

Outwitting the rational mind: How effortful thinking influences price cognition

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This is the peer reviewed version of the following article:

Hossain, Mehdi T. and Zhiyong Yang (2019), “Outwitting the Rational Mind: How Effortful Thinking Influences Price Cognition,” *Journal of Behavioral Decision Making*, 32, 280–296. <https://doi.org/10.1002/bdm.2112>

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Abstract:

Prior research presents mixed findings on how people's degrees of effortful thinking influence their reliance on heuristics and biases. Although the tenets of dual process theory would argue that effortful thinking should attenuate people's reliance on heuristics, a number of contemporary findings suggest otherwise: Effortful thinking may, in fact, enhance biased processing of information in certain instances. This research shows how, in the context of pricing, people's degrees of effortful thinking can amplify their inclination towards biased processing of price information. In five studies ($n = 1,339$), we find that effortful thinking induces a greater preference for nine-ending (vs. zero-ending) prices, and the effect is mainly driven by people's greater propensity for argument-based decision making. Such predilection to nine-endings attenuates with lower cognitive effort in processing price information. Moreover, when locus of deliberation shifts from price to quality, consumers' preference for nine-ending priced options is subdued.

Keywords: argument-based decision making | effortful thinking | need for cognition | nine-ending price | zero-ending price

Article:

1 INTRODUCTION

People's need for cognition (NFC) is defined as their tendency to engage in effortful thinking (Cacioppo & Petty, 1982). Generally, it is expected that individuals high in NFC are likely to

make fewer errors in their decision making relative to those who are low in NFC. Such efficiency shields high-NFC individuals against potential biases in judgment and decision making (Petty, Briñol, Loersch, & McCaslin, 2009).

Tenets of dual process theory hold that low-NFC individuals are likely to exert greater use of System 1 processing, which is a more affect-based and automatic system for information processing (Haugtvedt, Petty, & Cacioppo, 1992). However, in the domain of social cognition and decision making, the finding is not unanimous; that is, low- (vs. high-) NFC individuals do not always show greater tendency toward biases (Petty et al., 2009). Weak correlation of the NFC scale and Epstein's (2003) Faith in Intuition scale echoes this point and indicates that both low- and high-NFC individuals may use intuition and automatic processing, depending upon contextual factors. In other words, certain biases can emanate through effortful thoughts, and in such situations, individuals high in NFC are susceptible to biases to a greater degree than those with low NFC (Petty & Jarvis, 1996). For example, high- (vs. low-) NFC individuals show a greater number of false memories (Graham, 2007) and overreaction bias (Sommers & Kassin, 2001). In other situations, there is no difference between high- and low-NFC individuals; these include halo effects (Petty et al., 2009) and anchoring effects (Blankenship, Wegener, Petty, Detweiler-Dedell, & Macy, 2008). In alignment with this growing research stream demonstrating the counterintuitive fact that thoughtful individuals are susceptible to judgment and decision-making biases, we show a counterintuitive effect in the domain of pricing; that is, high-NFC individuals are more likely to make errors in price cognition than their low-NFC counterparts.

This research is of significance to both scholars and marketing practitioners. One of the popular pricing strategies over the years has been the “nine-ending price” (Schindler & Kirby, 1997). Marketers often offer products at a price that is just below a round number to make an impression to consumers that the product is being offered at a cheaper price or on sale. Although there is virtually no difference between \$4.00 and \$3.99, consumers perceive the latter as a lower price. The magnitude of such price perception is substantial enough to generate additional sales (Kalyanam & Shively, 1998). Even though research has shown that the perception is an error emanating from the incomplete processing of pricing information (Thomas & Morwitz, 2005), scant attention has been paid to exploring the impact of consumers' degrees of effortful thinking on their tendency to make such errors in price cognition. The present research fills in this gap by showing that consumers exhibit an enhanced (vs. attenuated) predilection towards nine-ending prices when their degree of effortful thinking is high (vs. low).

We demonstrate the proposed effect in a series of five studies composed of a total of 1,339 participants. Using chronically accessible tendencies of effortful thinking and its manipulation, Studies 1A and 1B show that the nine-ending pricing effect is prevalent in people's price perception when people's degree of effortful thinking is high (vs. low). Study 2 replicates the finding of Study 1 in a choice context. Study 3 reveals the key mechanism underlying this effect. Study 4 replicates the findings of previous studies in a high-value consumption context. Study 5 further demonstrates that locus of deliberation (price vs. quality) is a boundary condition for our proposed effect. When locus of deliberation shifts from price to quality, high effortful thinking consumers' preference for nine-ending prices is subdued.

2 JUST-BELOW PRICING

Nine-ending prices, also known as just-below pricing, have historically been popular in consumer markets due to its effectiveness in generating greater sales (Schindler & Kirby, 1997). Just-below pricing refers to setting the price of a product marginally below a round number so that it evokes a lower price perception (Schindler, 2006). As mentioned above, even though \$3.99 is only marginally lower than a round numbered price of \$4.00, consumers may magnify the difference and perceive it to be disproportionately more attractive than the proximate round-numbered price. This may explain why, in some retail categories, this tactic is used in 80% to 90% of all prices (Kreul, 1982).

Although just-below pricing is widely used by retailers, empirical research is indecisive as to its effects. Whereas some researchers (Kalyanam & Shively, 1998; Schindler & Kibarian, 1996) showed that just-below pricing helps generate sales, other researchers (Liang & Kanetkar, 2006; Schindler & Kibarian, 1993) found no effect of just-below pricing. This is mainly explained by consumers' lack of attention to the rightmost digits of a price (Schindler & Kibarian, 1993). Still others (Allred, Valentin, & Chakraborty, 2010; Bray & Harris, 2006) showed some contexts in which the effect of just-below pricing is not just subdued, but in fact reversed. Bray and Harris (2006), for example, reported that round-ending prices are more effective than the corresponding just-below prices among UK consumers. Allred et al. (2010) found that zero-ending prices—another term for round-numbered prices—are more prevalent than nine-ending prices among risky services, for which concern over quality of the product is strong.

Such illusionary processing of a just-below number is also evident beyond the domain of price cognition. Lacetera, Pope, and Sydnor (2012) found that cars with odometer values just below round numbers (e.g., 79,900–79,999) were sold at higher prices than cars with odometer values just above round numbers (e.g., 80,001–80,100). Similarly, a small change in the leftmost digit of the grade information led to a significant change in the performance evaluation of an educational institution (Olsen, 2013). Nine-ending numbers can also influence consumers' motivation to exert effort on a task. Pope and Simonsohn (2010) found professional baseball players put in more effort at the end of a season so that their batting average does not fall below a round number, and high school students were more likely to retake the SAT when they obtained a score just below rather than just above a round number.

In this paper, we offer a resolution to these mixed findings by isolating a moderator that determines conditions under which consumers are more influenced by just-below prices. To this end, we study the role that effortful thinking plays in this process. We speculate that people's propensity to argument-based decision making is enhanced by an increase in their reliance on effortful thinking, which in turn increases their preference for just-below prices.

3 EFFORTFUL THINKING AND PREFERENCE FOR JUST-BELOW PRICES

Effortful thinking is a manifestation of individuals' motivation to process information. Effortful thinkers look for a better value in their purchases and therefore are more motivated to process product information, especially the information about price, as price is one of the most direct and obvious cues used to compare products (Lalwani & Forcum, 2016; Monroe, 1990). The notion

that effortful thinking is a motivational factor is largely in line with previous research showing that NFC is by nature a motivational variable, not an ability one (Cacioppo & Petty, 1982; Drolet, Luce, & Simonson, 2009). Analytic processing of information is evident to a greater extent among individuals with higher NFC (Haugtvedt et al., 1992). Low-NFC people, on the other hand, exhibit greater reliance on heuristics (Petty, Cacioppo, & Schumann, 1983). Divergence in effortful thinking may lead to differences in decision outcomes, including greater attention to central cues in advertisements (Cacioppo & Petty, 1982); exhibition of the background contrast effect (the influence of attributes' trade-off values in one choice instance on subsequent choices; Priester, Dholakia, & Fleming, 2004); processing of partitioned pricing (Kim & Kramer, 2006); assimilation versus contrast effect (Martin, Seta, & Crelia, 1990); and the effect of argument quality on persuasion (Petty, Schumann, Richman, & Strathman, 1993). Please note that the concept of effortful thinking is separated from that of cognitive capacity, a constraint on cognition, which often leads to behaviors such as being less aversive to attribute trade-offs (Drolet & Luce, 2004) and disruption to goal commitment (Ward & Mann, 2000). Prior research exhibits that these two well-researched concepts pertaining to people's cognition may not be interchangeable after all (Drolet et al., 2009). In this research, our focus remains on people's motivation to think (high vs. low), rather than constraints on cognition (e.g., cognitive load, cognitive business; Gilbert, Pelham, & Krull, 1988; or time pressure; Dhar & Nowlis, 1999), and we examine how motivation to think influences their price cognition.

We argue that just-below prices provide sound arguments in favor of the priced options when consumers think effortfully than not. In the pricing domain, the just-below pricing effect has been attributed to multiple information-processing factors, such as truncation of the price digits (Schindler & Kirby, 1997), dropping off rightmost digits (Manning & Sprott, 2009; Thomas & Morwitz, 2005), left-to-right comparison of prices (Nagle, 1987), and the perceived gain effect (Schindler & Kirby, 1997). The truncation of pricing digits indicates that instead of rounding a just-below price (e.g., \$5.95), consumers may apply a truncating rule and process the price as \$5 instead of \$6. Dropping off the rightmost digits refers to consumers anchoring on the leftmost digits and mentally ignoring the rightmost digits. Although adhering to left-to-right processing of prices, in price comparisons, consumers may avoid processing information in the ones of the cents digits as soon as they realize a difference in the tens of cents digits. The perceived gain effect underlying just-below pricing is related to research findings showing that round numbers are easier to access than just-below numbers (Schindler & Wiman, 1989). Higher degrees of accessibility of round-numbered prices can cause a just-below price (e.g., \$19.99) being perceived as a gain over the next round number (e.g., \$20.00; Tversky & Kahneman, 1985). In a similar vein, Basu (1997) conjectured that perceiving nine-ending prices to be cheaper may be due to a rational and effortful thought process. Consumers who are more involved with the purchase, and who think effortfully about prices, are more likely to be well-informed about the market distribution of the "cents" information associated with the price of similar alternatives. Such consumers are likely to focus on the leftmost digits and assume the cents information to be an expected value (i.e., the most typical cents information, such as 99 cents).

Drolet et al. (2009) showed that effortful thinking, as proxied by people's NFC, induces reliance on self-goals. In our case, being driven by the self-goal of obtaining the best shopping outcome (i.e., acquiring the best deal), high-NFC individuals actively seek implicit signals for the best deals. These individuals, therefore, are more likely to accept these signals as diagnostic in their

decision process than their low-NFC counterparts and perceive the nine-ending prices as a gain over the next round numbers. Moreover, Nordgren and Dijksterhuis (2009) showed that, although thinking effortfully, people narrowly focus on a few attributes of interest rather than considering a broad spectrum of information about all available attributes. Therefore, they give disproportionate weight to information that is easily accessible and plausible. In our case, because high-NFC people are driven by the self-goal of obtaining the best shopping outcome, they should find nine-ending prices more attractive, as these prices would signal greater value compared with the next round-numbered prices, and the shoppers' narrowed focus on nine-ending prices would lead to their assignment of disproportionately high weight to such pricing. Therefore, for effortful thinkers, just-below prices provide sound arguments in favor of the priced option. Overall, meaning-based processing of prices, as often employed by effortful thinkers, leads to the perception that just-below price points are cues of greater savings. Because price represents a direct and obvious cue for product comparison (Lalwani & Forcum, 2016; Monroe, 1990), for an effortful thinker seeking reasons to justify her choices, the just-below pricing cue may thus provide a sound argument that vindicates her purchase decision.

On the basis of these findings and the theoretical arguments presented above, we hypothesize that high effortful thinking, either as a chronic disposition or situationally activated, will enhance meaning-based processing of price information, which in turn increases the just-below pricing effect.

H1. High- (vs. low-) effortful thinking will lead to enhanced preference for nine-ending prices over zero-ending prices.

H2. High- (vs. low-) effortful thinkers' preference for nine-ending (vs. zero-ending) prices is driven by their greater tendency to rely on argument-based decision making.

4 STUDY 1A

4.1 Participants, procedure, and measures

For this study, we recruited 354 participants (202 females; $M_{\text{age}} = 32.79$, $SD = 10.88$) from Amazon Mechanical Turk (MTurk). While recruiting respondents for all our studies, our primary focus was to recruit at least the number of respondents necessary to obtain 80% power for a medium-sized effect. On the basis of prior research in this domain, we had predicted the number needed to obtain a medium-sized effect. Using G*Power 3.1, we estimated that for a medium-sized effect of $f = 0.30$, we needed to recruit a minimum of 90 respondents given our study design (Faul, Erdfelder, Buchner, & Lang, 2009). The sample size for the first study was larger than necessary to achieve 80% power for a medium-sized effect. This happened due to the study being part of a larger study.

Price ending (\$3.99 vs. \$4.00) was manipulated between subjects, and participants' NFC was measured as the key independent variable. Participants were asked to imagine that a new ice cream store has just opened in their locality, and the store wants to know how consumers perceive the prices of certain items. They were given a picture of a hot fudge sundae priced at \$3.99/\$4.00 and a three-scoop ice cream priced at \$5. That is, the price of sundae changed from

\$3.99 in the nine-ending condition to \$4.00 in the zero-ending condition, whereas the price for the three-scoop ice cream remained unchanged at \$5 in both conditions as a baseline. Participants indicated whether they perceived the price for each item to be high (“the price for the above item is high”; 1 = *strongly agree*; 7 = *strongly disagree*). They indicated this perception for both items. After providing their price perception, participants completed the 18-item NFC scale (1 = *strongly disagree*; 7 = *strongly agree*; Cacioppo & Petty, 1982). Finally, participants indicated their age, gender, and ethnic origin. Two incomplete responses were excluded in the nine-ending condition, and five incomplete responses were excluded in the zero-ending condition. These respondents did not complete the NFC scale.

4.2 Results

We conducted a series of regressions where the dependent variable was the difference in price perception between the target product (sundae) and the benchmark product (three-scoop ice cream), with higher scores indicating cheaper price perception of the target item. The main effect of price ending (dichotomous variable, where 1 = *nine-ending condition* and 2 = *zero-ending condition*) was tested in the first regression, where the independent variable was price ending. Results indicated a significant main effect of price ending, $\beta = -0.53$, $SE = 0.20$, $t = -2.56$, $p = 0.011$; $M_{\text{nine-ending}} = 1.541$, $M_{\text{zero-ending}} = 1.006$, $F(1, 352) = 6.56$, $p = 0.011$, in that respondents perceived the relative magnitude of the price difference to be significantly lower in the nine-ending condition than in the zero-ending condition. The mean-centered NFC score was the independent variable in the second regression. The analysis revealed a significant main effect of NFC ($\beta = 0.31$, $SE = 0.09$, $t = 3.23$, $p < 0.01$) in that the difference in perception of prices of the two options provided was larger for the high-NFC group than for the low-NFC group.

The price ending \times NFC two-way interaction was tested in the third regression, where the independent variables were price ending, NFC (mean-centered), and their interaction. The analysis revealed a significant two-way interaction between price ending and NFC (mean-centered; $\beta = -0.72$, $SE = 0.19$, $t = -3.85$, $p < 0.01$). Consistent with our expectations, a floodlight analysis (Spiller, Fitzsimons, Lynch, & McClelland, 2013) revealed that the just-below pricing effect was prevalent among high-NFC participants (with mean-centered NFC scores ranging from -0.15 to 2.29), whereas a reversal of the just-below pricing effect was exhibited among low-NFC participants (with mean-centered NFC scores below -1.75), as shown in Table 1. We computed the Johnson–Neyman points (Johnson & Neyman, 1936) using a macro developed by Hayes (2012) for SPSS. The values of NFC that determined nonsimultaneous Johnson–Neyman significance regions were -1.77 and -0.14 . Here, the value of the mean-centered NFC below -1.75 was considered as low NFC, whereas the value of the mean-centered NFC above -0.14 was considered as high NFC. The floodlight analysis is ideal in obtaining deeper insights into an interaction effect when one of the interacting variables is a dichotomous variable and the other variable is continuous. The analysis demonstrates at what levels of the continuous variable the dichotomous variable has a positive/nonsignificant/negative impact on the dependent variable. In our case, the floodlight analysis provided further insights into the interaction effect by clearly demonstrating at what level of the NFC the price-ending effect emerged (Figure 1). Similar results were obtained after controlling for the effects of participants' age, gender, and ethnic origin.

Table 1. Results of floodlight analysis (Study 1A)

NFC_Cent.	Coeff	se	t	p	LLCI	ULCI
-3.488	1.9917	0.6806	2.9261	0.0037	0.653	3.3303
-3.199	1.7846	0.6295	2.8349	0.0048	0.5465	3.0228
-2.91	1.5776	0.5789	2.7253	0.0067	0.4391	2.7161
-2.621	1.3706	0.5288	2.5917	0.0099	0.3305	2.4107
-2.332	1.1636	0.4796	2.4261	0.0158	0.2203	2.1069
-2.043	0.9566	0.4315	2.2169	0.0273	0.108	1.8053
-1.773	0.7626	0.3877	1.9668	0.05	0	1.5252
-1.754	0.7496	0.3849	1.9477	0.0523	-0.0073	1.5065
-1.466	0.5426	0.3403	1.5942	0.1118	-0.1268	1.2119
-1.177	0.3356	0.2989	1.1228	0.2623	-0.2522	0.9234
-0.888	0.1286	0.2619	0.4908	0.6239	-0.3866	0.6437
-0.599	-0.0785	0.2316	-0.3387	0.735	-0.5341	0.3771
-0.31	-0.2855	0.211	-1.3532	0.1769	-0.7004	0.1294
-0.147	-0.4025	0.2047	-1.9668	0.05	-0.805	0
-0.021	-0.4925	0.2028	-2.4284	0.0157	-0.8913	-0.0936
0.2678	-0.6995	0.2087	-3.3524	0.0009	-1.1099	-0.2891
0.5567	-0.9065	0.2274	-3.9858	0.0001	-1.3538	-0.4592
0.8456	-1.1135	0.2563	-4.3443	0	-1.6176	-0.6094
1.1344	-1.3205	0.2923	-4.5173	0	-1.8955	-0.7456
1.4233	-1.5275	0.3332	-4.5851	0	-2.1828	-0.8723
1.7122	-1.7346	0.3772	-4.598	0	-2.4765	-0.9926
2.0011	-1.9416	0.4236	-4.5837	0	-2.7746	-1.1085
2.29	-2.1486	0.4715	-4.557	0	-3.0759	-1.2213

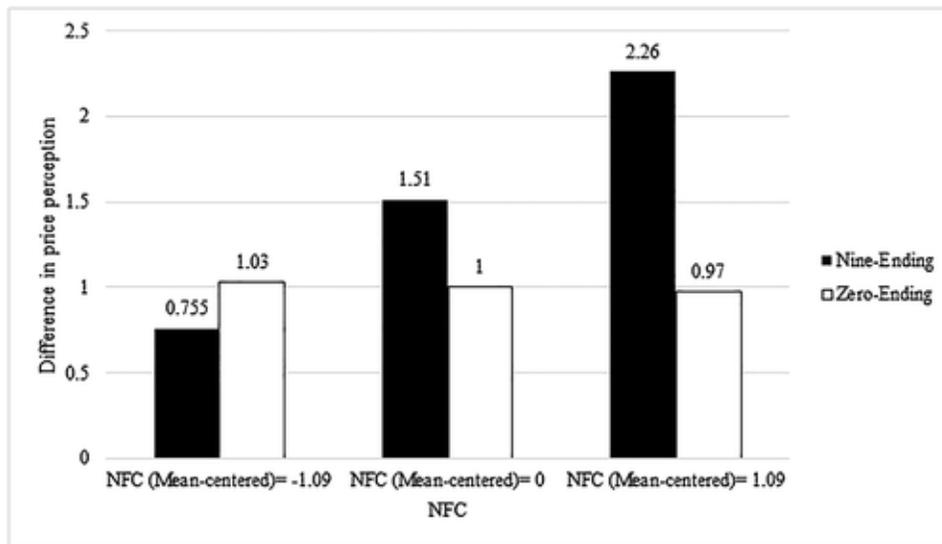


Figure 1. Conditional effect of price ending at various values of need for cognition (Study 1A)

5 STUDY 1B

Our next study attempts to replicate the findings from Study 1A using situationally activated effortful thinking rather than measurement. In this study, participants were provided with

branded products. Replication of our findings with the current set of stimuli is worthwhile in ruling out familiarity with the product stimuli as a potential confound.

5.1 Participants, procedure, and measures

We recruited 106 participants (61 males; $M_{\text{age}} = 34.34$, $SD = 10.05$) through MTurk to participate in this study. The study employed a 2 (effortful thinking: high vs. low) \times 2 (price-ending: nine vs. zero) between-subjects design. Participants were first presented the material of effortful thinking prime. Effortful thinking was manipulated using a procedure adapted from Priester et al. (2004). Participants in the high-effortful thinking condition read:

Your responses to the following questions will be kept separate from the responses of all other participants who participate in the study. In this manner, it will be possible to tell which responses you specifically made. That is, we are interested in understanding how you, as an individual, feel about these responses. As such, your responses will matter greatly and are very important.

Those in the low-effortful thinking condition read:

Your responses to the following questions will be pooled with the responses from all of the other participants who participate in this study. In this manner, it will be impossible to tell which responses you specifically made. That is, we are interested in understanding how all participants, as a group, feel about these responses. As such, your responses will not make much of a difference.

Following the effortful thinking manipulation, participants were provided a task of evaluating prices of a pair of branded products. In each of the price conditions, they were asked to imagine that they were shopping for chocolates at a neighborhood retailer. While evaluating different brands of chocolates, they came across two options, namely Lindt Milk Chocolate Truffles and Ferrero Rocher chocolates. The price of the Lindt Milk Chocolate Truffles was \$4.99 in the nine-ending condition, and \$5.00 in the zero-ending condition, whereas the price of the Ferrero Rocher chocolate remained constant (\$6.00) in both conditions. In each condition, participants indicated their price perception by responding to the question “To what extent is the price of the Ferrero Rocher chocolate higher than the price of Lindt Milk Chocolate Truffles?” (1 = *a little higher*; 7 = *much higher*). Therefore, higher numbers on the scale indicate participants' perception of a greater difference between the prices of the two products. We conjecture that participants in the high-effortful thinking condition will perceive the price magnitude of the baseline (\$6.00 Ferrero Rocher chocolate) as significantly higher than the accompanying nine-ending option (\$4.99 Lindt chocolate) as compared with the zero-ending condition (\$5.00 Lindt chocolate). In contrast, participants in the low-effortful thinking condition will exhibit a smaller difference in their evaluation of prices across the two conditions (nine-ending vs. zero-ending).

Following the price evaluation task, participants responded to the manipulation check questions. Specifically, participants rated how important they thought their responses were to the current study (1 = *not important at all*; 7 = *very important*); their level of involvement with the task

(1 = *not involved at all*; 7 = *very involved*); and to what extent they thought their responses were identifiable (1 = *not identifiable at all*; 7 = *easily identifiable*; Priester et al., 2004).

5.2 Results

5.2.1 Manipulation check

The three-item manipulation check questions were averaged to form an effortful thinking index ($\alpha = 0.54$). A one-way analysis of variance (ANOVA) with effortful thinking (high vs. low) as a between-subjects variable confirmed that participants thought more effortfully in the high-effortful thinking condition ($M = 5.73$, $SD = 1.06$) than in the low-effortful thinking condition ($M = 4.77$, $SD = 1.41$), $F(1,104) = 15.68$, $p < 0.01$, $\eta_p^2 = 0.13$. Respondents thought their responses were more important in the high-effortful thinking condition relative to the low-effortful thinking condition, $M = 6.16$ versus $M = 4.86$, $F(1,104) = 13.87$, $p < 0.01$. They thought they were more involved in the high-effortful thinking condition relative to the low-effortful thinking condition, $M = 6.67$ versus $M = 6.51$, $F(1,104) = 1.33$, $p = 0.251$, but the difference was not significant. Finally, they thought their responses were more identifiable in the high-effortful thinking condition relative to the low-effortful thinking condition, $M = 4.36$ versus $M = 2.96$, $F(1,104) = 9.39$, $p < 0.01$. Therefore, the manipulation of effortful thinking was successful.

5.2.2 Price magnitude perception

We submitted the price magnitude perception to a two-way ANOVA with effortful thinking (high vs. low) and price ending (nine vs. zero) as between-subjects variables. According to our expectation, the two-way ANOVA on price magnitude perception revealed a significant interaction of effortful thinking and price ending, $F(1,102) = 4.24$, $p = 0.042$, $\eta_p^2 = 0.04$. Participants in the high-effortful thinking condition perceived the price of Ferrero Rocher chocolate to be significantly higher than the Lindt chocolate in the nine-ending condition ($M = 4.06$, $SD = 1.50$) than in the zero-ending condition ($M = 2.35$, $SD = 1.11$), $F(1,102) = 23.39$, $p < 0.01$, $\eta_p^2 = 0.19$. In contrast, participants in the low-effortful thinking condition perceived the price of Ferrero Rocher chocolate to be similar to that of Lindt chocolate across both nine-ending ($M = 3.18$, $SD = 1.44$) and zero-ending conditions ($M = 2.52$, $SD = 1.06$), $F(1,102) = 3.28$, $p = 0.073$, $\eta_p^2 = 0.03$. There was a significant main effect of price conditions such that participants perceived the price of the Ferrero Rocher chocolate to be significantly higher in the nine-ending condition ($M = 3.70$, $SD = 1.52$) than in the zero-ending condition ($M = 2.44$, $SD = 1.07$), $F(1, 102) = 21.75$, $p < 0.01$, $\eta_p^2 = 0.18$. The main effect of effortful thinking was nonsignificant ($F < 0.20$). These results are presented in Figure 2. Similar results were obtained after controlling for the effects of participants' age and gender.

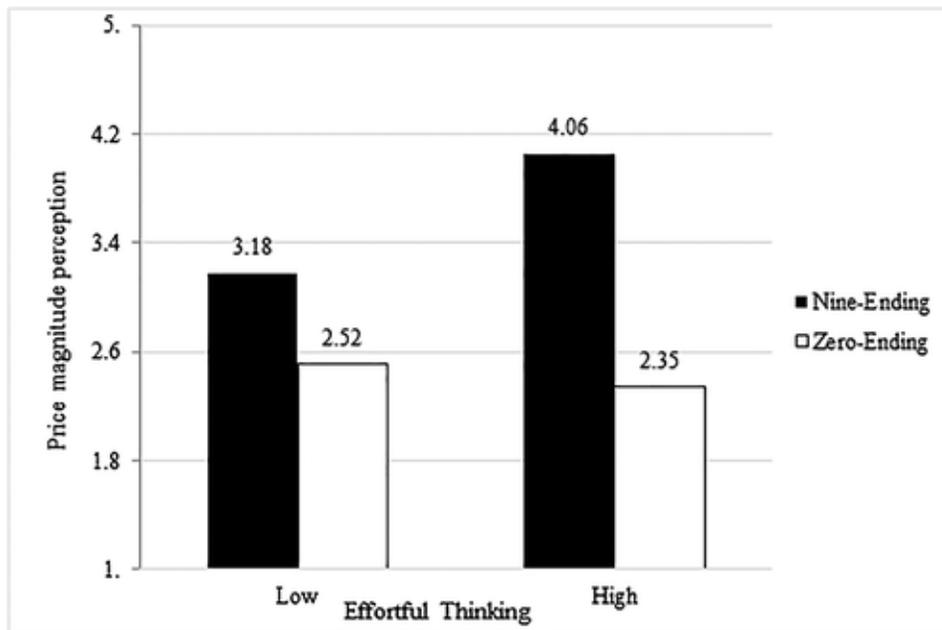


Figure 2. Price magnitude difference as a function of nine- and zero-ending (Study 1B)

5.3 Discussion

Study 1 provided preliminary evidence on how effortful thinking affects an individual's preference for just-below (vs. round-numbered) prices using chronic trait in Study 1A and situationally activated effortful thinking in Study 1B. Although different operationalizations of effortful thinking can enhance the validity of our findings, Study 1 has two potential limitations. The first limitation is that it examined the effect in a joint evaluation context. Will our proposed effects hold in a single evaluation context? To answer this question, we conducted two additional studies (follow-up study of Study 1A in Appendix A, and follow-up study of Study 1B in Appendix B) where respondents were provided with a single product and asked to evaluate its price. We found similar effects as in the first two studies utilizing the joint evaluation context.

Another potential limitation of Study 1 is that it used consumers' price magnitude perception as a manifestation of their preference for just-below prices. Does such a perception reflect consumers' actual product choice? According to previous research, there may be systematic elicitation-mode disparity in how consumers express their preferences (Nowlis & Simonson, 1997). Therefore, it is important to validate our findings in a choice-making context. Our next set of studies focuses on how effortful thinking affects consumers' distinctive choice behavior, emanating from their differential price perceptions.

6 STUDY 2

6.1 Participants, procedure, and measures

For this study, 162 MTurk individuals (74 females; $M_{age} = 35.60$, $SD = 12.05$) participated in exchange for a small compensation. We applied a 2 (effortful thinking: low vs. high) \times 2 (price-ending: zero vs. nine) between-subjects design. Effortful thinking was manipulated using the

same procedure as in Study 1B (Priester et al., 2004). Afterwards, participants were asked to imagine that they were shopping for a gift for an office colleague who just had a baby. Their task was to choose between two options, where the price-ending was manipulated. In the nine-ending condition, one of the two options (i.e., Little Monkey Gift Box) was priced at \$19.99, and the other (i.e., Sweet Memories Gift Set) was priced at \$30.00. In the zero-ending condition, everything remained the same, except that the price of the low-price option, Little Monkey Gift Box, was changed to \$20.00 (see Appendix C for the exact stimuli). The order of the choice options was randomized. After completing the choice task, participants responded to three manipulation check questions as in Study 1B.

6.2 Results

6.2.1 Manipulation check

The three-item manipulation check questions were averaged to form an effortful thinking index ($\alpha = 0.55$). A one-way ANOVA with effortful thinking (high vs. low) as a between-subjects variable confirmed that effortful thinking was higher in the high-effortful thinking condition ($M = 5.56$, $SD = 1.06$) than in the low-effortful thinking condition ($M = 4.45$, $SD = 1.22$), $F(1, 160) = 37.72$, $p < 0.01$. Respondents thought their responses were more important in the high-effortful thinking condition relative to the low-effortful thinking condition, $M = 6.00$ versus $M = 4.64$, $F(1, 159) = 25.74$, $p < 0.01$. They thought they were more involved in the high-effortful thinking condition relative to the low-effortful thinking condition, $M = 6.60$ versus $M = 6.27$, $F(1, 158) = 5.48$, $p = 0.021$. Finally, they thought their responses were more identifiable in the high-effortful thinking condition relative to the low-effortful thinking condition, $M = 4.17$ versus $M = 2.43$, $F(1, 158) = 27.37$, $p < 0.01$. These results provide clear evidence that the priming instrument successfully manipulated effortful thinking. However, we would like to acknowledge the limitation that the reliability measures of the effortful thinking indexes in studies 1B and 2 were low.

6.2.2 Choice of the low-price option

specifies that high-effortful thinking individuals are more likely to perceive the nine-ending prices as preferable to the zero-ending prices. To test this hypothesis, we conducted a logistic regression on the choice of the low-price option, with price ending, effortful thinking, and their interaction term as independent variables. Results revealed no main effect of either price ending or effortful thinking ($ps > 0.50$). Consistent with , there was a significant price-ending \times effortful thinking two-way interaction ($\beta = -1.75$, Wald = 6.64, $p = 0.010$, odds ratio [OR] = 0.17; 95%CI = [0.046, 0.658]). For participants in the high-effortful thinking condition, the choice share of the low-price option was significantly higher in the nine-ending condition (77%), compared with the zero-ending condition (52%; $\beta = 1.13$, Wald = 5.10, $p = 0.02$, OR = 3.11; 95%CI = [1.16, 8.30]), in support of . For participants in the low-effortful thinking condition, the choice share of the low-price option was not significantly different in the nine-ending condition compared with the zero-ending condition (55% vs. 70%; $\beta = -0.62$, Wald = 1.81, $p = 0.18$, OR = 0.54; 95%CI = [0.22, 1.32]).

6.3 Discussion

In Studies 1 and 2, we demonstrated that effortful thinking, either chronic or situationally activated, enhances the just-below (vs. round-numbered) pricing effect. A common drawback of both Studies 1 and 2 is that neither of the studies offered an explicit test on the underlying psychological mechanism of our proposed effect. In our theorizing, we argued that people's predilection to argument-based decision making is enhanced with an increase in effortful thinking. Such an argument-based decision-making tendency subsequently explains a stronger just-below prices effect among effortful thinkers. The next study utilizes the choice context again to provide an explicit test of our proposed underlying mechanism.

7 STUDY 3A

7.1 Participants, procedure, and measures

We recruited 130 participants from MTurk (45 females; $M_{\text{age}} = 36.18$, $SD = 11.70$) and randomly assigned them to conditions in a 2 (effortful thinking: low vs. high) \times 2 (price-ending: zero vs. nine) between-subjects design. The procedure and manipulations were the same as in Study 2. After the choice task, participants responded to a 2-item measure of argument-based decision making: (a) "I can easily find reasons to justify the choice of the Little Monkey Gift Box," and (b) "I can easily find reasons to justify the choice of the Sweet Memories Gift Set" (1 = *strongly disagree*; 7 = *strongly agree*). A justification differential index was created by taking the difference score of the two measures, with a higher score indicating easier justification for the Little Monkey Gift Box (the low-price option).

To rule out mood and familiarity with the product as potential confounds, participants answered the questions "How do you feel today?" (1 = *sad*; 7 = *happy*) and "How familiar are you with gift items for a newborn?" (1 = *not familiar at all*; 7 = *extremely familiar*). Prior literature indicates that people's mood influences their deliberation tendencies (Bodenhausen, Kramer, & Süsser, 1994). Also, product knowledge influences price acceptability (Rao & Sieben, 1992) and utilization of product information cues (Rao & Monroe, 1988). Three respondents were excluded from the analysis because they did not complete the mediation measure.

7.2 Results

7.2.1 Choice of the low-price option

A logistic regression on the choice of the low-price option using price ending, effortful thinking, and their interaction term as independent variables revealed no main effect of price ending or effortful thinking ($ps > 0.50$). More importantly, and consistent with the findings of Study 2, there was a significant price ending \times effortful thinking two-way interaction ($\beta = -2.28$, Wald = 7.38, $p < 0.01$, OR = 0.10, 95%CI = [0.02, 0.53]). For participants in the high-effortful thinking condition, the choice share of the low-price option was higher in the nine-ending condition (83%) than in the zero-ending condition (56%; $\beta = 1.31$, Wald = 4.97, $p = 0.03$, OR = 3.71, 95%CI [1.17, 11.75]), supporting . For participants in the low-effortful thinking condition, the choice shares of the low-price option were not significantly different across the

price-ending conditions (62% vs. 81%; $\beta = -0.97$, Wald = 2.62, $p = 0.11$, OR = 0.38, 95%CI = [0.12, 1.23]). Similar results were obtained when participants' age, gender, mood, and product familiarity were included as covariates in the model.

7.2.2 Mediation analysis

H2 depicts that high-effortful thinking individuals' preference for nine-ending (vs. zero-ending) prices is driven by their greater tendency toward argument-based decision making. To test this hypothesis, a moderated mediation analysis was conducted using Model 7 of PROCESS macro (Hayes, 2012), where the independent variable was price ending, the moderator was effortful thinking, and the mediator was the justification differential index. The moderated mediation analysis returned evidence of significant mediation by the justification differential index. The 95% CI [-10.46, -1.49] for the justification differential index excluded zero. The justification index mediated the just-below prices effect only in the high-effortful thinking condition (95%CI [-6.56, -0.85]), not in the low-effortful thinking condition (95%CI [-0.50, 5.20]). Taken together, these results provided confirmatory evidence for H2.

We also conducted an ANOVA to obtain deeper understanding of the nature of the mediation effect. The dependent variable in this analysis was the justification differential index, and the independent variables were effortful thinking (high vs. low), price ending (nine vs. zero) conditions, and their interaction. The two-way ANOVA returned a significant interaction effect between effortful thinking and price ending, $F(1, 126) = 10.56$, $p = 0.001$. Contrasts revealed a significant difference in the justification differential index across the price-ending conditions among high effortful thinkers (1.82 in the nine-ending condition vs. 0.027 in the zero-ending condition), $F(1, 126) = 7.57$, $p = 0.007$. There was a reversal of this effect among low effortful thinkers, but the difference was marginally significant (0.513 in the nine-ending condition vs. 1.73 in the zero-ending condition), $F(1, 126) = 3.41$, $p = 0.067$.

8 STUDY 3B

8.1 Participants, procedure, and measures

This study was conducted to obtain a deeper understanding of the psychological mechanism underlying the effect we observed. We recruited 231 respondents through Amazon Mechanical Turk (55% female; $M_{age} = 37.85$). The study featured a 2 (effortful thinking: low vs. high) \times 2 (reliance on arguments: low vs. high) \times 2 (price-ending: nine vs. zero) between-subjects design. Two respondents were excluded due to their responses being inattentive.

Effortful thinking was manipulated using a procedure adapted from Nordgren and Dijksterhuis (2009). Please see Appendix C for the exact priming instrument. After attending to the effortful thinking prime, respondents were provided with a choice task similar to that in Study 3A. Right before making the choice, respondents in the high reliance on arguments condition were told that they would be asked to provide arguments supporting their choice on the next screen ("On the next screen, you will be asked to provide arguments supporting your choice"). Respondents in the low reliance on arguments condition simply made the choice as in Study 3A. On the next page, respondents were provided eight open-ended boxes and asked to generate their arguments

supporting the choice they had made. They could use as many of the eight boxes as they needed. Our expectation was that high-effortful thinkers will demonstrate the nine-ending effect regardless of whether or not reliance on arguments was encouraged during decision making. This is because these individuals, due to the mindset being activated, will already be motivated to rely on arguments in decision making, and external inducement of argument-based decision making will not affect their decision process. On the other hand, low-effortful thinkers' demonstration of the nine-ending effect will be influenced by the reliance on arguments manipulation. Because these individuals will not be motivated to rely on argument-based decision making, externally induced motivation for argument-based decision making will lead to enhanced nine-ending bias among them. These results will provide a clean evidence demonstrating that argument-based decision making explains the effects that we observed in earlier studies.

8.2 Results

We submitted the choice of the low-price option to a logistic regression where the independent variables were effortful thinking, reliance on arguments, price ending, and their interactions (effortful thinking \times reliance on arguments, price ending \times reliance on arguments, effortful thinking \times price ending, and effortful thinking \times price ending \times reliance on arguments). The analysis returned a significant three-way interaction between effortful thinking, price ending, and reliance on arguments ($\beta = -2.66$, Wald = 5.58, $p = 0.018$, OR = 0.070, 95%CI = [0.008, 0.636]). In breaking down the three-way interaction, we conducted two separate logistic regressions on the choice share of the low-price option for the high- and low-effortful thinking conditions. In both the regressions, the independent variables were price ending (nine vs. zero), reliance on arguments (low vs. high), and their interaction. As expected, among the low-effortful thinkers, the two-way interaction between reliance on argument and price ending was significant ($\beta = 1.86$, Wald = 5.44, $p = 0.020$, OR = 6.45, 95%CI = [1.35, 30.87]). Specifically, low effortful thinkers' choice share of the cheaper option was enhanced in the nine-ending condition relative to the zero-ending condition when argument-based decision making was encouraged (72% in the nine-ending condition vs. 40% in the zero-ending condition; $\beta = 1.36$, Wald = 7.19, $p = 0.007$, OR = 3.90, 95%CI = [1.44, 10.54]). This nine-ending effect disappeared in the absence of external motivation for argument-based decision making (61% in the nine-ending condition vs. 72% in the zero-ending condition; $\beta = -0.503$, Wald = 0.663, $p = 0.415$, OR = 0.605, 95%CI = [0.180, 2.028]). There was no main effect of either reliance on argument or price ending ($ps > 0.10$).

Moreover, as per our expectation, the two-way interaction between reliance on argument and price ending was nonsignificant ($\beta = -0.799$, Wald = 1.009, $p = 0.315$, OR = 0.450, 95%CI = [0.095, 2.138]) among high effortful thinkers. Without any external motivation to rely on argument-based decision making, high effortful thinkers demonstrated the nine-ending bias (choice share of the cheaper option 71% in the nine-ending condition vs. 48% in the zero-ending condition; $\beta = 0.968$, Wald = 3.073, $p = 0.08$, OR = 2.63, 95%CI = [0.892, 7.769]). A similar increase in choice share of the cheaper option in the nine-ending condition relative to the zero-ending condition was observed with external motivation for reliance on arguments in decision making, but the difference was not significant (65% in the nine-ending condition vs. 61% in the zero-ending condition; $\beta = 0.169$, Wald = 0.087, $p = 0.77$, OR = 1.18, 95%CI = [0.386, 3.636]). It is possible that with already existing reliance on argument-based decision making induced by

high effortful thinking, the external motivation for effortful thinking led to generation of arguments for the cheaper option even when it was round-numbered, leading to a nonsignificant difference across the price-ending conditions. This observation requires further investigation in future research. There was no main effect of either reliance on argument or price ending ($ps = 0.15$ and 0.78 , respectively).

Overall, these results support our proposition that reliance on argument-based decision making explains the effects that we observe in our studies. Next, we present outcomes from the thought listing task. We counted the number of thoughts each respondent had generated. We also coded the nature of the thought generated. Thoughts related to price of the item chosen were coded as 1, and all other thoughts were coded as 0. Examples of price-related thoughts include “It was cheaper,” “It was cheapest by far,” “This option was cheaper,” and simple mentions of “price” and the option being “cheaper.”

8.2.1 Percentage of price-related thoughts

Among low effortful thinkers, a one-way ANOVA revealed that the percentage of the thoughts related to the price of the item was significantly higher in the nine-ending condition relative to the zero-ending condition (30% vs. 12%) when respondents were provided with external motivation to rely on arguments, $F(1, 68) = 11.76, p = 0.001$. Among low effortful thinkers, the percentage of thoughts related to the price of the item was similar in the nine-ending condition to that in the zero-ending condition (13% vs. 14%), $F(1, 46) = 0.030, p = 0.863$, when no external motivation for reliance on arguments was present. Among high effortful thinkers, the percentage of thoughts related to the price of the item was significantly higher in the nine-ending condition relative to the zero-ending condition (27% vs. 12%) when no external motivation for reliance on argument was provided, $F(1, 53) = 6.19, p = 0.016$. On the other hand, there was no such difference in the percentage of thoughts related to the price of the item among high effortful thinkers when external motivation for reliance on argument was provided (22% vs. 21%), $F(1, 47) = 0.025, p = 0.875$. Similar results (in both direction and significance) were obtained when looking into the first thought that the respondents had generated supporting their choice. It is possible that respondents had written their strongest argument first. Next, we present outcomes with the number of thoughts/arguments generated as the dependent variable.

8.2.2 Number of arguments

Among low effortful thinkers, a one-way ANOVA revealed that the number of arguments was similar across the nine- and zero-ending conditions ($M = 4.41$ vs. 4.63) when respondents were provided external motivation to rely on arguments, $F(1, 69) = 0.276, p = 0.601$. Among low effortful thinkers, the number of arguments was similar across the nine- and zero-ending conditions ($M = 4.54$ vs. 4.92), and this difference was not significant, $F(1, 47) = 0.581, p = 0.450$, when no external motivation for reliance on arguments was present. Among high effortful thinkers, the number of arguments was similar across the nine- and zero-ending conditions ($M = 4.70$ vs. 5.10) when respondents were provided external motivation to rely on arguments, $F(1, 52) = 0.739, p = 0.394$. Among high effortful thinkers, the number of arguments was similar across the nine- and zero-ending conditions ($M = 4.45$ vs. 4.30) when respondents were provided no external motivation to rely on arguments, $F(1, 56) = 0.097, p = 0.757$.

The above results provide insights into the important question of whether it is the number of arguments or the nature of arguments that facilitates the nine-ending effect among effortful thinkers. The direction of these results suggests that it is the nature of the arguments related to the cost effectiveness of the item, rather than the number of arguments, that likely explains the effect we observed in our studies.

Thus far, all our studies tested the influence of effortful thinking on the just-below pricing effect for relatively low-value items. In the next study, we attempt to show that our findings hold regardless of the product type. We examine this relationship in a relatively high-value purchase context where consumers are typically more engaged in the decision process. To enhance the generalizability of our findings, we also employ an alternate procedure to manipulate effortful thinking.

9 STUDY 4

9.1 Participants, procedure, and measures

We recruited 110 MTurk participants (59 females; $M_{age} = 34.36$, $SD = 11.44$) to participate in a study that featured a 2 (effortful thinking: high vs. low) \times 2 (price-ending: nine vs. zero) between-subjects design. The effortful thinking prime was borrowed from Kardes, Cronley, Kellaris, and Posavac (2004). This priming instrument was different from the one used in earlier studies. One potential criticism of the manipulation used in prior studies is that in the low-effortful thinking condition, respondents' level of attention was so low that they may not have paid any attention to the stimuli at all. To ensure that such instances did not occur in our studies, we decided to use a different priming instrument in the current study.

In the high-effortful thinking condition, respondents read:

It is extremely important that you take your time and carefully consider your responses and answer the questions as accurately as possible. Make sure that your answers are correct and reflect your true opinion—accurate responses are very important. Your responses are anonymous and confidential, but there is a small group of people responding to the survey. Therefore, your responses will have a strong impact on the results of the study.

In the low-effortful thinking condition, respondents read:

It is not necessary to spend a great deal of time pondering the questions. In fact, please answer the questions as quickly as possible (while still providing an accurate answer) without taking a lot of time to ponder each one—simply provide your initial, honest opinion. Your responses are anonymous and confidential and your response will be combined with those of many others who participate in the study.

After the effortful thinking prime, participants were asked to imagine that they were shopping for laptops, and while evaluating different brands of laptops and their configurations, they came

across two options, HP and TOSHIBA. The price for the HP laptop was given as \$399.99 in the nine-ending condition and \$400.00 in the zero-ending condition, whereas the price for the TOSHIBA laptop remained fixed at \$500.00 across the nine- and zero-ending conditions. Brief configuration information for each laptop was provided just above the price information. Participants were asked to indicate their choice from the two available options.

Towards the end of the survey, participants were asked to recall and write the prices for both the HP and TOSHIBA laptops. It may happen that in the low-effortful thinking condition, participants' motivation to process information was reduced so much that they did not even pay attention to the price information. A similar degree of recall accuracy in both the high- and low-effortful thinking conditions would rule out such a possibility and ensure the validity of the priming instrument.

9.2 Results

No difference in recall accuracy was evident across the high-effortful thinking (74%) and low-effortful thinking (71%) conditions. The dependent variable, choice share of the low-price option (the HP laptop), and the independent variables (effortful thinking, price ending, and their interaction term) were submitted to a logistic regression. The analysis revealed no main effect of price ending or effortful thinking ($ps > 0.15$). Consistent with our expectation, there was a significant price ending \times effortful thinking two-way interaction ($\beta = -1.84$, Wald = 3.89, OR = 0.16, $p < 0.05$). The choice share of the low-price option was higher in the nine-ending condition (88%) than in the zero-ending condition (66%) for participants primed with high-effortful thinking ($\beta = 1.35$, Wald = 3.43, $p = 0.06$, OR = 3.86, 95%CI = [0.93, 16.10]). Although the choice share of the low-price option was lower in the nine-ending condition (61%) than in the zero-ending condition (72%) for participants primed with low effortful thinking ($\beta = -0.49$, Wald = 0.70, $p = 0.40$, OR = 0.62, 95% CI = [0.19, 1.91]), this difference was nonsignificant (Figure 3).

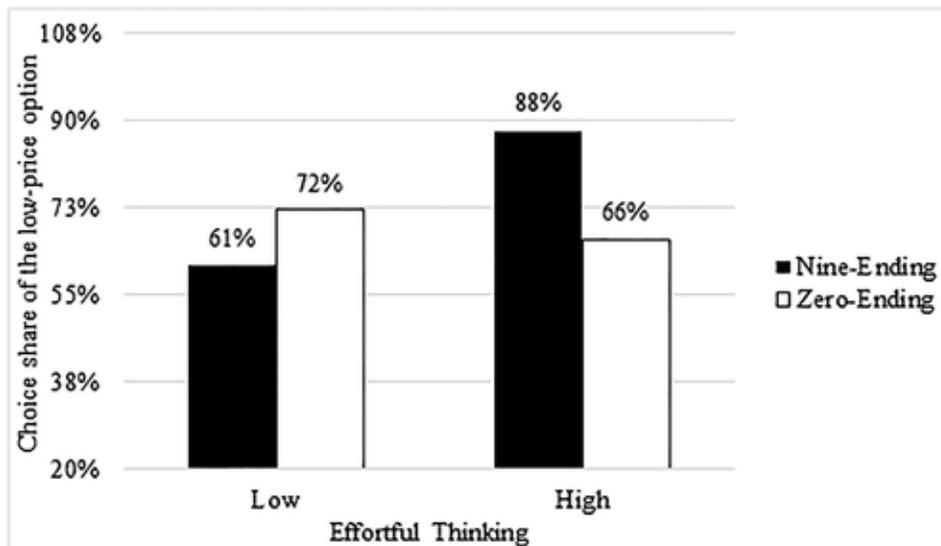


Figure 3. Choice share of the low-price option as a function of nine- and zero-ending (Study 4)

9.3 Discussion

Study 4 provided converging evidence in a high-involvement product choice situation. In the next study, we manipulated locus of deliberation (quality vs. price). On the basis of our theorization, effortful thinking enhances consumers' inclination towards argument-based decision making, which enhances their susceptibility to utilizing the just-below prices as a reasonable argument to judge an item to be inexpensive. But what if consumers' deliberation is focused on some nonprice attribute? Will effortful thinking continue to enhance preference for just-below prices? If our theory is valid, when locus of deliberation is on price, we should replicate the findings in previous studies. However, if locus of deliberation is on quality, high and low effortful thinkers should have similar preferences for the low-price option. In other words, only when a consumer thinks effortfully about the price information will she interpret the just-below pricing cue as a sound rationale for decision making. Thus, if the consumer is motivated to think effortfully but focuses on a nonprice attribute, the just-below pricing effect will be subdued.

It is worth noting that in Studies 3A and 4, we have observed a reversal of the nine-ending effect among low-effortful thinkers. Although this reversal was not statistically significant, the directional pattern may signal that it is possible that low-effortful thinking may lead to enhanced preference for zero-ending prices. This effect may take place due to the fact that zero-ending prices are processed fluently, and low-effortful thinking leads to processing fluency-driven preference. Future research is necessary to obtain further understanding of this matter.

10 STUDY 5

10.1 Participants, procedure, and measures

This study included 246 respondents from MTurk (46% females; $M_{age} = 32.11$, $SD = 9.98$) and featured a 2 (locus of deliberation: price vs. quality) \times 2 (effortful thinking: low vs. high) \times 2 (price ending: nine vs. zero) between-subjects design. Locus of deliberation and effortful thinking were primed using the stimuli adapted from Nordgren and Dijksterhuis (2009). In the deliberation-on-price conditions, participants in the high- [low-] effortful thinking prime were told:

You are about to see a pair of chocolate brands. Your task is to evaluate each brand and indicate your preference among the two.

New research has shown that people can make more accurate judgments while evaluating prices of objects if they make very deliberate decisions. This means that for each chocolate you should think very hard about the chocolate's price, trying to generate clear reasons that support your choice. [You are about to see a pair of chocolate brands. Your task is to evaluate each brand and indicate your preference among the two.

New research has shown that people can make more accurate judgments while evaluating prices of objects if they make quick decisions based on a gut feeling. This means that for each chocolate brand you should base your judgment of its price on your first impression].

In the deliberation-on-quality conditions, participants in the high- [low-] effortful thinking prime were told:

You are about to see a pair of chocolate brands. Your task is to evaluate each brand and indicate your preference among the two.

New research has shown that people can make more accurate judgments while evaluating quality of objects if they make very deliberate decisions. This means that for each chocolate you should think very hard about the chocolate's quality, trying to generate clear reasons that support your choice. [You are about to see a pair of chocolate brands. Your task is to evaluate each brand and indicate your preference among the two.

New research has shown that people can make more accurate judgments while evaluating quality of objects if they make quick decisions based on a gut feeling. This means that for each chocolate brand you should base your judgment of its quality on your first impression].

After attending to locus of deliberation priming, participants were asked to imagine that they were shopping for chocolates at a nearby Wal-Mart and came across two options: (a) Lindt chocolate truffles and (b) Ferrero Rocher chocolates. The price for the Lindt chocolate truffles varied from \$4.99 in the nine-ending condition to \$5.00 in the zero-ending condition, whereas the price for the Ferrero Rocher chocolate remained constant at \$6.00 across the conditions. Participants' choice between the two options was kept as the dependent variable.

10.2 Results

We conducted two separate logistic regressions on the choice share of the low-price option. The independent variables in the first analysis were price ending (nine vs. zero), deliberation on price (high vs. low), and their interaction term. There were no main effects of deliberation on price or price ending ($p > 0.20$). More importantly, and consistent with our theorization, there was a significant deliberation on price \times price ending two-way interaction ($\beta = -1.67$, Wald = 4.05, $p = 0.04$, OR = 0.19, 95%CI = [0.04, 0.96]). The choice share of the low-price option was higher in the nine-ending (85%) condition than in the zero-ending (61%) condition for participants primed with high deliberation on price ($\beta = 1.27$, Wald = 3.84, $p = 0.05$, OR = 3.58, 95%CI = [1.00, 12.78]) but lower in the nine-ending condition (55%) than in the zero-ending (65%) condition for those primed with low deliberation on price ($\beta = -0.40$, Wald = 0.59, $p = 0.44$, OR = 0.67, 95%CI = [0.24, 1.85]). A second analysis was conducted with deliberation on quality (high vs. low), price ending (nine vs. zero), and their interaction term as the independent variables. There was no main effect of deliberation on quality or price ending ($p > 0.50$). Consistent with our expectations, the two-way interaction between price ending and deliberation on quality was not significant either ($\beta = -0.41$, Wald = 0.29, $p = 0.59$). The three-way interaction between thoughtfulness, deliberation on price versus quality, and price ending was nonsignificant ($\beta = -1.26$, Wald = 1.24, $p = 0.27$). These results are presented in Figure 4.

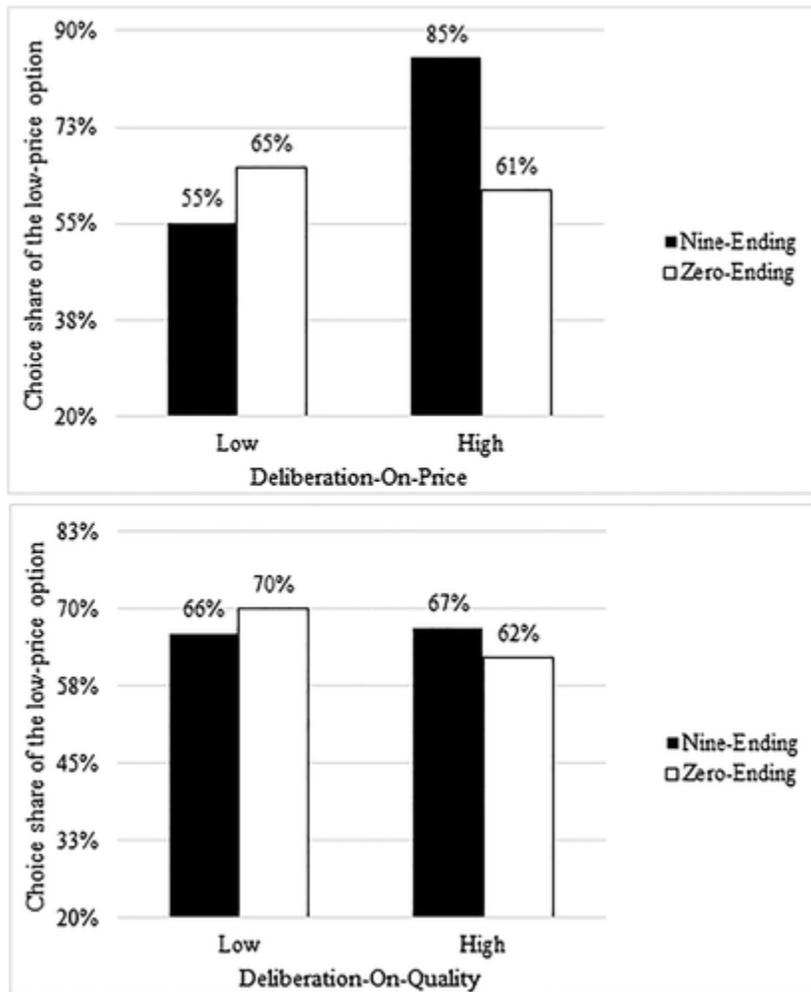


Figure 4. Deliberation on price or quality as a boundary condition (Study 5)

11 GENERAL DISCUSSION

In five studies, this research shows that consumers' preference for nine-ending vs. zero-ending prices is contingent upon their degrees of effortful thinking. With an increase in effortful thinking, consumers' preference for just below nine-ending prices increases. This effect is mainly driven by high-effortful thinking individuals' greater tendency to engage in argument-based decision making. In contrast, low-effortful thinking individuals prefer zero-ending over nine-ending prices, and this is due to their greater predilection to options with easily processed price information. Through a measure of chronic (Study 1A) and situationally activated (Studies 1B and 2) effortful thinking, the first three studies provide consistent evidence for our hypothesized effects in different decision situations. Replicating the findings of Studies 1 and 2, Study 3 (A and B) further demonstrates that argument-based decision making is the major driver of this effect. Extending the decisions from low-involvement products to high-involvement ones, Study 4 replicates the findings of previous studies. Study 5 provides additional evidence for our argument-based account through experimentally manipulated locus of deliberation, showing that the just-below pricing effect occurs only when consumers deliberate on price information. When consumers are motivated to deliberate on a nonprice attribute, the just-below pricing effect is

subdued. As shown in Appendix D, the findings of these studies are consistent with our theorization.

11.1 Theoretical contributions

This research contributes to the literature in three important ways. First, we add to the literature on cognitive motivation by showing that effortful thinking does not always lead to rational outcomes in marketplace decisions. Previous research shows that the desire to make justifiable decisions can sometimes lead to biased choices (Shafir, Simonson, & Tversky, 1993; Simonson, 1989). As Simonson (1989) argued, decisions based on “shallow but nice-sounding rationales” may be seen as more justifiable but can often hurt decision efficiency and lead to violations of various basic principles of rational choice. Our findings indicate that something similar happens when highly motivated consumers examine nine-ending prices that are just below the adjacent round-ending prices. Also, these findings shed lights on the mechanisms underlying the effects and identify novel boundary conditions for the influence of effortful thinking on consumers' preference for just-below prices.

It is not unusual to see that argument- or reason-based strategies, likely outcomes of effortful thinking, can lead to biased behavior. Mercier and Sperber (2011), for example, asserted that several heuristics and biases (e.g., confirmation bias, attitude polarization, and disjunction effect) may be consequences of such argument-based decision making. A case in point is the elicitation bias demonstrated by Shafir (1993). Enriched options (extremely negative or positive aspects) are favored over impoverished options (about average in most aspects) in choice tasks but not in rejection tasks. Enhanced reliance on argument-based decisions is the primary cause for such preference shift: Enriched options provide strong arguments for both being chosen and being rejected (Downs & Shafir, 1999). In a similar fashion, just-below pricing also provides a seemingly sound argument for consumer decision making. It gives a perception of greater savings and provides reinforcing arguments in favor of the just-below pricing option (Quigley & Notarantonio, 1992; Schindler & Kibarian, 1996). This is similar to how effortful thinking leads to greater price consciousness. To the extent that just-below pricing signals a low price, high-effortful thinking consumers are more influenced by it.

Second, these findings provide a basis for understanding how the just-below bias can persist even in high-involvement contexts where consumers typically engage in significant deliberation. Using archival car purchase data, Busse, Knittel, and Zettelmeyer (2013) demonstrated that the prices for used cars drop discontinuously at 10,000-mile odometer thresholds. This is a nonprice version of the just-below bias where consumers care about just-below miles instead of just-below prices. Similarly, Thomas, Simon, and Kadiyali (2010) revealed the “price precision” effect, where even for extremely high-involvement consumptions like purchasing a house, consumers incorrectly perceive precise large prices (such as \$364,578) to have lower magnitudes than comparable but lower round prices (such as \$364,000). Our findings suggest that such biases persist, and perhaps intensify, when consumers exercise effortful thinking. Our argument-based thinking account of the nine-ending prices also finds resonance in Choi, Jessica, Rangan, Chatterjee, and Singh (2014), who demonstrated that the discount image associated with nine-endings provides greater justifiability for the option.

Finally, it helps reconcile the mixed findings in the literature on just-below prices by showing that consumers' level of effortful thinking at the time of making decisions plays a critical role in influencing the effectiveness of just-below prices. Our findings indicate that the just-below pricing effect is complex in nature, because an implicit discount cue is embedded in these prices and provides consumers scope for deliberation. Such possibility lures individuals high in effortful thinking and leads them to prefer items priced at just below a round number.

11.2 Managerial implications

In addition to theoretical contributions, our research also provides important managerial implications for marketing managers. According to our findings, we may specify the price of a bicycle as \$111.99 when it is actually priced at \$112.00. Numbers are subject to rounding or approximation when they carry value signals (e.g., price of a product; Hinrichs & Novick, 1982; Monroe & Lee, 1999). Our findings indicate that magnitude perception of value-expressive numbers (i.e., prices) is conditional on consumers' effortful thinking. When value-expressive numbers contain implicit signals (i.e., discount cues) that are conducive to goal attainment (i.e., maximizing shopping value), high-effortful thinking consumers are more likely to form a biased perception of the magnitude of such numbers than nonthinkers.

Our findings also indicate how consumers can mitigate this illusionary effect of the pricing phenomenon. In Study 5, we demonstrate that the nine-ending effect can be mitigated when consumers primarily deliberate on the quality of the product rather than its price. Armed with this information, marketing managers may use situational cues (e.g., advertisements) to direct consumers' focus onto quality when round-numbered pricing is used, or to direct their focus onto price when nine-ending prices are used.

11.3 Limitations and future research

Although the present research offers initial insights into the effect of effortful thinking on consumer preference for just-below prices, future research can expand the study to examine the longitudinal impact of just-below prices—such as whether the just-below pricing effect strengthens over time among effortful thinkers. If high-effortful thinking consumers are more likely to engage in meaning-based processing of just-below prices, it is likely that such a meaning will be stored in their long-term memory and manifest itself as an enduring positive attitude about the focal option. Another interesting investigation would be to study the effectiveness of just-below prices and round-numbered prices across various media, as certain media (e.g., TV) require more involvement than others (e.g., billboards; Janiszewski, Noel, & Sawyer, 2003).

Our study can also be extended to explore the impact of effortful thinking on other price perception effects. Many of the behavioral pricing phenomena examined in consumer psychology can be attributed to overuse of irrelevant information, rather than underuse of relevant cues. The payment depreciation and transaction coupling phenomenon, for instance, would fade away if consumers ignored previous sunk investments (Gourville & Soman, 1998). Similarly, relative thinking in price perception, where \$5 saved on a \$20 item seems more valuable than the same \$5 saved on a \$200 item (Thaler, 1985), would not exist if consumers

ignored the base price of the item on which the \$5 saving is accrued. It is likely that effortful thinking may also similarly enhance such price perception biases by drawing attention to all cues, both relevant and irrelevant.

Finally, future research may examine whether cognitive ability enhances the nine-ending bias or any other decision biases in a similar manner as effortful thinking does. In our studies, we have situationally manipulated effortful thinking, which we believe shares commonality with people's need for cognition. For example, individuals who are high in NFC and those who are situationally motivated to think effortfully will prefer attending to complex problems that require much cognitive deliberation relative to simple ones. Also, both these groups are likely to find greater satisfaction from solving complex (rather than simple) problems. However, it remains an interesting question as to whether lower effortful thinking inherently leads to similar decision outcomes when cognitive constraints (such as cognitive load) are imposed. We conducted a study where we provided respondents the nine-ending stimuli as in our Study 3 and then asked them to complete the Cognitive Reflection Test (CRT; Frederick, 2005). The stimuli were entered as part of a larger study conducted among 303 respondents. The interaction between the nine-ending condition and CRT was nonsignificant ($\beta = -0.68$, Wald = 1.96, $p = 0.16$, OR = 0.519), but the study revealed important insights. Individuals with high CRT scores (who could solve at least two problems; $n = 133$) demonstrated the nine-ending effect. Their choice share of the low-priced option was significantly enhanced in the nine-ending condition (55%) than in the zero-ending condition (38%; $\beta = 0.704$, Wald = 3.98, $p = 0.046$, OR = 2.02). Among individuals with low CRT scores, the choice share of the low-priced option was similar in the nine-ending condition relative to that in the zero-ending condition (45% vs. 44%; $\beta = 0.048$, Wald = 0.024, $p = 0.877$, OR = 1.05). These results indicate that, like high effort in thinking, higher ability in thinking may lead to an enhanced nine-ending effect. Prior research has shown that cognitive motivations and cognitive capacity may not be interchangeable (Drolet et al., 2009). Alignment of the above findings with those of our main studies, however, exhibits that in certain contexts, the effects of cognitive motivation and cognitive capacity may work in the same direction.

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APPENDIX A. FOLLOW-UP STUDY OF STUDY 1A

A.1 Participants, procedure, and measures

We recruited 56 participants (33 males; $M_{\text{age}} = 32.87$, $SD = 11.46$) from an online panel, Amazon Mechanical Turk. Price condition (\$3.99 vs. \$4.00) was manipulated between subjects, and participants' need for cognition (NFC) was measured as the key independent variable. Participants were asked to imagine that a new ice cream store was opening in their locality, and the store wanted to know how consumers perceive prices of certain items. They were given the picture of a hot fudge sundae with its price stated either as \$3.99 (nine-ending condition) or as \$4.00 (zero-ending condition). Participants, on a seven-point scale, indicated their perception of whether the price of the item was high. Specifically, they were asked how much they agreed with the statement “price for the above item is high” where 1 = *strongly agree* and 7 = *strongly disagree*. Thus, higher scores indicated that the price for the item was perceived to be inexpensive. After indicating their price perception, participants completed the 18-item NFC scale ($-4 = \textit{very strongly disagree}$; $+4 = \textit{very strongly agree}$; $\alpha = 0.91$) developed by Cacioppo and Petty (1982).

A.2 Results

We conducted a series of regression analysis where the dependent variable was price perception. In the first regression, the independent variable was price conditions. The analysis revealed a significant main effect of price conditions ($\beta = -0.93$, $SE = 0.39$, $t = -2.37$, 95% CI $[-1.72, -0.14]$, $p = 0.022$), in that participants perceived the price of the item to be significantly lower in the nine-ending condition than in the zero-ending condition (nine-ending: $M = 4.71$, $SD = 1.56$; zero-ending: $M = 3.79$, $SD = 1.37$). The second regression tested the main effect of NFC where the independent variable was mean-centered NFC. This analysis returned no main effect for NFC ($\beta = 0.04$, $SE = 0.17$, $t = 0.22$, 95% CI $[-0.31, 0.39]$, $p > 0.80$). Finally, the third regression tested the interaction effect between price conditions and NFC (mean-centered) ($\beta = -0.74$,

$SE = 0.32, t = -2.29, 95\% \text{ CI } [-1.39, -0.09], p = 0.026$). The interaction effect showed that high-NFC individuals perceived the price to be significantly lower in the nine-ending condition ($M = 5.27, SD = 1.16$) than in the zero-ending condition ($M = 3.77, SD = 1.48$) whereas the low-NFC individuals did not show any variation of price perception across conditions (nine-ending: $M = 4.00, SD = 1.89$; zero-ending: $M = 3.86, SD = 1.35$). A breakdown of the interaction effect also showed that price perception was significantly lower in the nine-ending condition relative to the zero-ending condition for the high-NFC group ($\beta = -1.54, SE = 0.47, t = -3.28, p = 0.003$), whereas there was no such difference for the low-NFC group ($\beta = -0.14, SE = 0.62, t = -0.23, p > 0.80$). Similar results were obtained after controlling for age and gender of the participants.

APPENDIX B. FOLLOW-UP STUDY OF STUDY 1B

B.1 Participants, procedure, and measures

We recruited 154 participants through Amazon Mechanical Turk (79 females; $M_{\text{age}} = 32.28, SD = 11.36$). We employed a 2 (\$3.99 vs. \$4.00) \times 2 (high effortful thinking vs. low effortful thinking) between-subjects design. The experiment design was similar to the other experiment (follow-up study of Study 1A) except that in this study, we manipulated effortful thinking following a procedure from Priester et al. (2004, Experiment 2). That is, the same priming instruments as in Study 1B in the main paper was used to prime effortful thinking.

B.1 Results

We submitted the dependent variable price perception to a two-way analysis of variance with effortful thinking (high vs. low) and price ending (nine vs. zero) as between-subjects variables. A significant main effect of price ending was observed, indicating the presence of a nine-ending effect, $F(1,150) = 5.49, p = 0.020, \eta_p^2 = 0.035$. The main effect of effortful thinking was nonsignificant, $F(1,150) = 1.09, p = 0.297$. More pertinent to our theorizing, there was a significant interaction effect between the effortful thinking conditions and price ending ($F(1,150) = 5.34, p = 0.022, \eta_p^2 = 0.034$). The interaction effect revealed that participants in the high-effortful thinking condition showed significantly lower price perception in the nine-ending condition than in the zero-ending condition (nine-ending: $M = 4.63, SD = 1.56, 95\% \text{ CI } [4.13, 5.13]$; zero-ending: $M = 3.43, SD = 1.57, 95\% \text{ CI } [2.92, 3.92]$), $F(1,150) = 11.43, p < 0.01, \eta_p^2 = 0.071$. Participants in the low-effortful thinking condition did not show any such difference in price perception across the price conditions (nine-ending: $M = 4.31, SD = 1.67, 95\% \text{ CI } [3.78, 4.83]$; zero-ending: $M = 4.30, SD = 1.65, 95\% \text{ CI } [3.77, 4.82]$), $F(1,150) = 0.0004, p > 0.90$.

APPENDIX C. STIMULI FOR STUDIES 2 AND 3



Baby Care "Little Monkey" Gift
Box with Keepsake Basket

\$19⁹⁹



Sweet Memories Gift Set with Keepsake
Photo Box Ultimate Care Package for Babies

\$30⁰⁰

Imagine that you are looking for a gift for an office colleague, who has just had a baby. You have narrowed your choice to the two items shown above. Which of the gifts shown above are you more likely to choose?

-
-

C.1 Effortful thinking prime for Study 3B

C.1.1 High effortful thinking

In this study, we are interested in people's decision making. New research has shown that people can make more accurate choices if they make very deliberate decisions. This means that for most situations, you should think very hard and try to generate clear reasons for your choices while making your final decision.

In the space below, please recall and describe in detail a decision where you thought carefully before you decided what to do.

C.1.2 Low effortful thinking

In this study, we are interested in people's decision making. New research has shown that people can make more accurate choices if they make quick decisions based on gut feelings. This means that for most situations you should base your judgment on your intuition and rely on first gut reactions while making your final decision.

In the space below, please recall and describe in detail a decision where you trusted your intuition and gut feelings in deciding what to do.

APPENDIX D. SUMMARY OF FINDINGS (STUDIES 1B-5)

Study	Two-way interaction	Key findings
1B	2 (effortful thinking: high vs. low) × 2 (price ending: nine vs. zero)	High (vs. low) effortful thinking leads to lower magnitude perception of nine-ending prices compared to zero-ending prices.
2	2 (effortful thinking: low vs. high) × 2 (price ending: zero vs. nine)	High (vs. low) effortful thinking leads to enhanced preference for nine-ending prices over zero-ending prices.
3A	2 (effortful thinking: low vs. high) × 2 (price ending: zero vs. nine)	High (vs. low) effortful thinking leads to enhanced preference for nine-ending prices over zero-ending prices.
3B	2 (effortful thinking: low vs. high) × 2 (reliance on arguments: low vs. high) × 2 (price ending: nine vs. zero)	When reliance on arguments is low, high (vs. low) effortful thinking leads to enhanced preference for nine-ending prices over zero-ending prices When reliance on arguments is high, both high and low effortful thinking prefer for nine-ending prices over zero-ending prices.
4	2 (effortful thinking: high vs. low) × 2 (price ending: nine vs. zero)	High (vs. low) effortful thinking leads to enhanced preference for nine-ending prices over zero-ending prices.
5	2 (locus of deliberation: price vs. quality) × 2 (effortful thinking: low vs. high) × 2 (price ending: nine vs. zero)	When locus of deliberation is on price, high (vs. low) effortful thinking leads to enhanced preference for nine-ending prices over zero-ending prices. When locus of deliberation is on quality, neither high nor low effortful thinking leads to preference for nine-ending prices over zero-ending prices.