

The Threshold-Crossing Effect: Just-Below Pricing Discourages Consumers to Upgrade

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Managers often set prices just-below a round number (e.g., \$39)—a strategy that lowers price perceptions and increases sales. The authors question this conventional wisdom in a common consumer context: upgrade decisions (e.g., whether to upgrade a rental car or hotel room). Seven studies—including one field study—provide empirical evidence for a threshold-crossing effect. When a base product is priced at or just-above a threshold, consumers are more likely to upgrade and spend more money (studies 1–3) because they perceive the upgrade option as less expensive (study 4), and they place less weight on price (study 5). Testing theoretically motivated and managerially relevant boundary conditions, studies find that the threshold-crossing effect is mitigated under sequential choice (study 6) and when an upgrade price crosses an upper threshold (study 7). These studies demonstrate that a small increase in price on a base product can decrease price perceptions of an upgrade option and, thus, increase consumers' likelihood to upgrade. Results suggest that just-below pricing, while sometimes advantageous at first, may not always be an optimal strategy for managers trying to encourage consumers to ultimately choose an upgrade option.

Keywords: pricing, upgrades, left-digit effect, decision making

A pair of jeans for \$79.95, a latte for \$2.95, a house for \$399,900. There is not much in common across these products, except for their pricing tactics—just-below pricing. Under this popular pricing strategy, managers set a price just-below a round number, which lowers price perceptions (Manning and Sprott 2009; Snir, Levy, and Chen 2017;

Thomas and Morwitz 2005) and increases sales (Anderson and Simester 2003; Ginzberg 1936; Macé 2012; Schindler and Kibarian 1996; Stiving and Winer 1997). In economic terms, consumers exhibit a strong discontinuity in demand at each dollar crossing. Researchers have estimated that a \$1 increase from a just-below to a round-ending auto loan is equivalent to a \$2.05 increase (Jiang 2021), and a 1-cent increase from a just-below price to a round-ending price in the grocery store is equivalent to a 15–25 cent increase (Strulov-Shlain 2021). Thus, there is a compelling reason for managers to use just-below pricing, particularly when competing on price.

To date, there have only been a handful of documented exceptions where just-below pricing resulted in undesirable outcomes. The first is when just-below prices can signal lower-quality (Dodds, Monroe, and Grewal 1991; Lichtenstein, Ridgway, and Netemeyer 1993; Zeithaml 1988), making it less appropriate for luxury items. The second is in non-western-cultures, where consumers tend to distrust companies using just-below pricing (Nguyen, Heeler, and Taran 2007), suggesting caution in the universality of its effectiveness. Third, when

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used in conjunction with a pay-what-you-want strategy, consumers tend to prefer round (vs. just below) prices, likely due to increased convenience (Lynn, Flynn, and Helion 2013).

We suggest another instance where marketers may *not* want to use a just-below pricing strategy, namely when consumers have an option to upgrade before finalizing a purchase. Consumers are often presented with the option to upgrade a base product to a more feature-rich option. Such upgrade options are common in the marketplace and constitute a significant tool to increase margins and profits (Griffin and Herres 2002; Mohammed 2018). For example, Southwest Airlines made an additional \$73 million in revenue in one year from passengers' upgrading to Business Select. Similar strategies are common in hotels, rental cars, memberships, and the automobile industry, where consumers frequently upgrade from the base model to higher-end trims. Adopting the industry term, we use *upgrades*¹ to refer to vertically superior products (or services) that are similar to their base options but with additional features and higher prices. Thus, *upgrade decisions* are decisions between a base product and an upgrade option(s).

In this research, we propose and provide evidence that a just-below pricing strategy may be suboptimal when consumers are making upgrade decisions because it can discourage upgrades and decrease overall consumer spending compared to when a base product is priced just-above (or at) a round number. We argue that this threshold-crossing effect is due to the psychological barrier set by thresholds—in this case, the round numbers. In one field and six lab experiments—across six product categories, eight different price points, and with both hypothetical and incentive-compatible designs (see table 1 for a summary)—we find support for this prediction, above and beyond other alternative explanations. The results demonstrate that when the base product is priced just-below (vs. at or just-above) a round number, consumers perceive the price of the upgrade option as more expensive and are less likely to pay for upgraded options because of the upgrade price crosses a threshold. Furthermore, the results suggest that increasing the price of a base product to be at or just-above a threshold can decrease consumers' price perceptions of an upgrade option (even when the upgrade option is objectively more expensive) and lead to more consumer upgrades and increase consumer spending.

These findings contribute to both the behavioral pricing and upgrade-decision literatures. First, we contribute to the behavioral pricing literature (Coulter and Coulter 2007; Manning and Sprott 2009; Thomas and Morwitz 2005) by demonstrating a condition under which just-below pricing can backfire. In doing so, we also inform pricing theory by

providing evidence for a new threshold-based psychological account for just-below pricing, which is related to, yet distinct from, existing ones. Second, we contribute to the literature on upgrade decisions and multifunctional product choices (Bellezza, Ackerman, and Gino 2017; Goodman and Irmak 2013; Miller, Wiles, and Park 2019; Sela and LeBoeuf 2017; Thompson, Hamilton, and Rust 2005; Wang and John 2019) by examining the role of price in these decisions and showing how a small *increase* in the base price can increase the likelihood to choose an upgrade option. From a strategic standpoint, our findings demonstrate how a just-below pricing strategy may actually be suboptimal in upgrade decision contexts, and that just-above (or at) threshold pricing for a base product can decrease price perceptions of a more feature-rich and profitable upgrade option, which may ultimately increase the likelihood that consumers choose to upgrade.

CONCEPTUAL BACKGROUND

Pricing is one of the most important tools in a marketing manager's toolbox (Kotler and Armstrong 2010), and at least 80% of consumer choices are influenced by price (Forbes 2017, June 14). While there are instances where perceiving an item to be more expensive can have positive consequences for a brand, such as when the price is used as a quality cue (Dodds et al. 1991; Lichtenstein et al. 1993; Zeithaml 1988), in most instances, higher prices negatively affect purchase probability (Lichtenstein et al. 1993). Thus, in most cases, the goal for marketing managers is to decrease price perceptions of the target product.

Price Perceptions: Just-below Pricing

Just-below pricing—setting prices just-below a round number (Stiving and Winer 1997)—is one factor that can influence consumers' price perceptions, in addition to many others (e.g., past prices, framing, breadth and depth of discounts, irrelevant anchors, the decision context; Alba et al. 1994, 1999; Allard, Hardisty, and Griffin 2019; Lichtenstein et al. 1993; Thaler 1985). Its broad application in the industry is supported by empirical examinations that have consistently demonstrated its effectiveness in a large range of product categories ranging from small-ticket grocery items like tuna and yogurt (Stiving and Winer 1997) to apparel (Anderson and Simester 2003), and even to services like auto financing (Jiang 2021). Most recently, an examination of 1,710 grocery products (Strulov-Shlain 2021) found a spike in demand for prices that hit just-below a threshold, in line with consumers perceiving such prices significantly lower.

Behavioral research suggests two independent psychological processes to explain the effect: lay associations and the left-digit effect. According to the lay association theory, consumers have learned over time that just-below

¹ Marketing and consumer behavior literature at times uses upgrades to refer to replacement decisions (e.g., when to replace a mobile phone and "upgrade" to a new phone). We are not referring to these types of decisions.

prices, especially 99-ending ones (e.g., 99¢ or \$19.99), are associated with sales promotions. Thus, when a product is priced just below a round number, it activates an association with low prices, decreasing price perceptions (Schindler 2006). On the flip side, just-below pricing can also activate an inference of low quality because low prices are associated with low quality. Thus, marketers aiming to signal high quality often use whole number pricing (e.g., \$1 or \$20; Stiving 2000).

The other psychological process is the left-digit effect, which is more perceptual in nature. According to this account, consumers perceive just-below prices to be significantly lower because price information is processed from left to right. Consumers put more weight on the first (left-most) digit, to the point of mentally “dropping off” the right digits, effectively rounding the prices down (Bizer and Schindler 2005; Thomas and Morwitz 2005). Put differently, consumers evaluate \$2.99 significantly lower than \$3.00 because they visually encode the left-most digit (i.e., 2) first and weigh it more than the remaining digits (Thomas and Morwitz 2005). Supporting this perceptual account, inducing conceptual processing (i.e., memory-based evaluations) instead of perceptual processing (i.e., a stimulus-based evaluation) decreases the left-digit effect (Sokolova, Seenivasan, and Thomas 2020).

In examining the effectiveness and psychological processes behind just-below pricing, the aforementioned behavioral research has predominantly examined whether pricing an option below a round number lowered price perceptions of a target product (e.g., \$2.99 vs. \$3.00; Manning and Sprott 2009; Thomas and Morwitz 2005). However, just-below pricing may also have an effect on non-target (and higher-priced) upgrade options (e.g., an upgrade option priced at \$3.45). Importantly, when making an upgrade decision, consumers need to evaluate both the base product and the upgrade option (the higher-priced alternative), the latter of which is the focus of our investigation.

Upgrade Decisions

In many consumer purchase situations, consumers decide on a product (e.g., Toyota RAV4) and are then faced with a decision between a base product (e.g., Toyota RAV4 LE) and a more feature-rich upgrade option (e.g., Toyota RAV4 XLE, or add-ons, such as extended warranties, or paint protectant). We term this choice the *upgrade decision*—a consumer decision between a base product (or service) option and a higher-priced upgrade option(s) that is vertically superior in terms of quality, quantity, or additional features. Marketers provide upgrade options because they often result in higher margins and help retain customers (Griffin and Herres 2002; Mohammed 2018).

For upgrade decisions, the pricing structure is an important driver of choice and related research suggests that marketers may *not* want to raise the base price. Consumers

tend to weigh the base price more than the cost of each additional feature, which explains the use of drip pricing. In one recent study, participants preferred a lower-priced hotel room that offered several additional features (each with additional cost) to a higher-priced room that included the same features at no additional cost (Santana, Dallas, and Morwitz 2020). Similarly, a different study finds that consumers place a higher weight on an initial lower fixed base price of a printer at the expense of a higher price for additional cartridges (Miao 2010). Extrapolating these findings to our setting would suggest that retailers should focus on making the base price feel as low as possible—for instance, by using just-below pricing.

Other research on price focalism has found that how an upgrade price is framed (e.g., “\$20 more” or “\$60 total”; Allard et al. 2019) affects the upgrade decision. Consumers are more responsive to highlighting additional costs because they focus on the number highlighted in the context, which is smaller for the additional than the total cost. Extrapolating the price focalism hypothesis to upgrade pricing decisions suggests that just-below pricing would be of no real consequence if retailers list prices of both base product and upgraded options (and not make the price differential salient). However, counter to both suggestions, we propose that consumers are more likely to upgrade when the base product is priced at or above a round price because of psychological thresholds.

Psychological Thresholds

A threshold is a point of discontinuity in sensory experience (Laming 1986), and it helps consumers discriminate between what falls above and below it. When a stimulus crosses a threshold into a new category, consumers perceive the size of a change to be greater and more meaningful, even if the objective change is the same or smaller (Mishra and Mishra 2010). For example, people perceive cities that are outside their state (but objectively closer) as being further away than cities that are within the same state (Irmak, Naylor, and Bearden 2011), temperature changes between two consecutive days seem larger when they fall in different months instead of the same month (Krueger and Clement 1994), and the length difference between two lines appears greater when the lines are given different labels (Tajfel and Wilkes 1963).

While any salient category boundary can serve as a psychological threshold (Dehaene and Mehler 1992), consumers are particularly likely to see a threshold around the boundaries of natural categories. Relevant to our context, in natural language round decile numbers and numbers that are powers of ten are utilized most frequently (hundred, thousand, million; Jansen and Pollmann 2001), making round numbers, and particularly deciles (e.g., 10, 20, 30, etc.; Rosch 1975), salient psychological thresholds. Supporting this, people search for meaning in life when

reaching the end of a decade (e.g., 39 approaching 40; Alter and Hershfield 2014), consumers are more likely to prefer a software upgrade when the new version crossed a round number threshold (e.g., version 3.0; Shoham, Moldovan, and Steinhart 2018), observers evaluate a firm ranked 11th significantly worse than a firm ranked 10th, but do not judge the 10th ranked firm to be worse than the 9th ranked (Isaac and Schindler 2014), and investors estimate a lower likelihood of a stock price crossing a round price (e.g., \$1000 vs. \$987 and \$1013; Rosenboim and Shavit 2009). All of these effects are due to numeric differences being perceived as greater when they cross a categorical threshold of a round number, even though the objective numerical increase is the same.

Though it is possible for different numerical or categorical boundaries to serve as psychological thresholds, in this research we test and propose the use of round numbers as psychological thresholds because of their relevance to pricing. We argue that since numerical boundaries provide a natural and salient threshold for price judgments, in the absence of other relevant thresholds, consumers will readily rely on round numbers. However, we should note that since consumers rely on the most diagnostic feature in a particular context as the basis of categorization (Tversky and Gati 1978), consumers may adopt other psychological thresholds if the decision context provides one that is more relevant (e.g., budget constraints).

Threshold-Crossing Effect

We propose that round-ending prices serve as psychological thresholds, crossing of which influence price perceptions of an upgrade option. When a base product uses just-below pricing, this necessitates the upgraded option to go above a round number, which serves as a threshold. That is, if the base product uses just-below pricing, then the base product and the upgraded option would be on different sides of a threshold, making the prices appear less similar. Importantly, when the upgrade option crosses the threshold, its price does not only feel less similar but also more expensive compared to the base product price. This, however, is not the case if the base product is priced at or just-above a round number because prices of both the base and upgrade option can fall on the same side of the threshold, making the price difference feel smaller. Further, when the two prices are on the same side of a threshold, the upgrade price also appears less expensive because it does not cross an additional threshold. Thus, we predict that when a base product option is priced just-above (vs. just-below) a round number, consumers will perceive an upgrade product option as less expensive.

We also predict that this decrease in price perceptions will carry over to (and mediate) consumer choice. Consumers rely heavily on price comparisons when deciding whether they should upgrade or not (Helson 1964;

Monroe 1973). To the extent that passing the threshold will lead consumers to perceive an upgrade option as more expensive, using just-below pricing for the base product will discourage upgrade choice relative to just-above pricing.

To provide evidence for our psychological threshold account and establish important managerial boundary conditions, we test two theoretically motivated moderators that mitigate the threshold-crossing effect: memory-based evaluations (i.e., sequential comparison) and the presence of an upper threshold.

Memory-Based Evaluations. Our theory suggests that the threshold-crossing effect is driven by consumers' ability to perceive the upgrade price crossing or not crossing a threshold. Since this is a perceptual process, we would expect the effect to be mitigated when the consumer cannot make a direct comparison and thus need to rely on their memory. One factor that encourages memory-based evaluations (and reduces perceptual processing) is the sequential presentation of options (vs. side-by-side comparison; Sokolova et al. 2020). Sequential processing also makes it harder to compare alignable attributes (such as price, Markman and Loewenstein 2010), reducing the saliency of crossing a threshold. Thus, we predict the threshold-crossing effect to be mitigated when the base product and the upgrade options are presented sequentially (vs. side-by-side).

Upper Threshold. It is possible to imagine instances where upgrade prices are high enough to exceed an additional threshold (e.g., the base price of \$19 and upgrade price of \$31 that crosses the threshold of both \$20 and \$30). Under these circumstances, a just-above base price of \$21 that would normally encourage an upgrade, should no longer be effective because it is still separated from the base product with a threshold (\$30), discouraging upgrades. Put differently, we expect just-above pricing to lead to increasing upgrade likelihood, as long as the prices of the base and upgrade options are separated by one threshold. Note that, here, our predictions diverge from an account based on left-digit anchoring. In particular, while left-digit anchoring would predict a greater magnitude difference between \$19.99 and \$30.50 than between \$19.99 and \$27.50, the threshold-crossing effect predicts no such difference. This is because the differences in the left-most digit number is a critical determinant of price perceptions for the left-digit effect (Thomas and Morwitz 2005), but not for the threshold-crossing which is predicated on the separation of two prices by a categorical threshold, regardless of the quantity.

OVERVIEW OF STUDIES

We test our predictions in one field and six laboratory experiments. In study 1, students on a college campus were more likely to purchase a larger size coffee when the base

coffee option was priced at (vs. just-below) a threshold of \$1, ultimately resulting in higher sales. Study 2 replicated these initial findings in a controlled incentive-compatible experiment and using a different product category (face masks). Study 3 replicates the threshold-crossing effect using a choice context with multiple upgrade options. Having established the effect, we then test price perception as the mediating process and find that the threshold-crossing effect is mediated by a decrease in price perceptions of the upgrade option (study 4) and that this decrease in price perceptions leads consumers to put less weight on price (i.e., smaller part-worths in a choice-based conjoint; study 5). Finally, the last two studies test the perceptual nature of the threshold-crossing effect and establish important boundary conditions. Study 6 shows the moderating role of sequential decision making, while study 7 directly tests the role of thresholds by manipulating whether the upgrade price crosses an upper threshold. Taken together, these studies provide converging support for our framework and predictions, using multiple product categories and price points (see [table 1](#) for a summary). We report all conditions, measures, data exclusions, and sample size determinations. All materials are available via OSF (<https://osf.io/xp5n9/>)

STUDY 1: FIELD EXPERIMENT

In study 1, we test the threshold-crossing effect in a field experiment. Participants engaged in real purchase behavior without knowing that they were participating in a research study and that an experimental manipulation has occurred, defining characteristics of a field experiment ([Charness, Gneezy, and Kuhn 2013](#); [Morales, Amir, and Lee 2017](#)). We set up a coffee stand on a university campus and sold two sizes of coffee, manipulating whether a small coffee was priced just-below (\$.95) or at (\$1.00) the threshold and counting how many students purchased a small or upgraded to a large coffee. Though the \$.95/\$1.00 price point might seem low for coffee, we chose this price because multiple convenience stores around campus advertise coffee at this price point. Of importance, our setup naturally introduced a no-choice option, as choosing not to buy a coffee was an explicit option.

Method

During the last week of an academic semester, we set up a coffee stand outside the business school complex for two days, each day from 10 a.m. to 4 p.m.; thus, the sample size was set exogenously based on how many people passed the coffee stand during these 12 hours. Passersby were offered a free cookie from the “Marketing Ph.D. Student Association” to “celebrate the last week of classes.” Most people took a free cookie, which allowed us to unobtrusively track how many people engaged with the experimenter ($N = 378$). Purchase was not required for a free cookie or vice versa. Of those who took a free cookie,

19.58% bought a cup of coffee. Thus, a vast majority of participants chose not to buy at all, suggesting reciprocity was not a concern. We offered two sizes of coffee (with creamers, stirrers, and lids provided free of charge). The dependent variable was participants’ coffee choice: a small coffee, a large coffee, or no purchase. All proceeds were donated to charity.

Our independent variable was the price of coffee. In the just-below pricing condition, the base coffee was \$.95 and the larger upgrade option was \$1.20. In the at-threshold pricing condition, the prices were \$1.00 and \$1.25 for the small and large coffee, respectively. This pricing allowed us to keep the upgrade cost constant (i.e., \$.25). We chose the at-threshold price of \$1 for a conservative test of our hypothesis. Paying an even \$1 requires no change, which, if anything, encourages consumers *not* to upgrade in the at-threshold condition. This runs counter to our hypothesis, which predicts a higher rate of upgrade in the at-threshold condition. Nonetheless, to decrease transaction costs, we accepted credit/debit card payments. We changed prices around 11 a.m., 12 p.m., and 2 p.m. when no potential participants were around the coffee display, starting with the just-below pricing on the first day, and starting with the at-threshold pricing on the second day.

Results

Descriptive Statistics. During the two-day period, 378 students approached the table to grab one of the free cookies, and we sold 74 cups of coffee. No one bought more than one cup of coffee, resulting in a 19.58% purchase rate. We sold more coffee on the second day (26.90%), compared to the first day (13.53%, $\chi^2(1) = 10.64, p = .001$); however, the day effect did not interact with our manipulation ($b = .30, SE = .54, p = .580$). There were no differences in the overall proportion of consumers who bought coffee between conditions (at-threshold pricing: 20.93% vs. just-below pricing: 18.45%; $\chi^2(1) = .37, p = .545$), suggesting that higher prices in the at-threshold condition did not discourage purchase.

Test of Threshold-Crossing Effect. As predicted, participants were more likely to upgrade to the large coffee when the base price was set at-threshold (55.56%) compared to when the base price was set just-below a threshold (28.95%, $\chi(1)^2 = 5.38, p = .020$). In other words, we sold more of the large coffee when it was objectively more expensive (\$1.25 vs. \$1.20). Our experimental setup also allowed us to calculate and compare revenue under the two pricing structures. We found that the just-above pricing condition led to higher revenue per unit ($M_{\text{at-threshold}} = \$1.14, SD = \$.13$), and thus greater overall sales (\$41.00 vs. \$38.85), than the just-below condition ($M_{\text{just-below}} = \$1.02, SD = \$.11, \$38.85, F(1,72) = 17.31, p < .001, \eta_p^2 = .194$; see [figure 1](#)).

TABLE 1
STUDY OVERVIEW: PRODUCT CATEGORIES, PRICES, AND EFFECTS

Study	Product category	Dependent measure (mediator)	Moderator	Just-below			Just-above		
				Base price	Upgrade price(s)	Mean (SD)	Base price	Upgrade price(s)	Mean (SD)
Study 1	Coffee	Choice of upgrade		\$0.95	\$1.20	28.95% (11/38)	\$1.00	\$1.25	55.56% ^{^^} (20/36)
Study 2 ^{PR}	Face masks	Average sale				\$1.02 (.11)			\$1.14 (.13) ^{^^^}
		Choice of upgrade		\$9.95	\$15.25	60.14% (89/148)	\$10.45	\$15.75	70.86% [^] (107/151)
Study 3	Cars	Average spent				\$13.14 (2.60)			\$14.21 (2.42) ^{^^^}
		Choice of upgrade		\$19,500	\$22,800	76.9% (120/156)	\$20,250	\$23,550	85.4% [^] (134/157)
					\$26,100			\$26,850	
					\$28,600			\$29,350	
	Apartments	Choice of upgrade		\$980	\$1,060	85.3% (133/156)	\$1,020	\$1,100	93.0% ^{^^} (146/157)
					\$1,140			\$1,180	
					\$1,210			\$1,250	
Study 4	Blenders	Upgrade preference (Price perceptions)		\$39.99	\$47.50	4.94 (1.99)	\$40.00	\$48.50	5.39 (1.78) [^]
Study 5	Blenders	Part-worth				4.10 (1.58)			3.48 (1.33) ^{^^^}
		Upgrade preference	Side-by-side	\$39.99	\$47.50	2.37	\$40.50	\$48.50	2.12 ^{^^}
Study 6 ^{PR}	Blenders	Upgrade preference	Sequential	\$39.95	\$47.25	4.58 (2.06)	\$40.55	\$47.85	5.69 (1.73) ^{^^^}
Study 7	Streaming services	Upgrade preference	Below upper threshold	\$19.99	\$27.50	5.22 (1.70)	\$20.50	\$27.50	5.56 (1.63) ^{ns}
		Upgrade preference	Above upper threshold	\$19.99	\$30.50	4.21 (2.35)	\$20.50	\$30.50	5.12 (2.06) ^{^^^}
						3.90 (2.23)			

[^]Significantly different than just-below condition at $p < .09$.

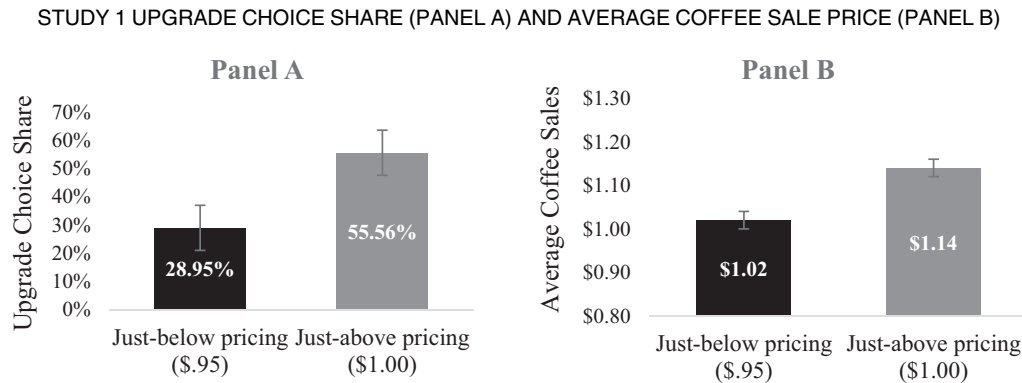
^{^^}Significantly different than just-below condition at $p < .05$.

^{^^^}Significantly different than just-below condition at $p < .01$.

^{ns}Theoretical moderator hypothesized not significant and not significant at $p > .27$.

^{PR}Pre-registered at aspredicted.org.

FIGURE 1



Discussion

Using a field experiment, where participants made a real purchase, spent their own money, and received a real product, study 1 shows that pricing a base product at a round number leads consumers to upgrade more and spend additional dollars. Thus, the first study provides initial evidence for the threshold-crossing effect. Our next study aims to replicate this core finding using a more controlled, yet incentive-compatible experiment, utilizing a new product category and a different price point.

STUDY 2: INCENTIVE COMPATIBLE CHOICE

Study 2 (pre-registration available at <https://aspredicted.org/bx9m5.pdf>) tests the threshold-crossing effect in an incentive-compatible lab experiment. Face masks were selected because they are highly relevant and affordable to the population of undergraduate students in early 2021.

Method

Participants. We recruited 299 undergraduates ($M_{\text{age}} = 20.51$, 49.50% female) from a large Midwestern university. Participants received extra credit in their introductory marketing class in exchange for participation. The sample size was set by the lab manager blind to the hypothesis and based on participant allocations.

Procedure. The study was a two-cell (base price: just-below vs. just-above) between-subjects design. Participants were presented with two packages of face masks: a package of two masks (base product) and a package of four masks (upgrade option). In the just-below condition, the options were priced at \$9.95 and \$15.25. In the just-above condition, the options were priced at \$10.45 and \$15.75. Participants made a choice between the two options and

were informed that we will randomly select five participants to execute their purchase for real at a discounted price; therefore, participants' choices were incentive compatible (adapted from Atlas and Bartels 2018).²

Results and Discussion

Consistent with study 1, participants chose an upgrade option more frequently when the base price was just-above (70.86%) than just-below the threshold (60.14%; $\chi^2(1) = 3.81$, $p = .05$). In terms of amount spent, participants preferred to spend more on average in the just-above condition ($M_{\text{just-above}} = \14.21 , $SD = 2.42$) than in the just-below condition ($M_{\text{just-below}} = \13.14 , $SD = 2.60$, $F(1, 297) = 13.53$, $p < .001$, $\eta_p^2 = .044$).³

Using an incentive-compatible design, study 2 provides further evidence that a just-below pricing structure was the less advantageous strategy and that when the base price was set just-above (vs. just-below) a threshold, consumers were more likely to spend additional dollars to upgrade—supporting our predictions.

STUDY 3: MULTIPLE UPGRADES AND TESTING ALTERNATIVE ACCOUNTS

Studies so far have used a single upgrade option. To increase the generalizability of the threshold-crossing effect,

2 None of the five students replied back—likely because (1) most classes were online and (2) the email came from one of the authors and not the lab manager (who quit during the studies), who usually corresponds with the students.

3 Unexpectedly, we noticed that we had 25 duplicate IP addresses. Though it was not pre-registered, we examined whether excluding these participants had a negative effect, and we found similar results: participants chose an upgrade option more in the just-above (71.23%) than just-below condition (59.38%, $\chi^2(1) = 4.26$, $p = .039$), and they spent more on average in the just-above ($M_{\text{just-above}} = \14.23) than just-below condition ($M_{\text{just-below}} = \13.10 , $SD = F(1, 272) = 13.83$, $p < .001$, $\eta_p^2 = .048$).

study 3 tests it when consumers have multiple upgrade options in two new categories—car trims and apartments. This is an important robustness check, as one could argue that with the more complex stimuli and more choices, price becomes less salient, which might mitigate the effect. For exploratory purposes, we also measured a variety of variables pertaining to the perceptions of the presented options. None of these variables proved consequential for the threshold-crossing effect and thus are not discussed further here (see web [appendix A](#) for a detailed discussion of these measures).

Method

Participants. We recruited 313 undergraduates ($M_{\text{age}} = 20.61$, 51.1% female) from a large Midwestern university. Participants received extra credit in their introductory marketing class in exchange for participation. The sample size was set by the lab manager blind to the hypothesis and based on participant allocations.

Procedure. The study followed a 2 (base price: just-below vs. just-above, between) \times 2 (replicates: cars and apartments, within) mixed design. Participants were presented with two purchasing scenarios, each with one base product and three upgrade options.

In the just-below pricing condition, the base car price was \$19,500; in the just-above pricing condition, the base car price was \$20,250. Each car upgrade option had an additional marginal cost of \$3,300, \$3,300, and \$2,500. In the apartment replicate, the base prices were \$980 for the just-below condition and \$1,020 for the just-above condition. Each apartment upgrade option had an additional marginal cost of \$80, \$80, and \$70 (see web [appendix B](#) for prices and features in each condition and for each replicate). For each replicate, participants were asked to select an option they would be most likely to choose. The order of replicates was randomized and did not influence the results.

Results

Choice. We coded the choice data as a binary variable (0 = base product is chosen, 1 = any of upgrade option is chosen) and conducted a multi-level logistic regression, allowing each participant and each replicates to have a random intercept, which permits unbiased estimations of the fixed effect of base price while treating both participants and replicates as random factors (Judd, Westfall, and Kenny 2017). The analysis showed a significant fixed effect of the base price on upgrade choice: Participants were more likely to choose an upgrade in the just-above (89.2%) than just-below price condition (81.1%, $b = .33$, $SE = .13$, $t = 2.62$, $p = .009$). Examining each replicate separately resulted in the same conclusion: Participants in the just-above condition were more likely to upgrade the car (85.4% vs. 76.9%, $\chi^2(1) = 3.63$, $p = .057$) and apartment

(93.0% vs. 85.3%, $\chi^2(1) = 4.84$, $p = .028$) than in the just-below condition.

Spending. We next examined dollars spent in each condition, which varied considerably because participants had multiple upgrade options. Because two replicates have different price ranges, we standardized additional spending beyond the base price for each replicate with a mean of zero and a standard deviation of 1. The analyses produced a significant main effect for base price. Participants spent significantly more money in the just-above condition compared to the just-below condition ($b = .12$, $SE = .04$, $t = 2.86$, $p = .005$). Examining replicates separately, we found that when shopping for cars, participants spent more money in the just-above ($M_{\text{just-above}} = \$5,720$, $SD = 2,686$) than just-below condition ($M_{\text{just-below}} = \$4,968$, $SD = 3,002$, $F(1, 311) = 5.46$, $p = .020$). The same pattern held for apartments ($M_{\text{just-above}} = \154 , $SD = 61$; $M_{\text{just-below}} = \138 , $SD = 69$; $F(1, 311) = 4.27$, $p = .040$).

Discussion

The results of study 3 demonstrate that when a base product was priced just-above a threshold, consumers were more likely to choose an upgrade option than when it was set just-below, providing further support for the threshold-crossing effect. Importantly, the average additional spending on upgrades was also significantly higher. Thus, the results suggest that it is more profitable for firms to set the base product price just-above a threshold as this increases consumers' upgrade choice and, thus, consumer spending.

Thus far, the studies show the effect of just-above pricing on upgrade decisions, while using different product categories—coffee, face masks, cars, and apartments—with various price ranges. Our framework suggests that the threshold-crossing effect is due to consumers perceiving the upgrade option to be less pricey when the base product is priced just-above a threshold—a proposition we test next.

STUDY 4: PRICE PERCEPTION OF THE UPGRADE OPTION

The goal of study 4 was to examine whether just-above (vs. just-below) pricing of a base product decreases price perceptions of an upgrade option, which in turn increases its choice. To that end, we manipulated the price of the base option as either just-below or at a threshold and measured price perceptions of both the upgrade option and the base product. Based on our proposed process, we expect price perceptions of the *upgrade option* to be lower when the base price is at the threshold, despite an objectively higher upgrade price. We also expect the *difference* between the upgrade and base options to be smaller when the base price is at the threshold. Finally, we expect price

perceptions of the upgrade option to mediate the effect of the base price on upgrade preferences.

This study also tested the possibility that it is the price perceptions of the base-product, and not the upgrade option as we propose, that drives the threshold-crossing effect. In particular, since the base price in the at (vs. just-below) threshold condition passes a psychological threshold, it is possible for participants to perceive the *base product* to be more expensive, which could discourage its choice. While related, this explanation is different from our proposed mechanism, which suggests that just-above pricing decreases the price perceptions of an *upgrade option* due to both options falling on the same side of the threshold. We test this alternative account by simultaneously testing price perceptions of both options as competing mediators.

Method

Participants. We recruited 212 undergraduates ($M_{\text{age}} = 20.75$, 57.5% female) from a large Midwestern university. Participants received extra credit in their introductory marketing class in exchange for participation. The sample size was set by the lab manager blind to the hypothesis and based on participant allocations.

Procedure. The study was a 2 (base price: at vs. just-above) \times 2 (brand replicate: Magic Bullet vs. NutriBullet) between-subjects design. Participants were asked to imagine buying a blender to make smoothies and juices. They were presented with two blender options: a standard blender (the base product) and a deluxe blender (the upgrade option). For realism, in this study, we use actual blender brands (either Magic Bullet or NutriBullet, depending on condition) and we described each option using several attributes. The options were priced at \$39.99 and \$47.50 (a difference of \$7.51) in the just-below condition, and at \$40.00 and \$48.50 (a difference of \$8.50) in the at-threshold condition (see web [appendix C](#) for the stimuli used). Note that the larger price difference in the at threshold price condition provides a conservative test of our theory as larger price differences should discourage upgrades.

To measure price magnitude perceptions, we asked participants to indicate the degree to which they agreed or disagreed with two statements: “The standard blender is expensive” and “The deluxe blender is expensive” on a 7-point scale (Thomas and Morwitz 2005). We also asked participants to indicate which blender they would be most likely to choose on a 7-point scale [1 (*definitely standard blender*) to 7 (*definitely deluxe blender*)]. Finally, participants indicated whether they owned a blender.

Results

Upgrade Preference. Consistent with our previous studies, participants preferred the upgrade option more in

the at ($M_{\text{at threshold}} = 5.39$, $SD = 1.78$) compared to the just-below threshold condition ($M_{\text{just-below}} = 4.94$, $SD = 1.99$), though this difference was marginally significant ($F(1, 210) = 3.01$, $p = .084$, $\eta_p^2 = .014$). There was no main effect or interaction with brand name ($ps > .37$) or with blender ownership ($ps > .14$).

Price Perceptions. We first examined the price perceptions of the *upgrade option*. As predicted, we found that participants perceived the upgrade option to be less expensive in the at- ($M_{\text{at threshold}} = 3.48$, $SD = 1.33$) compared to just-below threshold condition ($M_{\text{just-below}} = 4.10$, $SD = 1.58$, $F(1, 210) = 9.47$, $p = .002$, $\eta_p^2 = .043$). There was no main effect or interaction with brand replicate ($ps > .23$) or with blender ownership ($ps > .14$). Thus, as we expected, just-above pricing decreased the price perception of the upgrade option.

Next, we tested the alternative explanation based on differences in price perceptions of the *base product*. Consistent with our predictions, and inconsistent with this alternative account, we did not find a significant difference in base product perceptions across conditions ($M_{\text{at threshold}} = 3.71$, $SD = 1.58$ vs. $M_{\text{just-below}} = 3.89$, $SD = 1.52$, $F(1, 210) = .68$, $p = .411$, $\eta_p^2 = .003$). There was no main effect or interaction with brand replicate ($ps > .12$). Blender ownership had a main effect, such that participants perceived the base product as less expensive when they owned a blender ($M_{\text{owned}} = 3.49$, $SD = 1.52$ vs. $M_{\text{not-owned}} = 4.13$, $SD = 1.52$, $F(1, 208) = 9.02$, $p = .003$), but it did not interact with price manipulation ($F = .51$). Thus, the data is inconsistent with the notion that the threshold-crossing effect is due to lower price perceptions of the base product.

Finally, we examined a difference in price perceptions by subtracting the price perceptions of the upgrade option from the price perceptions of the base option. Objectively, the just-above condition had a larger differential (\$8.50) than the just-below condition (\$7.51); however, consistent with our theory, we observed the opposite: participants perceived a smaller price difference in the at ($M_{\text{at threshold}} = -.23$, $SD = 1.38$) than just-below threshold condition ($M_{\text{just-below}} = .21$, $SD = 1.47$, $F(1, 210) = 5.12$, $p = .025$, $\eta_p^2 = .024$).

Mediation. Often, mediation can occur even when an independent variable has a marginal (or even no) effect on a dependent variable (Zhao, Lynch, and Chen 2010). Thus, we tested whether the base price manipulation led to greater preferences for the upgrade option through price perceptions of the upgrade option (Hayes 2017). As predicted, we found a significant indirect effect of the base price on upgrade preference through price perceptions of the upgrade option (95% CI = [.04, .23]). This indirect effect remained significant when including the price perception of the base product as a parallel mediator (95% CI = [.06, .31]), whose indirect effect was not significant (95% CI = [-.09, .04]). Furthermore, the contrast of these two

indirect effects was also significant (95% CI = [−.37, −.05]), indicating these two indirect effects are significantly different from each other. Taken together, these results suggest that the threshold-crossing effect is driven by the price perceptions of the upgrade option, and not the base product.

Discussion

Examining the psychological process behind the advantage to just-above pricing, study 4 finds that pricing a base product at a threshold led consumers to perceive the upgrade option as less expensive and its price more similar to the base product, which in turn increased the preference for an upgrade option. Importantly, this was the case even though the objective price difference was greater in the just-above condition than the just-below condition. These results further support our predictions by demonstrating that using just-above pricing for the base product can *decrease* price perceptions of the upgrade option, thus making it more preferable. In addition, this study demonstrated the mediating role of price perception of the upgrade option, even after controlling for price perceptions of the base product—providing further evidence that the threshold-crossing effect is driven by a decrease in price perceptions of the upgrade option and not by an increase in price perceptions of the base product.

Somewhat unexpectedly, we did not observe differences in the price perception of the base option across conditions and thus failed to replicate the left-digit effect, which would predict that \$39.99 would be perceived as less expensive than \$40.00. While our goal was not to replicate the left-digit effect, not observing it in this context might provide insights about its potential boundary conditions. In this study, however, we framed the choice as an upgrade decision within a single brand, which might have changed the focus of comparison from the base product to the upgrade option. Nonetheless, further research is needed to demonstrate if this empirical finding is an anomaly or a regularity.

An implication of these findings is that price can become a less important decision criterion when upgrading from a just-above price because the perceived price difference between the base and the upgrade options is smaller and thus less consequential. To test this possibility, we conducted a conjoint study that manipulated the base price (as in our previous studies) and tested whether participants weigh price less when using a just-above pricing strategy.

STUDY 5: CHOICE-BASED CONJOINT STUDY

The goal of study 5 was to further examine price perceptions as the process driving upgrade choice. If consumers perceive a smaller difference in prices when the base

product is priced just-above (vs. just-below) a threshold, then we should see a decrease in the weight consumers put on price in a conjoint study. To that end, we created two (between-subject) conjoint conditions—one with a base product priced just-below a threshold and one with a base product priced just-above a threshold. We expected that the part-worth for the price will be significantly smaller in the just-above condition compared to the just-below condition.

Method

Participants. We recruited 298 undergraduates ($M_{\text{age}} = 20.31$, 52.01% female) from a large Midwestern university. Participants received extra credit in their introductory marketing class in exchange for participation. The sample size was set by the lab manager blind to the hypothesis and based on participant allocations.

Procedure. The study was a one-factor (base price strategy: just-below vs. just-above) between-subjects design using a standard choice-based conjoint design. Participants chose between blenders. We used two levels for each attribute: speed control (2 vs. 5 levels), number of cups (2 vs. 4 cups), color (black vs. white), and price (base price vs. upgrade price). In the just-below condition, the options were priced at \$39.99 and \$47.50. In the just-above condition, the options were priced at \$40.50 and \$48.50. Note that both the total and marginal cost of the upgrade option is greater in the just-above condition (total cost: \$48.50 and marginal cost: \$8.00) than in the just-below condition (total cost: \$47.50 and marginal cost: \$7.51), which should lead to a larger part-worth in the just-above condition and thus providing a conservative test of our hypothesis.

The choice tasks were created using Sawtooth software, which resulted in eleven pairwise choices between a base and an upgraded blender (see web [appendix D](#) for all pairwise options in each condition). To rule out involvement as an alternative account, we also measured psychological involvement with a three-item measure (Goodman and Malkoc 2012). Finally, participants indicated whether they own a blender.

Results

We dummy coded each attribute, using two-speed levels, two cups capacity, black color, and the upgrade price as the baseline. We also created a dummy variable for the base price strategy manipulation, where the just-below condition was coded as the baseline. To analyze the conjoint choice data, we used a multi-level logistic regression that controlled for the random effects of each participant and each choice task (Judd et al. 2017). The model included a dummy variable for the base price strategy manipulation, in addition to dummy variables for each attribute

(speed, cups, color, price). To test our core predictions, we included an interaction term between base price strategy manipulation and the price attribute. Finally, the model included blender ownership and psychological involvement as covariates.

The analysis showed significant main effects for all three of the four attributes: speed level ($b = 2.80$, $SE = .14$, $t = 20.18$, $p < .001$, $OR = 16.47$), number of cups ($b = 2.16$, $SE = .16$, $t = 13.15$, $p < .001$, $OR = 8.66$), and price ($b = 2.37$, $SE = .14$, $t = 17.16$, $p < .001$, $OR = 10.70$). Color was not a significant predictor ($b = -.15$, $SE = .11$, $t = -1.45$, $p = .146$, $OR = .86$). Thus, as would be expected, participants were more likely to choose a product that had more speed controls, more capacity, and a lower price. Blender color did not matter. We also found no significant effects for blender ownership or psychological involvement ($bs = .00$, $ps > .99$).

As expected, we did find a significant interaction between base price manipulation and price attribute ($b = -.25$, $SE = .10$, $t = -2.35$, $p = .019$, $OR = .78$; see [table 2](#) for the summary of results), indicating that the part-worth for price was significantly lower in the just-above condition ($b = 2.12$; or .27 per \$1) than in the just-below condition ($b = 2.37$; or .32 per \$1). In terms of a change in utility, the weight of a \$1 increase was 19% higher (i.e., .32 relative to .27) in the just-below condition compared to the just-above condition (see [web appendix E](#) for calculations).

Discussion

Using a choice-based conjoint design, study 5 demonstrated that price became a less consequential attribute when the base product was priced just-above (vs. just-below) a threshold. We priced the options such that the upgrade option was objectively more expensive in the just-above (vs. just-below) condition, which should have led to larger part-worths from a rational standpoint. Yet we found the opposite—smaller part-worths. This finding is consistent with our theorization that when the base product was priced just-above (vs. just below) a threshold, the perceived price difference is smaller, which decreases consumers' sensitivity to price in the decision process.

Our theory proposes that price perceptions decrease between a base and upgrade option because they are not separated by the threshold of a round number, which makes them appear more similar. If so, then the threshold-crossing effect should be mitigated when the perception of a threshold crossing is not salient. We test this process in the remaining two studies by examining memory-based evaluations (study 6) and the presence of an upper threshold (study 7).

STUDY 6: MEMORY-BASED (SEQUENTIAL) DECISION MODERATION

Study 6 (pre-registration at <https://aspredicted.org/wp2du.pdf>) examined the perceptual threshold account by manipulating whether consumers are making a memory-based (i.e., sequentially) or a stimulus-based (i.e., side-by-side) decision. Our studies thus far used a side-by-side presentation whereby both the base and upgrade options were visible, allowing participants to examine options simultaneously. Since side-by-side presentations encourage comparisons of alignable attributes ([Markman and Loewenstein 2010](#)) and facilitate perceptual processing ([Sokolova et al. 2020](#)), we reasoned that it would also make the threshold crossing more salient in the just-above condition. Alternatively, when options are presented sequentially, participants rely on their memory for non-visible options, thus decreasing the saliency of thresholds. As such, we expected the threshold-crossing effect to be mitigated (even eliminated) when consumers must make a memory-based (i.e., the base product is not immediately viewable) compared to a stimulus-based (i.e., side-by-side) upgrade decision.

Method

Participants. We recruited 254 undergraduates ($M_{\text{age}} = 20.48$, 42.52% female) from a large Midwestern university. Participants received extra credit in their introductory marketing class in exchange for participation. The sample size was set by the lab manager blind to the hypothesis and based on participant allocations.

Procedure. The study was a 2 (base price: just-below vs. just-above) \times 2 (presentation: side-by-side vs. sequential) between-subjects design. Participants were asked to imagine buying a blender. They were presented with two blenders: a basic blender (base product) and a deluxe blender (upgrade option). In the just-below condition, the products were priced at \$39.95 and \$47.25, while the prices were \$40.55 and \$47.85 in the just-above condition. Half the participants saw the options presented side-by-side on the same screen, while the other half saw them sequentially on different screens (base product first, the upgrade option second). We measured upgrade preference by asking participants to indicate which blender they would be most likely to choose on a 7-point scale [1 (*definitely basic blender*) to 7 (*definitely deluxe blender*)]. All participants indicated upgrade preference on a separate screen, with no information present.

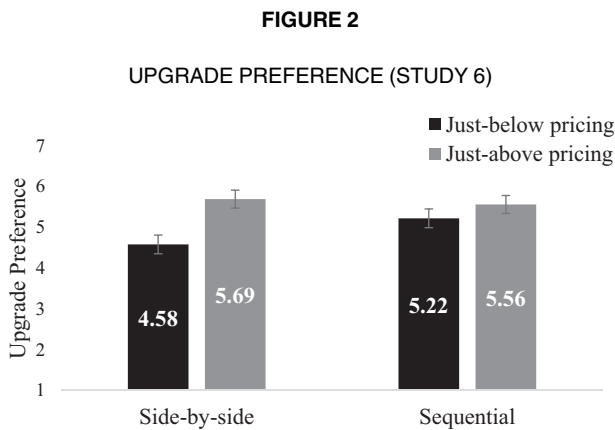
Results

Upgrade Preference. A 2 (base price: just-below vs. just-above) \times 2 (presentation: side-by-side vs. sequential) ANOVA revealed a significant main effect of base price,

TABLE 2
MEAN PART-WORTHS (STANDARD ERROR) OF CHOICE-BASED CONJOINT ANALYSIS (STUDY 5)

Attribute	Levels	Part-worth (SE)	<i>t</i>	<i>p</i>
Price	\$39.99 (or \$40.50) \$47.50 (or \$48.50)	2.37 (.14)	17.16	<.001
Speed control	5 levels 2 levels	2.80 (.14)	20.18	<.001
Number of cups	4 cups 2 cups	2.16 (.16)	13.15	<.001
Color	White Black	-.15 (.11)	-1.45	.146
Condition	Just-above pricing Just-below pricing	.12 (.07)	1.66	.097
Condition × price ^a	Just-above pricing × lower price	-.25 (.10)	-2.35	.019
Blender ownership	No Yes	.00 (.05)	.00	>.999
Engagement	Continuous	.00 (.02)	.00	>.999
Intercept		-3.27 (.41)	-7.91	<.001

^aKey hypothesized effect.



such that participants preferred an upgrade option more in the just-above ($M_{\text{just-above}} = 5.63$, $SD = 1.68$) than just-below condition ($M_{\text{just-below}} = 4.91$, $SD = 1.90$, $F(1, 250) = 10.55$, $p = .001$, $\eta_p^2 = .040$). We also found a marginal interaction between presentation style and base price manipulation ($F(1, 250) = 2.93$, $p = .088$, $\eta_p^2 = .012$; see [figure 2](#)) in the predicted direction. Specifically, in the side-by-side condition, participants preferred the upgrade option more when the base price was just-above ($M_{\text{just-above}} = 5.69$, $SD = 1.73$) than just-below ($M_{\text{just-below}} = 4.58$, $SD = 2.06$; $F(1, 250) = 12.19$, $p = .001$, $\eta_p^2 = .046$). However, in the sequential presentation condition, there was no reliable difference ($M_{\text{just-above}} = 5.56$, $SD = 1.63$ vs. $M_{\text{just-below}} = 5.22$, $SD = 1.70$, $F(1, 250) = 1.19$, $p = .276$, $\eta_p^2 = .005$).

Discussion

Study 6 provides further support for the threshold-crossing effect: participants preferred the upgrade option

more when the base product used just-above pricing than just-below pricing. However, this effect was mitigated in a memory-based decision (i.e., when the two options were presented sequentially on different screens) that made it harder to detect the threshold crossing, pointing out to the critical perceptual role of threshold saliency.

STUDY 7: ADDITIONAL UPPER THRESHOLD MODERATION

Studies 7 examines the role of thresholds by manipulating whether the upgrade option price is high enough to cross an additional threshold. We predicted that a just-above base price, which would normally encourage an upgrade, will no longer be effective when it is separated from the base price with another threshold. That is, we propose that just-above pricing is effective as long as the base and upgrade prices are not separated by a threshold. Study 7 also uses a new product category—streaming services—to increase generalizability.

Method

Participants. We recruited 400 MTurk workers, and 404 participated ($M_{\text{age}} = 36.76$, 46.29% female, US only, 97% approval or higher). Participants received monetary rewards in exchange for participation. As there are growing concerns regarding MTurk’s data quality in recent years, especially after 2018 ([Chmielewski and Kucker 2020](#)), we used CloudResearch to block suspicious participants from participating in the study and included an attention check item to exclude from the analysis those who failed the check.

Procedure. The study was a 2 (base price: just-below vs. just-above) × 2 (upgrade price: below upper threshold

vs. above upper threshold) between-subjects design. Participants were asked to imagine subscribing to a live streaming service. They were presented with two streaming options: a basic package (the base product) and a premium package (the upgrade option). The below upper threshold condition was similar to the previous studies: the products were priced either \$19.99 and \$27.50 (just-below) or \$20.50 and \$27.50 (just-above). In the above upper threshold condition, we priced the upgrade option at \$30.50, which crossed the upper threshold of \$30. Thus, in this condition, the upgrade price crossed at least one threshold in both just-below (threshold of \$20 and \$30) and just-above (threshold of \$30) conditions.

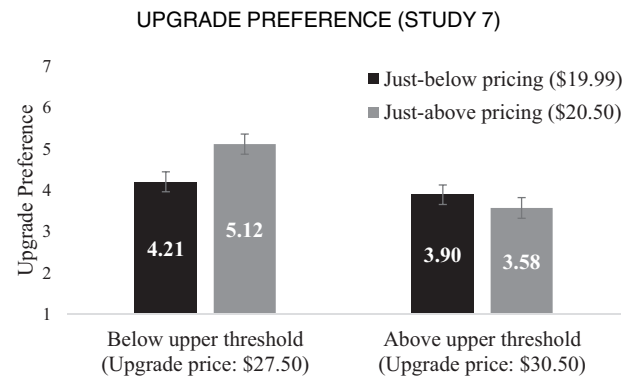
To measure upgrade preference, we asked participants to indicate which streaming package they would be most likely to choose on a 7-point scale [1 (*definitely basic package*) to 7 (*definitely premium package*)]. Finally, we added an attention check item, asking participants to report the number of movies they watched in the last 24 hours in letters, not in numbers. Those who put irrelevant input (e.g., good) or answered in numbers (e.g., 2) were removed from the analysis (removed $N = 73$).

Results

Upgrade Preference. A 2 (base price: just-below vs. just-above) \times 2 (upgrade price: below upper threshold vs. above upper threshold) ANOVA revealed a significant main effect of upgrade price, such that participants preferred an upgrade option less when the upgrade price crossed the upper threshold (i.e., \$30.50; $M = 3.75$, $SD = 2.20$) than when it did not (i.e., \$27.50; $M = 4.66$, $SD = 2.25$; $F(1, 327) = 14.68$, $p < .001$, $\eta_p^2 = .043$). There was no main effect for base price ($F(1, 327) = 1.46$, $p = .227$, $\eta_p^2 = .004$).

As predicted, we found a significant interaction between base and upgrade price ($F(1, 327) = 6.37$, $p = .012$, $\eta_p^2 = .019$; see [figure 3](#)). Replicating our previous studies, in the below upper threshold condition (i.e., upgrade price = \$27.50), participants preferred the upgrade option more when the base product was priced just-above ($M_{\text{just-above}} = 5.12$, $SD = 2.06$) than just-below a threshold ($M_{\text{just-below}} = 4.21$, $SD = 2.35$; $F(1, 327) = 7.00$, $p = .009$, $\eta_p^2 = .021$). However, in the above upper threshold condition (i.e., upgrade price = \$30.50), there was no difference in upgrade preference ($M_{\text{just-above}} = 3.58$, $SD = 2.18$ vs. $M_{\text{just-below}} = 3.90$, $SD = 2.23$, $F(1, 327) = .86$, $p = .354$, $\eta_p^2 = .003$). In other words, the threshold-crossing effect was eliminated once the upgrade price of just-above pricing crossed an upper threshold. Whether participants currently had a live streaming service did not have an effect ($F(1, 326) = 2.14$, $p = .145$), nor did it influence the interaction between base and upgrade price.

FIGURE 3



Discussion

In study 7, we again replicated the threshold-crossing effect and found that when either the base or upgrade option cross a threshold, participants were less likely to upgrade. Participants preferred the upgrade option more when the prices of the base and upgrade options were on the same side of a threshold (e.g., \$20.50 for the base option and \$27.70 for the upgrade option) compared to when the base option was priced just-below a threshold (e.g., \$19.99) or when the upgrade option is priced above another threshold (e.g., \$30.50). Further, these results provide theoretical support that the threshold-crossing effect is due to the upgrade option crossing a perceptual threshold when a just-below pricing strategy is used. Finally, the results provide an important boundary condition: pricing an upgrade option just-above another upper threshold also creates a psychological barrier that will discourage consumers to upgrade.

In this study, the price difference was larger in the above upper threshold condition. Since past research has demonstrated that the left-digit effect becomes weaker when the difference between two prices is larger ([Thomas and Morwitz 2005](#)), one might argue that our results are due to a larger price difference in the above upper threshold condition. If the mitigation was indeed driven by the larger price difference in the above upper threshold condition, this difference should produce parallel effects in the just-below condition (as this condition also has the same price difference). However, ancillary analyses showed that this was not the case. In particular, the upgrade preference did not decrease when the price difference increased in the just-below conditions ($M_{\text{below upper threshold}} = 4.21$, $SD = 2.35$ vs. $M_{\text{above upper threshold}} = 3.90$, $SD = 2.23$, $F(1, 327) = .88$, $p = .348$), but it did decrease when the price difference increased in the just-above condition ($M_{\text{below upper threshold}} = 5.12$, $SD = 2.06$ vs. $M_{\text{above upper threshold}} = 3.58$, $SD = 2.18$, $F(1, 327) = 19.55$, $p < .001$, $\eta_p^2 = .056$).

Thus, it is unlikely for the larger price difference to account for the interaction pattern we find. Rather, the results are consistent with the proposed theory that consumers are discouraged when the upgrade price crosses an upper threshold. These results also suggest that consumers are reluctant to upgrade as long as the upgrade option passes at least one threshold, with the passing of more thresholds not altering the findings.

Note that, in this study, the price difference between the base and upgrade options was smaller in the just-above conditions by 51¢. Given that overall prices are also higher in this condition, the 51¢ difference constitutes a smaller relative difference (Kahneman and Tversky 1979; Tversky and Kahneman 1991). To the extent that the smaller perceived price difference between the base and upgrade options would increase the likelihood to upgrade, it is possible for this smaller relative difference to contribute to the results obtained in this particular study. However, we do not think this is a likely alternative account for two reasons. First, the average price difference in just-below and just-above conditions were very small (i.e., 24.50 and 24.75 respectively), making it this a barely perceptible difference. Second, in several of our prior studies, the objective and relative price differences were objectively bigger in the just-above condition, again making it unlikely for an account based on relative magnitude difference to account for the threshold-crossing effect we observe.

GENERAL DISCUSSION

In seven studies in both the field and lab, and across multiple product categories, we provide consistent evidence for the threshold-crossing effect: pricing a base product at or just-above (vs. just-below) a round number leads consumers to perceive an upgrade as less expensive, which results in more upgrading and more spending. That is, pricing a base product just-below (vs. at or just-above) a round number separates the base product and upgrade option into different mental categories, making the upgrade feel more expensive. In contrast, when the base product is priced at or just-above the round number, both the base product and the upgrade option fall on the same side of the threshold, which makes the upgrade feel less expensive. Even when the upgrade option is objectively more expensive under the just-above pricing, consumers perceived it to be *less expensive* and thus were more likely to upgrade.

A field experiment (study 1) showed that consumers were more likely to upgrade to a larger size coffee and thus spend more money when the small coffee price is at (vs. below) a threshold. Study 2 provided additional evidence in more controlled, incentive-compatible setting. Study 3 provided further evidence using multiple upgrade options. Study 4 provided evidence that the effect of pricing a base product just-above a threshold on upgrade preference is

mediated by a decrease in consumer's price perception of the upgrade option, but not by price perception of the base product. Further, a choice-based conjoint study (study 5) showed that when the base product uses just-above pricing, price becomes a less important attribute in choice. Finally, studies 6 and 7 provided evidence for the psychological threshold process: the threshold-crossing effect was mitigated when a threshold becomes less salient during memory-based decisions (study 6) and when upgrade prices cross another upper threshold (study 7).

Theoretical and Managerial Implications

The current research offers several theoretical and managerial implications. First, we contribute to the literature on upgrade decisions and product choices (Bellezza et al. 2017; Bolton, Lemon, and Verhoef 2008; Goodman and Irmak 2013; Miller et al. 2019; Thompson et al. 2005; Wang and John 2019). Past research on upgrade decisions has predominantly examined product replacement decisions or multifunctional product choices. The question of what encourages consumers to choose an upgrade option over a base product has remained unanswered. We examine this question and show how the price structure of a base product influences consumer's upgrade decision in the context where consumer faces vertically differentiated product lineup.

Second, we highlight the importance of pricing of the base product in consumers' decision to upgrade. This deviates from the past work that mostly focused on how the upgrade option is priced and the range of prices consumers would be willing to pay to upgrade (Monroe 1971, 1973; Monroe and Venkatesan 1969; Sherif 1963). In the current research, we demonstrate that the pricing of the base product is germane to consumer's price perceptions of the upgrade option. Specifically, we show that consumers perceive a round price as a psychological threshold, and, thus, when the prices for the base product and the upgrade option fall on different sides, the upgrade feels more expensive.

Third, prior research on price perceptions has also primarily focused on the perceptions of the lower-priced option that uses just-below (vs. at or above) pricing (Manning and Sprott 2009; Thomas and Morwitz 2005). In contrast, we demonstrate how just-below and just-above pricing for the base product influence the price perception of a higher-priced upgrade option (i.e., upgrade option prices that did not receive a price manipulation).

From a more theoretical perspective, we contribute to the behavioral pricing literature by identifying an important boundary condition and a different psychological process for just-below pricing. Research to date has predominantly relied on the left-digit effect to explain why just-below prices are effective. In contrast, we introduce a related, but distinct, account based on thresholds. This new

account allows us to motivate and demonstrate a boundary condition for the effectiveness of just-below pricing: when consumers are considering upgrading to a feature-rich option (vs. a decision between competing brands).

Finally, our research has important implications for pricing strategy. While pricing literature provides few exceptions to the effectiveness of a just-below pricing strategy, we demonstrate that just-below pricing may be suboptimal in the upgrade decision context. Just-below pricing increases price perceptions of upgrade options and decreases consumer spending and brand profitability. Our results suggest that increasing the price of a base product to be just-above a threshold can be beneficial when brands offer upgrades. We also highlight boundary conditions. The advantage of just-above pricing on upgrade choice disappears when options are presented sequentially or the upgrade price crosses another threshold. Thus, brands should not only consider setting the base price to be just-above a threshold but also be careful to set the upgrade price below other thresholds.

Limitations and Future Directions

Our research focused on upgrade decisions (much like a consumer who has decided to buy a certain model of car but has not decided on the level of trim), and we assumed a brand choice has already been made. However, as discussed above, this is a simplification as just-below pricing could initially attract more consumers to the brand before an upgrade decision needs to be made. For example, a car manufacturer may use a just-below price to increase brand choice over competitors (e.g., Toyota RAV4 vs. a Honda CRV). However, once a consumer has decided to purchase the brand, according to our research, the manufacturer is at a disadvantage in terms of upgrades to a higher-end (and more profitable) trim. Thus, there is a tradeoff for marketers to make between increasing brand choice and increasing upgrades. Future research should examine further the relative benefit of bringing in customers at the just-below price strategy and whether it outweighs the losses in upgrade revenue and potential moderators. For instance, it will likely depend on a firm's competitive environment, margins, market share, target customer, and brand positioning. If a brand is not positioned as a price leader, then just-below pricing—sacrificing both quality perceptions and potential upgrades—is unlikely to be profitable. Similarly, if just-below pricing has a small effect on brand choice, then the benefit is unlikely to outweigh the cost in lost upgrades, particularly if that brand also enjoys significantly larger profit margins on their upgrade options.

The current research focused almost exclusively on instances where consumers make an upgrade decision with all the options presented simultaneously. Importantly, we find evidence for the threshold-crossing effect to weaken when the decisions are memory-based. Thus, we caution

the reader to make inferences about upgrade decisions when the upgrade opportunities are presented after consumers make a product choice (i.e., add-on pricing or drip pricing). Oftentimes, consumers are offered an opportunity to upgrade their purchase after they made the final product choice, but without base price information. For example, hotels and airlines often try to upsell consumers even after consumers made the final purchase, but without including the base price. It is possible that the threshold-crossing effect may change, especially with temporal distance which reduces the salience of crossing a threshold (e.g., Allard et al. 2019; our study 6). Future research is needed to understand the implications of these new pricing strategies.

To provide a controlled test of the threshold-crossing effect, our studies did not include other relevant external thresholds in consumer's decision environments. In reality, it is possible for consumers' decisions to be influenced by their budget or another external threshold. If the upgrade price goes over the pre-determined budget, the advantage of just-above pricing on upgrade choice might not be realized. Similar external thresholds could be in effect for currencies that utilize non-round numbers as a denomination (e.g., €2 coin or a €200 note), which can serve as meaningful thresholds. For instance, with a €2 coin at hand, consumers might not view €0.99 and €1.39 to be on different sides of a threshold and thus using a base price of €1.01 (and the upgrade price of €1.41) might not be more advantageous.

In our studies, we consistently find that an upgrade option that falls on the same side of a threshold as the base product is perceived to be less expensive. However, our studies have not explored instances where the base and upgrade prices are sufficiently different, despite being on the same side of a threshold as it would be the case for expensive product categories like houses (e.g., \$310,000 and \$375,000) or when the two prices are close to different thresholds (e.g., \$20,100 and \$29,900). Under these circumstances, it is possible for the threshold-crossing effect to be mitigated as threshold crossings might not be as effective in shifting price perceptions.

In addition, future research should also explore the effect of just-above pricing in a downgrade context. It is possible that an economical option is available in addition to the base product. In such cases, just-above pricing could encourage downgrades because it would make the price drop more salient. The price difference between the basic product and an economical downgrade option would be perceived to be greater when the price changes cross a threshold. In such cases, just-above pricing would decrease the sales of the more expensive base product.

In conclusion, the current research provides an important exception to the benefits of a just-below pricing strategy: when marketers want to encourage consumers to upgrade. We provide consistent evidence for the threshold-crossing effect, a pricing strategy that marketers can use to

encourage consumers to upgrade. Across multiple studies and contexts, we demonstrate that just-below pricing can discourage consumers to upgrade, suggesting that just-below pricing may not be an optimal strategy for managers facing upgrade pricing decisions. Thus, the studies demonstrate the counterintuitive finding that raising prices of a base product can actually decrease price perceptions of an upgrade option, which increases consumer's willingness to upgrade and ultimately increases consumer spending.

DATA COLLECTION INFORMATION

All authors jointly designed the studies, and the first author analyzed the data using SPSS. The first author managed the collection of data at The Ohio State University campus for study 1 (spring 2019). Studies 2 (spring 2021), 3 (fall 2018), 4 (spring 2019), 5 (spring 2020), 6 (fall 2020), and 7 (summer 2020) were collected using Qualtrics software. Studies 2, 3, 4, 5, and 6 were collected via the Fisher College of Business participant pool, and study 7 via Mechanical Turk on an account owned by the second author. All conditions and measures are reported in the article. All materials are available via OSF (<https://osf.io/xp5n9/>).

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