Patterns of price endings used in US and Japanese price advertising

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Abstract

Purpose – The purpose of this paper is to guide managers' choices of rightmost digits in retail prices by acquiring a better understanding of the psychological mechanisms by which price endings can influence sales.

Design/methodology/approach – The paper observes and compares the price endings used in large matched samples of advertised prices in two countries with considerable cultural differences, the USA and Japan.

Findings – Although the digit 9 predominates among the rightmost digits of advertised prices in the USA the digit 8 predominates in Japan. In contrast to this difference, the US and Japanese prices are similar in that both show greater use of 9 or 8 endings when this choice lowers the price's leftmost digit and when the advertised price is claimed to be a discount price.

Research limitations/implications – Future research should include a wider range of price advertising media and should examine usage patterns of less frequently occurring digits.

Practical implications – Setting a price that falls just below a round number can be helpful in creating a low-price image. Setting this just-below price with a 9-ending would be appropriate in the USA and European countries, but in Japan and other Asian countries, it would be more appropriate to set this just-below price with an 8-ending.

Originality/value – These results provide guidance to the retail price setter and illustrate to the basic researcher how universal psychological processes and specific cultural meanings can interact to determine consumer perceptions of marketing stimuli.

Keywords International marketing, Prices, Advertising, Consumer behaviour, United States of America, Japan

Paper type Research paper

Introduction

In the USA, it has long been a common retailing practice to set a price so that its ending (i.e. the one or more digits to the right of the price's leftmost digit) is likely to include the digit 9 (Rudolph, 1954; Schindler and Kirby, 1997; Twedt, 1965). Studies using controlled experimentation have found that this practice is capable of having a positive effect on retail sales (Anderson and Simester, 2003; Schindler and Kibarian, 1996). However, it appears that this positive sales effect is not present in all situations (Blattberg and Wisniewski, 1987; Georgoff, 1972). To optimally manage price-ending choices, it would be helpful to understand the psychological mechanisms by which price endings can influence sales.

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One approach to investigating these mechanisms is to observe in detail the patterns of price endings actually used by managers (Schindler and Kirby, 1997). A large survey of advertised prices can reflect collective managerial wisdom about price endings. Such a large survey also reflects consumer responses since companies that have been successful in generating consumer sales will be more likely to be represented in the survey than those that have been less successful in appealing to the consumer. The analysis presented in this paper is based on the pattern of price endings shown in a large sample of advertised prices in two countries, the US and Japan. Because of the considerable cultural differences between these two countries, a comparison of the pattern of price endings used may be informative concerning the mechanisms of price-ending effects.

In addition to contributing to the literature on price endings, the comparison of price endings used in different countries contributes to and informs the evolving debate on the standardization versus adaptation of marketing practices across nations and cultures (Powers and Loyka, 2007; Viswanathan and Dickson, 2007).

**Price endings used in Asian markets**
The over-representation of 9 endings, which has long been characteristic of prices in US consumer markets, has also been observed widely throughout Europe, South America, and the English-speaking world (Aalto-Setala and Halonen, 2004; El Sehity et al., 2005; Holdershaw et al., 1997; Nguyen et al., 2007; Suri et al., 2004). However, the over-representation of 9 endings does not appear to occur in many Asian markets. In surveys of price advertising in both print and online media, it has been found that it is the digit 8 rather than the digit 9 that is over-represented in the People's Republic of China (including Hong Kong), Taiwan, and Japan (Heeler and Nguyen, 2001; Nguyen et al., 2007; Simmons and Schindler, 2003).

Simmons and Schindler (2003) have suggested that this price-ending difference may be related to a deeply rooted cultural difference in the conception of man's relation to nature (Kluckhohn and Strodtbeck, 1961, p. 13). In contrast to the mastery-over-nature position of Western cultures, Asian cultures have been characterized by the harmony-with-nature position. In this latter view, human activities, nature, and the supernatural are each an aspect of a greater wholeness, and each should be equally respected. This respect for the supernatural would lead Asian cultures to recognize superstitions, even in business settings, such as the favoring of "auspicious" numbers like 8 in the endings of advertised prices.

In the People's Republic of China and Taiwan, the auspicious connotations of the digit 8 are due to the word for 8 being similar to the Chinese words for enrichment and luck (Lip, 1992, pp. 21, 31; Schmitt and Pan, 1994). In Japan, the favorable connotations of the digit 8 appear more related to the digit's shape than its sound. According to *Daijirin Japanese Dictionary* (1989, p. 1947), 8 is an auspicious number in Japan because of the shape of its character, 八. This shape is called *sue-hirogari* which means "widen (broaden) toward the end." Metaphorically, it connotes that things or people become better, happier, and more prosperous as time goes on. This shape may also have positive connotations because of its resemblance to the shape of Mount Fuji, which is venerated in Japanese culture. Further, in Japan it may be the case that the digit 9 not only lacks positive connotations, but also has negative connotations due to its sound *ku,* which is similar to the sound of the word for suffering or agony (Hanada, 1981).
Although auspicious digits have been widely discussed, there has been little systematic research on their effects in Asian cultures. However, there is some striking evidence for the effects of at least one unlucky number on an Asian population. In Asian languages, the sound of the digit 4 is similar to sound of the verb “to die,” and is thus associated with death. It has been reported in the *British Medical Journal* that among Chinese and Japanese living in the USA, deaths from chronic heart disease peak during the fourth day of the month, apparently from the stress associated with 4's connotations (Phillips et al., 2001).

*Role of rightmost digit drop-off in US Managers’ use of 9 endings*

It has often been proposed that a tendency of consumers to drop off, ignore, or otherwise give insufficient consideration to a price’s rightmost digits is an important factor behind the predominance of the digit 9 in US price endings (Basu, 1997; Brenner and Brenner, 1982; Schindler and Kibarian, 1993). There is evidence, from both econometric and experimental studies, that such a drop-off tendency does indeed exist (Bizer and Schindler, 2005; Stiving and Winer, 1997; Thomas and Morwitz, 2005). The presumption is that if consumers do not fully consider the rightmost digits when evaluating a price, it is in the interest of the seller to make these digits as high as possible. Thus, managers tend to choose 9, the digit of highest value.

There are two lines of behavioral evidence that support the idea that managers’ use of 9 endings is based on a consumer drop-off tendency. The first is that 9 endings are more likely to be used when they have the effect of lowering a price’s leftmost digit. In their sample of US prices, Schindler and Kirby (1997) found that managers were considerably more likely to choose 9 endings over 0 endings for those prices where that choice affected the value of the leftmost digit.

For example, if a manager chose a 0 ending for $4.99 (to make it $5.00) or a 9 ending for $200 (to make it $199) the leftmost digit of these prices would have changed. This change of leftmost digit would make the perceived price due to dropping off both rightmost digits much lower when 9 rather than 0 endings are used (e.g. $4.00 is 20 percent lower than $4.99; $100 is 50 percent lower than $199). Thus, if consumers tend to drop off a price’s rightmost digits, there would be great benefit to the seller of choosing 9 endings for prices where such a choice causes a decrease in the leftmost digit. By contrast, for a price such as $4.49 or $220, dropping both rightmost digits would lead to exactly the same perceived price whether a 9 ending or 0 ending were used. If consumers dropped off only the single rightmost digit, then choosing $4.49 over $4.50 would produce a benefit to the seller that would not only be small (e.g. $4.40 is 2 percent lower than $4.49), but might even be entirely inconsequential (Thomas and Morwitz, 2005). For this type of price, where the choice of ending does not affect the leftmost digit, a consumer tendency to drop off a price’s rightmost digits would lead to little or no benefit to the seller for choosing 9 endings.

The second line of behavioral evidence that managers use 9 endings because of consumers’ tendency to drop off rightmost digits is based on the business context of their use. Because drop-off of rightmost digits would lead consumers to underestimate the level of a price, managers should be particularly likely to use 9-ending prices in ads where their goal is to communicate that the price is one that represents a discount or an otherwise lower price than consumers might expect. In an analysis of a large sample of
US prices, Schindler (2006) reported a strong and robust correlation between the use of a 99 price ending and advertisements that appeared to be making a low-price appeal.

**Role of rightmost digit drop-off in Japanese managers’ use of 8 endings**

If, as suggested above, the predominance of the digit 8 in Japanese price advertising is based on the cultural meanings of numbers, one can ask how these cultural meanings act to influence the manager. One possibility is that the communication of number meanings is the overriding consideration. In such a case, for example, one might expect that the use of 8 endings would be determined mainly by cultural situations where auspicious numbers would be deemed important, such as promoting risky products or advertising to market segments with more traditional values.

On the other hand, it is possible that the use of 8-ending prices by Japanese managers involves their adaptation of the same logic that guides US managers. They may share with US managers the belief that consumers tend to drop off rightmost price digits, and thus see the advantage of choosing rightmost digits with high numerical values. However, the cultural meanings in favor of the digit 8 and against the digit 9 deflect the manager toward favoring the digit with the second highest, rather than the highest, numerical value. In other words, Japanese managers may use 8 endings in the same way US managers use 9 endings.

This latter explanation of 8-endings’ over-representation, that Japanese managers are responding to a consumer tendency to drop off rightmost digits, can be tested by examining the pattern of 8-ending use in Japanese price advertising. It can be asked, is the pattern of 8-ending use in Japan consistent with each of the two lines of behavioral evidence that support the drop-off explanation of 9 endings in the US?

The first line of behavioral evidence for drop-off in the US use of 9 endings is that 9s are more likely to be used when they have the effect of lowering the price’s leftmost digit. If 8 endings are more likely to be used by Japanese managers when they lower the price’s leftmost digit, then it would provide support for the role of a consumer drop-off tendency in 8-ending use. Formally, this possibility can be expressed as follows:

**H1.** Among Japanese prices that end in 8 or 0, the 8-ending will be particularly favored in those situations when choosing the 8-ending over the 0-ending decreases the price’s leftmost digit.

The second line of behavioral evidence for drop-off in the US use of 9 endings is that, 9s are more likely to be used when managers are trying to communicate a discount or particularly low price. If 8 endings are more likely to be used by Japanese managers when the advertised prices are claimed to be discounts than when the advertised prices are not claimed to be discounts, then it would provide further support for the role of consumer drop-off tendency in 8-ending use. Formally, this possibility can be expressed as follows:

**H2.** Among Japanese prices, the proportion of discount prices that end in the digit 8 will be greater than the proportion of nondiscount prices that end in the digit 8.

**Overview of the study**

The approach used in this study for investigating these two hypotheses involved sampling newspaper advertisements that prominently display a price, as has been
Patterns of price endings

done in previous price-ending studies (Rudolph, 1954; Schindler and Kirby, 1997; Tweedt, 1965). A large sample of price advertisements was collected from US and Japanese newspapers. Similar procedures were used to collect both the US and Japanese ads so as to produce comparable samples of newspaper price advertising.

In most of the previous price-ending surveys, the number used to represent a price's ending was the price's single rightmost digit (e.g. the 5 in $9.95). The single rightmost digit was also used in this study. In addition, because the low value of the Japanese yen leads the vast majority of Japanese prices to have 0 as the single rightmost digit, a second representation of a price's ending was used.

The second representation of a price's ending used in this study is the "rightmost salient ending digit" used by Simmons and Schindler (2003) in their study of Chinese price advertising (Aalto-Setala and Halonen (2004) used a similar zero-removal process). Following Simmons and Schindler's procedure, a price's rightmost salient ending digit is the first digit other than zero that is encountered when observing the price's digits from right to left. If the first nonzero digit encountered is also the price's leftmost digit (which could not plausibly be considered part of a price's ending), then the digit 0 is used. For example, the rightmost salient ending digits of $6.49, ¥2,500, $400, and ¥43,000 are 9, 5, 0, and 3, respectively.

Although both of these representations of a price's ending are used in the analysis of this study's samples of advertised prices, all comparisons made between US and Japanese price endings will involve like measures.

Method

The ads for both the US and Japanese samples were obtained from popular newspapers published in the large urban centers of each country. Specifically, the largest circulation newspaper from the six largest US and Japanese cities were included in the sample. In the US sample, price advertisements were drawn from the following six newspapers:

(2) Los Angeles Times, Los Angeles.
(3) Chicago Tribune, Chicago.
(4) Washington Post, Washington, DC.
(5) San Francisco Chronicle, San Francisco.
(6) Philadelphia Inquirer, Philadelphia.

The Japanese sample consisted of price advertisements drawn from the following six newspapers:

(1) Yomiuri, Tokyo.
(2) Asahi, Yokohama.
(3) Mainichi, Osaka.
(4) Chunichi, Nagoya.
(5) Yomiuri, Sapporo.
(6) Sankei, Kyoto.

For each of these 12 newspapers, the price ads were sampled from the issue published on Sunday, May 18, 1997, using the edition that included a full set of local flyers and inserts.
Because advertising is not as common in the Sunday editions of Japanese newspapers as it is in US newspapers, the sample of Japanese price advertisements was supplemented with price ads drawn from several subsequent Saturday and Sunday issues of the selected Japanese newspapers. The ads sampled from the US newspapers formed the basis of the second-sample analysis published in Schindler (2006), and that paper can be consulted for further details on the US sample.

Advertisements were sampled from each selected issue of a newspaper by first randomly choosing whether the newspaper's odd-numbered pages or even-numbered pages would be examined (for newspapers containing few advertisements, every page was examined). For each examined page, every ad that was at least 2 in. high and 2 in. wide and that contained at least one selling price was used in the sample. For local flyers and inserts, the whole examined insert page was considered to be a single ad.

Because of the similarity of price endings among the prices in advertisements that displayed more than one price, only one price was used from each selected ad. That one price was chosen by laying a numbered grid on the ad and selecting the price closest to a randomly selected numbered square on the grid. By this procedure, 1,391 prices were drawn from US newspapers and 1,121 prices were drawn from Japanese newspapers, for a total sample consisting of 2,512 advertised prices.

Coding of prices
The integer portion of each price was coded as digits even if part of the price was described using words (e.g. "$20 thousand" would be coded as the digits 20,000). Cents digits (for the US prices) were included in the coded price only when they actually appeared in the price shown in the advertisement.

Also coded with each price was whether or not the ad indicated it was a discount price. It was considered to be a discount price if it was associated with a reference price in the ad or if the ad contained semantic cues indicating a discount claim (e.g. "sale," "save," and "special offer").

Results
The prices in the US sample ranged from $1 to $9,950,000 with the median US price being $117. Five hundred and fifty-one of the 1,391 US prices (39.6 percent) were classified as claimed discounts. The second-sample analyses in Schindler (2006) used a slightly reduced version of this dataset, which cause the results reported there to differ slightly from those reported here.

The prices in the Japanese sample ranged from ¥1 to ¥105,000,000 with the median Japanese price being ¥12,000. Two hundred and seventy-five of the 1,121 Japanese prices (24.5 percent) were classified as claimed discounts. The exchange rate in mid-May 1997 was 116 yen to the US dollar (www.bankofcanada.ca/en/rates/exchform.html).

Distribution of price endings
The distribution of the single rightmost digits occurring in US and Japanese prices can be seen in the first two data columns of Table I. Among the US prices, the digit 9 was used as the rightmost digit 46.5 percent of the time, the digit 0 was used 22.8 percent of the time, and the digit 5 was used 15.0 percent of the time. Each of these three digits was over-represented with respect to the chance expectation of 10 percent
Patterns of price endings

<table>
<thead>
<tr>
<th>Digit</th>
<th>Rightmost price digit</th>
<th>Rightmost salient-ending digit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>US prices $(n = 1,391)$</td>
<td>Japanese prices $(n = 1,121)$</td>
</tr>
<tr>
<td>0</td>
<td>22.8</td>
<td>91.7</td>
</tr>
<tr>
<td>1</td>
<td>1.3</td>
<td>0.5</td>
</tr>
<tr>
<td>2</td>
<td>1.1</td>
<td>0.1</td>
</tr>
<tr>
<td>3</td>
<td>1.3</td>
<td>0.2</td>
</tr>
<tr>
<td>4</td>
<td>2.2</td>
<td>0.4</td>
</tr>
<tr>
<td>5</td>
<td>15.0</td>
<td>1.1</td>
</tr>
<tr>
<td>6</td>
<td>1.4</td>
<td>0.4</td>
</tr>
<tr>
<td>7</td>
<td>3.0</td>
<td>0.5</td>
</tr>
<tr>
<td>8</td>
<td>5.5</td>
<td>4.1</td>
</tr>
<tr>
<td>9</td>
<td>46.5</td>
<td>1.0</td>
</tr>
</tbody>
</table>

(binomial tests, all $p < 0.001$). In addition, among the US prices, the digit 9 was used as the rightmost digit more often than any other digit, more often even than the digit 0 (although 0 was the next most commonly occurring digit, the digit 9 occurred more frequently than 0 ($\chi^2[1] = 112.97, p < 0.001$). These results agree fairly well with the pattern of rightmost digits in a recent previous study of US newspaper price advertising (Schindler and Kirby, 1997).

As expected due to the low value of the Japanese yen, the preponderance of Japanese prices used 0 as the single rightmost digit (91.7 percent of the prices). Although the digit 8 occurred more than one-ninth of the time among the prices whose rightmost digit was not 0 (binomial test, $p < 0.001$) and occurred as a single rightmost digit more often than any other digit except 0 (i.e. more than 5, the most frequently occurring rightmost digit after 8, $\chi^2[1] = 19.93, p < 0.001$), it was clearly overwhelmed by the use of 0 in the rightmost digit position. To facilitate observation of the pattern of ending digits used in Japanese price advertising despite the preponderance of 0s caused by the low yen value, the rightmost salient ending digit was used to represent each price's ending. As described above, the rightmost salient ending digit is the first nonzero digit that is encountered when observing the price's digits from right to left. If the first nonzero digit encountered is also the price's leftmost digit (e.g. ¥70,000), then an exception to the rule is made and the rightmost salient ending digit is considered to be 0.

The distribution of rightmost salient ending digits occurring in US and Japanese prices can be seen in the third and fourth data columns of Table I. Among the US prices, the digit 9 is the most commonly occurring rightmost salient ending digit, occurring 52.2 percent of the time. This occurrence of 9 endings is greater than chance (binomial test, $p < 0.001$) and greater than the occurrence of the next most common rightmost salient ending digit, which is the digit 5 ($\chi^2[1] = 167.04, p < 0.001$). Among the Japanese prices, the digit 8 is the most common rightmost salient ending digit, occurring 37.5 percent of the time. This occurrence of 8 endings in the Japanese prices is greater than chance (binomial test, $p < 0.001$) and greater than the occurrence of the next most common rightmost salient ending digit, which, as in the US sample, is also the digit 5 ($\chi^2[1] = 113.29, p < 0.001$). Thus, using a price's rightmost salient ending digit to represent the price's ending confirms both the over-representation of 9s in the US sample and the over-representation of 8s in the Japanese sample.
It should be noted that, although the analysis of rightmost salient ending digits demonstrates the over-representation of 9 endings in the US sample and 8 endings in the Japanese sample, it also shows that there is less use of 8s in Japan than there is use of 9s in the US ($\chi^2[1] = 72.59, p < 0.001$) and more use of 0s ($\chi^2[1] = 54.26, p < 0.001$). This finding is further supported by the use of two alternative means of considering the low yen value. Considering only Japanese prices below ¥1,000 and US prices below $10.00, Japanese prices showed 18.9 percent 8 endings (vs 53.3 percent 9 endings in US; $\chi^2[1] = 57.26, p < 0.001$) and 71.4 percent 0 endings (vs 7.5 percent 0 endings in US; $\chi^2[1] = 202.0, p < 0.001$). Considering the endings of Japanese prices to be the third digit from the right and the endings of US prices to be the rightmost dollar digit, Japanese prices showed 18.5 percent 8 endings (vs 39.6 percent 9 endings in US; $\chi^2[1] = 89.82, p < 0.001$) and 53.8 percent 0 endings (vs 23.5 percent 0 endings in US; $\chi^2[1] = 154.5, p < 0.001$).

**Effect of price-ending choice on a price’s leftmost digit**

If consumers tend to drop off the rightmost digits when evaluating prices, then market forces should lead managers’ choice of price ending to be influenced by whether or not that choice would affect the price’s leftmost digit. For US prices, it has been found that managers are more likely to choose the 9-ending over the 0-ending when that choice would lower the value of the price’s leftmost digit (Schindler and Kirby, 1997). For Japanese prices, it was hypothesized ($H1$) that managers would be more likely to choose the 8-ending over the 0-ending when that choice would lower the value of the price’s leftmost digit.

Nine hundred and sixty-four of the US prices showed either the digits 9 or 0 as their single rightmost digit. For 403 of these prices, the leftmost digit would have been affected if the choice had gone the other way (e.g. $399 vs $400). For the other 561 of these prices, the leftmost digit would not have been affected by the 9-versus-0 choice (e.g. $2,699 vs $2,700). Among those prices where the 9-versus-0-ending choice affects the leftmost digit, 84.1 percent ended in the digit 9. Among those prices where the 9-versus-0-ending choice does not affect the leftmost digit, only 54.9 percent ended in the digit 9. This difference is statistically significant ($\chi^2[1] = 90.71, p < 0.001$), and confirms this pattern of price-ending use previously found in US price ads.

One thousand and seventy-four of the Japanese prices showed either the digits 8 or 0 as their single rightmost digit. For 191 of these prices, the leftmost digit would have been affected if the choice had gone the other way (e.g. ¥698 vs ¥700). For the other 883 of these prices, the leftmost digit would not have been affected by the 8-versus-0 choice (e.g. ¥1,748 vs ¥1,750). Among those prices where the 8-versus-0-ending choice affects the leftmost digit, 15.7 percent ended in the digit 8. Among those prices where the 8-versus-0-ending choice does not affect the leftmost digit, only 1.8 percent ended in the digit 8. Although the preponderance of 0s among the single rightmost digits of Japanese prices make these percentages considerably lower than the comparable percentages of 9s in US prices, the difference between the 15.7 and 1.8 percent is statistically significant ($\chi^2[1] = 73.95, p < 0.001$). Thus, these results provide support for $H1$.

Note that this analysis cannot be carried out if the rightmost salient ending digit is used to represent a price’s ending. Because the rightmost salient ending digit is created by stripping off a price’s right-side zeros except for ones in the second-to-leftmost digit.
position, the resulting lack of zeros makes it impossible to determine when there existed a 9-versus-0-ending choice or 8-versus-0-ending choice for those prices where the leftmost digit would not have been affected by this choice. For example, a 9-versus-0 choice would be apparent for $2,699 but not for $2,700, because $2,700's rightmost salient ending digit would be 7, not 0. This analysis can be carried out if the third digit from the right is used as a price's ending digit, and such an analysis confirms the data's support for $H_1$ (i.e., for Japanese prices where changing an 8 or 0 third-from-right digit would have changed the leftmost digit, 48.3 percent of these digits were 8; for Japanese prices where changing these digits did not affect the leftmost digit, only 15.4 percent ended in 8 [$\chi^2[1] = 80.64, p < 0.001$]).

**Price endings for discount and nondiscount prices**

As can be seen from the first two data columns of Table II, the percent of 9 endings among US prices that are claimed to be discounts is considerably higher than that among US prices that are not claimed to be discounts. This is true irrespective of whether price ending is represented by the single rightmost digit ($\chi^2[1] = 124.97, p < 0.001$) or by the rightmost salient ending digit ($\chi^2[1] = 74.07, p < 0.001$). These results confirm the pattern of price-ending use previously found in US price ads (Schindler, 2006).

As can be seen from the third and fourth data columns of Table II, the percent of 8 endings among Japanese prices that are claimed to be discounts is considerably higher than that among Japanese prices that are not claimed to be discounts. As with the US prices, this is true irrespective of whether price ending is represented by the single rightmost digit ($\chi^2[1] = 26.51, p < 0.001$) or by the rightmost salient ending digit ($\chi^2[1] = 43.46, p < 0.001$). These results provide support for $H_2$.

**Discussion**

This comparative survey of price endings used in US and Japanese price advertising confirms that the ending digits used differ dramatically from what a random process would predict. In the US, the digit 9 is used far more frequently than chance and more frequently than any other digit. This over-representation of the digit 9 was found to be even greater when its use lowers the price's leftmost digit, thus confirming a previous finding (Schindler and Kirby, 1997). Further, as was reported by Schindler (2006),

<table>
<thead>
<tr>
<th>Price-ending representation</th>
<th>US prices</th>
<th>Japanese prices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent of nine endings among prices claimed to be discounts $(n = 551)$</td>
<td>Percent of nine endings among prices not claimed to be discounts $(n = 840)$</td>
</tr>
<tr>
<td>Rightmost digit</td>
<td>65.0 $^*$</td>
<td>34.4</td>
</tr>
<tr>
<td>Rightmost salient-ending digit</td>
<td>66.4 $^*$</td>
<td>42.9</td>
</tr>
</tbody>
</table>

**Table II.** Percent of 9- and 8-endings among discount and nondiscount prices

Note: $^*$Higher than percent among prices not claimed to be discounts, $p < 0.001$
managers’ over-representation of the digit 9 is also greater when the advertised price is claimed to be a discount than when the price ad does not make such a claim.

Among the Japanese price endings, it is the digit 8 rather than the digit 9 that is highly over-represented, as was found by Heeler and Nguyen (2001). However, beyond this very salient difference, there is a considerable degree of similarity between Japan and the US in the pattern of occurrence of their over-represented digits. In particular, like the digit 9 in the US, the digit 8 is more likely to be used in Japanese price endings:

- when its use lowers the price’s leftmost digit; and
- when the price is claimed to be a discount.

Thus, despite the profound differences in the cultural traditions of the US and Japan and the marked differences in the particular price-ending digits used, there is an impressive similarity in the pattern of price-endings usage.

Implications for mechanisms of price-ending effects
The similarities in the pattern of price-ending usage in the US and Japan provide support for a commonly proposed psychological mechanism for price-ending effects, the possibility that consumers tend to drop off, or otherwise give insufficient consideration to, the rightmost digits of a price (Basu, 1997; Brenner and Brenner, 1982; Schindler and Kibarian, 1993). In both US and Japanese prices, there is more use of 9 or 8 endings than the digit 0 when the 0-versus-9/8 choice affects the leftmost digit than when it does not. This suggests that, in Japan, 8s are used as 9s are in the US — to make prices fall just below round-number/0-ending prices in order to reduce the level of the leftmost digit. If we assume that managerial choices are influenced by market forces, this is evidence that in both cultures, there is a tendency for consumers to give insufficient consideration to the digits on the right side of an advertised price.

The finding that both US and Japanese managers are more likely to use 9- or 8-ending prices when the prices are advertised to be discounts provides further support for a rightmost-digit drop-off tendency to exist in both cultures. Such a tendency would lead consumers to perceive prices as lower than they actually are, which would be particularly important to the seller who is trying to communicate that the price is discounted and thus a particularly low price.

The differences between the patterns of price-ending usage in the US and Japan also contribute to our understanding of price-ending effects. The most salient of these differences is that the Japanese favor the use of the digit 8 over the digit 9 in their “just-below prices,” even though use of 9s would lead to a bit more revenue. This difference supports the often-proposed idea that a price ending can carry a symbolic meaning (Schindler, 1991; Schindler and Kibarian, 2001). In this case, the symbolic meaning would be the auspicious connotations of the digit 8 in the Japanese culture, such as evoking thoughts of things or people becoming happier and more prosperous (Simmons and Schindler, 2003).

It should be noted that if a price ending can acquire a symbolic meaning, then the long-term use of just-below price endings to advertise discount prices could lead to an association in consumers’ minds between discounts and high rightmost price digits. This could enable 9- or 8-ending prices to communicate to consumers the symbolic meaning “discount price” and therefore be beneficial to retailers for a reason in addition to consumer drop-off tendencies or culture-specific connotations (Schindler, 2006).
Such a meaning could help explain field studies in the US market showing price-response functions with "spikes" at 9-ending prices rather than the "steps" descending between 9 and 0 endings that would be predicted by a drop-off tendency alone (Anderson and Simester, 2003; Kalyanam and Shively, 1998).

The tendency of Japanese managers to prefer the digit 8 over the digit 9 could also be due to 8's added distance from the round (0-ending) number. Being a little farther from the round number may lead 8 endings to seem less manipulative than 9 endings, in that they are not as close to the round number as possible. Because Japan is a high-context culture, where manipulative intent would be more devalued than in a low-context culture such as the US, this factor could help explain Japanese managers' preference for the digit 8 (Nguyen et al., 2007; Synodinos, 2001). This role of perceived respect for the consumer in price-ending choice is further supported by the finding in the present study that there is less use of 8 endings in Japan than 9 endings in the US (in other words, less just-below pricing), a result also reported by Nguyen et al. (2007). This perceived-respect factor could very well be operating in addition to the symbolic-meaning factor to cause the differences in the price-ending patterns between the US and Japan.

**Recommendations for price-ending choice**

The results of this study suggest the value to the seller of setting prices that fall just below round (i.e. 0-ending) numbers. They further suggest that just-below pricing is particularly useful when the ending choice affects the price's leftmost digit and when a discount or other low-price message is being communicated.

However, these results also suggest that the perceived meanings of digits differ between cultures and that these meanings can play a role in the effectiveness of a just-below price. The price setter would be wise to investigate the cultural meanings ascribed to the various high-value digits before using them in advertised prices. Moreover, the price setter would benefit from being sensitive to cultural meanings that could be conveyed by any digit and also to the way consumers in a market view the use of just-below pricing itself.

**Limitations and conclusions**

Although this study illustrates how the systematic comparative investigation of price-ending usage can be used to address questions of how price endings affect the consumer, it is only a first step. Future research could replicate these analyzes in other countries where 8 endings are favored, such as China. Further, future research on Japanese price endings could include prices from small town newspapers and from magazines (which are more likely to have price advertising in Japan than in the US) as well as those prices that are available only in stores. In addition, there is one finding from past price-ending research (Schindler and Kirby, 1997) - the under-representation of the digit 1 - that was not clearly apparent in this data. Although the sample of prices in the present study was large, it may not have been large enough to give reliable data on phenomena having to do with infrequently occurring digits.

The findings of this investigation indicate that, in two countries with very different cultural traditions, there is considerable similarity in the pattern of use of price-ending digits. This similarity supports the idea that price-ending effects draw, at least partially, on some basic and universal psychological processes of consumers.
However, there are also substantial cultural differences in patterns of price-ending usage, which suggest the importance of culturally dependent meanings and values. This investigation illustrates how both basic psychological processes and cultural specifics can combine to produce price-ending effects. Further, it points to the rich set of consumer behavior factors that should be considered, not only in pricing decisions, but in the whole range of managerial decisions regarding the standardization versus adaptation of marketing practices across nations and cultures.

References


Patterns of price endings


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