented by Random Utility Theory (RUT) (McFadden, 1986). RUT proposes that all consumer decisions are undertaken in order to maximize utility, with utility representing the underlying value and benefits a product conveys to the consumer minus any costs or disadvantages it imposes (McFadden, 1986). This utility maximisation does not necessarily need to be rational or even conscious.

The advantage offered by RUT over other theories is that it suggests that preference (and its underlying construct of utility) has two components: the systematic and the random (Hess and Daly, 2014; McFadden, 1986). These two components provide a framework in which we can conceptualise how decision framing may influence preferences in two different ways and subsequently produce changes in observed behaviour among consumer groups.

The systematic component of preferences (or utility) is the component of preference that can be observed and explained. When dealing with groups of people, this is the common systematic component, which from now on will be described as the *mean preference;* as it is the mean observable component of preferences across a group of people (Hess and Daly, 2014). The random component is that part of behaviour that cannot be fully explained. It is typically used to represent the limited ability to observe some aspects of human decisions, and can be used to represent a number of phenomena not captured by the systematic component. This research focuses on the variability in the random component, in particular variability in the random component that can be attributed to framing effects (Hess and Daly, 2014). This is referred to as the *variability in preference* from now on.

Changes in mean preference arising from decision framing are well established in the literature (Hutchinson et al., 2000; Laran and Wilcox, 2011). The second variability component in preferences remains unexplored.

Framing decisions as choices or rejections is expected to produce differences in preference variability in addition to the mean differences found in previous studies. People process greater amounts of information inconsistent with their established preferences when asked to reject alternatives (Laran and Wilcox, 2011). Processing additional information has been found to lower a person's confidence in their decisions (Chernev, 2009). This lack of confidence leads us to expect that framing a decision as a rejection would lead to an increase in preference variability relative to choices. The following studies allow us to examine whether this is the case with consumer decisions.

METHODOLOGICAL APPROACH

We used five studies to examine how framing influences the two components of preferences. Study 1 demonstrates that framing a decision as a choice versus a rejection produces a systematic difference in mean preferences and preference variability in consumers. Building on this, two tentative explanations for this phenomenon were proposed. The first explanation was that this arises from a difference in how consumers attend to information for choices versus rejections. Study 2 assesses this using eye-tracking technology to evaluate what information is being gathered. It was found that consumers attended to information in much the same way irrespective of whether the decision was framed as a choice or a rejection.

The purpose of subsequent studies was to examine the second tentative explanation: that the differences in mean preference and preference variability due to framing a decision as a choice versus a rejection arise due to a lack of familiarity with the task of rejecting. Study 3 shows that task familiarity drives the differences in mean preference and preference variability. Studies 4 and 5 explore the nature of the familiarity needed to overcome the effects of framing differences on preferences.

STUDY 1: THE MEAN AND VARIABILITY EFFECTS OF FRAMING

This study tests whether decision framing produces any systematic changes in preference (error) variability using a Discrete Choice Experiment (DCE). A DCE allows the incorporation of multi-attribute designs into the experiment, improving external validity of the findings. A further benefit arises from the repeated choices (measurement) provided by DCEs. If a single decision were used as the stimulus, one alternative could be perceived as dominant, with that dominance reducing potential variability in the data. Repeated choices across a wide assortment of products means that choice variability is less likely to be influenced by the presence (or absence) of any single product.

Research participants were presented with pairs of possible products from which they chose the one they preferred. A distraction task was then undertaken where participants reported some household and entertainment preferences. Then the pairs of products were again presented, this time asking the participants to reject the option they did not prefer. For both the choice and rejection DCE tasks, we were able to observe both the mean preferences held by participants for each product option and the variability in that preference across the group, allowing us to compare the differences that arose as a consequence of the choice and rejection framing.

Method

Participants were recruited through Amazon's Mechanical Turk. Fifty participants were allocated to a version of the experiment looking at airline flights and 52 to a version looking at car rental options (n = 102). Within each product version, the order of the choice and rejection tasks was blocked so half the participants saw the choice task first and the other half the rejection task first (to remove any order effects). Allocation to each block was random with a quota applied.

The DCE employed the same experimental design for both product versions. Eight products (the flights or car rental options) were designed by varying four product features each with two feature levels using a half fractional factorial design. For the flights, price, luggage allowance, food and beverage options, and estimated flight times were used. For the car rental version, the car model, number of included kilometres, return time, and insurance liability were used. These features are commonly seen in online booking systems for these products.

The eight product profiles designed in each version were organised into pairs that comprised each choice set in the experiment. This was achieved using a full factorial design to produce 28 choice sets for each product. The order of the choice sets was randomised for the experiment. These choice sets were used twice in the survey; once for the choice task and a second time for the rejection task. An example of one of these choice sets is shown in Appendix A.

Results

Mean Preference

The data for the rejection task was reverse coded to make comparison with the choice task easier. This reverse coding involved not coding the product actually rejected by the participant, but the product implied to be 'not' rejected by the participant for each pair of products in each choice set. Mean preferences were calculated from the choice frequencies for each product for each participant and then averaged across participants. These mean preferences are shown in Figures 1 and 2. The products are sorted from lowest to highest preference based on their mean choice frequency.

FIGURE 1
Study 1 Results: Airline Mean Preferences

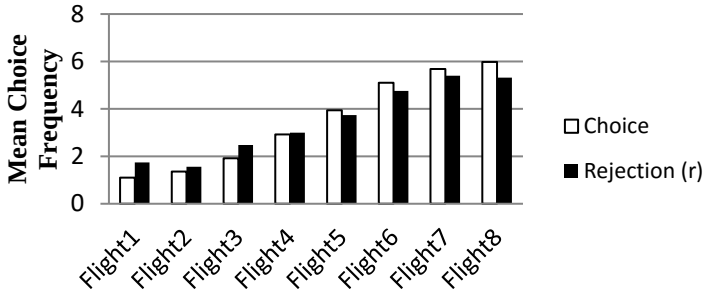
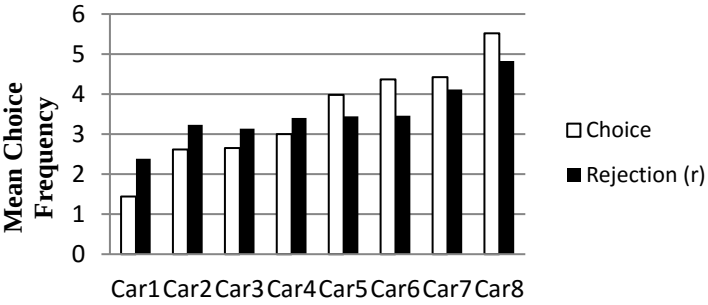


FIGURE 2
Study 1 Results: Car Rental Mean Preferences



Changes in mean preference (often dubbed preference reversals) were apparent from this experiment. Participants changed their mean preferences when switching between the choice and rejection tasks: low (high) preference products saw increases (decreases) in preference when changing from the choice to rejection tasks. Using paired samples t-tests, these changes were seen as significant differences in the choice frequencies for Flights 1, 3 and 8 ($M_{\text{Flight1 C-R}}$ = -.64, t (49) = -2.1885, $p < .05$; M_{F3} = -.56, t (49) = -2.4860, $p < .05$; M_{F8} = .66, t (49) = 2.3624, $p < .05$), notably including the flights at the most extreme levels of high and low preference where preference reversals were found in field experiments in the literature. For the car rentals, these preference changes were more pronounced with all cars having significant mean differences ($M_{\text{Car1 C-R}}$ = -.9423, t (51) = -3.0288, $p < .01$; M_{C2} = -.6154, t (51) = -2.1741, $p < .05$; M_{C3} = -.4808, t (51) = -2.0303, $p < .05$; M_{C5} = .5385, t (51) = 3.0227, $p < .01$; M_{C6} = .9039, t (51) = 3.3971, $p < .01$; M_{C8} = .6923, t (51) = 2.0927, $p < .05$), apart from cars 4 and 7 ($p > .05$).

Preference Variability

The variability in the preferences was calculated as the standard deviation of the participants' choice frequencies for each object. These are shown in Figures 3 and 4.

FIGURE 3
Study 1 Results: Airline Preferences Variability

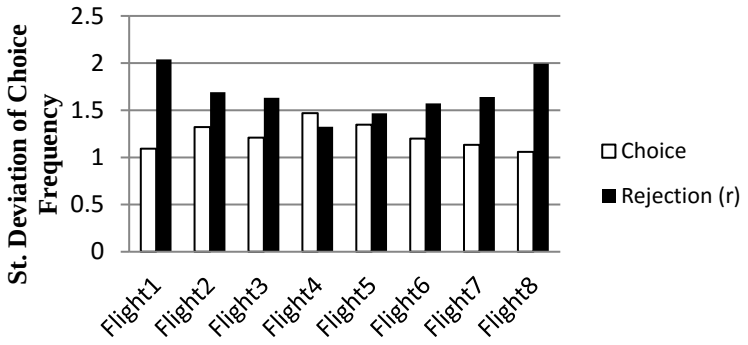
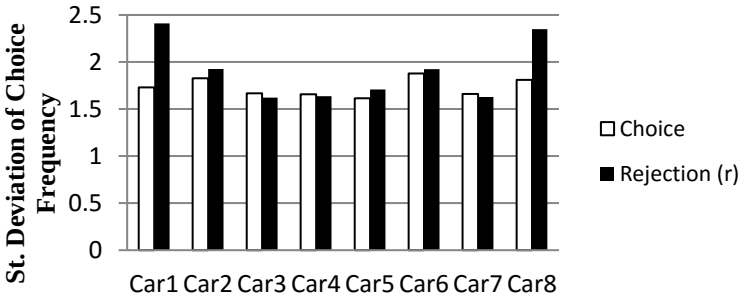


FIGURE 4
Study 1 Results: Car Preferences Variability



These results suggest a relationship between mean preference for the product option and the change in preference variability between choice and rejection tasks. In both product categories, changing from a choice task to a rejection task led to a dramatic increase in preference (error) variability for products that had both extremely high and extremely low mean preference levels. For the airline flights, the three least preferred flights had significantly higher variability for the rejection task compared to the choice task as per a Levene's F-test (F_{Flight1} (49, 49) = 3.4807, $p < .01$; F_{F2} (49, 49) = 1.6408, $p < .05$; F_{F3} (49,49) = 1.8203, $p < .05$); and likewise for the three most preferred flights (F_{F6} (49, 49) = 1.7180, $p < .05$; F_{F7} (49, 49) = 2.0992, $p < .01$; F_{F8} (49, 49) = 3.5446, $p < .01$). Similar results were seen for the car rentals with the least preferred car and most preferred car showing significantly higher variability for the rejection task compared to the choice task (F_{Car1} (51, 51) = 1.9389, $p < .01$; F_{C8} (51, 51) = 1.6855, $p < .05$).

Discussion

The results show that consumers change their mean preferences when a decision is framed as a rejection instead of a choice, with more preferred products seeing a decrease in preference. The results demonstrate that this effect is most prevalent for products with extremely high and low levels of preference. Also demonstrated is a previously unidentified effect of decision framing on preference variability. What is surprising about

this effect is that it is only prevalent for products with extremely high and low levels of mean preference. It was anticipated that preference variability would increase for all products; that it only arises for products with more extreme preference levels is surprising.

Increases in variability, such as those here, change which products are selected by consumer groups, as consumers systematically deviate from products they typically choose. This result provides strong evidence that what has been previously identified as a preference reversal may arise from both changes in mean preference and from changes in preference variability.

There are two tentative explanations for how these framing effects arise: 1) that they arise from a difference in how consumers attend to information during the decision-making process for choice tasks compared to rejection tasks and 2) that they arise from different levels of familiarity with the two tasks. The first explanation assumes that consumers attend to different information during choice tasks compared with rejection tasks. It is expected that participants draw on greater amounts of product information that is inconsistent with baseline preferences during rejection tasks than choice tasks (Laran and Wilcox, 2011; Takemura, 2014; Yoon et al., 2012). This increase in information is likely to include that which is less relevant (about less important product attributes), manifesting in higher choice variability as consumers attempt to incorporate this information into decisions (Chernev, 2009). As a tentative explanation of the results in Study 1, we suggest that such an effect occurs for products at the extremes of preference as this is where people are trying to make the 'best decision', thereby using all the information (including the less relevant information) they have obtained.

STUDY 2: TRACKING DIFFERENCES IN INFORMATION ATTENTION

Study 2 examines the first possible explanation for the changes in preference mean and variability: that people draw on greater amounts of product information that is inconsistent with baseline preferences during rejection tasks (Laran and Wilcox, 2011). To achieve this, eye-tracking is used to measure what information is being attended to by participants during a DCE. A DCE allows us to observe which product attributes are driving consumer choice, and to examine by using eye-tracking data whether less important product attributes are being looked at relatively more during rejection tasks than choice tasks. This allows us to test whether consumers may be 'over-attending' to less important product information when rejecting (Denstadli, Lines and Ortúzar, 2012).

Method

The DCE comprised the same airline experiment used in Study 1 (using the same design and procedure). The presentation of the flights' features of price, luggage allowance, food and beverage options, and estimated flight times were modified to appear in a large font

with a one centimetre white space around each piece of information. This ensured accurate measurement of what the participants were looking at.

Tobii X60 eye-tracking technology was used. The X60 employs an infra-red system to track binocular gaze with a 0.5 to 1° error. Positioned below a computer monitor facing the participant, it is not intrusive. A standard definition computer monitor was used at 60hz. Participants had an approximate 30 centimetre area in which they could move their head without data loss. Each participant was calibrated and recorded using the Tobii proprietary software.

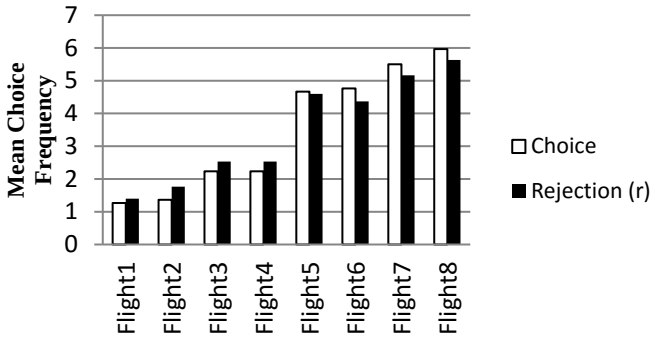
A sample of 30 university students was recruited to participate in this study. Each participant was to make 28 choices and 28 rejections in the experiment, providing substantial data for analysis. The choice and rejection tasks were blocked so half the participants saw the choice task first and the other half the rejection task first. Participants were allocated to a block on a rotating basis to minimise sampling bias.

Results

Mean Preference and Preference Variability

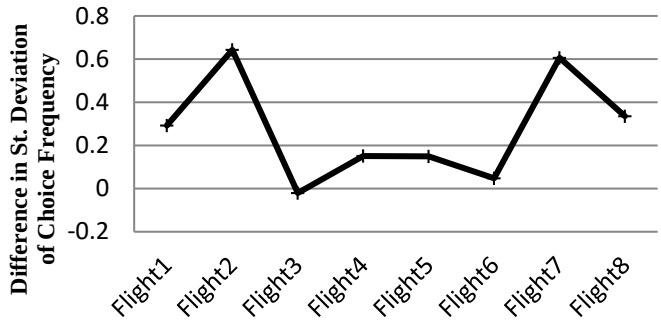
The mean preferences for the choice and rejection decisions tasks are shown in Figure 5. The pattern observed in the previous study holds for this study. The flights at the lowest of end of the preference scale tended to *increase* in mean preference when the decision changed from being a choice to a rejection, and those at the higher end of the preference scale *decreased*.

FIGURE 5
Study 2 Results: Airline Mean Preferences



The differences in the standard deviation of the choice frequencies for each flight across the two tasks are shown in Figure 6. The general pattern observed conforms to previous findings. When the task switched from a choice to a rejection, we observed substantial increases in preference variability for products with extremely high and low preference.

FIGURE 6
Study 2 Results: Differences in Variability



Eye Tracking

The proportion of time in the experiment that each participant spent looking at the features of each flight was calculated using the eye-tracking data. The mean and standard deviation of these proportions are shown in Table 1.

Table 1
Study 2 Results: Proportion of Time Spent Observing Each Feature

Flight Feature	Choice Mean (SD)	Rejection Mean (SD)	*Paired t* (*df* = 29)
Price	0.1442 (0.0512)	0.1478 (0.0682)	-0.5447
Luggage Allowance	0.1834 (0.0466)	0.1792 (0.0489)	0.5162
Food/Beverage	0.1469 (0.0482)	0.1404 (0.0458)	1.1802
Flight Time	0.0989 (0.0275)	0.0983 (0.0330)	0.1826

The results showed no significant differences ($p > .05$) in the proportion of time spent looking at each of the features of the airline flights between the choice and rejection tasks. While a lack of significance cannot be used to refute the null hypothesis, the result provided no support for the first explanation for the impact of decision framing on changes in preferences.

Discussion

The eye tracking results do not support the first possible explanation for why differences in mean preference and preference variability are observed between the choice and rejection tasks. Significant differences in the amount of time spent attending to the different airline features between the choice and rejection tasks had been expected. In particular, it was expected that the rejection task would have significantly more

information collected on less important product features. The results show no significant differences, and indeed no practical differences between the two tasks. The proportion of time spent attending to each product feature was virtually identical. These results indicate that the first possible explanation is not the reason for why differences in preference arise.

It is important to note that this result does not contradict previous studies that describe differences in how people attend to information when a decision is framed as a choice as opposed to a rejection. In this case, the experiment was designed using generic flight alternatives and utilitarian product features. Previous studies have deliberately assessed non-generic alternatives by using a variety of hedonic and utilitarian features that may elicit differences in attention (Dhar and Wertenbroch, 2000; Krishnamurthy and Prokopec, 2010). When such non-generic alternatives are used, changes in preference can arise as a consequence of the nature of the features comprising the alternatives, and the occurrence of reversals can be significantly mitigated when they are removed (Dhar and Wertenbroch, 2000; Laran and Wilcox, 2011; Takemura, 2014). In this study, such elicitation was not sought as changes in preference were found even without such manipulations being present.

Due to these findings, the second possible explanation for the differences in preference must be explored. The second explanation states there are different levels of familiarity with the tasks of choosing and rejecting (Kühberger, 1996; Park and Lessig, 1981). Although familiarity has not been considered for this particular type of framing, previously we reasoned that the more common, or familiar, nature of choosing rather than rejecting may lead to differences in preferences that create the differences observed (Kühberger, 1996). The different levels of familiarity could lead consumer groups to be more error prone (or even more heterogeneous) with less familiar rejection tasks, increasing preference variability. Such an effect would reflect findings that rejection tasks elicit responses that are held in less confidence by decision makers (Coupey, Irwin and Payne, 1998). Studies 4 through 6 test this explanation.

STUDY 3: TASK FAMILIARITY DRIVING PREFERENCE DIFFERENCES

The previous studies demonstrate that changes in mean preference and preference variability cannot be attributed to how consumers attend to information. Study 3 tests the alternative explanation that consumers' lack of familiarity with the task of rejecting leads to the changes in preferences we have observed. One way to test if task familiarity is driving these differences is to experimentally increase the familiarity of participants with rejection decisions to see if the differences persist.

This study uses a treatment and control to compare the preferences of a group that has had its familiarity increased to those of a group that hasn't. Preferences will be measured in the same way within each group to allow for comparison. However, the treatment group will also undertake an additional set of rejection tasks prior to

measurement to increase their familiarity with the task of rejecting – in essence, training them to reject before measurement. This training in rejection is a replication of the rejection task component of the DCE itself. The treatment group will complete one round of rejection from the DCE as training then they will make choices and rejections in the DCE as a measurement of their preferences.

Method

The airline flight DCE undertaken in Study 1 is used in both the control and treatment groups with the same experimental design and blocking procedure to control order effects. The control group only undertakes the original DCE. An additional copy of the rejection task is included in the treatment group at the start of the experiment for training. This treatment should increase familiarity with the subsequent rejection task in the DCE thus removing (or at least reducing) the mean and variance differences demonstrated in the previous studies.

The participants were 200 US residents recruited through Amazon's Mechanical Turk. Participants were randomly allocated to the control and treatment groups, and within those groups to the blocks that controlled for order effects for the choice and rejection tasks. As the treatment and control groups were drawn from the same population, and group allocation was controlled to minimize bias, we expected initial familiarity to be the same for both groups. This ensures that any differences detected can be attributed to the experimental manipulation.

Results

Mean Preference

The results for the control and treatment groups are shown in Figures 7 and 8 respectively. The differences between these groups help us understand the effect of increased task familiarity within the treatment group.

FIGURE 7
Study 3 Results: Mean Preferences (Control)

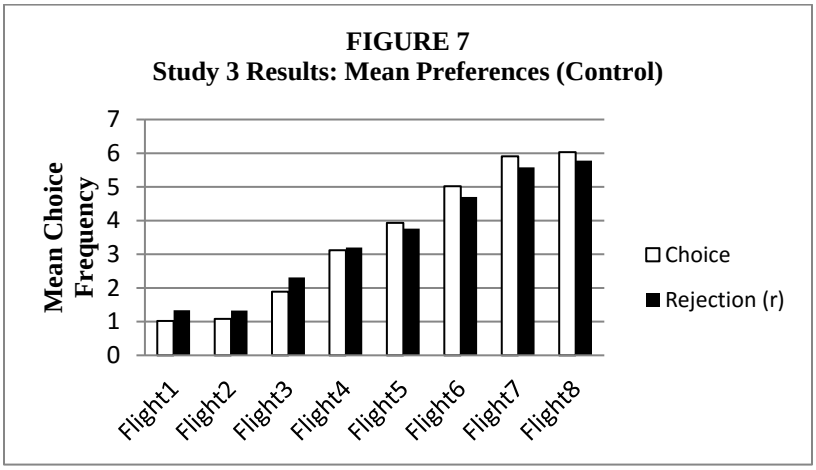
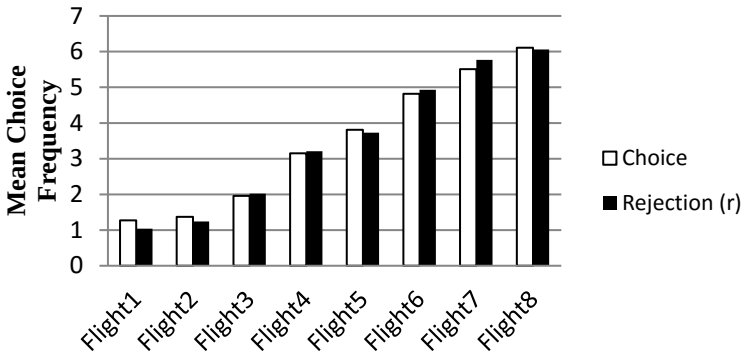


FIGURE 8
Study 3 Results: Mean Preferences (Treat.)



The preference differences seen in previous studies were still apparent in the control group. Paired samples t-tests showed that the three flights at the lower end of the preference scale had a marginally significant increase in mean preference when the participants switched to a rejection task ($M_{\text{Flight1 C-R}}$ = -.3200, t (99) = -1.9174, p < .10; M_{F2} = -.2500, t (99) = -1.9036, p < .10; M_{F3} = -.4200, t (99) = -2.6517, p < .05); and the reverse was seen for two of the three flights at the higher end of the scale (M_{F6} = .3200, t (99) = 2.0393, p < .05; M_{F7} = .3300, t (99) = 2.6449, p < .05; M_{F8} = .2500, t (99) = 1.6305, p > .10) with the remaining differences not being significant (p > .10).

The treatment group presented a stark contrast. In almost all cases, changes in preference did not occur, and in the remaining cases the change to a rejection task strengthened the preference rather than reversing it. None of the flights had significantly different means (p > .10) between the choice and rejection tasks apart from Flights 1 and 7, both of which appeared towards the extreme high and low end of the preference scale. Flight 1 (at the low end of the preference scale) saw the mean preference now decrease when participants switched to a rejection task from a choice task ($M_{\text{Flight1 C-R}}$ = .2300, t (99) = 1.8703, p < .10), and flight 7 at the high end of the preference scale saw an increase (M_{F7} = -.2600, t (99) = -1.8806, p < .10).

Preference Variability

The variability in the preferences observed for the control and treatment groups is shown in Figures 9 and 10.

FIGURE 9
Study 3 Results: Preference Variability (Control)

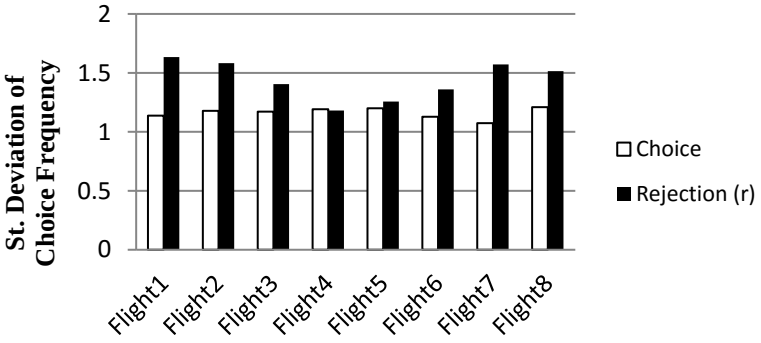
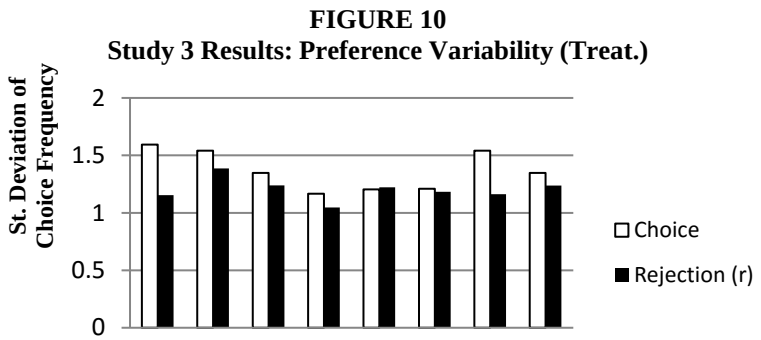


FIGURE 10
Study 3 Results: Preference Variability (Treat.)



The results from the control group again conformed with those of previous studies. Tested with Levene's F-tests, the change from a choice to a rejection task produced significant increases in preference variability for both low (F_{Flight1} (99, 99) = 2.666, p < .01; F_{F2} (99,99) = 1.8063, p < .01; F_{F3} (99,99) = 1.4389, p < .05), and high preference flights (F_{F6} (99,99) = 1.4528, p < .05; F_{F7} (99,99) = 2.1399, p < .01; F_{F8} (99,99) = 1.5676, p < .05), with the remainder non-significant (p > .10). The findings were dramatically different in the treatment group that received the training in rejection tasks. There were no longer any significant differences in preference variability among the flights (p > .10), apart from Flights 1 and 7 for which the *choice* task had greater variability (F_{Flight1} (99, 99) = 1.9092, p < .01; F_{F7} (99, 99) = 1.7575, p < .01).

Discussion

The results from Study 3 support the explanation that lack of familiarity with rejection decision tasks drives these differences in preference. Training the treatment group with additional rejection decisions to build task familiarity resulted in differences ceasing to arise in the main DCE. Both the mean preference and preference variability components were mitigated through building task familiarity.

One of the challenges posed by this study is that the training manipulation confounded task familiarity with product familiarity. The same rejection task used in the DCE was used to build task familiarity and therefore we cannot tell whether the familiarity needs to be product specific to produce the observed effect. If the training needs to be product specific, it might not just increase task familiarity but may also allow stronger preferences to be formed prior to the main experiment with these strong preferences overcoming the framing effect and not the task familiarity. The following two studies address the issue of context dependence of training and subsequent familiarity by taking the training task outside the context of the main experimental task.

STUDY 4: CONTEXT DEPENDENCE OF TASK FAMILIARITY

This study examines the issue of the potential context dependence of task familiarity. As in previous studies a treatment and control group are employed. The treatment group in this case uses a rejection task in a different product context to that of the main measurement in the DCE. That is, the participants are trained in one product category and then measured in another to increase task familiarity.

Such testing allows us to understand whether familiarity with the task of rejecting in one product context will sufficiently increase task familiarity in a subsequent different product context so as to remove any differences in mean preferences and preference variability. We expect that if task familiarity is responsible for driving the differences between preferences elicited with choices versus those elicited with rejections, training should remove those differences.

Method

The same procedure as Study 3 is used. A treatment and control group use the same airline flight DCE as Study 1. The treatment group in this study receives training that involves the rejection of car rental options. The experimental design for this training is the same as that of the airline DCE. Five product features (car model, number of included miles/kilometres, return time and insurance liability), each with two levels, are used to generate eight products (car rental options) using a half fractional factorial design. These are then organised into pairs using a full factorial producing 28 pairs of car rentals comprising the choice sets in the training.

The participants were 400 US members of Amazon’s Mechanical Turk. Due to the risks of re-sampling from a population used in previous studies, use of a control group was maintained in this study. Participants were randomly allocated to treatment and control groups, and simultaneously within those to the blocks that controlled for order effects for the two decision types in the main DCE.

Results

Mean Preference

The results for mean preference are shown in Figures 11 and 12.

FIGURE 11
Study 4 Results: Mean Preferences (Control)

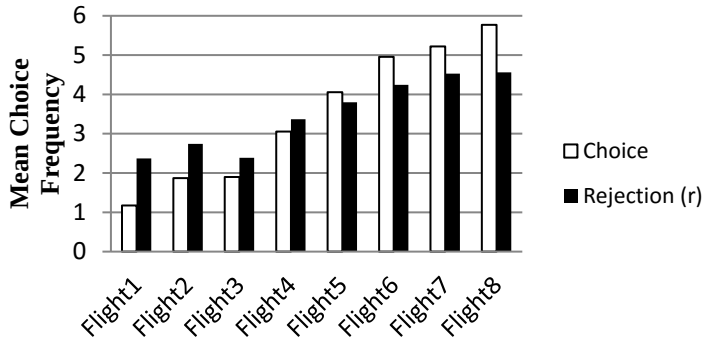
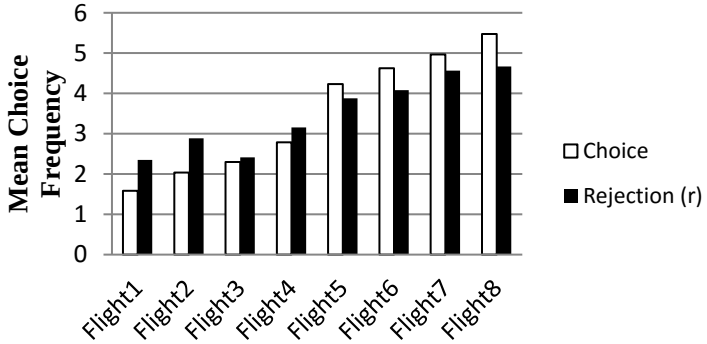


FIGURE 12
Study 4 Results: Mean Preferences (Treat.)



For both the control group *and* treatment group, the preference differences between the choice and rejection tasks (as measured with paired samples t-tests) were apparent. This result indicated that training within a different product-context generated insufficient task familiarity to overcome the framing effect in the treatment group. In the control group the mean preference for flights at the lower end of the preference scale increased when participants changed to a rejection task ($M_{\text{Flight1 C-R}}$ = -1.195, t (199) = -6.7718, p < .01; M_{F2} = -.8700, t (199) = -6.2604, p < .01; M_{F3} = -.4850, t (199) = -3.3708, p < .01; M_{F4} = -.3150, t (199) = -2.7581, p < .01); and the reverse was true for the higher end of the preference scale (M_{F5} = .2550, t (199) = 2.0980, p < .05; M_{F6} = .7100, t (199) = 5.3492, p < .01; M_{F7} = .6900, t (199) = 4.8645, p < .01; M_{F8} = 1.2100, t (199) = 6.6412, p < .01). Nearly identical results were seen for flights in the treatment group at the low ($M_{\text{Flight1 C-R}}$ = -0.765, t (199) = -4.3588, p < .01; M_{F2} =-.8500, t (199) = -5.5621, p < .01; M_{F3} = -.1150, t (199) = -0.7750, p > .10; M_{F4} = -.3700, t (199) = -2.8504, p < .01) and high ends (M_{F5} = .3500, t (199) = 2.6591, p < .01; M_{F6} = .5450, t (199) = 3.7840, p < .01; M_{F7} = .4000, t (199) = 2.7901, p < .01; M_{F8} = .8050, t (199) = 4.7044, p < .01) of the preference scale.

Preference Variability

The results regarding the variability in the preferences are presented in Figures 13 and 14.

FIGURE 13
Study 4 Results: Preference Variability (Control)

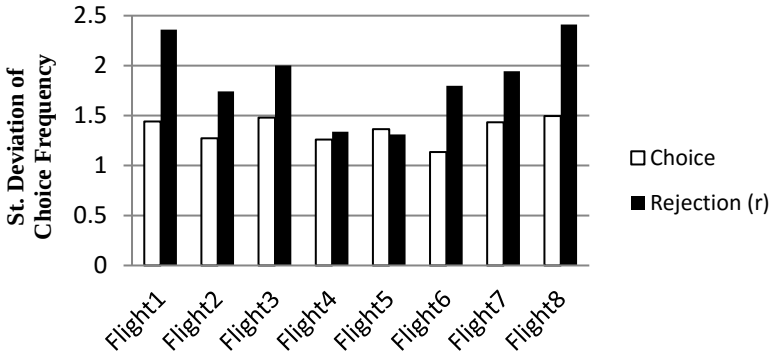
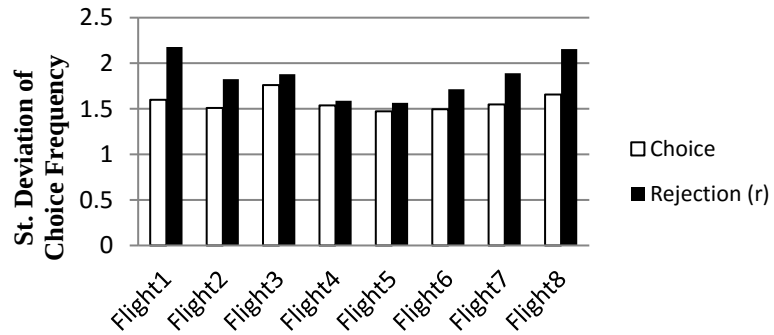


FIGURE 14
Study 4 Results: Preference Variability (Treat.)



The results from the control group for this study were in line with expectations. Assessed with a Levene's F-test, the rejection task results indicated significant increases in preference variability over choices for low (F_{Flight1} (199, 199) = 2.6851, $p < .01$; F_{F2} (199,199) = 1.8737, $p < .01$; F_{F3} (199,199) = 1.8288, $p < .01$), and high preference flights (F_{F6} (199,199) = 2.5059, $p < .01$; F_{F7} (199,199) = 1.8413, $p < .01$; F_{F8} (199,199) = 2.5982, $p < .01$), with the middle two flights not-significantly different ($p > .05$).

As we saw with mean preferences, the treatment group here was unaffected by the training in the rejection of products outside the main product context. The rejection task produced higher variability for low preference flights (F_{Flight1} (199, 199) = 1.8553, $p < .01$; F_{F2} (199,199) = 1.4629, $p < .01$), and the high preference flights (F_{F6} (199,199) = 1.4144, $p < 0.05$; F_{F7} (199,199) = 1.4917, $p < .01$; F_{F8} (199,199) = 1.6931, $p < .01$), with the remaining three flights proving non-significant ($p > .05$).

Discussion

These results highlight that for increases in task familiarity to mitigate the effects of decision framing on mean preferences and preference variability, it must be context specific. Training the participants in rejecting car rental options had no effect on their decision making for airline flights when compared to the control group.

Only one dimension of this context dependence needs to be clarified at this point. In Study 3 the same products were used in the training task as those in the DCE. It is unknown if the training to build familiarity to mitigate the preference reversals effect requires the exact same products or different products within the same product context. If it does require precisely the same products, this suggests that the mechanism may be a combination of increased task familiarity and/or increased knowledge of the products arising from the training.

STUDY 5: WITHIN-CATEGORY CONTEXT DEPENDENCE OF TASK FAMILIARITY

This fifth and final study examines whether familiarity with rejection tasks needed to disrupt framing effects can be achieved using similar but not identical products to those used in the main decision task. If products in the training must be identical to those in the main decision task, this indicates that task familiarity may not be the mechanism overcoming the framing effects, and that the effects may be due to some form of increased product knowledge or product familiarity. This study therefore uses products from the same product category, but with features that are not the same as those in the main DCE. Preferences formed during training should therefore have no impact on the subsequent DCE, allowing us to isolate the task familiarity effect. It is expected that familiarity with the act of rejecting built through training participants on similar products will remove the framing effect, producing no changes in mean preference and preference variability when switching from a choice to a rejection task.

Method

For this experiment a treatment and control group is used as in previous studies. The treatment group is trained by rejecting products from the same product category as in the main DCE, but which are designed with different feature levels. The product category tested is backpacks. This product category employs a half fractional design to construct eight product options. These are then organised into 28 choice sets comprising pairs of products using a full factorial. The order of the choice and rejection tasks is blocked for order in the main DCE.

The backpacks in the DCE were designed using four product features. The features used were those of price, bag weight when empty, colour and closure type. The training task for the treatment group used products with different levels ascribed to those same features. For example, the colours available for the main DCE were blue and dark red and for the training they were black and dark green. This ensured that preferences

formed during the training task would have minimal impact on preferences elicited during the main experimental task as the products are composed of different feature levels. This allows the effects of task familiarity on framing effects to be isolated.

The participants were 200 US members of Amazon's Mechanical Turk. Each participant was randomly allocated to the treatment or control group. Each group contained the same number of participants.

Results

Mean Preference

The results for mean preference are shown in Figures 15 and 16. The shift in mean preference when the decision changed from a choice to a rejection were overcome in the treatment group with increased familiarity built from the training. The treatment group demonstrated no significant differences in mean preferences between choice and rejection tasks ($p > .05$). In the control group the most extreme high (low) preferred backpack saw a significant decrease (increase) in preference when changing to a rejection as assessed using paired samples t-tests ($M_{\text{Pack1 C-R}} = -.4200$, $t\ (199) = -2.0680$, $p < .05$; $M_{\text{P8}} = .4300$, $t\ (199) = 2.0293$, $p < .05$).

FIGURE 15
Study 5 Results: Mean Backpack Pref. (Control)

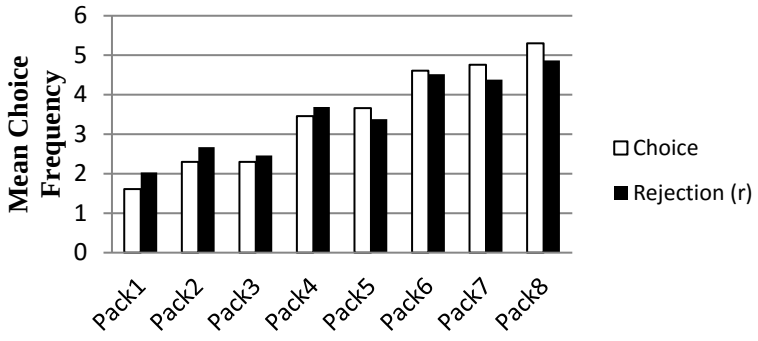
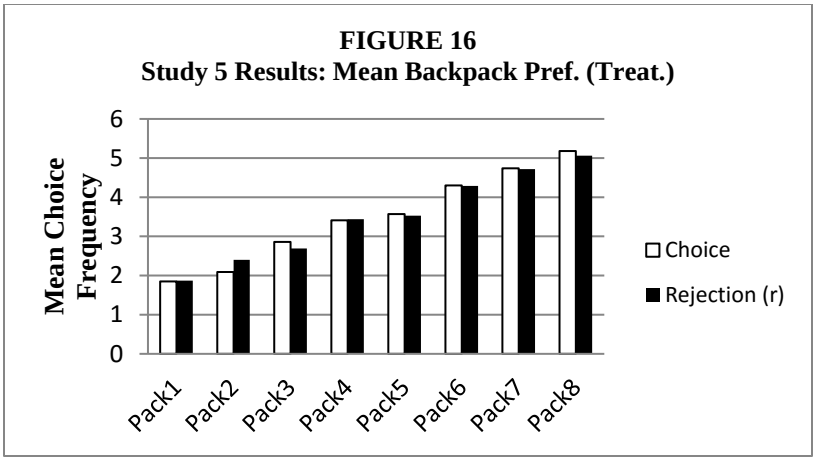


FIGURE 16
Study 5 Results: Mean Backpack Pref. (Treat.)



Preference Variability

The changes in variability for the choice and rejections tasks are shown in Figures 17 and 18; the associated statistical tests employed the Levene's F. The control group exhibited the same pattern of higher preference variability for rejection at the extremes of the preference scale as previous findings, although only the backpack with the lowest preference was significant within this pattern (F_{Pack1} (99, 99) = 1.4115, p <.05) with the remainder of the pattern being non-significant (p > .05). The task training that the treatment group received saw the pattern of higher variability for the rejection task completely disappear. Higher and lower levels of variability randomly appeared across the different backpacks, with none being significantly different (p > .05).

FIGURE 17
Study 5 Results: B'pack Pref. Variability (Control)

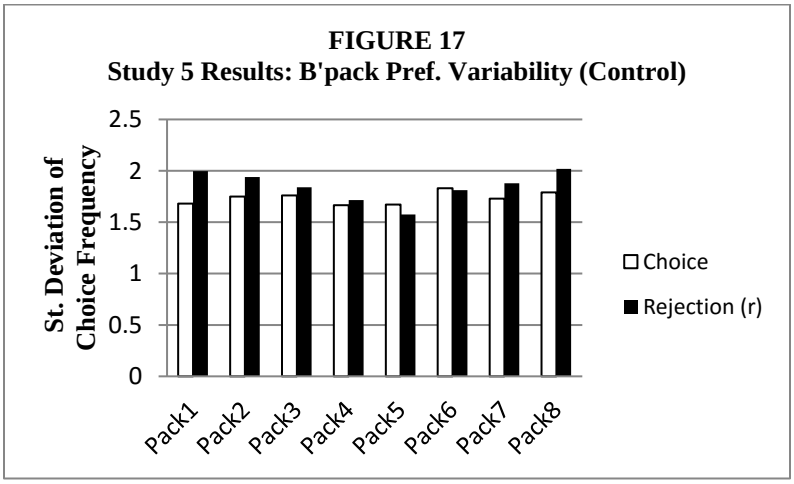
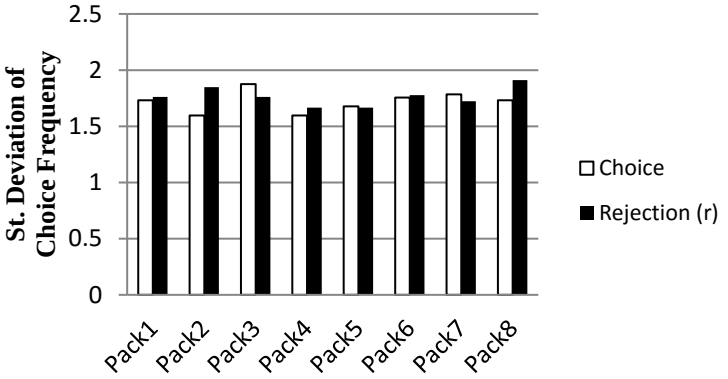


FIGURE 18
Study 5 Results: B'pack Pref. Variability (Treat.)



Discussion

The results from Study 5, coupled with the results from Study 3, demonstrate that task familiarity overcomes effects arising from framing a decision as a choice or rejection. Training used to build familiarity with the rejection task gives the strongest results when context specific. However, the products used to build familiarity need not be identical to those in the target decisions. This indicates that the effect can be attributed to product-context specific task familiarity and not necessarily product familiarity.

GENERAL CONCLUSIONS AND FUTURE RESEARCH

This research demonstrates that decision framing influences both mean preferences and preference variability; both of which are capable of producing the preference reversal effect noted in literature. When a decision is changed from being framed as a choice task to a rejection task, significant increases in preference variability can be observed for products with very high and very low preference levels. It is likely that this contributes to the reversals seen in other research, as consumer groups will now deviate from typical choice behaviour when rejecting. Increasing familiarity with the task of rejection removes this effect for both mean preference and preference variability. The familiarity needs to be context specific to produce any meaningful reduction in these two effects.

Extensive literature has identified that preferences change when a decision is framed as a choice versus as a rejection (Dhar and Wertenbroch, 2000; Laran and Wilcox, 2011; Shafir, 1993; Takemura, 2014). Framing has been shown to alter what information a consumer attends to during the decision-making process, leading to different preferences being formed by a consumer. With such differences in preference, purchase outcomes are reached that are seemingly inconsistent between decision contexts that are framed in different ways (Bettman et al., 1998; Shafir, 1993). The findings of this research support those in the literature. Furthermore, they confirm the occurrence of changes in mean preference consistent with the preference reversal phenomenon. Additionally, the

findings add to the literature by highlighting how the variability of preferences can be influenced by framing. The differences in variability indicate that at least some of the variability in the random component can be attributed to framing effects (Hutchinson et al., 2000; Hess and Daly, 2014). This study represents the first attempt to integrate framing effect and random utility theory. Future research examining framing must consider the role of both components of preference suggested by RUT.

The impact of framing on consumer decisions cannot be underestimated. From a practical perspective, marketers may attempt to influence consumer decisions by framing the consumption decision. A market leader would be best served by ensuring that consumers activate a product selection process. Preferences for highly preferred alternatives are re-enforced in selection (or choice) decision approaches with higher mean preferences and lower preference variability. By helping consumers to activate a selection process, the market leader increases the mean preference for their product and reduces preference variability, maximising the likelihood that any individual consumer will select it. In contrast, a product or brand positioned second or third in the marketplace may be better served by encouraging consumers to use a decision making process that employs the rejection of unwanted alternatives. The mean preferences for the dominant alternative are supressed, and preference variability is increased, making it more likely that consumers will switch to the less dominant product alternatives. It is interesting that such strategies are only relevant to products at or near the top of the marketplace, and there is less impact of framing on consumer preferences and subsequent decisions for middle positioned alternatives.

Rejection decisions are common in many situations, but particularly in areas such as health and nutrition marketing. Enabling the public to refuse that extra slice of cake they don't *really* want, or reject the offer of a cigarette while trying to quit can benefit the individuals concerned and the wider community. Marketing campaigns can educate consumer groups to build familiarity with the act of rejection with messages such as 'get used to saying *no* by practicing', and health interventions can focus on building task familiarity to suitably equip consumers to say 'no'. A community of people trying to lose weight, or stop smoking is less subject to framing effects leading them to (on average) make decisions that better reflect their preferences to lose weight or quit smoking. The associated decreases in preference variability with the removal of the framing effect would also result in the community more consistently making decisions to say 'no'.

The findings here suggest several potential directions for future research. This research held the nature of the information comprising the product alternatives in the experiment relatively constant, primarily focusing on utilitarian product features. This limits the generalisability of our findings, but led to the discovery that changes in preferences substantially decreased as familiarity with rejecting increased. It would be interesting to see if the familiarity effect becomes subordinate to the differences in attention found to drive preference reversals in those studies if different types of information are introduced, such as preference consistent or inconsistent information as

presented by Laran and Wilcox (2011), or hedonic and utilitarian information as per Dhar and Wertenbroch (2000). Identification of the conditions where task familiarity or information attention become the dominant mechanism underlying framing effects would provide an interesting avenue for future research.

The findings of this research also suggest a possible relationship that has yet to be fully explored between the mean differences and differences in preference variability arising from framing. The greatest mean differences nearly always co-occurred with the greatest differences in preference variability – in other words, the variability differences nearly always occurred for the products with both the highest and lowest levels of mean preference. This is surprising as this particular relationship is not predicted in any of the literature. Indeed, it would be expected that products with extreme preference levels would differentiate themselves from other products in a decision producing lower preference variability, not higher. Research into statistical methods for estimating consumer preferences suggests that the mean and variance components of preference, and the systematic and error components of utility which comprise the theoretical constructs underlying preference, can be related (Islam, Louviere and Burke, 2007, Louviere and Eagle, 2006; Takemura, 2014). Therefore, whether mean differences can occur without differences in preference variability also occurring, and vice versa, and why this particular curvilinear relationship arises present interesting avenues for future research.

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Appendix A

Study 1 Sample Choice Set

	Flight A	Flight B
Price	$305	$335
Luggage	Check in included	Carry on only
Meal option	Drinks only	Meal and drinks
Flight time	3 hours	4.5 hours