The Uncertain Value of Uncertainty: When Consumers Are Unwilling to Pay for What They Like

Alice Moon¹, Leif D. Nelson²

¹Disney Research
²University of California, Berkeley

Author Note
This work was completed while Alice Moon was a PhD student at the University of California, Berkeley. Correspondence concerning this article should be addressed to Alice Moon, Disney Research, 4720 Forbes Avenue, LL Suite 110, Pittsburgh, PA, 15213. Email: alice.moon@disneyresearch.com

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Understanding how much consumers value products is crucial for marketers. Though past research has assumed that pricing measures (e.g., willingness-to-pay) and rating measures (e.g., enjoyment) are interchangeable in determining value, across seven studies \((N = 3919)\), we find that these measures are distinct under uncertainty. Namely, when considering pricing measures (e.g., willingness-to-pay), uncertainty is evaluated negatively, whereas when considering rating measures (e.g., enjoyment), uncertainty is evaluated positively. This effect holds whether the outcomes are positive or negative, and even when changing the amount of uncertainty, uncertainty remains negative with pricing measures and positive with rating measures. We empirically test some possible explanations and discuss crucial implications for both theory and applications.

Keywords: Willingness-to-pay, Enjoyment, Uncertainty, Measurement
Uncertain products and promotions, such as lotteries and surprise discounts, have gained popularity in the market. In fact, some airlines even offer “blind bookings” for which the destination is not revealed until the day before you leave. Such uncertainty could produce excitement about the vacation destination, which could add to the perceived value of the prospect. On the other hand, the same offer might produce anxiety, which could detract from the perceived value of the prospect. Uncertainty brings an emotional mixture that makes valuation a challenge: how do you price a product when the product is unknown?

Determining the price of a product is one of the most important decisions in marketing. Overpricing limits the likelihood that consumers will buy the product, whereas underpricing squanders potential profits and revenues. Precise pricing is vital for estimating demand and designing competitive strategies (e.g., Marn, Roegner, and Zawada 2003; Wertenbroch and Skiera 2002), and willingness-to-pay (WTP; a pricing measure) allows economists, psychologists, and market researchers to estimate satisfaction with, liking for, and general attitudes towards a product (e.g., Kahneman, Ritov, and Schkade 1999; Homburg, Koschate, and Hoyer 2005). For example, AC Nielsen, the top revenue-generating market research firm in the U.S., uses WTP as a primary measure of consumer attitudes and value (e.g., Nielsen 2010; 2015). They assume that a person’s liking for products can be assessed with either rating scales (e.g., ratings of expected enjoyment) or WTP. In this paper, we illustrate that this measure of value might not always be the right one – in particular, under uncertainty, WTP does not correctly assess expected enjoyment.
Past research on uncertainty hints at our notion that WTP and expected enjoyment diverge under uncertainty. Specifically, uncertain prospects are perceived in seemingly contradicting ways. Traditionally, researchers have viewed uncertainty to be negative. Risk and uncertainty have been found to be fear- and anxiety-provoking (see Slovic 1987 and Loewenstein et al. 2001 for reviews) as well as ego-depleting (Milkman 2012) to the point that uncertainty reduction is thought to be a fundamental human motivation in various domains (e.g., Hogg and Abrams 1993; van den Bos and Lind 2002). Nevertheless, some researchers suggest that uncertainty can be positive (e.g., excitement as in the case of gambling; Cowley 2013). For example, Wilson and colleagues (e.g., Wilson et al. 2005) propose that uncertainty can prolong positive emotions by slowing adaptation. In one study, Kurtz, Wilson, and Gilbert (2007) found that when people were uncertain about whether they would receive one or two prizes at the end of an experiment, they felt happier for longer than when they knew for sure that they would receive two prizes. The seeming contradiction of these findings led researchers to point out that much of the prior literature concerned investigations of negative stimuli, and that perhaps the negative influence of uncertainty was limited to uncertainty regarding negative possible outcomes. Accordingly, it appeared that when uncertainty was focused exclusively on positive outcomes, heightened uncertainty intensified positivity (e.g., Wilson et al. 2005; Bar-Anan, Wilson and Gilbert 2009; Lee and Qiu 2009).

This explanation, however, proves insufficient to reconcile a perplexing phenomenon termed the “uncertainty effect” (Gneezy, List and Wu 2006), which revealed that people devalue uncertainty even when the uncertainty involves only positive outcomes. They found that people appear so risk-averse that they valued lotteries less than their worst possible outcome. For example, participants report a higher WTP for a certain $50 gift card than they would for a lottery that
offers 50-50 chance at either a $50 gift card or a $100 gift card. Participants valued the former at approximately $38 but the latter at only $28, despite the latter being an objectively superior option. The uncertainty effect holds in both hypothetical and real-stakes scenarios, extends to other goods (e.g., a field experiment with baseball trading cards), and notably, to a choice measure (i.e., choice between the prospect and $25 in cash).

The uncertainty effect challenges the psychological understanding of uncertainty and is also fundamentally at odds with how existing decision-making theories consider risk. The uncertainty effect is therefore thought to offer new insight into how people think about risk and uncertainty, and why it might lead to devaluation. In part because of this, many researchers have tried to better understand the driving force of this effect. The prevailing explanation for the uncertainty effect suggests that people simply dislike uncertainty, which contaminates their valuation of risky prospects (an account referred to as “direct risk aversion”; Simonsohn 2009). This account directly addresses the question of the value of uncertainty: the direct risk aversion account predicts that people devalue risk and uncertainty.

A direct risk aversion explanation offers a general account for the negative side of uncertainty, but it generally appears at odds with the positive consequences of uncertainty. In an influential paper, Goldsmith and Amir (2010) discovered a critical new insight: consumers were just as likely to buy a product with an uncertain promotion as they were to buy a product with the best possible promotion. They theorized that uncertain promotions that did not specify likelihoods of receiving possible rewards provoked “innate optimistic responses” toward uncertainty. At first glance then, these findings suggest that direct risk aversion may be an insufficient account.
An alternative explanation for the uncertainty effect that merits further exploration proposes that buyers simply assume lotteries are somehow always worth less than their worst outcome. This belief could artificially lower the WTP for lotteries, but would not generalize to comparable risky prospects that lack the contamination of a lottery label (assuming that there are not similar assumptions with all risky prospects). Removing the lottery wording has led to some conflicting results. Newman and Mochon (2012) found that uncertain vouchers still exhibited the uncertainty effect, while Yang, Vosgerau, and Loewenstein (2013), in a thorough investigation of risky versus riskless framings, found that both uncertain vouchers and uncertain gift cards eliminated the uncertainty effect while raffles, coin flips, gambles, and lotteries upheld the uncertainty effect. Owing to the inconsistent results, further examination of this account is needed.

Current Research

WTP is not the only way to measure value, but all measures of value are thought to be closely connected. For example, in their analysis of WTP, Kahneman et al. (1999) state that “valuations expressed in dollars are highly correlated with those expressed on ratings scales” (Proposition 2-1, p. 207). In essence, those researchers argue that WTP is an attitude measure, and as such will in most cases behave as an attitude measure (e.g., show general scope insensitivity). However, as we will highlight, uncertainty threatens to undo the relationship between rating scales and WTP.

When consumers are asked to consider the prospect of an uncertain gift card, they must ask themselves how much they expect to enjoy using it. Accordingly, that anticipated enjoyment could be expressed on a rating scale (e.g., “how much do you think you will like this gift card?”) or by WTP (e.g., “how much would you be willing to pay for this gift card?”). Although both are conceptually measuring the same construct, the specifics of the situation could distort their rela-
tionship. For example, WTP may reflect decision rules (e.g., consumers should not pay to delay positive experiences) as much as anticipated value (Amir and Ariely 2007). This possibility speaks to a very different interpretation of the uncertainty effect: Consumers might value an uncertain prospect more than its worst possible outcome, but when valuation is elicited with WTP it appears as though they value it less.

Past research on preference reversals supports the idea that different measures (e.g., choice, rating, and pricing) can, at times, exhibit different preferences (e.g., Lichtenstein and Slovic 1971; Schkade and Johnson 1989). It is possible that the decoupling of WTP and expected enjoyment under uncertainty reflects that people make evaluations by making “judgments by prototype” (Kahneman et al. 1999; Proposition 3-2, p. 211), and that each measure brings to mind different prototypes: enjoyment could evoke prototypical stimuli (e.g., this movie or that movie), whereas WTP might evoke prototypical exchanges (e.g., payment for uncertain products typically only occurs with unfair lotteries or with promotions.

In the studies that follow, we examine how uncertainty influences different measures of preference and show that WTP and rating scales seem to reveal different underlying preferences. Under uncertainty, pricing measures seem to trigger negative valuations whereas rating measures seem to trigger positive valuations. This effect holds when the outcomes are positive (Studies 1 – 3) or negative (Study 5), and when varying the amount of uncertainty (Study 4). We test potential explanations of our effect: the influence of stakes in valuations (Study 6) and the perceived selling price of uncertain prospects (Study 7).

Compliant with Simmons, Nelson, and Simonsohn (2011), we report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the studies, for all of the studies. We attempted to recruit 50 participants per cell for all studies, except Stud-
ies 3 and 4 (100 per cell due to the 5x2 between-factors designs), and Study 7 (125 per cell; see Footnote 7). Because of the extreme variability of open-ended pricing data, we winsorized these data at the 95th percentile for all of our studies that include WTP or compensation demanded (Studies 2 – 5, 7). We also report the analyses with the raw data in the Supplementary Materials.

Data and materials for all the studies in this paper (including those mentioned in the footnotes) are posted.

**STUDY 1: ENJOYMENT OF A CERTAIN VERSUS AN UNCERTAIN PROSPECT**

Study 1 explored whether people valued uncertain positive prospects by testing whether people expect to enjoy uncertain positive prospects.

*Method*

Undergraduates (N = 202) received course credit for participation in a study in which they watched a movie at a local movie theater and completed short surveys (before the movie, at the time of the movie, and after the movie). We partnered with a local movie theater within walking distance of the campus. This movie theater was chosen because it allowed us to rent out the entire venue (at least two screens), and because it would be showing two similar premiering movies with similar content.

One week before the movie premieres, participants watched, in randomized order, online trailers for the movie *Friends with Kids* and for the movie *Jeff who Lives at Home.* Participants then indicated which they wanted to watch more.

Participants were then randomly assigned to one of two conditions. In the Certain condition participants were told which movie they would see at the theater (i.e., “You have been randomly assigned to watch [Movie].”). In the Uncertain condition participants were told that they
would find out their movie when they got to the theater (i.e., “You will watch one of the two movies… When you get to the theater, the experimenter will randomly assign you to which movie you will be watching.”).

Participants in both conditions were randomly assigned to the movie they would see. For those in the Certain condition, some participants would be watching their less preferred movie (hereafter referred to as “Worse”), and some participants would be watching their more preferred movie (hereafter referred to as “Better”). Hence, for this survey, participants were essentially assigned to one of three conditions: (1) Worse (n = 45), (2) Better (n = 55), or (3) Uncertain (n = 101; participants were not yet informed of which movie they would be watching).

After this manipulation, participants rated how much they expected to enjoy the movie on a 7-point scale (“How much do you think you will enjoy the movie?”; 1 = Not At All; 7 = Very Much). Therefore, in the Worse and Better conditions, participants were asked about their expected enjoyment of specific movies, whereas in the Uncertain condition, participants were asked about their expected enjoyment of an uncertain movie.

Results and Discussion

Participants in the Better condition expected to enjoy the movie (M = 5.18, SD = 1.32) more than participants in the Worse condition (M = 3.78, SD = 1.54), t(98) = 4.91, p < .001, d = .98.

In seeming opposition to the uncertainty effect, participants in the Uncertain condition expected to enjoy the movie (M = 4.83, SD = 1.29) more than those in the Worse condition (t(144) = 4.30, p < .001, d = .74), and about as much as those in the Better condition, t(154) = 1.61, p = .11 (see Figure 1).
When evaluating an uncertain prospect, people are willing to pay less than they would for its worst possible outcome (Gneezy et al. 2006). Nevertheless, in this study we find that people think that they will enjoy the uncertain outcome much more than the worst possible outcome. The result is striking, but it is not without limitation. First, we did not state the 50-50 odds explicitly, so participants might have been optimistic about which movie they would see rather than optimistic about how much they would enjoy it. Additionally, although Study 1 was designed to investigate how uncertainty influences enjoyment, it was exploratory. Study 2 sought to address these issues while also collecting both WTP and expected enjoyment measures in order to directly identify whether response format moderated responses to uncertainty.

**STUDY 2: ENJOYMENT AND WTP UNDER UNCERTAINTY**

*Method*

Participants (N = 303) recruited from Amazon’s Mechanical Turk (MTurk) received $0.40 for completing an online survey. Participants watched, in randomized order, online trailers for two upcoming movies (*Frozen* and *Free Birds*) and indicated which they wanted to watch more. Participants were then randomly assigned to one of three certainty conditions: Worse (they were asked about the movie they liked less; n = 107), Better (they were asked about the movie they liked more; n = 100), or Uncertain (they were asked about a 50-50 lottery between the two movies; n = 96). After this manipulation, participants reported how much they valued the prospect in two different ways (the order of which was counterbalanced). Participants reported both: (1) their WTP for the prospect (i.e., for a movie ticket for the Better and Worse conditions, and for a lottery between the two movie tickets in the Uncertain condition), and (2) their expected enjoyment of the prospect (the same measure as in Study 1).
Results and Discussion

WTP. Participants in the Worse condition were willing to pay less ($M = 5.11, SD = 3.07$, Median = $5$) than participants in the Better condition ($M = 7.74, SD = 2.89$, Median = $8$), $t(205) = 6.35, p < .001, d = .88$. Replicating the uncertainty effect, participants in the Uncertain condition were willing to pay even less ($M = 2.45, SD = 1.98$, Median = $2$) than participants in the Worse condition, $t(201) = 7.22, p < .001, d = 1.03$ (see Figure 2A).

Enjoyment. Participants in the Worse condition ($M = 3.83, SD = 1.54$) expected to enjoy the movie less than participants in the Better condition ($M = 5.58, SD = 1.14; t(205) = 9.24, p < .001, d = 1.29$). Replicating Study 1, participants in the Uncertain condition expected to enjoy the movie ($M = 5.34, SD = 1.26$) significantly more than participants in the Worse condition ($t(201) = 7.60, p < .001, d = 1.07$), and about the same as participants in the Better condition, $t(194) = 1.38, p = .17$ (see Figure 2A).

Relationship between Enjoyment and WTP. In light of the discrepancy between our WTP and enjoyment findings, we also explored the relationship between enjoyment and WTP (see Figure 2B). Using z-tests for the difference between correlation coefficients, we found that the relationship between enjoyment and WTP was attenuated (though still significant) in the Uncertain condition ($r_{Uncertain} = .27$) compared to the two certain conditions ($r_{Worse} = .63, z = 3.26, p = .001; r_{Better} = .54, z = 2.26, p = .02$). Furthermore, the two certain conditions did not significantly differ in the relationship between enjoyment and WTP ($p > .3$). This suggests that under uncertainty, the relationship between WTP and expected enjoyment starts to collapse.

Taken together, the results of Study 2 imply that expected enjoyment and WTP diverge under uncertainty. These findings indicate that people are averse to uncertain prospects when asked about their WTP, yet people like uncertain prospects when asked about their expected en-
joyment. This suggests that WTP is not an adequate proxy for expected enjoyment when considering uncertain prospects. Study 2 also provided additional evidence that direct risk aversion cannot entirely account for the uncertainty effect. If it were the case that direct risk aversion explained the uncertainty effect, then people should also feel averse to uncertain movies when asked about expected enjoyment. However, people expected to enjoy uncertain movies as much as the better movie. Nevertheless, one could argue that risk does not exist with expected enjoyment because there are no stakes involved when asking about a free movie. We return to this point in Study 6.

**STUDY 3: SPECIFYING THE UNCERTAIN PROSPECT**

Studies 1 and 2 demonstrated that unlike the uncertainty effect, in which people pay significantly less than even the worst outcome, people expect to enjoy uncertain prospects significantly more than the worst outcome and potentially as much as the better outcome. One potential account for our previous studies is that participants may have understood the enjoyment question as referring to enjoyment of the outcome only while understanding the payment question as referring to payment for the lottery. This would suggest that perhaps expected enjoyment and WTP do not actually diverge, but simply reflect that these questions were not parallel.

We address this issue in Study 3 by specifying whether the uncertain prospect refers to: (a) the lottery, (b) the outcome, or (c) the lottery and the outcome. We wanted to examine whether asking about the lottery and its outcome would show the same pattern as in Study 2. That is, people would be willing to pay less for the lottery and its outcome than the worst possible outcome, yet still expect to enjoy the lottery and its outcome significantly more than the worst pos-
sible outcome. If we found this to be true, we would rule out the possibility that this confound accounted for our effect.

Finally, we included the two other Uncertain conditions to compare to this wording. We hypothesized that when asked about the lottery, people would respond more negatively to uncertain prospects (i.e., be willing to pay less for lotteries and expect to enjoy lotteries less), whereas when asked about the outcome, people would respond more positively to uncertain prospects (i.e., be willing to pay more for and expect to enjoy lotteries more).

Method

Participants (N = 1000) recruited from Amazon’s Mechanical Turk (MTurk) received $0.15 for completing an online survey. The procedure was similar to that of Study 2 with two exceptions: (1) instead of using movie trailer stimuli, we asked participants to evaluate coffees (i.e., ground coffee from either Starbucks or Dunkin’ Donuts), and (2) though the Better (participants were asked about the ground coffee they liked more; n = 199) and Worse (participants were asked about the ground coffee they liked less; n = 200) conditions remained the same, the Uncertain condition was divided into three distinct conditions: (a) Uncertain Pure Lottery (participants were asked about the lottery specifically; n = 199), (b) Uncertain Pure Outcome (participants were asked about the outcome of the lottery specifically; n = 203), and (c) Uncertain Lottery & Outcome (participants were asked about the lottery and its outcome specifically; n = 199). Again, as in Study 2, participants reported how much they valued the prospect in two different ways (the order of which was counterbalanced). Participants reported both: (1) their WTP for the prospect (i.e., for a 1 pound bag of ground coffee from the respective location for the Better and Worse conditions; after a description of the lottery for each of the Uncertain conditions, for a lottery between the 1-pound bags of ground coffee in the Uncertain Pure Lottery condition, for the
ground coffee in the Uncertain Pure Outcome condition, and for the lottery and its outcome in the Uncertain Lottery & Outcome condition), and (2) their expected enjoyment of the prospect (the same measure as in Studies 1 and 2).

Results and Discussion

WTP. Participants in the Worse condition were willing to pay less ($M = 6.33, SD = 2.75, Median = $6) than participants in the Better condition ($M = 7.81, SD = 3.54, Median = $7), $t(397) = 4.69, p < .001, d = .47.$

The Uncertain Pure Lottery condition replicated the uncertainty effect: participants in the Uncertain Pure Lottery condition were willing to pay even less ($M = 2.35, SD = 1.90, Median = $2) than participants in the Worse condition, $t(397) = 16.81, p < .001, d = 1.69.$

The Uncertain Pure Outcome condition still showed an uncertainty effect, even though it was completely decoupled from the lottery itself. People in this condition were willing to pay less ($M = 5.30, SD = 2.86, Median = $5) than participants in the Worse condition, $t(401) = 3.66, p < .001, d = .37.$ They were willing to pay significantly more than those in the Uncertain Pure Lottery condition ($t(400) = 12.19, p < .001, d = 1.22$), however, suggesting that people are both sensitive to the value of the outcome while still being irrationally sensitive to the contamination of uncertainty from the lottery.

Importantly, the Uncertain Lottery & Outcome condition also replicated the uncertainty effect: participants in the Uncertain Lottery & Outcome condition were willing to pay significantly less ($M = 2.50, SD = 1.94, Median = $2) than participants in the Worse condition, $t(397) = 16.04, p < .001, d = 1.61$ (see Figure 3).
Enjoyment. Participants in the Worse condition (\(M = 4.37, SD = 1.35\)) expected to enjoy the coffee less than participants in the Better condition (\(M = 5.55, SD = 1.33\)), \(t(397) = 8.83, p < .001, d = .88\).

Replicating Study 2, participants in the Uncertain Pure Outcome condition expected to enjoy the outcome (\(M = 5.34, SD = 1.40\)) significantly more than the Worse condition, \(t(401) = 7.11, p < .001, d = .71\), and as much as the Better condition, \(t(400) = 1.53, p = .13\).

The Uncertain Pure Lottery condition, on the other hand, expected to enjoy the lottery (\(M = 4.55, SD = 1.64\)) only as much as the worse outcome, \(t(397) = 1.18, p = .24\), and significantly less than the better outcome, \(t(396) = 6.71, p < .001, d = .68\).

Importantly, the Uncertain Lottery & Outcome condition also replicated Study 2: participants in the Uncertain Lottery & Outcome condition reported significantly higher expected enjoyment (\(M = 4.94, SD = 1.68\)) than participants in the Worse condition, \(t(397) = 3.74 p < .001, d = .37\) (see Figure 3), though lower expected enjoyment than participants in the Better condition, \(t(396) = 4.04, p < .001, d = .40\).

These results provide evidence that the discrepancy between WTP and expected enjoyment is not due to people evaluating different prospects for these measures (i.e., the lottery and the associated feelings of risk versus the pleasant outcome of the lottery). Even when we specified the uncertain prospect to evaluate, people were willing to pay less for the uncertain prospect than its worst possible outcome, but simultaneously expected to enjoy the uncertain prospect significantly more than the worst possible outcome.\(^6\)

\textit{STUDY 4: INCREASING LIKELIHOODS OF BETTER AND WORSE OUTCOMES}
Studies 1 - 3 established that people value uncertainty with *rating* measures (e.g., expected enjoyment) and devalue uncertainty with *pricing* measures (e.g., WTP). In Study 4, we sought to investigate the boundaries of the effects of uncertainty. In particular, we changed the likelihood of receiving the better outcome (and thereby, the worse outcome), such that in the lottery, either the better outcome was much more likely (99% likely) or much less likely (1% likely). This manipulation was used by Gneezy et al. (2006) to learn more about the original uncertainty effect. By including these nearly certain lotteries, we can examine how having even a very small amount of uncertainty would influence WTP and expected enjoyment.

There are several possibilities for how modifying the likelihoods of receiving the better and worse outcomes could affect valuations of the different prospects. One possibility is that when the probabilities of receiving a particular outcome are very close to certainty, people evaluate the nearly certain prospect the same as a certain prospect. The original uncertainty effect paper (Gneezy et al. 2006) found that with both a lottery in which the better outcome was nearly certain and in which the worse outcome was nearly certain, the uncertainty effect was eliminated: people were willing to pay at least as much as the worst possible outcome. Therefore, this possibility would predict that people would be willing to pay at least as much for an uncertain movie as the worst possible movie.

A second possibility is that any amount of uncertainty is treated the same. In other words, people may be scope-insensitive to the level of uncertainty – that is, people may react to the mere presence of uncertainty and may not be sensitive to changes in the likelihoods. This second account would predict that people would be willing to pay the same amount for all the lotteries and that people would expect to enjoy all the uncertain movies the same amount. In fact, researchers suggest that both WTP and expected enjoyment should be scope-insensitive because they depend
primarily on the affective response of the presence or absence of a good (e.g., Kahneman et al. 1999; Hsee and Rottenstreich 2004)

A final possibility is that people may be sensitive to the different likelihoods and take this into account when making their evaluations (see Buechel, Zhang, Morewedge and Vosgerau 2014). This final account would predict that when the better outcome is more likely, valuations of the uncertain prospect would increase, and when the better outcome is less likely, valuations of the uncertain prospect would decrease.

Study 4 was designed to find out which of these explanations was supported, and to examine how changing the likelihoods of the better and worse outcomes influenced WTP and expected enjoyment.

*Method*

Participants recruited from MTurk (N = 1006) received $0.40 for completing an online study. The procedure and materials were the same as Study 2 with two exceptions: (1) the movies were *Big Hero 6* and *Penguins of Madagascar*, and (2) in addition to the three conditions in Study 2 (Worse: n = 200; Better: n = 205; Uncertain 50%: n = 201), we included two additional conditions: Uncertain 1% (participants were asked about a lottery in which the better outcome was 1% likely and the worse outcome was 99% likely; n = 201), and Uncertain 99% (a lottery in which the better outcome was 99% likely and the worse outcome was 1% likely; n = 199). To differentiate between the new conditions, the original Uncertain condition will from hereon be referred to as Uncertain 50%.

*Results and Discussion*

*WTP.* Participants in the Worse condition were willing to pay less ($M = $5.49, $SD = $3.22, $Median = $5) than participants in the Better condition ($M = $7.86, $SD = $2.98, $Median =
$8), t(403) = 7.71, p < .001, d = .76. Replicating the uncertainty effect in Study 2, participants in the Uncertain 50% condition were willing to pay even less ($M = $3.72, $SD = $2.85, Median = $3) than participants in the Worse condition, $t(399) = 5.81, p < .001, d = .58.

Moreover, WTP was consistently lower for the Uncertain conditions than the Worse condition. Participants in both the Uncertain 1% condition ($M = $2.75, $SD = $2.82, Median = $1) and the Uncertain 99% condition ($M = $3.88, $SD = $2.84, Median = $5) were willing to pay significantly less than participants in the Worse condition, $t(399) = 9.05, p < .001, d = .91$, and $t(397) = 5.30, p < .001, d = .53$, respectively (see Figure 3).

Participants in the Uncertain 1% condition were also willing to pay significantly less than both those in the Uncertain 50% condition and participants in the Uncertain 99% condition, $t(400) = 3.43, p < .001, d = .34$, and $t(398) = 3.98, p < .001, d = .40$, respectively.

**Enjoyment.** Participants in the Worse condition ($M = 4.18, SD = 1.63$) expected to enjoy the movie less than participants in the Better condition ($M = 5.75, SD = 1.28$; $t(403) = 10.81, p < .001, d = 1.07$). Replicating Study 1, participants in the Uncertain 50% condition expected to enjoy the movie ($M = 5.20, SD = 1.24$) significantly more than participants in the Worse condition, $t(399) = 7.11, p < .001, d = .70$. Unlike Study 1, participants in the Uncertain 50% condition expected to enjoy the movie significantly less than participants in the Better condition, $t(404) = 4.37, p < .001, d = .44$.

Expected enjoyment showed a linear pattern with increasing likelihood of obtaining the better outcome. Participants in the Uncertain 1% condition expected to enjoy the movie more ($M = 4.76, SD = 1.60$) than participants in the Worse condition ($t(399) = 3.59, p < .001, d = .36$), but less than participants in the Uncertain 50% condition ($t(400) = 3.13, p = .002, d = .31$). Participants in the Uncertain 99% condition expected to enjoy the movie more ($M = 5.89, SD = 1.23$)
than participants in the Uncertain 50% condition ($t(398) = 5.55, p < .001, d = .56$) and just as much as those in the Better condition, $t(402) = 1.10, p = .27$ (see Figure 3).

**Relationship between Enjoyment and WTP.** We again investigated the relationship between enjoyment and WTP for each of the conditions. Confirming what we found in Study 2, the relationship between enjoyment and WTP was attenuated in the Uncertain conditions ($r_{Uncertain \ 1\%} = .36, r_{Uncertain \ 50\%} = .27, r_{Uncertain \ 99\%} = .29$) compared to the two certain conditions ($r_{Worse} = .59, r_{Better} = .57$, all $z$'s > 2.7, all $p$'s < .01). Furthermore, the two certain conditions did not significantly differ in the relationship between enjoyment and WTP ($p > .7$), and the three Uncertain conditions did not significantly differ in the relationship between enjoyment and WTP ($p$'s > .3).

Collectively, these results demonstrate that both expected enjoyment and WTP were somewhat sensitive to changes in the likelihoods of the better and worse outcomes. Though both expected enjoyment and WTP were sensitive to changes in likelihoods, people always expected to enjoy uncertain prospects more than the worse outcome, but at the same time, people were willing to pay less for uncertain prospects than the worse outcome.

**STUDY 5: EXPECTED DISLIKE AND COMPENSATION DEMANDED WITH NEGATIVE OUTCOMES**

Studies 1–4 focused on uncertainty in the realm of positive outcomes, as with the case of the original uncertainty effect studies (Gneezy et al. 2006). In doing so, the previous studies allowed us to examine the aversiveness of uncertainty itself. Nevertheless, by examining the negative domain (i.e., expected dislike and compensation demanded for two negative possible outcomes), we would learn more about how these effects are operating. Thus, Study 5 was de-
signed to determine whether uncertainty is always positive with rating measures and always negative with pricing measures (https://osf.io/mi2c9/).

Specifically, for expected dislike (i.e., a rating measure comparable to expected enjoyment in the positive domain), we would learn: (a) whether rating measures always elicit hope (i.e., people always assume that they will receive the better option regardless of the valence of the possible outcomes), or (b) whether rating measures of value always tends toward the more extreme outcome under uncertainty (i.e., people assume that they will receive the better option when the possible outcomes are positive, but assume that they will receive the worse option when the possible outcomes are negative).

For compensation demanded, we would learn: (a) whether pricing measures always elicit fear (i.e., compensation demanded for the uncertain prospect would exceed the compensation demanded for the worse of two negative possible outcomes), or (b) whether fear is not due to pricing itself, but due to the idea of payment and spending your own money (i.e., compensation demanded for the uncertain prospect would display a more rational response).

Method

Participants recruited from MTurk (N = 602) received $0.15 for completing an online survey. Study 5 used a 3 (Certainty: Better vs. Worse vs. Uncertain) x 2 (DV: Dislike vs. Compensation Demanded) between-subjects design. Participants were asked to imagine that they worked in a dormitory where the tasks rotate between the workers. In the Better condition, participants were asked about the task of washing dishes for 20 people who ate at the dormitory cafeteria. In the Worse condition, participants were asked about the task of cleaning three stalls in a dormitory bathroom after a weekend of use. These tasks were adapted from McGraw, Shafir, and Todorov (2010), and we expected that cleaning the bathroom stalls would be worse than washing
dishes. In the Uncertain condition, participants were asked about a lottery between the two tasks in which they would for sure be assigned to one of the two tasks with equal probability. Participants were randomly assigned to report either: (a) how much they would dislike the task (“How much do you think you will dislike your task?”) on an 11-point scale (1 = Not At All; 11 = Very Much), or (b) how much they would have to be paid to complete the task (compensation demanded; to complete the task for the Better and Worse conditions, and to be entered in a lottery between the two tasks for the Uncertain condition).

**Results and Discussion**

**Dislike.** As expected, participants expected to dislike the Worse task ($M = 9.21; SD = 2.89$) significantly more than they expected to dislike the Better task ($M = 7.61, SD = 2.93$), $t(199) = 3.90, p < .001, d = .55$.

Consistent with the previous studies, participants expected to dislike the Uncertain task ($M = 8.11; SD = 2.13$) significantly less than participants expected to dislike the Worse task, $t(200) = 3.08, p = .002, d = .43$, and about the same as the Better task, $t(199) = 1.38, p = .17$ (see Figure 5). That is, participants expected that an uncertain prospect would not be as bad as the worst outcome.

**Compensation demanded.** As expected, participants needed to be paid significantly more to complete the Worse task ($M = $181.52, $SD = $259.26, Median = $100) than to complete the Better task ($M = $28.38, $SD = $30.56, Median = $20), $t(199) = 5.87, p < .001, d = .83$. Moreover, consistent with WTP in the positive domain, participants demanded to be paid more to be entered into a Uncertain lottery ($M = $347.88, $SD = $697.10, Median = $100) between the two tasks than to complete the Worse task, $t(198) = 2.25, p = .03, d = .32$. (see Figure 5).
These results suggest that uncertainty is positive when elicited through rating measures (i.e., expected enjoyment and dislike), regardless of the valence of the possible outcomes. On the other hand, uncertainty is negative when elicited through pricing measures (i.e., WTP and compensation demanded), regardless of whether they require payment on behalf of the person or not.

Why is it that uncertainty is devalued with WTP but valued with expected enjoyment? Understanding why pricing and rating measures differ under uncertainty is crucial in marketing research, and the value of uncertain promotions relies on reconciling these two measures. Studies 6 and 7 were designed to test three different possible explanations for why these two types of measures might differ.

**STUDY 6: ADDING STAKES IN ENJOYMENT**

In the studies we presented so far, the expected enjoyment findings are devoid of any investment in that participants in the Uncertain conditions are asked to imagine being entered into a lottery without any investment. It is possible that people value uncertain prospects that do not contain an element of potential loss (as with expected enjoyment in the previous studies) and devalue uncertain prospects that do contain an element of potential loss (as with WTP in the previous studies, because you pay an amount for a prospect in which you may get the worse outcome). This begs the question of whether expected enjoyment allows people to have hope simply because they have no stakes in the outcome of the uncertain prospect. Study 6 was designed to test this explanation by examining whether adding stakes would influence how much people expected to enjoy an uncertain prospect compared to a certain one.

*Method*
Participants recruited from MTurk (N = 304) received $0.40 for completing an online survey. Study 6 used a 3 (Certainty: Worse vs. Better vs. Uncertain) x 2 (Stakes: Original vs. Payment Information) between-subjects design. The procedure and materials were the same as Study 2 with three exceptions: (1) the movies were 3 Days to Kill and Non-Stop, (2) we added an additional between-subjects factor of Stakes in which half of the participants were first asked to imagine having paid $7 for the prospect (Payment Information condition), and (3) participants were only asked to report their expected enjoyment because the objective of this study was to examine whether including this factor of Stakes influenced how much uncertain prospects were valued.

If investment was the key reason for the effect of uncertainty on enjoyment, we would expect that for those in the Payment Information conditions, participants’ enjoyment of the Uncertain prospect would no longer be significantly higher than participants’ enjoyment of the Worse prospect.

Results and Discussion

There was a main effect of Certainty, $F(2, 298) = 27.12, p < .001$. Participants in the Better condition expected to enjoy the movie more ($M = 5.54, SD = 1.40$) than participants in the Worse condition ($M = 4.09, SD = 1.50$), $t(202) = 7.19, p < .001, d = 1.01$. Replicating our previous studies, participants in the Uncertain condition expected to enjoy the movie ($M = 5.19, SD = 1.55$) significantly more than participants in the Worse condition ($t(201) = 5.16, p < .001, d = .72$), and marginally less than participants in the Better condition ($t(199) = 1.70, p = .09$).

There was also a main effect of Stakes, $F(1, 298) = 5.08, p = .02, d = .28$. Having stakes in the prospect (Payment Information condition) decreased expected enjoyment of the movie ($M = 4.71, SD = 1.68$) compared to the Original condition ($M = 5.16, SD = 1.50$).
Most importantly, there was no interaction between Certainty and Stakes, \( F(2, 298) = .25, \ p = .78 \) (see Figure 6). That is, having stakes involved did not change the pattern of results with expected enjoyment: participants still expected to enjoy the Uncertain prospect more than the Worse prospect. Thus, even when having an investment in the prospect, uncertainty is still positive with expected enjoyment. This provides stronger evidence that direct risk aversion cannot fully account for the uncertainty effect, because when measuring value with expected enjoyment, people are not risk-averse.

**STUDY 7: REFERENCE POINTS AND PERCEIVED PRICES**

Why is it that people are seemingly irrational in their WTP? One potential explanation advanced by Yang et al. (2013) is that people may simply have a low reference point of how much they think uncertain prospects are worth (i.e., the actual price of the product, regardless of how much one is willing to pay for it). They proposed that under uncertainty, buyers have a lower reference point in their WTP, whereas sellers have a higher reference point in their willingness-to-accept. However, as sellers, people may be motivated to sell products at a higher price than the actual value. If uncertain prospects appear to be worth less, people’s low WTP for uncertain prospects may simply be a reflection of an aversion to bad deals (Weaver and Frederick 2012). Therefore, a direct test of buyers’ lower reference prices might more precisely address whether the perceived price for a lottery also reflects a lower price than that of the worst possible outcome. Thus, in Study 7, we tested whether people actually perceive uncertain prospects as being of lower value by asking people about for how much they believed uncertain prospects were sold.

**Method**
Participants recruited from MTurk (N = 502) received $0.15 for completing an online survey. Participants randomly assigned to one of two certainty conditions: Certain (asked about a $50 Whole Foods gift card) or Uncertain (asked about a 50-50 lottery between a $50 Whole Foods gift card and a $100 Whole Foods gift card). After this manipulation, participants reported perceived worth in two different ways (the order of which was counterbalanced): (1) how much they were willing to pay for the prospect (WTP), and (2) how much they thought the prospect would be sold for by the company (Perceived Selling Price).

Results and Discussion

WTP. Replicating the uncertainty effect, people were willing to pay less for the Uncertain lottery ($M = $34.03, $SD = $22.76, Median = $35) than the Certain gift card ($M = $43.72, $SD = $9.24, Median = $49), $t(500) = 6.24, p < .001, d = .56. (see Figure 7).

Selling Price. Supporting the idea that people believe lotteries are sold for less than certain gift cards, people also perceived companies as selling the Uncertain lottery ($M = $41.70, $SD = $26.85, Median = $50) for less than the Certain gift card ($M = $48.14, $SD = $5.75, Median = $50), $t(500) = 3.71, p < .001, d = .33 (see Figure 7).

This advances the idea that the uncertainty effect is partly explained by uncertain prospects evoking different reference prices – namely, perceived selling price. If people believe that uncertain products are sold for a lower price than the worst outcome, then it is rational to be willing to pay less for the uncertain product than the worst outcome as well (Frederick 2012). Furthermore, these results are consistent with the premise that uncertainty between positive outcomes can be positive (as we found with expected enjoyment) provided that value is not measured with pricing, and may even suggest that one reason uncertain prospects are appealing with
ratings measures is because they offer a positive prospect that is priced lowered than the amount of enjoyment they would give.

**GENERAL DISCUSSION**

Determining consumer value is of utmost importance to marketers. WTP and attitudinal measures, such as expected enjoyment, are two measures of value that are thought to be theoretically equivalent. However, across several experiments, we found that these two evaluation methods are not substitutable under uncertainty, and provide distinct conclusions about the value of an uncertain prospect. Specifically, with pricing tasks (i.e., WTP), people devalue uncertainty, thereby willing to pay less for an uncertain prospect than the worst possible outcome. Conversely, with rating tasks (i.e., expected enjoyment), people value uncertainty, expecting to enjoy the uncertain prospect more than the worst possible outcome. Put another way, with uncertain prospects, people appear to be irrational when reporting value with pricing measures, but display rational responses when reporting value with rating measures. These effects are sensitive to changes in likelihoods of better and worse outcomes (Study 4), and hold in the negative domain (Study 5), such that people demand to be compensated more for an uncertain prospect than the worst possible outcome, but expect to dislike the uncertain prospect less than the worst possible outcome. Moreover, the discrepancy between pricing and rating measures is not explained by a lack of information about payment with rating measures (Study 6). There was compelling evidence that perceived selling price provides a reference point for pricing measures (Study 7). This could explain why WTP for uncertain prospects is low while rating measures, which should be unaffected by this reference point, for uncertain prospects is high.
An important theoretical implication of this work concerns WTP (and other pricing measures) as a measure of preference. WTP is a complex measure that takes multiple factors into consideration (e.g., Amir and Ariely 2007), including reference prices, one’s own valuation, and subjective probabilities. Although WTP allows researchers to put a face-valid economic value on preferences, the noisiness of the measure can often be problematic. Our research suggests that not only is WTP a noisy measure, but WTP is sensitive to a host of factors that obscure actual preferences and at times, can even erroneously appear to be a reflection of irrational behaviors. When attempting to measure valuations and preferences, more direct measures of preference, such as rating measures, may be more accurate reflections of preferences and exhibit more rational patterns of preference.

Nevertheless, pricing measures might be a better predictor of some types of behavior, such as purchasing behavior, under uncertainty. One interesting avenue for future research could examine what the differential consequences of these various measures of value predict. It is possible that expected enjoyment influences willingness-to-participate in uncertain promotions (as suggested by Goldsmith and Amir 2010) but that WTP influences purchase decisions of uncertain products. Given the prevalence of uncertain prospects in everyday life, future research should investigate the consequences of these different valuations of uncertainty.

The present research also helps elucidate when uncertainty is valued or devalued. For instance, in the medical field, people are often reluctant to undergo genetic testing to find out whether they are susceptible to an incurable disease, such as Huntington’s disease (e.g., Quaid & Morris, 1993). Our findings could help explain why people may avoid learning whether they have or are carriers for diseases such as Huntington’s. Specifically, we found that people dislike uncertain negative prospects significantly less than they dislike the worst outcomes (Study 5). In
the same way, people may expect to dislike the worse news of being a carrier more than they dislike the uncertainty of whether they are a carrier or not.

Related Phenomena

Disjunction effect. Tversky and Shafir (1992) found that when faced with uncertainty, people make different choices than when faced with any sure outcome. For example, when deciding on whether or not to go on a vacation after an exam, a student may choose not to go on that vacation when they don’t know whether they passed or failed that exam. However, if that person knew for sure that they passed the exam, they would choose to go on vacation to celebrate, and if that person knew for sure that they failed the exam, they would also choose to go on vacation but in this case, to cheer themselves up. Because the act of thinking through the consequences of the different outcomes is difficult, under uncertainty, people fail to recognize that they would go on the vacation no matter what the outcome. Similar to the disjunction effect, the uncertainty effect illustrates that people are willing to pay less for an uncertain prospect than any of the possible outcomes, which could suggest that people pay less for the uncertain prospect simply because people do not like to think through possibilities in the face of uncertainty. However, contrary to that explanation, we find that people are not entirely irrational, because they are sensitive to likelihoods of the different outcomes (Study 4), which illustrates that they do process information even under uncertainty. Moreover, even if people did not think through the possibilities of uncertain prospects, there is no reason to believe that people would be influenced by uncertainty in opposing ways for WTP and expected enjoyment, which gives us reason to believe that the disjunction effect does not account for our results.

Preference reversals. People have been found to exhibit inconsistent preferences with regards to risky prospects (called “preference reversals”; e.g., Lichtenstein & Slovic 1971). The
classic example demonstrated that when evaluating two different gambles: (1) a gamble with a high probability of winning a small outcome (*high-probability gamble*), and (2) a gamble with a low probability of winning a large outcome (*large-outcome gamble*), participants report that they would choose to play the high-probability gamble over the large-outcome gamble, but for the same set of gambles, the same participants report being willing to pay more for the large-outcome gamble than for the high-probability gamble. This occurs because when people make choices, probabilities of winning and losing are weighted more heavily, whereas when people make pricing estimates, outcomes are weighted more heavily. Consequently, pairs of gambles exist in which people will choose one gamble but will assign a higher price for the other gamble. Similarly, Vosgerau and Peer (2015) have also demonstrated that people are both willing to pay for and demand compensation for the *same* gambles further indicating that responses to risk can appear paradoxical. Though our effects compare certain to uncertain prospects (as opposed to comparing different gambles or comparing responses to the same gambles) and are between-subjects (i.e., participants do not evaluate both the certain and uncertain prospects), our findings provide additional evidence that preferences are constructed by demonstrating another circumstance in which preferences diverge.

*Cognition versus affect.* Although we provided evidence that WTP may be driven by the salient reference price of perceived selling price (Study 7), there are other differences between WTP and expected enjoyment that could also account for the discrepancies in the value of uncertain prospects. One such difference is that WTP is a more cognitive measure, whereas expected enjoyment is a more affective measure. This distinction is similar to ones made in the past literature, such as: affect-poor versus affect-rich and monetary versus nonmonetary. Research has found that people are more rational with regards to affect-poor gambles than affect-rich measures
(i.e., they are more sensitive to probability information with affect-poor gambles; Rottenstreich & Hsee 2001). Similarly, monetary gambles are more sensitive to probability information than nonmonetary gambles (McGraw et al. 2010). Hsee and Rottenstreich (2004) suggest that these types of findings occur because people arrive at their valuation of a prospect by different processes: valuation by calculation or valuation by feeling. Though our studies focused on different types of elicitation methods rather than on different types of outcomes, one could predict that our findings match up with these distinctions. However, the findings we report here do not align with these distinctions. We found that people were irrational with WTP but rational with expected enjoyment, and if anything, enjoyment displayed a clearer pattern of sensitivity to probability information than WTP.

Possible Future Directions

Our findings illustrate a remarkable deviation from the assumption that WTP assesses attitudes, such as anticipated enjoyment. As our work is the first to document this effect, there are several exciting opportunities for future research. For example, we focused on the discrepancy between WTP and expected enjoyment. However, marketing researchers are not restricted to these two measures. Indeed, one of the most common measures asks people to report purchase likelihood. On the one hand, such a measure has psychometric properties similar to a rating measure (i.e., asking people to report their likelihood on a scale). On the other hand, it necessarily implies something about the active market – that is, it indicates whether people will opt into a prospect. It is therefore unclear how uncertainty would operate under this measure. Future research could investigate whether purchase likelihood and other measures of interest show the same pattern as rating measures or payment measures under uncertainty.
We also found that people expect companies to sell uncertain products at a much lower price than the worst possible outcome (Study 7). Again, if uncertain products are thought to be sold at a lower price than the worst outcome, this would provide a rational explanation for why the uncertainty effect occurs. This offers a couple of opportunities for future research: (a) future research should explore whether the reference price of perceived selling price can be altered, and (b) in order for people to more positively value uncertainty, future research could explore whether framing uncertain prospects in terms of experiences (e.g., expected enjoyment) instead of expenditures (e.g., WTP) could allow people to value uncertainty. Indeed, a recent paper (Shen, Fishbach, and Hsee 2015) has shown that in the domain of motivation, uncertain rewards are more motivating when focusing on pursuing the reward (process) rather than focusing on the outcome (the reward itself).

Though we tested several interpretations of our effects, the effects presented here are unlikely to be determined by one explanation alone. Although we provide evidence that perceived selling price accounts for the uncertainty effect, it is unclear whether compensation demanded (Study 5) can be explained by the same account. It is possible that people have a rational reference point for compensation demanded for uncertain negative tasks as well. However, uncertain negative tasks, such as the one we described in Study 5, are uncommon in the real world, and thus, it is less obvious what that reference point would be. For an uncertain negative task without a clear monetary value to demonstrate an effect parallel to the uncertainty effect with WTP in the positive domain is a curious finding that future research should investigate further.

Conclusion

The present research provides a major insight into preferences under uncertainty that violates assumptions of a prospect’s value. Researchers have worked under the assumption that
WTP and expected enjoyment are interchangeable measures of value (e.g., Kahneman et al. 1999). However, our studies document cases that deviate from this assumption. Complementing the research on preference reversals for gambles (e.g., Lichtenstein and Slovic 1971), we find that people expect to enjoy uncertain prospects but are less willing to pay for them. We offered evidence that this discrepancy occurs because people perceive uncertain prospects as being sold at lower prices. This account recommends that though pricing measures may be invaluable in predicting purchase behavior, rating measures may be more informative for revealing preferences.
REFERENCES


FOOTNOTES
1 Although unusual, this is one way to book flights on Germanwings, a German-based airline. It was also the original business model for a couple of start-ups, such as getgoing.com.
2 Only the pre-survey is relevant for this paper and therefore, the other parts of the three-part study will not be discussed further.
3 In Study 1, we also asked participants two questions after each movie trailer (and prior to the manipulation): (1) how much they enjoyed the trailer, and (2) how much they wanted to see the movie.
4 Although Frozen was ultimately much more successful than Free Birds, prior to the movies premiering, participants were essentially indifferent to the two movies (about half ranked each of the movies as being the one they wanted to watch more).
5 There were significant interactions between certainty condition and order of measures. These interactions were not hypothesized, did not alter the pattern of results that we report, and were not significant in Study 3. Therefore, we do not discuss it further.
6 Although we believe this study adequately addresses this potential confound, we also address this issue in two additional studies in the Supplementary Materials.
7 Study 7 was a replication of a study we conducted. The preliminary study was inconclusive as to whether there was an interaction between Certainty and Perceived Worth. Therefore, we increased our sample size when running Study 7.
8 There was no interaction with order of measures for either WTP or Perceived Selling Price.
Figure 1. Expected enjoyment of a certain or an uncertain movie in Study 1.
Figure 2A. Mean willingness-to-pay for and expected enjoyment of a certain or an uncertain movie in Study 2.
Figure 2B. The relationship between expected enjoyment and willingness-to-pay is attenuated in the Uncertain condition in Study 2.
Figure 3. Mean willingness-to-pay for and expected enjoyment of a certain or an uncertain lottery, outcome, or lottery and outcome in Study 4.
Figure 4. Mean willingness-to-pay for and expected enjoyment of a certain or an uncertain movie in Study 4.
Figure 5. Mean compensation demanded for and expected dislike of a certain or an uncertain task in Study 5.
Figure 6. Mean expected enjoyment for a certain or an uncertain movie when payment information is included (Stakes) or excluded (Original) in Study 6.
Figure 7. Mean willingness-to-pay and perceived selling price of certain and uncertain prospects in Study 7.