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The use of odd-ending numbers in the pricing of five tourism services in three different cultures

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HIGHLIGHTS

- The most frequent price endings in each city were culturally specific.
- The prominence of the 0 and 5 digit endings suggested they were universally accepted.
- 9-endings were not used more frequently when the leftmost digit was lowered by using them.
- Dominant culturally specific endings were not used more frequently in lower priced services.

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ABSTRACT

The study measured the extent to which the 1 through 9 digits were used as price endings by suppliers of five tourism services in three different cultures represented by New York City, Seoul, and Shanghai. Four results emerged. The first confirmed the hypothesis, but the other three results were contrary to expectations. First, 9 and 8-ending prices were dominant in New York City and in Shanghai, respectively. Second, these culture specific endings were complemented by the universality of the 0 and 5- digit endings of prices which were ranked first and second, respectively, in Seoul, second and third in Shanghai, and third and second in New York. Third, 9-ending prices were not used more frequently when they resulted in a lowering of the leftmost digit. Fourth, dominant cultural specific price endings were not used more frequently in lower than in higher priced tourism services.

1. Introduction

Beyond its allocative function, price also has an informational role. The most widely recognized manifestation of this role is the relationship of *level of price* with quality of service. This was first identified more than 70 years ago (Scitovszky, 1944) and has been described as "one of the most commonly studied extrinsic cues in marketing" (Volckner & Hofmann, 2007, p. 182). The study reported here addresses the use of *price endings* to communicate information, which is a less explored aspect of the informational function of price. The information that price endings connote may be independent of that communicated by price level. Strategies that effectively embrace consumers' interpretations of the price ending heuristic are not likely to result in such substantive revenue gains as may be forthcoming from effective use of the price-quality relationship. Nevertheless, they have the potential to contribute meaningfully to profitability, since the high fixed costs which are typical of many tourism services means that a relatively small increase in revenues of (say) 1% is likely to result in a disproportionate increase in profits.

This study investigates the odd-ending heuristic through analyzing the patterns of price endings used by managers of tourism services in three different cultures. This supplier oriented perspective is consistent with the approach used by others in other marketing contexts (Aalto-Setala & Halonen, 2004; Schindler & Kirby, 1997; Schindler, 2009). Complementary studies by the authors have explored the heuristic from the perspectives of prospective tourists' in the three cultures. It is anticipated that addressing the heuristic from both supply and demand perspectives will provide holistic insights into its utility.

Over 50 years ago, Friedman (1967) reported that more than 80% of American retail food prices ended in the numbers 5 or 9. Subsequently, the widespread use of 9-ending prices in the U.S.

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has been demonstrated across a broad range of products including gasoline (Bacon, 1991; Lewis, 2015), retail food (Baumgartner & Steiner, 2007), women's clothing (Schindler & Kibarian, 1996), and fast food restaurants (Parsa & Naipaul, 2007). Multiple psychological explanations for this prevalence have been proposed, but it is generally accepted that odd-ending prices enhance price competitiveness in two ways: (i) they lower leftmost digits; and (ii) odd-numbered rightmost digits have connotations of discounting (Hackl, Kummer, & Winter-Ebmer, 2014; Nguyen, Heeler, & Taran, 2007).

Odd-ending prices are frequently used on online shopping sites where price comparisons are relatively easy. Because many tourism services are purchased online, it seems likely that tourists may be particularly influenced by odd-number ending prices when selecting a service from an array of differently priced options. However, little is known about the effects of odd-ending prices on tourism services, because empirical studies reported in the literature have been conducted almost exclusively on relatively low-priced retail products (Kleinsasser & Wagner, 2011).

Tourism services differ from retail products in at least eight ways. First, services such as hotels, restaurants, music concerts, sports events and live theater performances, are generally more expensive than the retail items that have been the focus of most research on this issue (Baumgartner & Steiner, 2007). Second, the decision-making process is longer because tourists deal with a higher level of perceived risk attributable to their substantive commitment of time, effort and money (Teare, 1990). Third, tourists plan and save money over a longer time period which makes it likely they will have a greater level of involvement in the selection of tourism services (Gursoy & Gavcar, 2003; Havitz & Dimanche, 1997). Fourth, tourism services tend to be more carefully chosen and subjected to more cognitive processing because bad decisions are irreversible, while unsatisfying retail products often can be returned or refunded relatively easily (Mills, 1986). Fifth, the opinions of others often are considered when traveling as a group, so decisions related to tourism services are more complex than when purchasing retail goods for personal use (Pearce, 2005; Ritchie, 1997). Sixth, the fairness of tourism service prices is more difficult to ascertain than general merchandise prices because there is relatively low price transparency in the tourism sector. Tourism services typically engage in dynamic pricing and widespread price differentiation, charging different prices to different customers for the same service. Seventh, people have fewer cues about the costs of services than goods, so it is more difficult to embrace the Principle of Dual Entitlement which posits that people judge price fairness by its relationship to costs (Bolton & Alba, 2006). Eighth, motives for purchasing tourism services tend to be hedonic whereas those which underlie purchases of retail products tend to be functional, suggesting that consumers' price sensitivities to tourism services are likely to be lower than those associated with retail products (Wakefield & Inman, 2003). These differences suggested it would be fruitful to expand the empirical investigation of odd-ending price research into the area of tourism services.

2. The influence of culture on heuristics and price endings

Tourism is a global phenomenon, so many tourism service suppliers target international visitors from multiple countries. A challenge in setting prices is to enhance visitors' willingness to pay by creating positive feelings about a price. However, people from different cultures may use different heuristics in their decision processes and, consequently, respond differently towards a given price framing.

For several decades, psychologists have recognized there are two modes of thinking (Kahneman, 2011). These dual process theories identify parallel processors of information. The labels System 1 and System 2 often are used to describe them: “System 1 operates automatically and quickly with little or no effort and no sense of voluntary control”, while “System 2 allocates attention to the effortful mental activities that demand it, including complex computation” (Kahneman, 2011, pp. 20–21).

System 1 judgments are made in many contexts because “we think associatively, we think metaphorically, we think casually” (p. 13). Kahneman concludes: “The intuitive System 1 is more influential than your experience tells you, and it is the secret author of many of the choices and judgments you make” (p.13). System 1 makes extensive use of heuristics which are “rules of thumb” that people use to simplify their decision-making. They may be innate which reflects “we are born prepared to perceive the world around us” (p. 21); or they may be learned since “other mental activities become fast and automatic through prolonged practice … and learned associations” (p. 22).

Odd-ending prices in the U.S. have been widely adopted because they have been effective in triggering a heuristic among consumers that causes them to perceive a price is lower than they would conclude if they invested the cognitive effort of System 2 to investigate it. If this heuristic is innate, then it should be universal across cultures. If it is not universal, then it suggests price endings are learned and interpreted differently in different cultures.

Countries have been classified into high and low context cultures based on consumers' interpretations of communications (Hall, 1976). In general, western/individualist-culture countries, such as the U.S. are categorized as low context cultures, because people in these countries tend to interpret communications literally. In contrast, non-western/collectivist-culture countries, such as China and Korea, are categorized as high context cultures because people in these countries often seek hidden meanings and to identify more implicit, non-verbal cues in communications (Hall, 1976; Copeland & Griggs, 1985).

The primary reasons suppliers use odd-ending prices in western cultures is to create an illusion of a substantially lower price. Consumers from these cultures tend to understand meanings by what is delivered in the message itself, and so may perceive odd-ending prices as good deals because those endings connote lower prices and discounts. In contrast, people in non-western/collectivist cultures may be less prone to accept the illusion of cheapness or gain created by odd-endings; be more likely to read the seller's true deceptive intentions of using odd-ending prices; and react negatively to this tactic (Nguyen et al., 2007).

In summary, the literature suggests consumers' responses to odd-ending prices may differ because of culturally different approaches to interpreting communications (Nguyen et al., 2007; Schindler, 2009; Suri, Anderson, & Kotlov, 2004). Tourists from non-western/collectivist cultures may be less likely than those from individualist cultures to respond positively to odd-ending prices. The connotation of discount associated with odd-ending prices may be much stronger among people from low context and individualist cultures, while connotations of low quality and deceptive practice of odd-ending prices may be stronger among people from high context and collectivist cultures.

3. Explanations for the effectiveness of odd-ending prices

3.1. Left-digit effect

It has consistently been suggested that the leftmost digit has a relatively greater influence on judgments of prices than other digits. For example, Thomas and Morwitz (2005) demonstrated prices ending in 9 were perceived to be substantially smaller than even-ending prices that were one cent higher. That is because

consumers are likely to encode each price on their internal maps into different categories according to the leftmost digit when comparing prices. For example, $9.99 and $10.00 may be cognitively mapped as $9.00 and $10.00, respectively. Thus, an odd number ending price (e.g. $9.99), which is slightly lower than an even number ending price (e.g. $10), appears to give the larger discount of $1 than the actual discount amount of $0.01. As a result, odd-ending prices lead to increased sales (Schindler & Kibarian, 1996; Thomas & Morwitz, 2005).

Three complementary explanations have been offered to account for this left-digit effect. First, there is a tendency to round down prices (Gabor & Granger, 1964). Second, consumers remember and recall only the leftmost digit exactly (Brenner & Brenner, 1982) and tend to assume the right-digits invariably will end in 9, even though some prices do not end in 9 (Schindler & Kibarian, 1993). Third, people tend to processes prices by reading them from left-to-right and to quit reading after the first number, so the leftmost digit is mapped as the most significant internal reference (Poltrock & Schwartz, 1984; Thomas & Morwitz, 2005). This process has been termed "truncation" and results in a decision about price being reached by comparing only the left-hand digits (Quigley & Notarantonio, 1992; Stiving & Winer, 1997).

In summary, sellers lower the leftmost digit of prices by using odd-ending prices, so they can reframe and change the contexts of consumers' perceptions of prices with the minimum amount of effort. This discount can often change consumers' perceptions of the magnitude of a price.

3.2. Right-digit effect

If the rightmost digit is disregarded through truncation or the other complementary explanations but it does not lead to a drop in the left-digit (say $9.59 instead of $9.60), then the result is only a small gain (1 cent) to the seller which would probably be considered to be inconsequential to most tourist service suppliers. However, while customers' perceptions are likely to be influenced most by leftmost price digits, these effects do not provide a complete explanation for the effectiveness of odd-ending prices. For example, experiments showed a service priced at $39 induced disproportionately larger sales not only than a $44 price, but also than a $34 price (Stiving & Winer, 1997). The leftmost digit effect cannot explain the superiority of a $39 price in sales over a $34 price. This result has to be attributed to the right-digit effect. Hence, even though its effect may be substantially lower than the left-digit effect (Thomas & Morwitz, 2005), the right-digit may influence perceptions and judgments of tourism service prices by communicating its own meaning to consumers.

It may be that odd-number ending prices deliver a message that customers are being offered a good deal because they connote low, recently decreased, or discount prices; while those ending with even numbers communicate high, recently increased, full, or regular prices (Bliss, 1952; Dodds & Monroe, 1985; Quigley & Notarantonio, 1992; Schindler, 1991, 2009, 2006). A potential complementary explanation is that the rightmost digits also may have connotations relating to product quality and/or retailers' integrity. It has been suggested that odd-ending prices may communicate the items are low quality and left-over or out-of-date (Kreul, 1982; Schindler & Kibarian, 2001; Stiving, 2000), or interpreted in some cultures as a trick to mislead consumers (Nguyen et al., 2007; Schindler, 2009).

4. Hypotheses

The previous discussion established that odd-ending prices were ubiquitous in retailing in the U.S. Prices in markets are set by the interaction of supply and demand. Thus, sellers' decisions to use odd-endings are likely to reflect their perceptions of how tourists will respond to a pricing format. Hypothesis 1-1 was designed to test if the ubiquity of odd-ending prices in the functional context of retailing in the U.S., extended to higher priced hedonic tourism services and into high context cultures. If service suppliers believe odd-ending prices will lead to greater sales, then they are likely to be widely used. In contrast, this strategy is unlikely to be adopted if they perceive odd-ending prices will communicate a lack of integrity and result in a decrease in visitors' trust:

H1-1. There will be significant differences in the frequency with which odd-ending prices are used between suppliers of five tourism services in the U.S. and those in Korea and China.

There is evidence in some international contexts that U.S. corporations' pricing decisions have been perceived as "an offensive approach when dealing with cultural factors instead of taking advantage of them" (Odongo, Agneta, & Orinda, 2012. p. 66). In contrast to this critical observation, Hypothesis 1-2 offered a positive view and tested the proposition that franchise hotels whose marketing departments were headquartered in the U.S. would use 9-digit price endings less frequently in Korea and China, reflecting a sensitivity to the local cultures.

H1-2. There will be significant differences in the frequency with which odd-ending prices are used between franchise hotels in the U.S. and those in Korea and China.

Odd-ending price effects are associated with the effects of both left-digits and right-digits. However, the literature review indicated the most pronounced effect occurs when the left digit is changed by the use of a 9-ending right digit (Thomas & Morwitz, 2005):

H2. There will be significant differences in the frequency with which odd number endings are used when a price's left digit is changed by the 9-ending right digit, compared to when the left digit is not changed by the 9-ending right digit.

Involvement is the level of arousal, interest, and engagement tourists exhibit in their purchase behavior (Havitz & Dimanche, 1997). It was noted in the opening section of the paper that tourists are likely to have a high level of involvement because they invest substantial resources into purchase decisions which is a characteristic of System 2 processing. This suggests they will be less likely to rely of the heuristic associated with System 1. In contrast, low price services are not given as much thoughtful attention so the heuristic will be more prominently used. Further, Prospect theory's tenet of diminishing effects (Kahneman & Tversky, 1979) directs that a saving of (say) $10 on a service costing $500 is likely to have minimal influence on a purchase decision. If the $10 savings is on a $50 purchase, then it is likely to be much more salient. Hence, the discount connotation of 9-ending services is more likely to be used by suppliers of relatively low-price tourism services.

H3-1. There will be increased frequency of odd-ending prices by suppliers of low-price tourism services, compared to those that are high-price.

H3-2. There will be increased frequency of odd-ending prices by hotels rated as 1, 2, or 3 stars, compared to hotels with 4 or 5 stars.

5. Sources of data

Since sellers' decisions on price endings are likely to reflect their experience and expectations of potential consumers' responses, the frequency of price ending digits may be regarded as a proxy of tourists' acceptability of price endings. The major cities of New York

City, Seoul, and Shanghai were selected as representative cities in the U.S., Korea, and China, respectively. They are the largest cities in their countries: New York City with 8.49 million, Seoul with 10.01 million, and Shanghai with 24.15 million. Also, the three cities are the top destination cities in their respective countries, and are all among the world's top 20 destination cities ranked by the number of international overnight visitors: New York City with 11.86 million, Seoul with 9.84 million, and Shanghai with 5.68 million (Hedrick-Wong & Choong, 2015). Hence, it was assumed service suppliers in these cities were likely to consider foreign tourists as important target markets.

A major city in China was selected because it tested the universality of the 9 digit in a high context culture where there was a strong competing heuristic (Heeler & Nguyen, 2001; Schindler, 2009). In that country the similar pronunciations of the Chinese characters for the number 8 and for wealth/prosperity/good fortune, result in the 8 digit being widely favored. For example, it was manifested at the Beijing Olympic Games where the opening ceremony commenced on 8/8/08 at 8 s after 8pm local time (Williams, 2008). It explains why a telephone number comprised exclusively of 8-digits was sold for 2.23 million yuan ($280,000) to Sichuan Airlines (BBC, 2003), and why international airlines such as Air Canada, British Airways, KLM, United Airlines, and Cathay Pacific, routinely use 88 or 888 as flight numbers on their China routes.

In contrast to the U.S. and China, there appeared to be no cultural attachment to any given digit in Korea. Thus, Korea was selected because it was a high context culture that provided an evaluation of the universality of odd-ending price effects without there being a dominant competitor digit.

Using the most popular search engine in each country (google.com for the U.S., baidu.com for China, and naver.com for Korea), the homepages of each service business and websites containing price information were used to report prices of selected tourism services in the three cities (Table 1). These search engines and online sites provided convenient access to sellers' price information.

A total of 3,762 prices were collected, comprised of 1,184 from NYC, 1,380 from Seoul, and 1,198 from Shanghai. Tables 2, 3, and 4 show in each of the three cities the distribution of prices ending in each digit (0 through 9) gathered in five categories into which services are frequently classified on tourism web sites: Music concerts, sport events, live theaters, restaurants, and hotels.

Hotel rates for the nights of June 24 (Friday) and June 25 (Saturday), representing a weekend during peak vacation season, were selected because it was believed at those times there would be a relatively small proportion of less price-sensitive business visitors whose travel budgets were provided by their employers. Hotels typically have a wide variety of priced rooms on any given evening. Accordingly, the hotel prices that were used were those suggested by booking.com which is perhaps the most popular global travel aggregator and travel metasearch engine for accommodations. The number of hotel prices used in New York City, Seoul and Shanghai were 567, 459 and 492, respectively. These numbers represented all of the hotels that were offering rooms for sale for the two day period selected for the study.

Ticket prices for three types of attractions (music concerts, sport events, and live theaters) that were available during the study period (June 9 – June 20) were collected. The events and prices were gathered from Ticket Master (http://www.ticketmaster.com/) for New York City, Naver shopping (shopping.naver.com) and Interpark (http://ticket.interpark.com/) for Seoul, and Damai (http://en.damai.cn/) and 247 ticket (https://247tickets.cn/)for Shanghai. The numbers of sporting events identified in New York City and Seoul were similar, but in Shanghai fewer were listed. That may be attributable to the heat and heavy pollution in Shanghai in the summer which is not conducive to staging sport events. The reverse situation occurred with music events where many more were listed for Shanghai than in New York City and Seoul. In Seoul and Shanghai theaters are generally much smaller than in New York City. Perhaps as a consequence, there are many more of them which would account for the relatively small number of theaters available for inclusion in the New York City sample. In many cases multiple price options were available for the same event. In those cases, the first four prices listed were used. If the same event or show was available on different dates only the first show time listed was selected. These decision rules were intended to prevent over-representation of a given service supplier's use of price endings,

Selection of restaurants for inclusion in the study was based on popularity and recommendations (from Asia Today, 2015; New York Times, 2015; and Timeout Shanghai, 2014). All restaurants listed by these sources that could be found on the internet were included in the study. Popular search engines were used to identify the prices charged at each of the selected restaurants. If more than five main dishes were listed, then the prices of the first five were selected to prevent over-representation of restaurants with more extensive menus.

Additionally, the prices used by a set of global franchise hotels were analyzed in the three cities to test Hypothesis 1-2. This complementary analysis recognized the pricing strategies of global chain hotels may be more strongly influenced by consumers' responses in the U.S. where their marketing headquarters are located, than those of local businesses. At the same time, it was recognized that using price samples from homogeneous global franchises may reduce extraneous sources of variance that may explain differences in results across countries. For this analysis, the leading three international hotel franchises of Hilton, InterContinental, and Marriott were selected (Hotel News Now, 2015). For statistical analyses, a sample of at least 100 data points was deemed to be desirable. To

Table 1
Online sites used to collect price information in New York City (U.S.), Seoul (Korea), and Shanghai (China).

City (Population size)	New York City, U.S. (8.49 million)	Seoul, Korea (10.01 million)	Shanghai, China (24.15 million)
Currency	US Dollar	Won (1 US Dollar = 1,120 Won)	Yuan (1 US Dollar = 6.48 Yuan)
Primary search engine	- google.com	- naver.com	- baidu.com
Websites for price information	- Ticket master (http://www.ticketmaster.com/) - Booking.com (www.booking.com)	- Naver shopping (shopping.naver.com) - Interpark (http://ticket.interpark.com/) - Booking.com (www.booking.com)	- Damai. cn (http://en.damai.cn/) - 247 ticket (https://247tickets.cn/) - Booking.com (www.booking.com)
Franchise Hotels	- Hilton (www.hilton.com) - InterContinental (www.intercontinental.com/) - Marriott (www.marriott.com/)		

Table 2
The frequency and percent of ending-digits of selected tourism service prices in New York City.

	Ending digit of prices										
	0	1	2	3	4	5	6	7	8	9	Total
Music Concerts	12[a]	8	13	11	10	12	12	10	11	11	110
	1.01[b]	0.68	1.10	0.93	0.84	1.01	1.01	0.84	0.93	0.93	9.29
	10.91[c]	7.27	11.82	10.99	9.09	10.91	10.91	9.09	10.00	10.00	
	11.43[d]	11.11	13.54	14.10	10.10	5.31	16.22	10.42	14.47	4.20	
Sport Events	22	10	9	8	7	23	7	9	9	23	127
	1.86	0.84	0.76	0.68	0.59	1.94	0.59	0.76	0.76	1.94	10.73
	17.32	7.87	7.09	6.30	5.51	18.11	5.51	7.09	7.09	18.11	
	20.95	13.89	9.38	10.26	7.07	10.18	9.46	9.38	11.84	8.78	
Live Theaters	7	1	7	2	1	40	1	11	1	38	109
	0.59	0.09	0.60	0.17	0.08	3.38	0.09	0.93	0.08	3.21	9.21
	6.42	0.92	6.42	1.83	0.92	36.70	0.92	10.09	0.92	34.86	
	6.67	1.39	7.29	2.56	1.01	17.70	1.35	11.46	1.32	14.50	
Restaurants	54	12	28	20	33	56	23	11	19	15	271
	4.56	1.01	2.36	1.69	2.79	4.73	1.94	0.93	1.60	1.27	22.89
	19.93	4.43	10.33	7.38	12.18	20.66	8.49	4.06	7.01	5.54	
	51.43	16.67	29.17	25.64	33.33	24.78	31.08	11.46	25.00	5.73	
Hotels	10	41	39	37	48	95	31	55	36	175	567
	0.84	3.46	3.29	3.13	4.05	8.02	2.62	4.65	3.04	14.78	47.89
	1.76	7.23	6.88	6.53	8.47	16.75	5.47	9.70	6.35	30.86	
	6.67	56.94	40.63	47.44	48.48	42.04	31.89	57.29	47.37	66.79	
Total	105	72	86	78	99	226	74	96	76	262	1,184
	8.87	6.08	8.11	6.59	8.36	19.09	6.25	8.11	6.42	22.13	100.00

[a] Frequency.
[b] Percent (%).
[c] Row Percent (%).
[d] Column Percent (%).

Table 3
The frequency and percent of ending-digits of selected tourism service prices in Seoul.

	Ending digit of prices										
	0	1	2	3	4	5	6	7	8	9	Total
Music Concerts	29[a]	6	8	5	9	28	9	8	4	4	110
	2.10[b]	0.43	0.58	0.36	0.65	2.03	0.65	0.58	0.29	0.29	7.97
	26.32[c]	5.45	7.27	4.55	8.18	25.45	8.18	7.27	3.64	3.64	
	6.42[d]	8.45	6.50	6.41	7.96	13.53	8.49	16.67	3.39	6.25	
Sport Events	79	2	18	4	16	12	1	2	3	1	138
	5.72	0.14	1.30	0.29	1.16	0.87	0.07	0.14	0.22	0.07	10.00
	57.25	1.45	13.04	2.90	11.59	8.70	0.72	1.45	2.17	0.72	
	17.48	2.82	14.63	5.13	14.16	5.80	0.94	4.17	2.54	1.56	
Live Theaters	104	9	10	10	9	14	1	1	1	1	160
	7.54	0.65	0.72	0.72	0.65	1.01	0.07	0.07	0.07	0.07	11.59
	65.00	5.63	6.25	6.25	5.63	8.75	0.63	0.63	0.63	0.63	
	23.01	12.68	12.82	12.82	7.96	6.76	0.94	2.08	0.85	1.56	
Restaurants	202	24	26	30	16	110	26	11	28	40	513
	14.64	1.74	1.88	2.17	1.16	7.97	1.88	0.80	2.03	2.90	37.17
	39.38	4.68	5.07	5.85	3.12	21.44	5.07	2.14	5.46	7.80	
	44.69	33.80	21.14	38.46	14.16	53.14	24.53	22.92	23.73	62.50	
Hotels	38	30	61	29	63	43	69	26	82	18	459
	2.75	2.17	4.42	2.10	4.57	3.12	5.00	1.88	5.94	1.30	33.26
	8.28	6.54	13.29	6.32	13.73	9.37	15.03	5.66	17.86	3.92	
	8.41	42.25	49.59	37.18	55.75	20.77	65.09	54.17	69.49	28.13	
Total	452	71	123	78	113	207	106	48	118	64	1,380
	32.75	5.14	8.91	5.65	8.19	15.00	7.68	3.48	8.55	4.64	100.00

[a] Frequency.
[b] Percent (%).
[c] Row Percent (%).
[d] Column Percent (%).

prevent overrepresentation of a given hotel's price endings, 40 prices from each hotel chain were collected by arraying the room prices of all hotels for each franchise within 5 miles of each of the three cities in the same order in which they were displayed on the homepage and proportionately selecting rooms from each hotel property.

Each country's indigenous currency was used, so sellers' perspectives would not be distorted by currency exchange rates: the dollar for the U.S., the won for Korea, and the yuan for China. Prices were coded as they were provided, so decimal prices such as cent-digits in the U.S. and jiao-digits in China were included only when they actually appeared in the price. The Korean Won currency uses only large denominations (₩1,120 = $1) and 1 won is the lowest unit of currency in circulation so Korea prices do not include any decimal places.

The ending-digits of prices were defined by methods adopted by others in the price-ending literature. The first salient rightmost digit of a price was considered to be the ending digit of the price

Table 4
The frequency and percent of ending-digits of selected tourism service prices in Shanghai.

	Ending digit of prices										
	0	1	2	3	4	5	6	7	8	9	Total
Music Concerts	48[a]	0	22	1	0	3	2	0	161	0	237
	4.01[b]	0.00	1.84	0.08	0.00	0.25	0.17	0.00	13.44	0.00	19.78
	20.25[c]	0.00	9.28	0.42	0.00	1.27	0.84	0.00	67.93	0.00	
	34.04[d]	0.00	24.18	2.50	0.00	2.78	2.50	0.00	31.20	0.00	
Sport Events	22	0	2	0	0	9	16	0	27	0	76
	1.84	0.00	0.17	0.00	0.00	0.75	1.34	0.00	2.25	0.00	6.34
	28.95	0.00	2.63	0.00	0.00	11.84	21.05	0.00	35.53	0.00	
	15.60	0.00	2.20	0.00	0.00	8.33	20.00	0.00	5.23	0.00	
Live Theaters	44	4	17	3	23	33	10	3	150	1	288
	3.67	0.33	1.40	0.25	1.92	2.73	0.83	0.25	12.52	0.08	24.04
	15.28	1.39	5.90	1.04	7.99	11.46	3.47	1.04	52.08	0.35	
	31.21	11.76	18.68	7.50	37.10	30.56	12.50	5.88	29.07	1.33	
Restaurants	12	0	14	1	1	12	4	0	55	6	105
	1.00	0.00	1.17	0.08	0.08	1.00	0.33	0.00	4.59	0.50	8.76
	11.43	0.00	13.33	0.95	0.95	11.43	3.81	0.00	52.38	5.71	
	8.51	0.00	15.38	2.50	1.61	11.11	5.00	0.00	10.66	8.00	
Hotels	15	30	36	35	38	51	48	48	123	68	492
	1.25	2.50	3.01	2.92	3.17	4.26	4.01	4.01	10.27	5.68	41.07
	3.05	6.10	7.32	7.11	7.72	10.37	9.76	9.76	25.00	13.82	
	10.64	88.24	39.56	87.50	61.29	47.22	60.00	94.12	23.84	90.67	
Total	141	34	91	40	62	108	80	51	516	75	1,198
	11.77	2.84	7.60	3.34	5.18	9.02	6.68	4.26	43.07	6.26	100.00

[a] Frequency.
[b] Percent (%).
[c] Row Percent (%).
[d] Column Percent (%).

(Aalto-Setala & Halonen, 2004; Schindler, 2009; Simmons & Schindler, 2003). In other words, when a price was read from right to left, the first non-zero digit was considered to be the ending digit. However, if the first non-zero digit that was encountered was also the leftmost digit of the price, then an exception to the rule was made (since the price's leftmost digit could not plausibly be considered part of a price's ending) and the next rightmost digit (zero) was considered to be the ending digit of the price. Thus, for example, the ending-digits of the prices of $19.99, ₩30,000, and ¥180 are 9, 0 and 8, respectively (Schindler, 2009).

6. Results

Tests of Hypotheses 1-1 and 1-2 were designed to investigate whether price endings were specific to cultures. Tables 2–4 report the frequency of ending digits in the five tourism service categories in each city. Fig. 1 displays the aggregated percent of the use of each digit from 0 to 9 shown in the last row of Tables 2–4. The tables show that 9-ending digits accounted for 22.13% of all price endings in New York City where they were used much more frequently than in Seoul or Shanghai; 0-ending digits accounted for 32.75% in Seoul; while in Shanghai 43.07% of endings used the 8 digit. These results suggest tourism service suppliers in high context cultures (Seoul and Shanghai) did not see 9-ending digits as being effective price ending practices. As expected, the positive connotations of the number 8 in China, led to the 8-ending digit being dominant in Shanghai, but the dominance of the 0-ending in Seoul was not anticipated.

An expected usage rate of 10% would occur if all digit endings were regarded as being equally effective. A chi-square goodness-of-fit test was used to see whether there was statistically significant overrepresentation of any ending-digits in a city. More than 10% of the price samples in New York City ended in 5 and 9- digits, indicating there was a significant departure from an equal distribution of each digit ($x^2 = 348.92$, $p < 0.001$). The over-representation of the 9- digit was especially strong in three categories: Sport events ($x^2 = 34.18$, $p < 0.001$), live theaters ($x^2 = 191.09$, $p < 0.001$), and hotels ($x^2 = 349.47$, $p < 0.001$).

The 0-digit was used significantly more than 10% in the samples of price endings in Seoul, indicating that distribution of each ending digit was not equal ($x^2 = 922.43$, $p < 0.001$). In all the service categories in Table 3, with the exception of hotels, the digits of 0 and 5 were significantly over-represented, resulting in an unequal distribution of each digit: Music concerts ($x^2 = 72.55$, $p < 0.001$); sport events ($x^2 = 369.25$, $p < 0.001$); live theaters ($x^2 = 551.13$, $p < 0.001$); and restaurants ($x^2 = 627.21$, $p < 0.001$).

The 8-digit price ending was used more prevalently than 10% in the Shanghai samples, indicating that distribution of each ending digit was not equal ($x^2 = 1534.12$, $p < 0.001$). This was consistent across all five service categories: Musical concerts ($x^2 = 939.43$, $p < 0.001$); sport events ($x^2 = 111.47$, $p < 0.001$); live theaters ($x^2 = 631.38$, $p < 0.001$); restaurants ($x^2 = 226.18$, $p < 0.001$); and hotels ($x^2 = 159.46$, $p < 0.001$),

In Table 5, the frequency of ending digits *within* a city was compared *across* the three cities. The results confirmed a statistically significant association between cultures and ending digits of tourism service prices ($x^2 = 1114.39$, $p < 0.001$), indicating some digits were used significantly more in each city than in the others.

Additionally, the cell chi-square values in Table 5 were reviewed. Unlike the chi-square test which is carried out on a *whole* set of rows and columns, the *cell* chi-square test is undertaken independently on *each* table cell value. As expected, some digits were significantly more frequently used in each city than in the other cities. The differences in the use of ending digits across the cities were mainly attributable to the dominant use of 9-digit in New York City ($x^2 = 146.11$), 0-digit in Seoul ($x^2 = 149.97$), and the 8-digit in Shanghai ($x^2 = 371.71$). These results generally supported Hypothesis 1-1.

Table 6 compares the prices of the three leading global chain hotels within and across the three cities. The row percent in Table 6 indicates the 6 (20%) and 9 digits (16%) were used more frequently than other digits in New York City, while the digits of 5 (37%) and 8

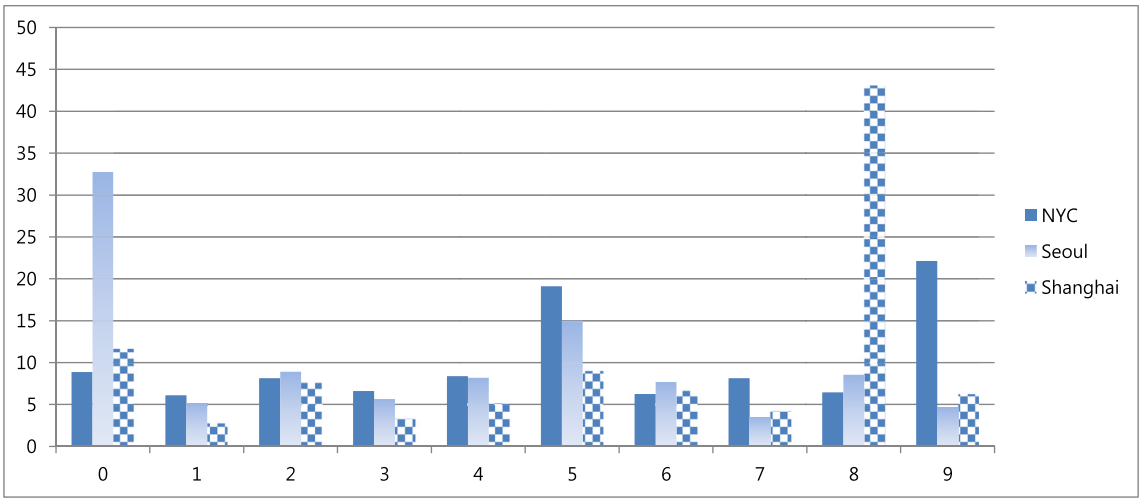

Fig. 1. The percent of each ending-digit of tourism service prices.

Table 5
Cell Chi-Square test to identify the most significantly different frequency among ending digit in the three cities.

	Ending digit of prices										
	0	1	2	3	4	5	6	7	8	9	Total
NYC	105[a]	72	96	78	99	226	74	96	76	**262**	1,184
	220[b]	56	98	62	86	170	82	61	223	126	
	49.87[c]	4.77	0.03	4.31	1.89	18.24	0.74	19.54	97.30	146.11	
Seoul	**452**	71	123	78	113	207	106	48	118	64	1,380
	256	65	113	72	101	198	95	71	260	147	
	149.97	0.57	0.75	0.52	1.55	0.37	1.18	7.74	77.10	46.94	
Shanghai	141	34	91	40	62	108	80	51	**516**	75	1,198
	222	56	99	62	87	172	83	62	226	128	
	29.72	8.87	0.60	8.05	7.31	23.98	0.09	1.98	371.71	21.75	
Total	698	177	310	196	274	541	260	195	710	401	3,762
											100.00

_ Underlined numbers have the highest chi- square value.
[a] Frequency.
[b] Expected.
[c] Cell Chi-Square.

(27%) were used more in Seoul and Shanghai respectively, confirming that distribution of digit- endings were not equal *within* the cities (New York City, $x^2 = 34.17$, $p < 0.001$; Seoul, $x^2 = 106.17$, $p < 0.001$; and Shanghai, $x^2 = 62.33$, $p < 0.001$). The dominant uses of 9-digit ending prices in New York City and of the 8-digit ending prices in Shanghai were consistent with the previous results. However, given the previous Seoul findings in which the 0-digit dominated, it was not anticipated that among chain hotels the 5-digit would be most widely used. Thus, Hypothesis 1-2 was only partially confirmed.

Comparisons *across* the cities showed different use patterns of price ending digits by the chain hotels ($x^2 = 97.72$, $p < 0.001$) which confirmed Hypothesis 1-2. The 6-digit in New York City ($x^2 = 7.14$), the 5-digit in Seoul ($x^2 = 17.56$), and the 8-digit in Shanghai ($x^2 = 11.73$) were most common in their respective cities. Surprisingly, there was no significant difference in frequency of the use of 9-digit price endings among the cities. This was attributable to both New York City and Seoul using the 9-digit relatively frequently, which suggested some tendency for franchise hotel prices in Seoul to reflect the U.S preference for 9-digit price endings.

Hypothesis 2 proposed that 9-ending prices would be used significantly more frequently when they were associated with changes in leftmost digits. If the 9-ending digit was placed next to the leftmost digit (that is, if the 9-ending digit was placed in the second leftmost digit place [SLP]), it was considered likely to have a left digit effect as well as a right digit effect because 9-endings of the *rightmost digit* lower the *leftmost digit* (e.g., from $90 to $89, from ₩20,000 to ₩19,000, and from ¥600 to ¥590). In contrast, if the 9-ending digit was not in the SLP (e.g., $1,590, ₩155,900, and ¥22.9) it was regarded as having only a right digit effect because the 9 ending of the rightmost digit does not influence the leftmost digit. Thus, 9-endings in the SLP were regarded as having a combined left and the right digit effect, while those not in the SLP were regarded as having only a right digit effect.

Table 7 reports the frequency, the expected frequency, cell chi-square, and row percent of each ending digit in the SLP across the three cities. Similar to the tests relating to Hypothesis 1, the 9-digit was used in the SLP significantly more frequently than the other digits in New York City, while the 0-digit and 8-digit were used significantly more frequently than other digits in Seoul and in Shanghai, respectively.

Additionally, the cell chi-square values compared usage rates of each ending digit in SLP *among* the three cities. There were significant differences which confirmed the findings relating to Hypothesis 1 ($x^2 = 755.57$, $p < 0.001$). Cell chi-square tests results indicated that the differences were mainly attributable to the greater frequency of the 9-digit in New York City ($x^2 = 69.60$); the 0-digit in Seoul ($x^2 = 51.87$); and the 8-digit in Shanghai

Table 6
Cell Chi-Square test to Identify the most Significantly Different Frequency among Ending Digit of the Global Chain Hotels in the Three Cities.

	Ending digit of prices										
	0	1	2	3	4	5	6	7	8	9	Total
NYC	1[a]	10	7	11	18	10	**24**	7	13	19	120
	6[b]	5	10	8	13	24	14	9	18	12	100
	4.49[c]	5.00	0.74	0.86	1.92	8.44	7.14	0.58	1.55	4.61	
	0.83[d]	0.83	5.83	9.17	15.00	8.33	20.00	5.83	10.83	15.83	
Seoul	7	4	6	7	11	**45**	12	7	9	12	120
	6	5	10	8	13	24	14	9	18	12	100
	0.07	0.20	1.39	0.21	0.31	17.56	0.29	0.58	4.75	0.01	
	5.83	3.33	5.00	5.83	9.17	37.50	10.00	5.83	7.50	10.00	
Shanghai	11	1	16	7	10	18	6	14	**33**	4	120
	6	5	10	8	13	24	14	9	18	12	100
	3.44	3.2	4.15	0.21	0.70	1.65	4.57	2.33	11.73	5.03	
	9.17	0.83	13.33	5.83	8.33	15.00	5.00	11.67	27.50	3.00	
Total	19	15	29	25	39	73	42	28	55	35	360
	5.28	4.17	8.06	6.94	10.83	20.28	11.67	7.78	15.28	9.72	100

_ Underlined numbers have the highest chi- square value.
[a] Frequency.
[b] Expected.
[c] Cell Chi-Square.
[d] Row percent.

Table 7
Cell Chi-Square test to identify the most significantly different frequency among ending digit in the second leftmost digit place in the three cities.

	Ending digit of prices										
	0	1	2	3	4	5	6	7	8	9	Total
NYC	105[a]	31	48	40	53	71	40	40	39	**84**	551
	159[b]	22	47	26	36	65	33	22	106	35	100
	13.19[c]	3.41	0.04	7.64	8.38	0.50	1.39	14.59	42.71	69.60	
	19.06[d]	5.63	8.71	7.26	9.62	12.89	7.26	7.26	7.08	15.25	
Seoul	**452**	61	91	68	78	150	71	38	71	40	1120
	323	45	95	53	73	133	67	45	216	71	100
	51.87	5.44	0.15	4.44	0.41	2.27	0.18	1.04	97.63	13.35	
	40.36	5.45	8.13	6.07	6.96	13.39	6.34	3.39	6.34	3.75	
Shanghai	141	6	66	6	26	66	35	19	**358**	29	752
	217	30	64	35	49	89	45	30	145	47	100
	26.40	19.60	0.09	24.40	10.6	5.98	2.35	4.10	311.63	7.20	
	18.75	0.80	8.78	0.80	3.46	8.78	4.65	2.53	47.61	3.86	
Total	698	98	205	114	157	287	146	97	468	153	2423

_ Underlined numbers have the highest chi square value.
[a] Frequency.
[b] Expected.
[c] Cell Chi-Square.
[d] Row percent.

($x^2 = 311.63$). These analyses indicated that 9-ending prices for the left digit effect were used more in New York City than in the other two cities.

A complementary analysis investigated if prices ending in 9 were more likely to be associated with the second leftmost digit place (SLP) of a price. A chi-square test compared the ratio of the 9-ending digit in the SLP to that in the other ending digit places. In all three cities, 9-ending prices were used significantly less frequently in the SLP than other ending digit places: NYC ($x^2 = 28.34$, $p < 0.001$), Seoul ($x^2 = 15.28$, $p < 0.001$), and Shanghai ($x^2 = 19.89$, $p < 0.001$). Thus, Hypothesis 2 was rejected.

Hypothesis 3 addressed the difference in use of odd-ending formats between low and high priced services. The data reported in Tables 2–4 were used for this analysis. Low and high priced services were defined by the median. The medians for music concerts, sport events, live theaters, restaurants, and hotels in New York City were $113.08, $51, $97.5, $19, and $299, respectively; in Seoul they were ₩40,000, ₩10,000, ₩50,000, ₩12,000, and ₩180,000; and in Shanghai they were ¥380, ¥470, ¥380, ¥48, and ¥391. Additionally, hotel prices were categorized into two groups according to their number of stars, so a separate analysis was conducted with hotels; those with 3 or fewer stars were deemed to represent low priced services, while those with 4 and 5 stars represented high priced services. A Pearson chi-square was used to test whether the use of 9-endings in the low-price groups significantly exceeded the use of 9-endings in the high price groups.

Table 8 reports the frequency and percent of prices ending in the 9-digit when low priced and high priced were defined by the median price. Contrary to expectation, the lower price services ended in the 9-digit significantly less frequently than the higher price group in New York City ($x^2 = 5.02$, $p = 0.03$) and in Seoul ($x^2 = 7.93$, $p = 0.01$). In contrast, 9-ending prices were used more frequently in the lower price group than the higher price group in Shanghai, but the difference was not significant ($x^2 = 3.20$, $p = 0.07$).

Table 8 also shows the frequency of culture specific price-endings (i.e. 0-endings for Seoul; and 8-endings for Shanghai) when low price and high price were defined by the median price. Results were mixed. In Korea 0-ending prices were significantly more frequently used for lower priced services than for higher priced services ($x^2 = 44.27$, $p < 0.001$). However, there was no

Table 8
Frequency and percent of the use of culture specific price-endings by price level.

Cities	Price level	All price-endings	9-Ending prices	Culture specific Price-endings[a]
NYC	Lower price	592	115 (19.43%)	–
	Higher price	592	147 (24.83%)	–
Seoul	Lower price	690	21 (3.04%)	284 (41.16%)
	Higher price	690	43 (6.23%)	168 (24.35%)
Shanghai	Lower price	599	45 (7.51%)	204 (34.06%)
	Higher price	599	30 (5.01%)	312 (52.09%)

[a] Culture specific price-endings refer to 9-endings, 0-endings, and 8-endings in NYC, Seoul, and Shanghai, respectively.

significant differences in use of 0-ending prices between the two hotel groups ($x^2 = 0.17$, p = 0.67, Table 9). In China, higher price services used 8-ending prices significantly more frequently than lower price services ($x^2 = 39.71$, $p < 0.001$, Table 8), but there were no significant differences between the two hotel groups ($x^2 = 0.00$, p = 0.96, Table 9).

Table 9 replicated this analysis using number of stars to define low and high prices for hotels. Results were consistent with those in Table 8, confirming New York City and Seoul used 9-endings less frequently in hotels with fewer than 4 or 5 stars. However, the differences were not statistically significant (NYC, $x^2 = 0.10$, p = 0.76; Seoul, $x^2 = 1.54$, p = 0.22). In Shanghai, 9-endings were used significantly more frequently in hotels with fewer than 4 and 5 stars ($x^2 = 6.40$, p = 0.01).

The New York City results were not consistent with the belief that 9-digit endings in the U.S. would be more frequently used for lower priced than for higher priced services. However, they are consistent with findings reported by Schindler and his associates (Schindler & Kibarian, 2001; Schindler & Kirby, 1997; Schindler, 2006) who termed the use of 9-ending prices for higher priced items as "the 99-meaning paradox", because they were contrary to the conventional wisdom that they were used primarily for lower priced goods.

7. Managerial implications

Globalization means that many tourism suppliers target international visitors from multiple countries, so understanding cultural differences is a key to gaining a competitive advantage. This requires tourism managers to adopt strategies that reflect the multi-faceted responses to price formats exhibited by visitors from different cultures. This research empirically examined the prevalence of price-ending practices of tourism suppliers across three cities to ascertain whether odd-ending price effects were culturally specific or universal.

The results summarized in Table 10 indicated that cultural context influences managers' price framing decisions, but that there were also some universal trends. The results confirm that prices endings are not random or determined only by costs, but rather are often purposefully set to take advantage of visitors' cognitive processing and use of heuristics. Tourists' economic decisions often are not rational because they seek to minimize cognitive effort in the decision-making processes by using heuristics (rules of thumb) derived from experience.

The study provides confirmative evidence that there are different cultural interpretations of price endings, resulting in differences in frequency of their use. Tests of Hypothesis 1-1 offer clear evidence that price endings were perceived by tourism service suppliers to be culturally specific. The 9-digit in New York City, the 0-digit in Seoul, and the 8-digit in Shanghai were used significantly more frequently than the other digits within and across the cities. They differed dramatically from the outcome that would be expected if the process was random. The infrequent use of 9-ending prices in tourism services in Seoul and Shanghai by either local tourism suppliers suggested they did not have positive connotations for people from non-western/collectivist-culture countries (Nguyen et al., 2007; Suri et al., 2004).

The dominant use of the 8-ending digit in Shanghai (43.07%) is much more pronounced than that use of 9-endings in the U.S. (22.13%). This may be attributable not only to its association with good fortune in Chinese culture, but also to this influence being reinforced by managers adopting the same "truncation" strategy as their U.S. counterparts in believing that tourists drop the rightmost digit. However, they may take advantage of this heuristic by using the second highest, rather than the highest, rightmost digit in order to retain the advantage of the prosperity connotations of the 8-digit.

The complementary analysis using a sample from the leading three international franchise hotel operators to test Hypothesis 1-2 provided different results. Their pricing in Shanghai was consistent with local hotels in that they used the 8-digit in price endings significantly more frequently than the other digits. However, the chain hotel results in New York City and Seoul differed markedly from the local distributions shown in Tables 2 and 3

In New York City the 6-digit was the most frequently used by chain hotels. This was unexpected. It was used not only more than the 9-ending, but also more than the 0 and 5 endings discussed below whose presence suggested evidence of universality. A possible explanation is that the 6 digit is such an unconventional price ending that it may give visitors the impression of "having priced much more sharply" (p. 795). Curiosity by visitors about why a price ends in such a random, unorthodox number may lead them to conclude it must result from a very careful and precise price-setting process (Schindler, 1991).

In Seoul the 0-end digit dominated (32.75%) local prices of tourist services and the only other digit that was overrepresented was the 5 digit (15%, Table 3). However, while the 0-end digit dominated in the sport events, live theaters and restaurants categories, and together with the 5 digit also dominated the music concert category, it was not dominant in the hotel sector. Similarly, the data in Table 6 show the 0 digit was not prominent among chain hotels in Seoul, but the chain hotels did use the 5-digit ending in 37.5% of their Seoul room prices. The prominence of the 0 digit in

Table 9
Frequency and percent of use of culture specific price-endings by hotel stars.

Cities	Hotel star level	All price-endings	9-Ending price	Culture specific Price-endings[a]
NYC	1, 2, and 3 stars	229	69 (30.13%)	–
	4 and 5 stars	338	106 (31.36%)	–
Seoul	1, 2, and 3 stars	392	14 (3.57%)	34 (8.67%)
	4 and 5 stars	57	4 (7.02%)	4 (7.02%)
Shanghai	1, 2, and 3 stars	293	50 (17.06%)	73 (24.91%)
	4 and 5 stars	199	18 (9.05%)	50 (25.13%)

[a] Culture specific price-endings refer to 9-endings, 0-endings, and 8-endings in NYC, Seoul, and Shanghai, respectively.

Table 10
Summary of results.

1. The most frequent price endings in each city were culturally specific. In New York City, 9-endings were 22.13% of the total. In Shanghai 8-endings were dominant (43.07%). In Seoul 0 (32.75%) and 5 (15.00%) endings dominated.
2. Among the global chain hotels 8-digits were the most frequent price ending in Shanghai (27.50%); the 6-digit (20.00%) in New York City; and the 5 digit in Seoul (37.5%).
3. The 0 and 5- digits were prevalent in all three cities, suggesting they are universal heuristics that cross cultures.
4. 9-endings were not used more frequently when the leftmost digit was lowered by the use of the 9-ending price than when it was not.
5. The dominant culturally specific endings (9 in New York City; 8 in Shanghai; and 0 in Seoul) were not used more frequently in lower than in higher priced tourism services.

four of the Seoul tourism service categories may in part be attributable to an artifact of the interface between the study procedures that defined price endings and the large number of zeros that characterize the low value of the won currency. The prevalence of the zero in the won currency reflects the use of whole units and the absence of decimal places compared to the dollar and yuan currencies. The influence of this artifact is suggested by the median values that were used to define low and high priced services for the analyses testing Hypothesis 3. For example, the median prices for music concerts in New York City, Shanghai and Seoul were $113.08, ¥380, and ₩40,000, respectively.

Although the prominence of the 0 in Seoul in local prices may be partially attributable to a measurement artifact of the study, the dominant use of the 5-ending digit among chain hotel prices in that city and the prominence of both 0 and 5-ending digits in Shanghai and New York City suggests these two digits may have some universal appeal. Table 4 shows that in Shanghai they followed the 8 digit in frequency of use. Although the 5 digit in Shanghai did not quite exceed the 10% expectation, this was at least in part attributable to the overwhelming dominance of the 8 digit. In New York City, the only digit other than 9 to be overrepresented was 5; its use frequency of 19% was close to the 9-ending frequency of 22%; and it was followed by 0 (Table 2).

This relative prominence of the 0 and 5 digits in all three cities was not anticipated. In contrast to the cultural specificity described above, these findings suggest the specificity may be complemented by some level of universal acceptance of these two digits. Their pervasive presence is consistent with findings reported by others (Baird, Lewis, & Romer, 1970; Kreul, 1982; Rudolf, 1954; Schindler, 2009; Twedt, 1965). For example, in the context of pricing Schindler and Winer (1989) reported 0-ending numbers dominated when consumers were asked to recall prices they paid. Their prominence in this study suggest a universal heuristic driven by the rounded number effect (Wadhwa & Zhang, 2015) and/or by the availability effect (Kahneman & Tversky, 1974).

Rounded numbers are those ending in 0, while 5 is considered to be a semi-round number (Lynn, Flynn, & Helion, 2013). The rounded number effect means the 0 and 5 numbers are fluently processed. Their mental saliency makes them relatively easy to memorize, process, and perform mathematical operations compared to non-rounded numbers leading to System 1 processing and their use as a heuristic (Wadhwa & Zhang, 2015). In the context of leisure, they have dominated in estimates of frequency of participation in recreation activities (Chase & Godbey, 1983; Chase & Harada, 1984), and in fishing (Tarrant & Manfredo, 1993), and have been termed "prototypes", in that the estimates effectively serve to characterize a range of values (Beaman, Vaske, Schwidt, & Huan, 2015).

The prominence of their use in decision-making reflects their dominance in everyday communications (Schindler & Kirby, 1997). Their pervasiveness in multiple cultures (Copeland & Griggs, 1985; Dehaene & Mehler, 1992; Kettle & Haubl, 2010; Schindler & Yalch, 2006) suggests the rounded number effect is a universal heuristic. This is reinforced by a belief that the decimal number system is probably related to a reliance on humans having ten fingers for counting (Schindler & Kirby, 1997).

The availability effect (Kahneman & Tversky, 1974) is related to roundedness. It refers to the ease with which a mental unit is retrieved from memory. The high level of cognitive accessibility, exposure, and familiarity with the 0 and 5 digits generates positive warm emotions and affect towards them, so they feel "just right" (Wadhwa & Zhang, 2015). It has been observed that, "By setting prices at numbers that have relatively high cognitive accessibility, the price setter communicates with consumers in the terms in which consumers think. The result is prices that are more easily perceived, remembered and compared" (Schindler & Kirby, 1997, p. 193). This is likely to be especially important in sectors like tourism where there is a substantial price variability in many services. Using round numbers, simplifies the information processing challenge for tourists and makes it more likely they will perceive and recall those prices.

Hypothesis 2 investigated whether 9-ending prices were used more frequently when both left and right digit odd numbers were incorporated in a price. Contrary to expectations, 9-endings were not used more frequently when the leftmost digit was lowered by the use of the 9-ending price than when it was not. Sellers appeared content merely to use 9-digits in the end of a price, rather than to use them to also lower a leftmost digit. This suggests sellers considered the 9-ending to be sufficiently resonant in connoting low price that it did not need to be reinforced by a lowering of the leftmost digit. This is consistent with results reported by Stiving and Winer (1997) that a 9-ending price *itself* resulted in superior sales *regardless* of the leftmost digit.

Tests of Hypothesis 3-1 revealed that in New York City the association of the 9-ending prices with lower priced items was not present. When the analyses were repeated using the cultural specific 0 and 8-endings on the Korea and Shanghai samples, the lack of relationship with lower prices observed in New York City was confirmed. Hence, Hypothesis 3-1 was rejected. Similarly, Hypothesis 3-2 was rejected since in none of the three samples were the price endings more prominent among hotels with fewer stars.

These results were inconsistent with conventional wisdom in the U.S. However, the rejections of Hypotheses 2, 3-1 and 3-2 were consistent with both the Weber-Fechner law and prospect theory. When the Weber-Fechner law is adapted to the context of pricing, it directs that users process price differences in proportionate rather than absolute terms (Monroe & Lee, 1999). The diminishing sensitivity tenet of prospect theory complements this by stating that each additional increment of gain will have a smaller impact than the equal amount preceding it (Kahneman & Tversky, 1974).

The definition of "low price" is relative and most studies in which this relationship has been identified were focused on functional goods such as groceries (Berman & Evans, 1986; Kleinsasser & Wagner, 2011; Quigley & Notarantonio, 1992). In this study tourism services that were defined as being low price were likely priced much higher than "high price" functional goods in other studies. In accordance with Weber-Fechner law and prospect

theory, this higher threshold suggested the savings from truncation processing were relatively small so the odd-ending heuristic was unlikely to be effective. Thus, for example, if admission to a "low priced" music concert in New York City is $79.99 the truncation mechanism may cognitively map it as $70, a saving of 12.5%. In contrast, if a "high priced" functional item is listed at $29.99 and is cognitively mapped as $20, the saving is 33%.

Reviewing the pricing strategies employed by suppliers in their home cultures is an effective way to gain insights into tourists' responses. These strategies reflect the cumulative insights of managers who presumably have substantial expertise in pricing. This research provides practical guidelines to tourism marketing managers for applying effective price ending practices. It suggests that heuristic responses related to 9 and 8 digit ending prices are learned skills which are specific to the U.S. and China cultures, respectively. Accordingly, tourism service suppliers should recognize that visitors from different cultures may react to price frameworks differently, and that they need to be tailored to each culture. At the same time, the research also revealed a belief among managers that the 0 and 5 digits had a universal appeal that crossed cultures.

The study's results suggest a managerial conundrum. The use of the 9 and 8 digits in New York City and Shanghai are likely to be effective in attracting visitors from these cities' home cultures, but they may be unappealing to visitors from other cultures. The findings suggest that prices in New York City, for example, should emphasize the 8-digit endings when they are targeted at Chinese visitors, but the 9-digit endings when promoting to U.S. visitors, and the 0 and 5 digits when targeting other high context cultures.

A possible resolution of the conundrum may be to price online sales of performance tickets, flights, or hotels in the currency of the targeted consumers. Indeed, most international tourism websites for online sales (e.g. booking.com, expedia.com, kayak.com) allow consumers to choose a preferred currency to pay for services. Framing the same price in different currencies, so it incorporates the odd-ending heuristic most acceptable in each culture would enable prices to be accepted more easily by visitors from respective foreign cultures.

References

Aalto-Setala, V., & Halonen, M. (2004). Attractive prices in grocery and automobile markets- Why is such pricing use? *Journal of Retailing and Consumer Services, 11*, 299–306.

Asia Today. (April 10. 2015). *Top 100 Seoul restaurants of 2015*. http://www.asiatoday.co.kr/view.php?key=20150410010006766.

Bacon, R. W. (1991). Rockets and feathers: The asymmetric speed of adjustment of UK retail gasoline prices to cost changes. *Energy Economics, 13*(3), 211–218.

Baird, J. C., Lewis, C., & Romer, D. (1970). Relative frequencies of numerical responses in ratio estimation. *Perception and Psychophysics, 8*(November), 358–362.

Baumgartner, B., & 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.

BBC. (2003). China's lucky phone number. *BBC News August 13*. Retrieved January, 2017.

Beaman, J., Vaske, J. J., Schwidt, J. L., & Huan, T. C. (2015). Measuring and correcting response heaping arising from the use of prototypes. *Human Dimensions of Wildlife, 20*, 167–173.

Berman, B., & Evans, J. R. (1986). *Retail management: A strategic approach* (3rd ed.). New York, NY: McMillan Publishing Company.

Bliss, P. (1952). Price determination at the department store level. *Journal of Marketing, 17*(1), 37–46.

Bolton, L. E., & Alba, J. W. (2006). Price fairness: Good and service differences and the role of vendor costs. *Journal of Consumer Research, 33*(2), 258–265.

Brenner, G. A., & Brenner, R. (1982). Memory and markets, or why are you paying $2.99 for a widget. *Journal of Business, 55*(1), 147–158.

Chase, D. R., & Godbey, G. C. (1983). The accuracy of self-reported participation rates. *Leisure Studies, 2*(2), 231–235.

Chase, D. R., & Harada, M. (1984). Response error in self-reported recreation participation. *Journal of Leisure Research, 16*, 322–329.

Copeland, L., & Griggs, L. (1985). *Going international*. New York: Random House.

Dehaene, S., & Mehler, J. (1992). Cross-linguistic regularities in the frequency of number words. *Cognition, 43*(April), 1–29.

Dodds, W. B., & Monroe, K. B. (1985). The effect of brand and price information on subjective product evaluation. *Advances in Consumer Research, 12*(1), 85–90.

Friedman, L. (1967). Psychological pricing in the food industry. In A. Phillips, & O. E. Williamson (Eds.), *Prices: Issues in theory, practice, and public policy* (pp. 187–201). , Philadelphia: University of Pennsylvania Press.

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

Gursoy, D., & Gavcar, F. (2003). International leisure tourists' involvement profile. *Annals of Tourism Research, 30*, 906–926.

Hackl, F., Kummer, M. E., & Winter-Ebmer, R. (2014). 99 Cent: Price points in e-commerce. *Information Economics and Policy, 26*(1), 12–27.

Hall, E. T. (1976). *Beyond culture*. New York, NY: Doubleday.

Havitz, M., & Dimanche, F. (1997). Leisure involvement revisited: Conceptual conundrums and measurement advances. *Journal of Leisure Research, 29*, 245–278.

Hedrick-Wong, Y., & Choong, D. (2015). *Master card 2015 global destination cities index*. Master Card.

Heeler, R., & Nguyen, A. (2001). Price endings in Asia. In *Proceedings of the Australian and New Zealand marketing, academy conference*. Albany, New Zealand: Massey University.

Hotel News Now. (Nov. 19. 2015). *The 10 largest hotel companies by room count*. http://www.hotelnewsnow.com/articles/28560/The-10-largest-hotel-companies-by-room-count.

Kahneman, D. (2011). *Thinking fast and slow*. London: Penguin.

Kahneman, D., & Tversky, A. (1974). Judgment under uncertainty: Heuristics and biases. *Science, 185*, 1124–1131.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision making under risk. *Econometrica, 47*, 263–291.

Kettle, K., & Haubl, G. (2010). In M. C. Campbell, J. Inman, & R. Pieters (Eds.), *Numeric fluency and preference in advances in consumer research* (Vol. 37). Duluth, MN: Association for Consumer Research.

Kleinsasser, S., & Wagner, U. (2011). Price endings and tourism consumers' price perceptions. *Journal of Retailing and Consumer Service, 18*(1), 58–63.

Kreul, L. M. (1982). Magic numbers: Psychological aspects of menu pricing. *Cornell Hospitality Quarterly, 23*(2), 70–75.

Lewis, M. S. (2015). Odd prices at retail gasoline stations: Focal point pricing and tacit collusion. *Journal of Economics and Management Strategy, 24*(3), 664–685.

Lynn, M., Flynn, S. M., & Helion, C. (2013). Do consumers prefer round prices? Evidence from pay-what-you-want decisions and self-pumped gasoline purchases. *Journal of Economic Psychology, 36*, 96–102.

Mills, P. K. (1986). *Managing service industries*. Cambridge: MA: Ballinger.

Monroe, K. B., & Lee, A. Y. (1999). Remembering versus knowing issues in buyers' processing of price information. *Journal of the Academy of Marketing Science, 27*, 207–225.

New York Times. (Dec. 15. 2015). *Top New York restaurants of 2015*. http://www.nytimes.com/2015/12/16/dining/best-restaurants-in-nyc.html?_r=0.

Nguyen, A., Heeler, R. M., & Taran, Z. (2007). High-low context cultures and price-ending practices. *Journal of Product and Brand Management, 16*(3), 206–214.

Odongo, E. K., Agneta, N., & Orinda, E. O. (2012). The impact of global cultural differences on the pricing strategies in the United States of America. *International Journal of Academic Research in Business and Social Science, 2*(2), 58–68.

Parsa, H. G., & Naipaul, S. (2007). Price-ending strategies and managerial perspectives: A reciprocal phenomenon -part I. *Journal of Services Research, 7*(2), 8–26.

Pearce, P. (2005). *Tourist behaviour: Themes and conceptual schemas*. Clevedon: Channel View.

Poltrock, S. E., & Schwartz, D. R. (1984). Comparative judgments of multi-digit numbers. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 10*(1), 32–45.

Quigley, C., & Notarantonio, E. M. (1992). An exploratory investigation of perceptions of odd and even pricing. In V. L. Crittenden (Ed.), *Developments in marketing science XV* (pp. 306–309). Chestnut Hill, MA: Academy of Marketing Science.

Ritchie, J. R. B. (1997). Beacons of light in an expanding universe: An assessment of the state-of-the-art in tourism marketing/marketing research. *Journal of Travel and Tourism Marketing, 5*(4), 49–84.

Rudolf, H. J. (1954). Pricing for today's market. *Printers' Ink.247 May, 28*, 22–24.

Schindler, R. M. (1991). Symbolic meanings of a price ending. *Advances in Consumer Research, 18*(1), 794–801.

Schindler, R. M. (2006). The 99 Price ending as a signal of a low-price appeal. *Journal of Retailing, 82*(1), 71–77.

Schindler, R. M. (2009). Patterns of price endings used in US and Japanese price advertising. *International Marketing Review, 26*(1), 17–29.

Schindler, R. M., & Kirby, P. N. (1997). Patterns of rightmost digits used in advertising prices: Implications for nine-ending effects. *Journal of Consumer Research, 24*, 192–201.

Schindler, R. M., & Yalch, R. F. (2006). In C. Pechmann, & L. Price (Eds.), *It seems factual, but is it? Effects of using sharp versus round numbers in advertising claims in Advances in Consumer Research* (Vol. 33). Duluth, MN: Association for Consumer Research.

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

Schindler, R. M., & Kibarian, T. (1996). Increased consumer sales response through use of 99-ending prices. *Journal of Retailing, 72*(2), 187–199.

Schindler, R. M., & Kibarian, T. M. (2001). Image communicated by the use of 99 Endings in advertised prices. *Journal of Advertising, 30*(4), 95–99.
Schindler, R. M., & Winer, A. R. (1989). Effects of odd pricing on price recall. *Journal of Business Research., 19*(November), 165–177.
Scitovszky, T. (1944). Some consequences of the habit of judging quality by price. *The Review of Economic Studies., 12*(2), 100–105.
Simmons, L. C., & Schindler, R. M. (2003). Cultural superstitions and the price endings used in Chinese advertising. *Journal of International Marketing, 11*(2), 101–111.
Stiving, M. (2000). Price-endings when prices signal quality. *Management Science, 46*(12), 1617–1629.
Stiving, M., & Winer, R. S. (1997). An empirical analysis of price endings with scanner data. *Journal of Consumer Research, 24*(1), 57–66.
Suri, R., Anderson, A. E., & Kotlov, V. (2004). The use of 9-ending prices: Contrasting the USA with Poland. *European Journal of Marketing, 38*(1/2), 56–72.
Tarrant, M. A., & Manfredo, M. J. (1993). Digit preference recall bias, and non-response bias in self-reports of angling participation. *Leisure Sciences, 15*, 231–238.
Teare, R. (1990). An exploration of the consumer decision process for hospitality services. In R. Teare, L. Moutinho, & R. Morgan (Eds.), *Managing and marketing services* (pp. 233–248). London: Cassell Educational.
Thomas, M., & Morwitz, W. (2005). Penny wise and pound foolish: The left-digit effect in price cognition. *Journal of Consumer Research, 32*(1), 54–64.
Timeout Shanghai. (July 12. 2014). *The 100 best restaurants in Shanghai*. http://www.timeoutshanghai.com/feature/20650/The-100-best-restaurants-in-Shanghai.html.
Twedt, D. W. (1965). Does the 9 fixation in retail pricing really promote sales? *Journal of Marketing, 29*(October), 54–55.
Volckner, F., & Hofmann, J. (2007). The price-perceived quality relationship: A meta analytic review and assessments of its determinants. *Marketing Letters, 18*(3), 181–196.
Wadhwa, M., & Zhang, K. (2015). This number feels just right: The impact of roundedness of price numbers on product evaluations. *Journal of Consumer Research., 41*(5), 1172–1185.
Wakefield, J. L., & Inman, J. J. (2003). Situational price sensitivity: The role of consumption occasion, social context and income. *Journal of Retailing., 79*(4), 199–212.
Williams, R. (2008). Patriot games: China makes its point with greatest show. *The Guardian August, 9*.

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