臺大管理論叢 2016/6
第 26 卷 第 2 期 73-106
DOI: 10.6226/NTUMR.2016.SEP.A102-066

九尾數定價效果在不同評估模式中的侷限：分別、聯合與依序評估

The Boundary Conditions of the Nine-Ending Pricing Effect in Different Evaluation Modes: Separate, Joint and Sequential

鄭尹惠 / 國立臺中教育大學國際企業學系副教授
Yin-Hui Cheng, Associate Professor, Department of International Business, National Taichung University of Education

莊世杰 / 國立中正大學企業管理學系教授
Shih-Chieh Chuang, Professor, Department of Business Administration, National Chung Cheng University

張佳榮 / 國立臺灣師範大學企業管理學系助理教授
Chia-Jung Chang, Assistant Professor, Department of Business Administration, National Taiwan Normal University

鄭為遠 / 國立中正大學行銷管理研究所碩士
Wei-Yun Cheng, Master, Graduate Institute of Marketing Management, National Chung Cheng University

Received 2013/10, Final revision received 2014/9

摘 要

基於捷思－系統雙元訊息處理模型，當九尾數與零尾數的價格以分別、聯合與依序進行評估時，此研究藉此確認九尾數定價效果的有限性。研究一證實九尾數定價效果會出現在分別評估模式，但不會出現於聯合評估模式。研究二增加了依序評估模式並在購買預算的條件下衡量實際購買數量。結果與研究一相符，且驗證在分別評估模式時，有不同最左端數字的九尾數與零尾數之知覺價格差異大於在聯合評估模式。研究四操弄了任務複雜度且結果發現因為較高任務複雜度造成認知能力超過人們負荷時，九尾數效果將消失。

【關鍵字】九尾數定價效果、評估模式、捷思－系統雙元訊息處理模型

Abstract

This paper, which is based on a heuristic-systematic dual-process model, identifies the boundary conditions of the nine-ending pricing effect when nine-ending and zero-ending prices are separately, jointly, and sequentially evaluated. Study 1 proves the occurrence of the nine-ending effect in separate, but not joint, evaluation conditions. Study 2 adds an extra sequential evaluation mode to Study 1 and measures actual quantitative estimations with a shopping budget. The results are consistent with those from Study 1. The results of Study 3 demonstrate that the perceived price difference between nine- and zero-ending digits with different leftmost digits is greater in the separate-evaluation mode than it is in the joint-evaluation mode. In Study 4, task complexity is manipulated and the results show that no nine-ending effect is observed when cognitive capacity, which is induced by greater task complexity, exceeds the capabilities that people possess.

【Keywords】nine-ending pricing effect, evaluation modes, heuristic-systematic model

1. Introduction

The research streams of the nine-ending pricing strategy, which is widely used among retailers, have shown inconsistent results. In the initial stage of research, there exists doubt about the effect of nine-ending pricing on magnitude perception (e.g., Gabor and Granger, 1964), and more recent research has indicated that people's responses are not affected by a very small price change (e.g., Monroe, 2003; Monroe and Lee, 1999).

However, Bizer and Schindler (2005) provide evidence supporting the effectiveness of nine-ending prices via the drop-off mechanism, and Thomas and Morwitz (2005) find evidence of a left-digit effect and distance effect. Stiving and Winer (1997) explain the nine-ending price endings by referring to level and image effects. Researchers provide some explanations for nine-ending effect, but why are there so many inconsistent results? Combined with Evaluability Hypothesis proposed by Hsee (1996) to explain how joint and separate evaluation modes may reverse consumers' preference, this article infers that the possible reason for the inconsistence may be caused by the different evaluation modes (joint and separate evaluation modes).

Most of these experimental conditions evaluate the nine-ending effect separately (e.g., Bizer and Schindler, 2005; Manning and Sprott, 2009). Only Thomas and Morwitz (2005) study lets people evaluate prices in joint mode, but their experiments focus on measuring the price magnitude perception of the target price after comparing this magnitude with the reference price of the same product. In other words, the target prices of two products are not being directly compared side by side as in the real world (e.g., product prices printed on direct mail [DM], in-store shelves, and on the Internet; see Appendix Figure 1 and 2). In order to determine whether nine-ending pricing influences actual purchasing decisions when nine-ending and zero-ending prices are presented side by side or sequentially, as in the real world,[1] this article investigates how different evaluation modes influence the nine-ending effect both in theory and practice.

According to the preceding discussion, we develop a conceptual framework based on a heuristic-systematic dual-process model (HSM), which states that people may make a decision based on either a systematic process or a heuristic process, to explore the boundary

1 According to single-option aversion, which documents that people have the desire to search when faced with a single option (Mochon, 2013), consumers tend to recall a reference price from their prior experience and memory, or compare the prices of the similar products near the target one. That is, in daily life, joint and sequential evaluation modes are used by consumers more frequently than separate evaluation mode.

conditions of nine-ending effects, and to extend the research to incorporate different evaluation modes. Experimental results are presented and concluding remarks are provided together with implications and directions for future research.

2. Literature Review

2.1 Evaluation Modes: Separate, Joint and Sequential

The Evaluability Hypothesis maintains that it is more difficult to evaluate the desirability of values associated with certain attributes than those associated with others, and that compared to easy-to-evaluate attributes, difficult-to-evaluate attributes will have a greater influence on joint evaluation (JE) than on separate evaluation (SE) (Hsee, 1996; Hsee, Loewenstein, Blount, and Bazerman, 1999). As these terms imply, SE refers to the condition where two stimulus options are separately presented and evaluated, whereas JE refers to the condition where two stimulus options are presented and evaluated side by side at the same time (Goldstein and Einhorn, 1987). These evaluation modes are utilized to argue against normative decision theories, which suggest that regardless of the way preferences are elicited, people's preferences remain unchanged; in reality, people may display different or even reverse preferences within two normatively equivalent evaluation conditions (Hsee, 1996; Schmeltzer, Caverni, and Warglien, 2004). Hence, the preference for stimulus options changes according to the evaluation condition.

For example, Hsee (1996) has designed a second-hand dictionary scenario to examine the amount that people say they are willing to pay. Dictionary A contains 10,000 entries and looks new; Dictionary B contains 20,000 entries and has a torn cover. The results show that people will assign a higher price to dictionary A ($24) than to dictionary B ($20) when they make their judgment in the SE mode. However, in the JE condition, the opposite results occur: people assign a higher price to dictionary B ($27) than to dictionary A ($19). In this example, the number of entries is regarded as a difficult-to-evaluate attribute in the SE mode; thus, the easy-to-evaluate attribute, "new" versus "old," has a greater influence on the people, who are more willing to pay for Dictionary A than Dictionary B. Conversely, as the Evaluability Hypothesis[2] proposes, people will compare the difficult-to-evaluate attribute in

2 Although researchers use Evaluability Hypothesis to explain the comparisons among two or more attributes, it is reasonable to compare the single attribute of price in this article. Based on prior studies, price may play a dual role in consumers' product evaluations at the same time. For example, Bornemann and Homburg (2011) present that consumers may interpret price information as either an indicator of quality or an indicator of monetary sacrifice when evaluating a product. That is, the extension of Evaluability Hypothesis is suitable and acceptable here.

the JE mode and put more weight on this attribute than they do in the SE mode. Stated differently, a preference reversal occurs in the joint condition.

According to Bettman and Kakkar (1977) study, they present that the information format in which information is given has a great influence on the information processes (Kleinmuntz and Schkade, 1993; Schkade and Kleinmuntz, 1994). We can infer, therefore, that SE and JE, which are different information formats, may affect the judgment and decision-making processes used by people. Consistent with the Change-of-Process Theory, which states that the processes by which people combine information vary as a function of the task (Mellers, Chang, Birnbaum, and Ordóñez, 1992), we maintain that the preference between price and rating will be reversed by many factors, such as the display of information and the demand of cognitive effort (Garbarino and Edell, 1997; Payne, 1982). It is therefore reasonable to suppose that people will make more effort to judge the difficult-to-evaluate attributes in the JE condition when simultaneously comparing them to easy-to-evaluate attributes. In other words, more cognitive effort will be required when making a decision in the JE mode than in the SE mode. Similarly to the comparisons of single attribute of price, consumers may recall the possible reference price of this product intuitively in the SE mode, whereas they may make much cognitive effort to compare nine- and zero-ending prices first and then judge whether having to recall another reference price in JE mode.

Explained in terms of HSM, if people need to exert a lot of mental effort in performing a task, they tend to use a systematic process for judgment and decision making; conversely, people will use a heuristic process if less effort is exerted to judge and make decisions (Chaiken, 1980, 1987; Chaiken and Maheswaran, 1994). Thus, this paper infers that people will tend to use a systematic process in the JE mode when simultaneously comparing nine- and zero-ending prices and a heuristic process in the SE mode.

In addition to extending Hsee (1996) Evaluability Hypothesis to include the SE and JE conditions, this study investigates a third condition, the “sequential evaluation” (SQE) condition, which is examined alongside the other two. It is constructed as the midpoint between the SE and JE conditions with the stimulus options evaluated back-to-back in a sequence (Moore, 1999). Bartels (2006) further explains that consumers may make an absolute judgment first and then take the first price as a reference price to make a possible comparative judgment strategy when facing a sequential mode. The significance of the SQE mode is that it is becoming more and more common in the real world. For example, people often click “next” button page by page to browse the information on products when they try to buy things on the Internet. Even in physical retail stores, people may also remember

information presented in the first store they visited, and then compare it with the information given in the next store. In both conditions of the virtual and physical stores, the sum of cognitive effort required to judge nine- and zero-ending prices in the SQE mode is midway between the SE and JE modes: more effort to make a comparative judgment is required than in the SE condition and less effort to recall a reference price is required than in the JE condition.

2.2 Nine-Ending Pricing Effect

Prices can be segmented into two elements: (1) the leftmost digit and (2) the digits to the right of the leftmost digit, which are known as the ending digits (Bizer and Schindler, 2005; Coulter, 2001). The literature shows mixed evidence as to whether people perceive products with nine-ending prices to be much lower in price than ones with zero-ending prices that are one cent or one dollar higher. Several theories have been proposed to explain the preponderance of nine-ending prices. Stiving and Winer (1997) have explained these theories and broadly categorized them into image effect and level effect, which are two consumer behavioral explanations. Image effect includes two aspects: price image and quality image. Stiving and Winer (1997), and Baumgartner and Steiner (2007) maintain that price image indicates that the products are on sale and at the lowest price when the prices end in 99, and quality image assumes that odd prices are considered low-quality products, while even prices indicate high-quality merchandise (Gendall, Holdershaw, and Garland, 1997; Schindler, 1991, 2001, 2006; Schindler and Kibarian, 1996, 2001; Stiving, 2000).

Level effect can be categorized into three aspects: “rounding down”, “left-to-right comparison”, and “memory effect”. The rounding down mechanism (drop-off mechanism) is commonly proposed in support of the effect of nine-ending pricing on magnitude perception (Bizer and Schindler, 2005; Brenner and Brenner, 1982; Schindler, 1984; Stiving and Winer, 1997). According to this theory, when people see a price, they pay very little or no attention to the ending digits; hence, the term “price ending drop off” (Manning and Sprott, 2009; Schindler, 1991; Schindler and Kirby, 1997). For example, when people see a price of $199, they may perceive the price ending digits as zero, making the price virtually equivalent to $100. They may also see the price as $200. The former circumstance reflects the tendency of people to drop off or give less attention to the ending digits of a price.

Bizer and Schindler (2005) have developed a new experimental approach to demonstrate numerical drop-off and avoid two major causes of failures in research into the nine-ending pricing effect. These two causes are high variation among open-ended responses

in free-recall tasks (e.g., short-term price recall in the study of Schindler and Kibarian, 1993) and unrealistic conditions (e.g., the several minutes given to respondents to examine an advertisement showing only one price in the study of Schindler and Kibarian, 1993). Respondents in the study of Bizer and Schindler (2005) were asked to make quantitative estimations of the number of items with either nine-ending prices (e.g., $2.99, $4.99) or zero-ending prices one penny higher (e.g., $3.00, $5.00) that could be purchased given a total budget of $73. If people do indeed drop off the last digits of a nine-ending price during the perception process, then this would make the perceived price much smaller than it actually is (e.g., perceiving $2.99 as $2.00), which would cause the quantitative estimation of items with nine-ending prices to be much greater than that of items with zero-ending prices, as more items could be purchased within a given budget for a lower perceived price (Bizer and Schindler, 2005). For example, the number of items that could be purchased for $73 for the prices $2.99 and $3.00 is practically the same (24.3 items vs. 24.4 items). However, if the actual price of $2.99 is perceived as $2.00 or a price somewhere between $2.00 and $3.00 by dropping off the ending digits, then the quantitative volume that could be purchased for $73 would be much greater (more than 24.3 items, at least) than that given a price of $3.00.

Stiving and Winer (1997) propose that rounding down and left to right comparison are not similar, but closely related. Rounding down and left to right comparison seem indistinguishable and lead to identical results when the left-hand digits are different; however, left to right comparison may be regarded as a modified version of rounding down when the left-hand digits are the same. In addition, memory effect, which takes into consideration an individual's limited memory capacity, means that people merely remember the first digits of a price and have poorer memories for odd prices than for even prices. Consistent with the later studies of Thomas and Morwitz (2005), Stiving and Winer (1997) propose that the nine-ending pricing effect is the left-digit effect, indicating that it is the change in the leftmost digit, rather than the ending digit to its right, that influences the magnitude perception of numerical symbols.

2.3 The Link between Evaluation Modes and the Nine-Ending Effect

As prior research indicates, there are two important influences on the nine-ending pricing effect that need to be investigated further. These are cognitive effort and evaluation mode. With regard to cognitive effort, most explanations of the nine-ending effect assume that some kind of heuristics involving mental effort is involved in price evaluation. For example, according to the moderator called distance effect, as examined by Thomas and

Morwitz (2005), the farther (closer) the two prices being compared, the less (greater) the efforts in encoding the magnitude of the nine-ending prices, in regard to the left-digit effect. They also prove that people will more likely rely on a simplifying leftmost-heuristic for the judgment of the nine-ending effect under a high cognitive load. Stiving and Winer (1997) demonstrate that people will easily tend to use a rounding down or left-to-right heuristic without expending the extra mental processing efforts to evaluate the nine-ending effect (Coulter, 2001; Schindler and Chandrashekaran, 2004). A study based on cognitive effort by Schindler and Warren (1988) finds that the effect of nine-ending prices depended on the amount of attention people paid to the decision to purchase. Furthermore, Bizer and Schindler (2005) propose that a mental drop-off will occur upon immediate perception of the price. In summation, the heuristic process with a low cognitive effort is the main focus of previous nine-ending effect research. However, the HSM shows that it is important to understand the mechanism whereby people become involved in a systematic process and what decisions are chosen after their involvement in this condition. Along with Garbarino and Edell (1997), Bizer and Schindler (2005) further review the research on cognitive effort and maintain that humans often switch to heuristics that may cause inaccurate decisions, biased responses, and preference reversals due to their limited cognitive resources. Thomas and Morwitz (2005) also discuss whether or not awareness and cognitive effort can mitigate the nine-ending effect, but they do not empirically test these issues. Above-mentioned studies all indicate that cognitive effort is a key factor in determining whether or not the effects of nine-ending pricing appear.

The other important key is the evaluation mode. Although various experimental conditions have been constructed to investigate the nine-ending and zero-ending pricing effects, they are mostly evaluated separately in experimental designs (e.g., Bizer and Schindler, 2005; Manning and Sprott, 2009). Only Thomas and Morwitz (2005) study has people evaluating prices in comparison, but their experiments only measure the price magnitude perception of the target price after comparing it to the standard price. That is, the two target prices are not directly compared side by side as in the real world. What is more, all of the previous research has ignored the evaluation mode of SQE. Given the nine-ending research on cognitive effort, along with the HSM provided by Chaiken (1980), this article infers that the occurrence of the nine-ending effect will depend on the amount of cognitive effort expended. In conclusion, the nine-ending effect will occur in a heuristic decision-making process when the decision is made in the SE mode; however, no effect will occur in a systematic process when the decision is made in the JE mode, which requires more

cognitive effort.

2.4 Research Hypotheses

This paper first proposes that when nine-ending and zero-ending prices are set as stimulus options in SE and JE conditions, the nine-ending pricing effect will be manifest in the former but diminished in the latter. In the SE condition, nine-ending and zero-ending prices are presented and evaluated independently; thus, there is no comparison target for each price. This makes people have to rely only on their mental cues of the prices. The consequence corroborates the findings of Stiving and Winer (1997) research. People are more likely to be influenced by the left-digit heuristic, which results in an underestimation of the perceived value of the nine-ending price as the numerical digits of both prices are converted into magnitudes. This means that the difference between the allocated positions of nine-ending and zero-ending prices on an internal analog magnitude scale will be significant.

However, in the JE mode, the nine-ending and zero-ending prices are comparison targets for each other since they are presented and evaluated simultaneously. This condition promotes people to make more cognitive effort comparing the nine-ending and zero-ending prices,[3] and this means that people will be more likely to use a systematic process than a heuristic process. Consequently, they will perceive that the minor difference in the ending digits (i.e., one cent/dollar difference) may cause a difference between the two prices in the leftmost digits. Although they will still perceive the price digits as a whole, indicating an analog representation, the perception of the prices on a mental analog magnitude scale will

3 According to prior studies on separate and joint evaluation modes, individuals might take different cognitive efforts to evaluate the easy-to-evaluation and difficult-to-evaluation attributes. Although no studies mentioned that consumers would take more cognitive efforts on the joint evaluation mode than on the separate evaluation, it is reasonable to infer the possible phenomenon. First, this research manipulated only one attribute (price) for participants to evaluate nine-ending and zero-ending digits separately or jointly. In separate evaluation mode, participants might directly use a heuristic to judge that nine-ending digit price would be cheap, but zero-ending digit price would be not. Conversely, in joint evaluation mode, people saw the nine-ending and zero-ending digits price simultaneously, and then they had to pay much attention to judge or compare if the products with nine-ending or zero-ending digits price had any difference. Thus, more cognitive efforts may be taken in the joint evaluation than in the separate evaluation whether there was difference or not.
In addition, this research also examined the nine-ending pricing effect by quantitative estimations. In separate evaluation mode, individuals would possibly answer that they could purchase more products based on the simple heuristic (nine-ending digits price is cheap). Conversely, people had to judge or compare if two products with nine-ending or zero-ending digits were different, and then calculate the possible quantitative estimations for two products. In other words, much cognitive efforts would be taken in the joint evaluation mode to evoke a systematic process. In sum, it was possible that consumers would make more cognitive efforts to evaluate two different prices in JE modes than in SE modes.

no longer be influenced by an anchoring heuristic that focuses on the difference in the leftmost digits, and the difference between the allocated positions of nine-ending and zero-ending prices on the analog magnitude scale will be very insignificant. This will, in turn, diminish the influence of the difference in the leftmost and ending digits between nine-ending and zero-ending prices. Given these inferred effects, the following hypothesis is proposed:

H1: The difference in magnitude perception between nine-ending items and zero-ending items priced one level higher is greater in the separate evaluation condition than in the joint evaluation condition.

Following Bizer and Schindler (2005), the experimental condition in this study involves quantitative estimations of the number of items that can be acquired for a given budget (e.g., how many $199 items can be purchased for $2000). However, Bizer and Schindler (2005) procedure is extended by considering both separate and joint evaluation conditions. In the SE condition, the quantitative estimations of nine-ending and zero-ending prices are carried out independently by two groups of people. In the JE condition, these quantitative estimations are carried out simultaneously, or side by side, by the same groups of people. Under the mechanism of HSM, it is proposed that the nine-ending pricing effect is manifested when the two types of prices are evaluated separately, but that it diminishes when they are evaluated side by side, or jointly.

Since quantitative estimations of nine-ending and zero-ending prices are done independently in the SE condition, there is no comparison target for each price. As H1 would also seem to indicate, people can only rely on their mental cues of the prices, which makes them more likely to ignore, or drop off, the ending digits of the prices and use an anchoring heuristic to perceive the value on the leftmost digits by converting the numerical digits of both prices into a magnitude (e.g., perceiving $199 as $100). The quantitative estimation of items with the dropped off price is much greater than the actual number of items that can be purchased within the same budget. Since the nine-ending pricing effect is manifested in the SE condition, the quantitative estimations of nine-ending priced items are greater than those of zero-ending priced items one level higher (e.g., $199 vs. $200).

In the JE condition, the quantitative estimations of nine-ending and zero-ending priced items are carried out simultaneously; thus, the two prices become comparison targets for each other, which greatly increase cognitive effort. As cognitive effort increases, people are more inclined to use a systematic process than a heuristic process. Thus, they are more likely

to perceive that the minor difference in the ending digits (i.e., one cent/dollar difference) causes the difference in the leftmost digits between the two prices. This means that their perception of value is no longer influenced by an anchoring heuristic that focuses on the leftmost digits, and they are more likely to perceive the nine-ending price as a whole representation, which makes their price perception equivalent to the actual price itself. Eventually, as the nine-ending pricing effect diminishes, there will be no significant difference in the quantitative estimations between items with nine-ending prices and those with zero-ending prices one level higher (e.g., $199 vs. $200). The following hypothesis summarizes these inferred effects:

H2: The difference between quantitative estimations of nine-ending and zero-ending priced items will be greater in the separate evaluation condition than in the joint evaluation condition.

As H1 and H2 might be seen to imply, the comparison of the stimulus options needs more cognitive effort in the SQE condition than in the SE condition. However, the amount of cognitive effort in the SQE condition is still lower than that in the JE condition. It is therefore proposed that the nine-ending pricing effect manifests in the SQE condition to a degree between that of the SE and the JE conditions. More precisely, the effect of nine-ending pricing in the SQE condition is expected to be greater than that in the JE condition but less than that in the SE condition.

Previously, it was proposed that the quantitative estimations of nine-ending priced items are greater than those of zero-ending priced items in the SE condition, whereas no significant difference exists between quantitative estimations of nine-ending and zero-ending priced items in the JE condition. Given the expectation regarding the SQE condition that has just been proposed, we can therefore infer that the difference between quantitative estimates of nine-ending and zero-ending priced items in the SQE condition will be greater than that in the JE condition but less than that in the SE condition. The following hypothesis states this inference:

H3: The difference between quantitative estimations of nine-ending and zero-ending priced items in the sequential evaluation condition will be less than that in the separate evaluation condition but greater than that in the joint evaluation condition.

3. Methodology

To understand the boundary conditions of the nine-ending price effect, four studies have been conducted on the basis of prior studies, including experimental designs, procedure and the variable manipulations. First, Study 1 focused on how SE and JE modes influenced the nine-ending effect. By rating the price perception, participants showed the difference in price perception between nine-ending and zero-ending prices in SE and JE modes. To generalize the findings, Study 2 manipulated three different kinds of evaluation modes (SE, JE and SQE modes) and measured the perception of practical purchases of nine-ending and zero-ending priced items as manipulated by Bizer and Schindler (2005) to simulate the product purchasing instead of a price-perceived judgment (Study 1). Based on level effect, Study 3 examined the other kind of the nine-ending pricing effect with the same and different left-hand digits to strengthen our findings. Finally, to provide evidence in support of the inference of heuristic-systematic dual-process model, task complexity has been manipulated to demonstrate the possible theoretical link and to examine an inverted U-shape relationship of task complexity on nine-ending pricing effects as Keller and Staelin (1987) showed.

3.1 Study 1

The aim of Study 1 was to examine whether the difference in magnitude perception between nine-ending and zero-ending prices is greater in the SE condition, in which the nine-ending pricing effect is expected to manifest, than in the JE condition, in which the nine-ending pricing effect is expected to diminish. If the difference in magnitude perception is greater in the SE condition, then H1 is supported.

3.1.1 Method

One hundred and forty-six undergraduate students, seventy-two males and seventy-four females, were recruited from a large southern university. This study utilized a one-factor, three-level (separate nine ending, separate zero ending, and joint nine ending and zero ending) design. The stimuli for this study were nail clippers, batteries, and baseball caps. The particular products were chosen for one reason: they are commonly seen yet rarely purchased. Hence, it was expected that the participants would be familiar with the products but not their prices, which would prevent people' judgment from being influenced by their subjective selling price. There were two items within each product category, each with different fictional brand names (S and K) and ending prices (nine- and zero-ending one dollar higher). The prices of the S-branded nail clippers, battery, and baseball cap were

manipulated to have nine-ending prices with lower values in the leftmost digits ($1.99, $2.99, $6.99), whereas the prices of the K-branded nail clippers, battery, and baseball cap were manipulated to have zero-ending prices with higher values in the leftmost digits ($2.00, $3.00, $7.00). The participants were randomly divided into three subgroups, each of which was randomly assigned to one of three conditions: SE of nine-ending prices, SE of zero-ending prices, and JE of both ending prices. In the SE condition, the participants saw only one kind of price, either a nine-ending or zero-ending one. By contrast, in the JE condition, they saw both kinds of prices side by side at the same time.

The participants were informed that they needed to shop for three products: nail clippers, a battery, and a baseball cap. Within each product category, there were two brands: S and K. Three types of questionnaires, which included product descriptions (brand name and price) and pictures, were prepared. Each participant received one of the three alternative questionnaires, which inquired into the three S-brand products, three K-brand products, or three products from both brands. In the first two conditions, the participants saw only one product of a specific brand on one page, whereas those in the third condition saw products of the same category from both brands on one page.

3.1.2 Dependent Variable

Based on the studies of Coulter and Coulter (2007), and Thomas and Morwitz (2005), Study 1 had participants answer questions regarding pricing perception by responding to the following two statements: “The product price of S-/K-brand is expensive/high-priced” for each product on two five-point Likert scales (1 = very disagreeable, 5 = very aggreable).

3.1.3 Results

An ANOVA was performed for perceived price magnitude. The evaluation condition by nine-ending price was significant ($F(3,187) = 3.08$, $p < 0.05$; nail clippers: $F(1,189) = 4.12$, $p < 0.05$; battery: $F(1,189) = 4.26$, $p < 0.05$; baseball cap: $F(1,189) = 4.41$, $p < 0.05$). In the SE condition, the mean magnitude perception of nine-ending prices was lower than that of zero-ending prices for the nail clippers ($M_0 = 3.32$ vs. $M_9 = 2.63$, $t = 3.39$, $p < .001$); battery ($M_0 = 3.70$ vs. $M_9 = 3.06$, $t = 3.59$, $p < .001$); and baseball cap ($M_0 = 3.64$ vs. $M_9 = 2.94$, $t = 3.36$, $p < .001$). However, in the JE condition, the difference in mean magnitude perception between nine-ending and zero-ending prices was not significant for the nail clippers ($M_0 = 2.98$ vs. $M_9 = 2.85$, $t = .68$, $p > 0.1$); battery ($M_0 = 3.47$ vs. $M_9 = 3.38$, $t = 0.42$, $p > 0.1$); or baseball cap ($M_0 = 3.09$ vs. $M_9 = 2.98$, $t = .58$, $p > 0.1$). In conclusion, the nine-ending pricing effect increased the perceived magnitude of the difference between nine-ending and zero-ending prices in the SE condition, but not the JE condition. Hence, H1 was supported.

3.1.4 Discussion

The results from Study 1 support H1, which postulates that the difference in magnitude perception between nine-ending and zero-ending prices is greater in the SE condition than in the JE condition. The results also support Hsee (1996) proposal that stimulus options (nine-ending and zero-ending prices) become relatively easier to evaluate when presented simultaneously (jointly) rather than individually (separately). Compared to the SE condition, there was very little difference in the mean magnitude perception between nine-ending and zero-ending prices one level higher (e.g., $1.99 vs. $2.00) in the JE condition, indicating that the nine-ending pricing effect was weakened in the joint condition.

3.2 Study 2

Study 2 was conducted to further test H2 and H3, which pertain to the differences in the nine-ending pricing effect among the separate, sequential, and joint evaluation conditions. In contrast to Study 1, which focused on the psychological interpretation of price perception, Study 2 utilized the perception of practical purchases of nine-ending and zero-ending priced items as manipulated by Bizer and Schindler (2005) to simulate the product purchasing instead of a price-perceived judgment. This manipulation may not only improve the generalization of this article but also be closely related to the real world by examining whether the difference in quantitative estimations between nine-ending and zero-ending priced items is greatest in the SE condition, least in the JE condition, and midway in the SQE condition (H2 and H3).

3.2.1 Method

Study participants were a random sample of consumers (n = 158) recruited from a large hypermarket. The sample consisted of 78 males and 80 females with a mean age of 31.4 (over two-thirds were between 25 and 55 years). Over half the respondents reported being married, and over half completed an associate, bachelor's, or graduate degree. Three-fourths were employed full time (including self-employed, with < 5% unemployed and looking for work). The sample was predominantly middle class (almost two-thirds reported an annual household income between $40,000 and $180,000, 4% earned > $180,000, 16% reported earning < $50,000, and 10% preferred to not respond to the income question).

This study utilized a one-factor, four-level (separate nine ending, separate zero ending, joint nine ending and zero ending, and sequential nine ending and zero ending) design. The participants were asked to make quantitative estimations of three products (nail clipper, battery, and baseball cap) within a given budget. There were two items within each product

category, each with different fictional brand names (S and K) and ending prices (nine- and zero-ending one dollar higher). The prices of the S-branded nail clippers, battery, and baseball cap were manipulated to have nine-ending prices with lower left-digit values ($1.99, $2.99, $6.99), whereas the prices of the K-branded nail clippers, battery, and baseball cap were manipulated to have zero-ending prices with higher left-digit values ($2.00, $3.00, $7.00). A budget was given for each product category ($47 for the nail clippers; $43 for the batteries; $228 for the baseball caps) for both brands/ending prices.

The budget figures were manipulated so that diverse quantitative results would be generated for each product to prevent inadequate estimations (e.g., the same estimate for all three products). The participants were randomly divided into four subgroups, each of which was randomly assigned to one of four conditions: SE of nine-ending prices, SE of zero-ending prices, JE of both ending prices, and SQE of both ending prices. In the SE condition, the participants only saw either a nine-ending or zero-ending price, but not both. In the JE condition, they saw both prices side by side at the same time. In the SQE condition, they saw products of the same category from two different brands independently shown back to back. After receiving the questionnaires, the participants were asked to calculate the maximum number of products at the offered price that could be purchased within a budget for each product category.

3.2.2 Dependent Variable

Participants answered questions regarding pricing perception by responding to the statement, "How many $_____ priced products can you buy with a $_____ budget?" with integer numbers based on their calculation. To determine whether the drop-off (rounding down) heuristic among quantitative estimates made by the participants was consistent with the nine-ending effect, each estimate was allocated to one of three categories, as proposed by Bizer and Schindler (2005). The three categories were accurate estimation, drop-off error, and non-drop-off error. For example, quantitative estimates of 23 or 24 were categorized as accurate estimations, since participants could purchase 23.6 nail clippers priced at $1.99 within a budget of $47.

Quantitative estimations influenced by the nine-ending effect that resulted in the price ending being ignored or minimized were categorized as drop-off errors. In the example given, if participants perceived the price of the nail clippers as $1.00, then their perception was anchored by the leftmost digit and they ignored, or dropped off, the other digits leading to a quantity estimation of 47. Quantitative estimations between 24 (accurate) and 47 (price ending drop-off) were all classified as drop-off errors. Estimates that could not be classified

as either accurate estimations or drop-off errors were considered non-drop-off errors. In the example of the $1.99 nail clippers, quantity estimations greater than 47 or less than 23 were categorized as non-drop-off errors; that is, errors that point to an incorrect overestimation or underestimation due to various possible factors, including arithmetic mistakes, inattention, carelessness, and so on (Bizer and Schindler, 2005).

3.2.3 Results

An ANOVA was performed for quantitative estimations. The interactions of evaluation conditions and nine-ending effect were significant in the scenarios of nail clipper and baseball cap showed in Table 1 (Nail clipper: $Difference_{SE} = 1.75$ vs. $Difference_{SQE} = 0.7$ vs. $Difference_{JE} = 0.59$, $F_{SE\text{-}SQE\text{-}JE}(2,231) = 2.44$, $p_{SE\text{-}SQE\text{-}JE} < 0.1$; Baseball cap: $Difference_{SE} = 3.55$ vs. $Difference_{SQE} = 0.48$ vs. $Difference_{JE} = 0.36$, $F_{SE\text{-}SQE\text{-}JE}(2,231) = 2.52$, $p_{SE\text{-}SQE\text{-}JE} < 0.1$), but insignificant in the case of the battery ($Difference_{SE} = 0.39$ vs. $Difference_{SQE} = 0.12$ vs. $Difference_{JE} = 0.1$, $F_{SE\text{-}SQE\text{-}JE}(2,231) = 0.53$, $p_{SE\text{-}SQE\text{-}JE} = 0.95$). That is, the differences in mean price perceived quantitative estimations of nine-ending and zero-ending prices in the SQE condition was smaller than that in the SE condition but greater than that in the JE condition. Besides, stimuli in SE and JE conditions were also significant for the nail clippers and baseball cap ($Difference_{SE} = 1.75$ vs. $Difference_{JE} = 0.59$, $F_{SE\text{-}JE}(1,163) = 10.35$, $p_{SE\text{-}JE} < 0.01$; $Difference_{SE} = 3.55$ vs. $Difference_{JE} = 0.36$, $F_{SE\text{-}JE}(1,163) = 8.64$, $p_{SE\text{-}JE} < 0.01$), but not significant for the battery ($Difference_{SE} = 0.39$ vs. $Difference_{JE} = 0.1$, $F_{SE\text{-}JE}(1,163) = 1.40$, $p_{SE\text{-}JE} = 0.254$). Most of the results, as expected, showed that the difference of quantitative estimations between nine- and zero-ending digits was greater in JE mode than in SE mode. These findings were re-confirmed and consistent with the findings in Study 1.

In order to examine the error analyses as proposed by Bizer and Schindler (2005), the quantitative estimations were also classified according to their consistency with the nine-ending pricing effect by calculating the difference in percentage between nine-ending and zero-ending prices among each response type. However, the battery stimulus was excluded because of its insignificance (see Table 2). The results demonstrated that the accuracy percentage in zero-ending digit was almost the same in SE, SQE, and JE modes (Nail clipper: $Accurate_{SE} = 83\%$ vs. $Accurate_{SQE} = 80\%$ vs. $Accurate_{JE} = 76\%$; Baseball cap: $Accurate_{SE} = 77\%$ vs. $Accurate_{SQE} = 70\%$ vs. $Accurate_{JE} = 82\%$), but the accuracy percentage in nine-ending digit was least in the SE condition, followed by the SQE and the JE condition in the products of the nail clippers and baseball caps (Nail clipper: $Accurate_{SE} = 44\%$ vs. $Accurate_{SQE} = 61\%$ vs. $Accurate_{JE} = 68\%$; Baseball cap: $Accurate_{SE} = 41\%$ vs. $Accurate_{SQE} = 57\%$ vs. $Accurate_{JE} = 71\%$).

Consistent with H2 and H3, the findings, an decreasing difference with the order of SE,

SQE, and JE modes between nine- and zero-ending digits, proved that people would be influenced by nine-ending effect only in SE condition, but not in SQE and JE modes (Nail clipper: $Difference_{ACCU\text{-}SE}$ = 39%, $Difference_{ACCU\text{-}SQE}$ = 19%, $Difference_{ACCU\text{-}JE}$ = 8%; Baseball cap: $Difference_{ACCU\text{-}SE}$ = 36%, $Difference_{ACCU\text{-}SQE}$ = 13%, $Difference_{ACCU\text{-}JE}$ = 11%). Besides, the results of the zero-ending digits with drop-off error were similar to the results of accuracy rate that the percentage of drop-off error in zero-ending digits was almost the same in SE, SQE, and JE modes (Nail clipper: $Drop\text{-}off\text{-}error_{SE}$ = 11% vs. $Drop\text{-}off\text{-}error_{SQE}$ = 13% vs. $Drop\text{-}off\text{-}error_{JE}$ = 15%; Baseball cap: $Drop\text{-}off\text{-}error_{SE}$ = 15% vs. $Drop\text{-}off\text{-}error_{SQE}$ = 25% vs. $Drop\text{-}off\text{-}error_{JE}$ = 15%). Conversely, the percentage of drop-off error in nine-ending digits was greatest in the SE condition, followed by the SQE and the JE condition for of the nail clippers and baseball caps (Nail clipper: $Drop\text{-}off\text{-}error_{SE}$ = 50% vs. $Drop\text{-}off\text{-}error_{SQE}$ = 28% vs. $Drop\text{-}off\text{-}error_{JE}$ = 22%; Baseball cap: $Drop\text{-}off\text{-}error_{SE}$ = 50% vs. $Drop\text{-}off\text{-}error_{SQE}$ = 30% vs. $Drop\text{-}off\text{-}error_{JE}$ = 20%).

Combined with the difference between nine- and zero-ending digits, the findings showed that the influence of the drop-off mechanism was greatest in SE mode, but with less influence in SQE and JE modes as H2 and H3 predicted (Nail clipper: $Difference_{Drop\text{-}SE}$ = 39%, $Difference_{Drop\text{-}SQE}$ = 15%, $Difference_{Drop\text{-}JE}$ = 7%; Baseball cap: $Difference_{Drop\text{-}SE}$ = 35%, $Difference_{Drop\text{-}SQE}$ = 5%, $Difference_{Drop\text{-}JE}$ = 5%).

Table 1 Results in Study 2

	Mean of Perceived Quantitative Estimations			Interaction [a]	
	9-Ending Price	0-Ending Price	Difference	*F*(2,231)	P-value
Nail clipper					
SE	24.17	22.42	1.75		
SQE	23.55	22.85	0.70	2.44	0.084*
JE	23.15	22.56	0.59		
Battery					
SE	14.29	13.90	0.39		
SQE	14.85	14.73	0.12	0.53	0.950
JE	14.69	14.59	0.10		
Baseball Cap					
SE	36.00	32.45	3.55		
SQE	34.33	33.85	0.48	2.52	0.082*
JE	33.54	33.18	0.36		

* Significant at 0.1 significance level.

[a] Interaction: Interaction of the difference between nine- and zero-ending price magnitude among SE, SQE, and JE modes.

Table 2 Percentage of the Response Types in SE, SQE and JE Modes in Study 2

Response Type		Nail Clipper				Baseball Cap			
		Accu.[a]	Drop.[b]	NonD.[c]	Total	Accu.	Drop.	NonD.	Total
SE	0-Ending	83%	11%	6%	100%	77%	15%	8%	100%
	9-Ending	44%	50%	6%	100%	41%	50%	9%	100%
	Difference[d]	39%	39%	0%		36%	35%	1%	
SQE	0-Ending	80%	13%	7%	100%	70%	25%	5%	100%
	9-Ending	61%	28%	11%	100%	59%	24%	17%	100%
	Difference	19%	15%	4%		11%	1%	12%	
JE	0-Ending	76%	15%	9%	100%	82%	15%	3%	100%
	9-Ending	68%	22%	10%	100%	69%	22%	9%	100%
	Difference	8%	7%	1%		13%	7%	6%	

[a] Accu.: The percentage of accurate

[b] Drop.: The percentage of drop-off error

[c] NonD.: The percentage of non-drop-off error

[d] Difference = |the percentage of 0-ending – the percentage of 9-ending|

Hence, all of the findings proved that people tend to use a heuristic process (a drop-off or rounding down heuristic) in SE modes more than in SQE and JE modes. Finally, because of the relatively smaller percentage in the group of non-drop-off error than accurate and drop-off error, the results of Study 2 were reliable.

3.2.4 Discussion

The results of Study 2 support H2 and H3, which postulate that the difference in magnitude perception between nine-ending and zero-ending prices differs between SE and JE conditions and among the SE, SQE, and JE conditions during the process of making quantitative estimations. Among the actual consumers, the nine-ending pricing effect was greatest in the SE condition, followed by the SQE and the JE condition. The difference in perception between nine-ending and zero-ending prices also provides support for the findings of Thomas and Morwitz (2005), and Bizer and Schindler (2005). The results also support the Evaluability Hypothesis of Hsee (1996).

As previously mentioned, the nine-ending pricing effect, which leads to rounding down the price ending, is an outcome of the leftmost heuristic. The greater the leftmost effect, the more drop-off errors that will occur. As shown in Table 2, the difference in the percentage of drop-off errors between nine-ending and zero-ending prices is greater in the SQE condition than that in the JE but smaller than that in SE condition. These findings demonstrate that the nine-ending pricing effect is manifested in the SQE condition more strongly than in the JE

condition but less strongly than in the SE condition. In brief, all of the findings prove that people tend to use a heuristic process in SE modes, but a systematic process in SQE and JE modes.

Finally, a possible explanation for the insignificance of the perceived quantitative estimation of the battery stimulus is that the maximum number that could be purchased within a given budget was relatively smaller (14.4 items for a $2.99 battery) than that of the other two stimuli (23.6 items for $1.99 nail clippers and 32.6 items for a $6.99 baseball cap). This made its quantitative estimation comparatively a more cognitive process than that of the others, which diminished the nine-ending pricing effect.

3.3 Study 3

Study 2 demonstrated that influence of JE and SQE modes were similar on the nine-ending effect. Toward this end, the aim of Study 3 was designed to examine the nine-ending pricing effect from various perspectives between SE and JE modes. According to the left-digit effect, when people encounter multi-digit prices they pay most attention to the leftmost digit, which has a more dominant influence on their magnitude perception than the other digits to its right. It follows that the nine-ending pricing effect is more likely to be manifested when the nine-ending price and zero-ending price one dollar higher have different leftmost digits (e.g., $199 vs. $200). While previous studies have adopted different leftmost digits between nine-ending price and zero-ending prices, this research sets these leftmost digits at the same value (e.g., $129 vs. $130). This diminishes the dominance of the leftmost digit in price perception when comparing nine-ending and zero-ending prices one dollar higher.

Since the difference in magnitude perception is smaller between nine-ending and zero-ending prices with the same leftmost digits than between those with different leftmost digits, without the anchoring of the leftmost digit, the nine-ending and zero-ending prices are allocated onto locations on the mental analog magnitude scale (Dehaene, 1997; Dehaene, Dupoux, and Mehler, 1990) not far from each other. As a result, the influence of the nine-ending pricing effect diminishes since nine-ending prices are no longer perceived to be much smaller than zero-ending prices one dollar higher, regardless of the way they have been evaluated (separately or jointly). When the leftmost digits are the same for both nine-ending and zero-ending prices, the nine-ending pricing effect diminishes to the extent that the difference in the perceived price magnitude between these two kinds of prices is viewed as insignificant in both separate and joint evaluation conditions.

Combined with the inference from H1 that the difference in the perceived price magnitude between nine and zero-ending prices is greater in the separate evaluation condition than in the joint evaluation condition, we further propose that there is an interaction among the following: the leftmost digits, which are either the same or different, the two evaluation modes, and the difference in the perceived price magnitude between nine- and zero-ending digits. This inference leads to Hypothesis 4, which states:

H4: There is an interaction among the same and different leftmost digits, the two evaluation modes on the difference in the perceived price magnitude between nine- and zero-ending digits, such that the nine-ending effect with different leftmost digits is greater in the SE condition than JE condition, although no nine-ending effect occurs in either condition when the leftmost digits are the same.

3.3.1 Method

Two hundred seventy undergraduate students (one hundred fifty-eight males and one hundred twelve females) were recruited from a large southern university. Two factors were utilized: the same and different leftmost digits, with three levels: separate nine-ending, separate zero-ending, and joint nine-ending and zero-ending figures. The stimuli for this study were the same as in Study 1, and the prices of S-branded items in the same leftmost group (the experiment group) were manipulated so they had nine-ending prices ($1.19, $2.39, $3.59), whereas prices of K-branded items were manipulated so they had zero-ending prices one cent higher ($1.20, $2.40, $3.60). Participants were randomly divided into three subgroups. Each subgroup made its evaluations in one of the three modes: the SE of nine-ending prices, SE of zero-ending prices, and the JE of both ending prices. With the exception of the prices in the experiment group, all of the price manipulations in Study 3 were the same as in Study 1.

3.3.2 Results

The perceived price magnitude was submitted to an ANOVA and the results are shown in Table 3. First, the results of the comparisons among the evaluation modes (SE and JE), same and the different leftmost digits, and the difference of the perceived price magnitude of nine- and zero-ending digits were significant (nail clippers: $F(3,56) = 54.160$, $p < 0.01$; battery: $F(3,56) = 13.539$, $p < 0.01$; baseball cap: $F(3,56) = 8.616$, $p < 0.01$). Second, the difference in the mean price magnitude perception in the separate group between nine-ending and zero-ending prices in the same and different leftmost digits were significant in comparison (nail clippers: $F(1,28) = 43.978$, $p < 0.01$; battery: $F(1,28) = 10.560$, $p < 0.01$;

baseball cap: $F(1,28) = 6.900$, $p < 0.05$).

Furthermore, in order to make sure what the determination of the nine-ending effect was, we examined both groups of with and without the same leftmost digits individually, and the results showed a significance only in different leftmost digits with separate modes (nail clippers: $M_0 = 3.11$ vs. $M_9 = 2.62$, $t = 7.142$, $p < 0.01$; battery: $M_0 = 3.57$ vs. $M_9 = 2.95$, $t = 11.570$, $p < 0.01$); baseball cap ($M_0 = 3.72$ vs. $M_9 = 3.29$, $t = 3.812$, $p < 0.01$), but no significance in the same leftmost digits with separate modes (nail clippers: $M_0 = 2.89$ vs. $M_9 = 2.74$, $F = 0.997$, $p = 0.347$; battery: $M_0 = 3.14$ vs. $M_9 = 3.01$, $F = 1.594$, $p = 0.223$; baseball cap: $M_0 = 3.28$ vs. $M_9 = 3.09$, $F = 1.930$, $p = 0.182$).

Table 3 Results in Study 3

	Modes	With Group[a]			Without Group[b]			Interaction[c]	
		Nine[d]	Zero[e]	Diff.[f]	Nine	Zero	Diff.	*F*(3,56)	P-value
Nail Clipper	SE	2.74	2.89	0.15	2.62	3.11	0.49	54.160	0.000***
	JE	2.89	2.91	0.02	2.71	2.82	0.11		
Battery	SE	3.01	3.14	0.13	2.95	3.57	0.62	13.539	0.000***
	JE	3.16	3.22	0.06	3.13	3.28	0.15		
Baseball Cap	SE	3.09	3.28	0.19	3.29	3.72	0.43	8.616	0.000***
	JE	3.31	3.35	0.04	3.18	3.41	0.23		

[a] With group: With the same leftmost digits group

[b] Without group: Without the same leftmost digits group

[c] Interaction: Interaction between with and without the same leftmost digits groups

[d] Nine: The mean of perceived price magnitude with nine-ending

[e] Zero: The mean of perceived price magnitude with zero-ending

[f] Diff.: Difference of the mean between zero- and nine-ending

*** Significant at 0.01 significance level.

Finally, the differences of mean magnitude perceptions in the joint group between nine-ending and zero-ending prices in the same and different leftmost digits were insignificant in comparison (nail clippers: $F(1, 28) = 1.684$, $p = 0.205$; battery: $F(1, 28) = 0.373$, $p = 0.546$; baseball cap: $F(1, 28) = 0.254$, $p = 0.618$). That is, as expected, the evaluation with joint mode in Study 3 influences the disappearance of nine-ending effect. In addition, as long as participants were manipulated in the groups of the joint mode, the nine-ending effect were both insignificant (nail clippers, battery, and baseball cap: (1) with the different leftmost in joint mode: $M_0 = 2.82$ vs. $M_9 = 2.71$, $F = 0.336$, $p = 0.569$; $M_0 = 3.28$ vs. $M_9 = 3.13$, $F = 0.649$, $p = 0.433$; $M_0 = 3.41$ vs. $M_9 = 3.18$, $F = 2.522$, $p = 0.130$; (2) with the same leftmost in joint mode: $M_0 = 2.91$ vs. $M_9 = 2.89$, $F = 0.089$, $p = 0.769$; $M_0 = 3.22$ vs. $M_9 = 3.16$, $F =$

0.894, $p = 0.413$; $M_0 = 3.35$ vs. $M_9 = 3.31$, $F = 0.332$, $p = 0.601$).

Therefore, when both nine-ending and zero-ending prices had the same leftmost digits, the nine-ending pricing effect diminished, and the differences in the price magnitude perception between two kinds of prices were not significant in both SE and JE conditions, thus supporting H4.

3.3.3 Discussion

Results from Study 3 support H4 that differences in magnitude perceptions between nine-ending and zero-ending prices are insignificant in both SE and JE conditions when their leftmost digits are the same. In contrast to the results of Study 1, Study 3 shows that when the leftmost digits of nine-ending and zero-ending prices are one level apart (e.g., $1.99 vs. $2.00), the differences in mean magnitude perception between nine-ending and zero-ending prices are relatively smaller in both SE and JE conditions, and the variations of these differences between SE and JE conditions are also insignificant for all three stimuli. Therefore, when nine- and zero-ending prices have the same leftmost digits, participants are more likely to make similar perceptions for both kinds of prices regardless of the changes in price ending digits and how they are presented or evaluated. This finding supports Thomas and Morwitz (2005) inference that the leftmost digit has a more dominant influence over people's magnitude perception than do the other digits to its right when multi-digit prices are being perceived.

3.4 Study 4

According to the basis of cognitive effort, the predictions that the evaluation modes would moderate the nine-ending effect were supported and proved in Studies 1, 2, and 3. In Study 4, task complexity, which was most often used to examine the role of cognitive effort on product evaluations, was manipulated to re-examine the bounded nine-ending effect in order to more accurately test the strength of the evaluation modes. To understand the role of task complexity, we might imagine that we are preparing to buy some cookies in a store. There are usually several different brands with different packaging and different flavors, and this wide array of choices increases the difficulty and complexity of making a comparison between items (similar to Appendix). It also has an impact on our shopping time and on what we will finally purchase. As Keller and Staelin (1987) study indicates, task complexity has an inverted U-shape relationship with effective decisions. That is, people make an additional cognitive effort initially, which increases the effectiveness of decision making. Clearly, complex tasks require more cognitive effort, as Campbell and Gingrich (1986) have

proposed (Bettman, Johnson, and Payne, 1990; Bettman and Kakkar, 1977; Campbell, 1988; Jiang and Benbasat, 2007). However, decision effectiveness begins to decline until task complexity reaches a reversed point induced by an individual's limited cognitive capacity (Swait and Adamowicz, 2001). In sum, cognitive loading is an important factor in decision switching (Garbarino and Edell, 1997).

In view of these studies and the HSM, this paper maintains that if the increasing demand on cognitive capacity induced by greater task complexity exceeds what people may possess, there will be an increased tendency to use a heuristic process that will lower cognitive effort and response time. In other words, the difference in the perceived price magnitude between nine- and zero-ending digits will keep on increasing in the JE mode when the task becomes more and more complex. No nine-ending effect will occur both in the SE and JE modes when the degree of task complexity exceeds an individual's cognitive loading because people will just make a rash judgment. Following the study of Thomas and Morwitz (2005), Study 4 tries to explore the bounded effect of nine-ending prices with increasing degrees of task complexity in the different evaluation modes and measure the response time so as to confirm which processes people tend to use. The following hypothesis is proposed:

H5: The greater the task complexity, the less cognitive effort is expended in the JE mode, and the less difference in the perceived price magnitude between the SE and JE modes.

3.4.1 Method

One hundred undergraduate students (sixty-one males and thirty-nine females) were recruited from a large southern university. The stimuli were the same as in Studies 1, 2, and 3. There were two items of perceived price magnitude within each product category, each with different fictional brand names (nail clippers: S and K; battery: R and T; baseball cap: P and U) and ending prices. The prices of the stimuli were manipulated to have a nine-ending price with a lower value in the leftmost digits (S: $1.99; R: $2.99; P: $6.99), whereas the prices of the K, T and U-branded nail clippers were manipulated to have a zero-ending prices with higher values in the leftmost digits ($2.00, $3.00, and $7.00). This study utilized a between-subjects design with one factor (price magnitude) and five-levels (separate: S, K; joint: S-K, S-K-R-T, S-K-R-T-P-U). The participants were randomly divided into eight subgroups and were only asked to state the perceived price magnitude of S and K. In order to resolve the order effect, a counterbalance design was used. For example, S-K-R-T and R-T-

S-K both comprised one half of the S-K-R-T group; S-K-R-T-P-U comprised only one third of the S-K-R-T-P-U group and R-T-S-K-P-U and R-T-P-U-S-K comprised the other two-thirds. The results showed no order effect among these groups.

3.4.2 Dependent Variable

Study 4 had participants answer questions regarding pricing perception by responding to the same statements as Study 1. Besides, following the study of Thomas and Morwitz (2005), Study 4 measured the response time that is often used by numerical cognition researchers to determine the cognitive processes used by participants (e.g., Dehaene, 1997; Dehaene et al., 1990; Hinrichs, Yurko, and Hu, 1981). Chaiken (1980) also proposes that the response time one spends on finishing a task can be regarded as a good way of measuring cognitive effort. In brief, the shorter the response time one needs to evaluate the price magnitude, the more likely that person is in a heuristic process. By contrast, the longer the response time, the more likely the nine- and zero-ending digits are being evaluated in a systematic process.

3.4.3 Results

In Study 4, in order to re-confirm the boundary conditions of nine-ending effect, we used an ANOVA to examine the results. As shown in Table 4, the interaction among two evaluation conditions, high and low task complexity, and nine- and zero-ending prices was significant ($F(3, 76) = 14.330$, $p < 0.01$). That is, the difference of perceived price magnitude between SE and JE was a decreasing curve when task complexity was increasing (see Figure 1). Furthermore, in order to re-confirm the inference that the increasing degree of task complexity would play an important role on nine-ending effect, first, the difference between SE and JE in S-K was examined and showed the significance ($Difference_{SE} = 1.03$ vs. $Difference_{JE} = 0.23$, $F_{S\text{-}K}(1, 38) = 32.916$, $p < 0.01$). This finding was consistent with Study 1 that nine-ending effect occurred under the tasks that are less complex. Secondly, the difference in S-K-R-T was also significant ($Difference_{SE} = 0.91$ vs. $Difference_{JE} = 0.24$, $F_{S\text{-}K\text{-}R\text{-}T}(1, 38) = 15.344$, $p < 0.01$). This finding also proved the hypothesis that nine-ending effect was supported when the degree of task complexity did not exceed an individual's cognitive loading.

Combined with both of the results, the existence of nine-ending effect was re-confirmed to be the same as that in Study 1 under less complex conditions. However, as expected, the difference in S-K-R-T-P-U, a condition with high task complexity that may exceed one's cognitive burden, was insignificant ($Difference_{SE} = 0.90$ vs. $Difference_{JE} = 0.77$, $F_{S\text{-}K\text{-}R\text{-}T\text{-}P\text{-}U}(1, 38) = 0.468$, $p = 0.498$). These results not only re-confirmed H5 that the more task complexity, the less nine-ending effect between the comparison of the difference of the perceived price

magnitude in SE and JE modes, but also were consistent with the results of Study 1.

3.4.4 Response Time

In order to measure the differences in cognitive effort between SE and JE modes, Study 4 recorded the response time following the studies of Garbarino and Edell (1997), and Thomas and Morwitz (2005). Comparisons among each group were then made. For example, the total response time shown in Table 5 of S and K (M_S = 13.1 sec, M_K = 12.6 sec, M_{Total} = 25.7 sec) was compared with the response time of S-K in JE ($M_{S\text{-}K}$ = 33.5 sec), yielding a difference in response time of 7.8 sec. The curve plotted by the difference of response time in each group is shown in Figure 2, and the results indicate a decreasing curve that is proportionate to task complexity.

3.4.5 Discussion

As predicted, the results from Study 4 proved a boundary condition of the nine-ending effect that presented a decreasing curve of the difference in perceived price magnitude between SE and JE modes. That is, increasing degrees of task complexity in different evaluation modes influenced individuals to use a heuristic or systematic process to estimate the nine-ending prices. Furthermore, the results of the differences in response time showed a consistent decreasing curve that followed the difference in perceived price magnitude. More precisely, Study 4 indicated that people may tend to use a heuristic process to evaluate prices when the higher complexity of the JE condition requires more cognitive effort exceeding one's limited cognitive capacity and less response time; by contrast, they tend to use a systematic process to estimate nine-ending prices when the complexity of the condition does not exceed their cognitive capacity.

Table 4 Results in Study 4

	Modes	Mean of Perceived Price Magnitude				Interaction[c]	
		Nine-Ending	Zero-Ending	Diff. [a]	Diff. [b]	*F*(1, 38)	P-value
S-K	SE	3.16	4.19	1.03	0.90	32.916	0.000***
	JE	3.73	3.96	0.23			
S-K-R-T	SE	3.25	4.16	0.91	0.67	15.344	0.000***
	JE	3.81	4.05	0.24			
S-K-R-T-P-U	SE	3.27	4.17	0.90	0.13	0.468	0.498
	JE	3.62	4.39	0.77			

[a] Diff.: Difference of mean of perceived price magnitude between nine- and zero-ending price

[b] Diff.: Difference of mean of perceived price magnitude between SE and JE modes

[c] Interaction: Interaction among evaluation modes and the difference of nine- and zero-ending prices

*** Significant at 0.01 significance level.

Table 5 Difference of Response Time in Study 4

Separate	Mean of Time*	Joint	Mean of Time	Difference**
S	13.1	S-K	33.5	7.8
K	12.6	S-K-R-T	31.1	5.4
Total	25.7	S-K-R-T-P-U	23.1	-2.6

* The units of time are all seconds.

** Difference = mean of time in joint -total mean of time in separate

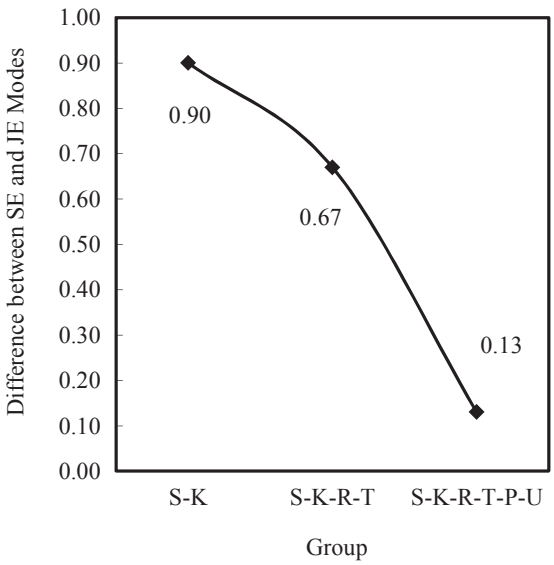

Figure 1 The Relationship between the Difference of Perceived Price Magnitude and Group

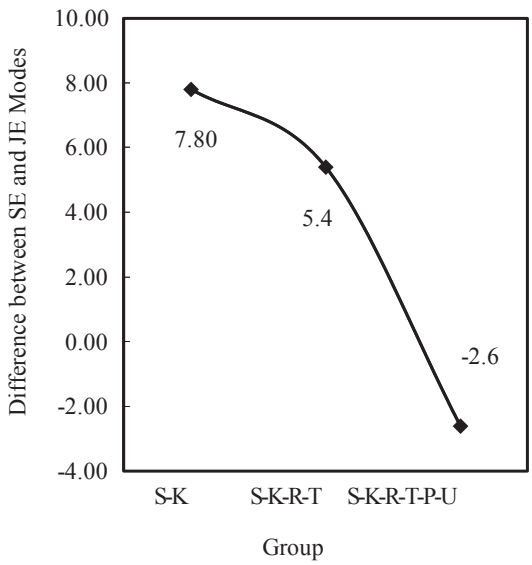

Figure 2 The Relationship between the Difference of Response Time and Group

4. General Discussion

This research offers evidence of the boundary conditions of the nine-ending effect. First, Study 1 demonstrates that the magnitude perception of nine-ending prices is lower than that of zero-ending prices one level higher (e.g., $1.99 vs. $2.00) when the prices are evaluated individually (SE condition), and that no significant difference in perception between nine-ending and zero-ending prices exists when both prices are evaluated simultaneously (JE condition). That is, the nine-ending effect may only occur in the condition of SE mode as prediction.

In order to generalize the findings, Study 2 utilizes an experimental simulation of a real-life purchasing situation to provide further evidence of the nine-ending pricing effect in the SE condition and its diminishing effect in the JE and SQE conditions. The results also show evidence of the influence of nine-ending pricing on quantitative estimations, which is greatest in the SE condition, followed by the SQE and the JE conditions.

Study 3 extends the left-to-right comparison to confirm the different nine-ending effects. The results reveal that there is an insignificant difference in both SE and JE conditions when both prices have the same leftmost digits. That is, when nine- and zero-ending prices have the same leftmost digits, participants are more likely to make similar perceptions for both kinds of prices regardless of the changes in price ending digits and how they are presented or evaluated.

Study 4 shows a boundary of the nine-ending effect as the task complexity increases, and it supports our inference regarding the cognitive effort presupposed by HSM. In brief, consumers may tend to use a heuristic to evaluate prices when the higher complexity requires more cognitive effort exceeding one's limited cognitive capacity and shorter response time; by contrast, they tend to use a systematic process to estimate nine-ending prices when the complexity of the condition does not exceed their cognitive capacity. Combined with Studies 3 and 4, these results not only show a boundary for the nine-ending effect regardless of the leftmost digits, the task complexity, or whether single or multiple prices are presented, but they also support our inference regarding the cognitive effort presupposed by HSM.

4.1 Theoretical and Practical Implications

The present article contributes to the understanding of the cognition processing of prices. In contrast to the experimental approach of prior research, in which nine-ending and zero-ending prices are often separately evaluated, this article extends joint and sequential evaluation conditions with the intention of inducing realistic purchasing behavior. The findings, first, support our hypotheses that people will make different judgment by different evaluation modes, and extend the evaluation modes to compare with one single attribute, price, ignored in previous evaluation research. Although Thomas and Morwitz (2005) use the similar evaluation modes to compare the price magnitude, they only focus on measuring the price magnitude perception of the target price after comparing this magnitude with the reference price of the same product, and merely use higher level difference between two

prices than this research does. Second, this article develops a conceptual framework based on HSM to explore the boundary conditions of nine-ending effects. With the link of cognitive effort measured by response time, the findings may not only show a better explanation than distance effect, and resolve the inconsistent results showed in previous research, but also extend the methodological of evaluation modes with a new perspective by HSM.

Besides, the more cognitive effort would be that joint evaluation makes participants aware of the retailer's attempt to influence their price magnitude perception, and this in turn causes them to adjust for the 99 cents and thus encode 2.99 as 3.00. The less cognitive effort would be that when the 9-ending and 0-ending prices are presented side by side (2.99 vs. 3.00), then the analog representation of 2.99 is assimilated towards 2.00. Both the results are compatible with Study 4; participants might be less likely to correct under conditions of cognitive load or when the distance between the prices on the internal analog scale is large. In other words, these results show that mitigation of left-digit anchoring is difficult because it requires cognitive resources.

Finally, the evidence concerning the boundary conditions of nine-ending effect have been examined and presented interesting results that many conditions will diminish the influence of nine-ending digit and re-confirm the influence of leftmost digit on nine-ending effect as Thomas and Morwitz (2005) and Manning and Sprott (2009) have. Future researchers, therefore, have to be more careful in examining the nine-ending effect.

The results of the present research offer practical implications for predicting actual purchasing behavior, as people constantly encounter buying circumstances involving either separate or joint evaluations in daily life (Hsee, 1996). However, this article adds a sequential comparison to improve the evaluation modes and examines the influence on nine-ending effect. The diversity in evaluation conditions provides an advantage in marketing campaigns depending on the managerial approach. For instance, if the retailers want to create the nine-ending effect (the perception of a much lower price), nine-ending priced items could be only advertised (e.g., on a DM) or might be sold in the obvious place (e.g., cash register desk or entrances to the stores) to make consumers use the SE mode to judge the price information. The example may apply to the physical in-store allocation or on-line of products. In addition, providing very simple illustrations (even only a big price tag) or complicated information of the products (over-cognitive loading for a consumer) may increase the nine-ending effect and raise the revenues.

4.2 Limitations and Future Studies

Although the present research offers support for the varying influence of nine-ending pricing in different evaluation conditions, several research questions remain unanswered. One question is whether the difference in magnitude perception between nine-ending and zero-ending prices is affected by cultural background. The participants of the present research in general share a fairly similar cultural background. Hence, the results of the present research may not apply to those who come from different cultural backgrounds. Thus, future research could be conducted to examine whether the degree of the effect of nine-ending pricing on magnitude perception in the SE and JE conditions differs between participants of different cultural backgrounds (e.g., Chinese vs. American).

Another research question is whether different monetary units affect the research outcome. For example, the smallest units used in Korea are mainly ₩10, and the conditions in which nine-ending digits are presented may make a difference.

References

Bartels, D. M. 2006. Proportion dominance: The generality and variability of favoring relative savings over absolute savings. ***Organizational Behavior and Human Decision Processes***, 100 (1): 76-95. doi: 10.1016/j.obhdp.2005.10.004

Baumgartner, B., and Steiner, W. J. 2007. Are consumers heterogeneous in their preferences for odd and even prices? Findings from a choice-based conjoint study. ***International Journal of Research in Marketing***, 24 (4): 312-323. doi: 10.1016/j.ijresmar.2007.05.003

Bettman, J. R., Johnson, E. J., and Payne, J. W. 1990. A componential analysis of cognitive effort in choice. ***Organizational Behavior and Human Decision Processes***, 45 (1): 111-139. doi: 10.1016/0749-5978(90)90007-V

Bettman, J. R., and Kakkar, P. 1977. Effects of information presentation format on consumer information acquisition strategies. ***Journal of Consumer Research***, 3 (4): 233-240. doi: 10.1086/208672

Bizer, G. Y., and Schindler, R. M. 2005. Direct evidence of ending-digit drop-off in price information processing. ***Psychology and Marketing***, 22 (10): 771-783. doi: 10.1002/mar.20084

Bornemann, T., and Homburg, C. 2011. Psychological distance and the dual role of price. ***Journal of Consumer Research***, 38 (3): 490-504. doi: 10.1086/659874

Brenner, G. A., and Brenner, R. 1982. Memory and markets, or why are you paying $2.99 for a widget?. ***The Journal of Business***, 55 (1): 147-158. doi: 10.1086/296157

Campbell, D. J. 1988. Task complexity: A review and analysis. ***Academy of Management Review***, 13 (1): 40-52. doi: 10.5465/AMR.1988.4306775

Campbell, D. J., and Gingrich, K. F. 1986. The interactive effects of task complexity and participation on task performance: A field experiment. ***Organizational Behavior and Human Decision Processes***, 38 (2): 162-180. doi: 10.1016/0749-5978(86)90014-2

Chaiken, S. 1980. Heuristic versus systematic information processing and the use of source versus message cues in persuasion. ***Journal of Personality and Social Psychology***, 39 (5): 752-766. doi: 10.1037//0022-3514.39.5.752

_____. 1987. The heuristic model of persuasion. In Zanna, M. P., Olson, J. M., and Herman, C. P. (Eds.), ***Social Influence: The Ontario Symposium***: 3-39. Hillsdale, NJ: Erlbaum.

Chaiken, S., and Maheswaran, D. 1994. Heuristic processing can bias systematic processing:

Effects of source credibility, argument ambiguity, and task importance on attitude judgment. ***Journal of Personality and Social Psychology***, 66 (3): 460-473. doi: 10.1037/0022-3514.66.3.460

Coulter, K. S. 2001. Odd-ending price underestimation: An experimental examination of left-to-right processing effects. ***Journal of Product and Brand Management***, 10 (5): 276-292. doi: 10.1108/10610420110401838

Coulter, K. S., and Coulter, R. A. 2007. Distortion of price discount perceptions: The right digit effect. ***Journal of Consumer Research***, 34 (2): 162-173. doi: 10.1086/518526

Dehaene, S. 1997. ***The Number Sense***. New York, NY: Oxford.

Dehaene, S., Dupoux, E., and Mehler, J. 1990. Is numerical comparison digital? Analogical and symbolic effects in two-digit number comparison. ***Journal of Experimental Psychology: Human Perception and Performance***, 16 (3): 626-641. doi: 10.1037//0096-1523.16.3.626

Gabor, A., and Granger, C. W. J. 1964. Price sensitivity of the consumer. ***Journal of Advertising Research***, 4 (4): 40-44.

Garbarino, E. C., and Edell, J. A. 1997. Cognitive effort, affect, and choice. ***Journal of Consumer Research***, 24 (2): 147-158. doi: 10.1086/209500

Gendall, P., Holdershaw, J., and Garland, R. 1997. The effect of odd pricing on demand. ***European Journal of Marketing***, 31 (11-12): 799-813. doi: 10.1108/03090569710190541

Goldstein, W. M., and Einhorn, H. J. 1987. Expression theory and the preference reversal phenomena. ***Psychological Review***, 94 (2): 236-254. doi: 10.1037/0033-295X.94.2.236

Hinrichs, J. V., Yurko, D. S., and Hu, J. M. 1981. Two-digit number comparison: Use of place information. ***Journal of Experimental Psychology: Human Perception and Performance***, 7 (4): 890-901. doi: 10.1037//0096-1523.7.4.890

Hsee, C. K. 1996. The evaluability hypothesis: An explanation for preference reversals between joint and separate evaluations of alternatives. ***Organizational Behavior and Human Decision Processes***, 67 (3): 247-257. doi: 10.1006/obhd.1996.0077

Hsee, C. K., Loewenstein, G. F., Blount, S., and Bazerman, M. H. 1999. Preference reversals between joint and separate evaluations of options: A review and theoretical analysis. ***Psychological Bulletin***, 125 (5): 576-590. doi: 10.1037/0033-2909.125.5.576

Jiang, Z., and Benbasat, I. 2007. The effects of presentation formats and task complexity on online consumers' product understanding. ***MIS Quarterly***, 31 (3): 475-500.

Keller, K. L., and Staelin, R. 1987. Effects of quality and quantity of information on decision effectiveness. ***Journal of Consumer Research***, 14 (2): 200-213. doi: 10.1086/209106

Kleinmuntz, D. N., and Schkade, D. A. 1993. Information displays and decision processes. ***Psychological Science***, 4 (4): 221-227. doi: 10.1111/j.1467-9280.1993.tb00265.x

Manning, K. C., and Sprott, D. E. 2009. Price endings, left-digit effects, and choice. ***Journal of Consumer Research***, 36 (2): 328-335. doi: 10.1086/597215

Mellers, B. A., Chang, S., Birnbaum, M. H., and Ordóñez, L. D. 1992. Preferences, prices, and ratings in risky decision making. ***Journal of Experimental Psychology: Human Perception and Performance***, 18 (2): 347-361. doi: 10.1037//0096-1523.18.2.347

Mochon, D. 2013. Single-option aversion. ***Journal of Consumer Research***, 40 (3): 555-566. doi: 10.1086/671343

Monroe, K. B. 2003. ***Pricing: Making Profitable Decisions***. New York, NY: McGraw-Hill.

Monroe, K. B., and Lee, A. Y. 1999. Remembering versus knowing: Issues in buyers' processing of price information. ***Journal of Academy of Marketing Science***, 27 (2): 207-225. doi: 10.1177/0092070399272006

Moore, D. A. 1999. Order effects in preference judgments: Evidence for context dependencies in the generation of preferences. ***Organizational Behavior and Human Decision Processes***, 78 (2): 146-165. doi: 10.1006/obhd.1999.2828

Payne, J. W. 1982. Contingent decision behavior. ***Psychological Bulletin***, 92 (2): 382-402. doi: 10.1037//0033-2909.92.2.382

Schindler, R. M. 1984. Consumer recognition of increases in odd and even prices. ***Advances in Consumer Research***, 11 (1): 459-462.

_____. 1991. Symbolic meanings of a price ending. ***Advances in Consumer Research***, 18 (1): 794-801.

_____. 2001. Relative price level of 99-ending prices: Image versus reality. ***Marketing Letters***, 12 (3): 239-247. doi: 10.1023/A:1011116827790

_____. 2006. The 99 price ending as a signal of low-price appeal. ***Journal of Retailing***, 82 (1): 71-77. doi: 10.1016/j.jretai.2005.11.001

Schindler, R. M., and Chandrashekaran, R. 2004. Influence of price endings on price recall: A by-digit analysis. ***Journal of Product and Brand Management***, 13 (7): 514-

524. doi: 10.1108/10610420410568453

Schindler, R. M., and Kibarian, T. M. 1993. Testing for perceptual underestimation of 9-ending prices. ***Advances in Consumer Research***, 20 (1): 580-585.

_____. 1996. Increased consumer sales response through use of 99-ending prices. ***Journal of Retailing***, 72 (2): 187-199. doi: 10.1016/S0022-4359(96)90013-5

_____. 2001. Image communicated by the use of 99 endings in advertised prices. ***Journal of Advertising***, 30 (4): 95-99. doi: 10.1080/00913367.2001.10673654

Schindler, R. M., and Kirby, P. N. 1997. Patterns of rightmost digits used in advertised prices: Implications for nine-ending effects. ***Journal of Consumer Research***, 24 (2): 192-201. doi: 10.1086/209504

Schindler, R. M., and Warren, L. S. 1988. Effect of odd pricing on choice of items from a menu. ***Advances in Consumer Research***, 15 (1): 348-353.

Schkade, D. A., and Kleinmuntz, D. N. 1994. Information displays and choice processes: Differential effects of organization, form, and sequence. ***Organizational Behavior and Human Decision Processes***, 57 (3): 319-337. doi: 10.1006/obhd.1994.1018

Schmeltzer, C., Caverni, J. P., and Warglien, M. 2004. How does preference reversal appear and disappear? Effects of the evaluation mode. ***Journal of Behavioral Decision Making***, 17 (5): 395-408. doi: 10.1002/bdm.482

Stiving, M. 2000. Price-endings when prices signal quality. ***Management Science***, 46 (12): 1617-1629. doi: 10.1287/mnsc.46.12.1617.12078

Stiving, M., and Winer, R. S. 1997. An empirical analysis of price endings with scanner data. ***Journal of Consumer Research***, 24 (1): 57-67. doi: 10.1086/209493

Swait, J., and Adamowicz, W. 2001. The influence of task complexity on consumer choice: A latent class model of decision strategy switching. ***Journal of Consumer Research***, 28 (1): 135-148. doi: 10.1086/321952

Thomas, M., and Morwitz, V. 2005. Penny wise and pound foolish: The left-digit effect in price cognition. ***Journal of Consumer Research***, 32 (1): 54-64. doi: 10.1086 /429600

Appendix

Figure 1

Figure 2

作者簡介

鄭尹惠

現為國立臺中教育大學國際企業學系副教授，國立雲林科技大學企管博士。主要研究領域為消費者行為、行銷管理、消費者心理及服務業管理。學術論文曾發表在 Journal of Behavioral Decision Making、Advances in Consumer Research、Journal of Judgment and Decision Making、Journal of Economic Psychology、International Journal of Psychology、Journal of Applied Social Psychology、Journal of Business and Psychology、The Service Industries Journal、Journal of Service Theory and Practice、臺大管理論叢、管理評論等知名期刊。

莊世杰

現為國立中正大學企業管理學系教授，國立中央大學企管博士。研究領域為行銷管理、消費者行為、行為決策、消費心理及廣告策略等。學術論文曾發表在 Journal of the Academy of Marketing Science、Marketing Letters、Journal of Behavioral Decision Making、Advances in Consumer Research、Journal of Judgment and Decision Making、Journal of Economic Psychology、International Journal of Psychology、Journal of Applied Social Psychology、Journal of Business and Psychology、The Service Industries Journal、Journal of Service Theory and Practice、臺大管理論叢、管理學報、管理評論等國內外知名期刊。

*** 張佳榮**

現為國立臺灣師範大學企業管理學系助理教授，國立中正大學企管博士。研究領域為消費者行為與服務業行銷。學術論文曾發表在 Marketing Letters、Advances in Consumer Research、Journal of Economic Psychology、International Journal of Psychology、Journal of Service Theory and Practice、The Service Industries Journal、臺大管理論叢、Asia Pacific Management Review 等知名期刊。

鄭為遠

國立中正大學行銷管理研究所碩士。

* E-mail: cjchang1979@gmail.com