Available online at www.sciencedirect.com

ScienceDirect

Journal of Consumer Psychology 26, 3 (2016) 410–416

JCP JOURNAL OF CONSUMER PSYCHOLOGY

Research Report

Lasting performance: Round numbers activate associations of stability and increase perceived length of product benefits

Jorge Pena-Marin [a,*,1], Rajesh Bhargave [b,2]

[a] University of Texas at San Antonio, 1 UTSA Circle, San Antonio, TX 78249-1644, USA
[b] Imperial College Business School, Imperial College London, London SW7 2AZ, UK

Accepted by Amna Kirmani, Editor; Associate Editor, Manoj Thomas

Received 26 June 2015; received in revised form 29 October 2015; accepted 12 November 2015
Available online 2 December 2015

Abstract

Consumers prefer products that deliver benefits for a longer time. For instance, caffeinated drinks are consumed for energy, but the key characteristic that performs this benefit—caffeine—tends to wear off in its effects. How can marketers communicate the lasting performance of product characteristics? This work proposes that numbers used in conveying product characteristics—round (200 mg) or precise (203 mg)—influence consumers' perception of lasting performance and product attitudes. More specifically, product characteristics described in round (vs. precise) numbers are perceived as performing for a longer time, and this effect is driven by a symbolic association between round numbers and stability. This finding is important because numbers are commonly used in conveying product benefits and past work has mainly documented the advantages of using precise numbers (e.g., higher competence), whereas less is known about when and why using round numbers boosts product attitudes. Three studies, including one with actual consumption, offer triangulating evidence for this prediction and its underlying psychological mechanism. Overall, this work contributes to research on product perception, numerical cognition, and persuasion.

Keywords: Numerical information; Product performance; Persuasion; Preferences

A critical dimension of many products' performance is the length of benefits provided after consumption: caffeinated drinks increase energy, aspirin relieves headaches, and snacks satisfy hunger for some time. These and many other products have a key characteristic that offers a benefit after product usage or consumption (e.g., snacks' calories produce ensuing satiety), and the numerical amount of this characteristic appears in marketing messages. For instance, a drink's caffeine may be described as 100 or 102 mg (round vs. precise number; Dehaene & Mehler, 1992). Although these numbers' magnitudes are similar, systematic differences in how round and precise numbers are perceived and processed suggest that these numbers might differentially affect perceptions of product performance (King & Janiszewski, 2011; Wadhwa & Zhang, 2014; Xie & Kronrod, 2012).

In this paper, we propose and find that round (vs. precise) numbers are more persuasive in conveying products' lasting performance. For instance, a 100 (vs. 102) mg caffeine drink is perceived as providing longer lasting energy. Further, our proposed mechanism is that when round (vs. precise) numbers are used in product descriptions, this brings to mind an associated concept of stability. In turn, greater thoughts of stability enhance perception of long-lasting performance, which increases product preference.

Our work offers two important contributions to research on numerical cognition and product perceptions. First, past work on

* Corresponding author.
E-mail addresses: jorge.penamarin@utsa.edu (J. Pena-Marin), r.bhargave@imperial.ac.uk (R. Bhargave).
[1] Jorge Pena-Marin is a doctoral candidate at the University of Texas at San Antonio.
[2] Rajesh Bhargave is an assistant professor of marketing at Imperial College London.

http://dx.doi.org/10.1016/j.jcps.2015.11.004
1057-7408/

numerical cognition has documented that consumers have different feelings (King & Janiszewski, 2011; Wadhwa & Zhang, 2014) and inferences (Welsh, Navarro, & Begg, 2011; Xie & Kronrod, 2012) when using round versus precise numbers. Building on this, we propose that through the accumulation of life experiences in using numbers, consumers have learned different associations for round versus precise numbers. Correspondingly, we show that round (more than precise) numbers activate the concept of stability.

Second, and more importantly, we show the downstream consequences of this association on consumers' perception of products' lasting benefits. Although this dimension of product performance is highly predictive of purchases (Faro, 2010; Ilyuk, Block, & Faro, 2014), it has received relatively little research attention. Moreover, marketing messages often contain round numbers, but research on numerical cognition has focused primarily on documenting positive effects of precise numbers, including increases in perceived credibility (Schindler & Yalch, 2006), accuracy (Zhang & Schwarz, 2012), and competence (Xie & Kronrod, 2012). We help to fill this research gap by showing how round numbers enhance perceptions of products' lasting benefits.

Theoretical background

Consistent with the literature, we define a number as more round the more ending zeros it has (Dehaene & Mehler, 1992; Thomas, Simon, & Kadiyali, 2010). Research on marketing communications has shown that consumers infer greater credibility, confidence, and accuracy for messages containing round (vs. precise) numbers (Jerez-Fernandez, Angulo, & Oppenheimer, 2013; Schindler & Yalch, 2006; Zhang & Schwarz, 2012). For instance, product claims with precise (vs. round) numbers (19.41% vs. 20%) are seen as more credible (Xie & Kronrod, 2012). Other work on numerical cognition has shown greater felt fluency for round (vs. precise) numbers (e.g., $365,000 vs. $364,578; King & Janiszewski, 2011; Wadhwa & Zhang, 2014), and precise (vs. round) numbers reduce adjustment from the anchor in anchoring effects (Janiszewski & Uy, 2008).

In our research, we build upon the above and other related work to suggest that consumers hold different associations for round (vs. precise) numbers. More specifically, round numbers activate stability-related concepts, which influence judgments of lasting product performance. Therefore, our proposed mechanism is akin to semantic priming or symbolic association, wherein words, phonemes, and sensory stimuli activate particular concepts (Labroo, Dhar, & Schwarz, 2008; Meyers-Levy & Zhu, 2007; Yorkston & Menon, 2004). We claim that round and precise numbers have different learned associations due to consumers' divergent accumulated experiences in processing and using these numbers. Below we draw on three theoretical perspectives that suggest reasons why consumers might learn to associate round numbers with stability.

First, research has found that finer numerical values are perceived at a more concrete, lower construal level than coarse numerical values (Monga & Bagchi, 2012). Additionally, people generally perceive concrete and lower construal elements as more prone to change over time (Trope & Liberman, 2010). Therefore, we argue that attributes described with round (vs. precise) numbers will facilitate greater thoughts of stability and fewer thoughts of change.

Second, individuals see round (more than precise) numbers as salient reference points (Rosch, 1975). As a consequence, people commonly configure categories to contain a round number of elements (Isaac & Schindler, 2014). For instance, people create lists of hierarchy with multiples of 10 (e.g., top 10, bottom 10, etc.), and round numbers are often featured in the names and labels for categories and organizations (e.g., S&P 500, G20, etc.). In these examples, although which elements enter into the category might change (e.g., the specific companies in the S&P 500), the *number* of elements is generally stable, because it is a salient reference point. In the same vein, people also express goals and benchmarks in terms of round numbers (Pope & Simonsohn, 2011). For instance, baseball players strive for a .300 batting average, and students aim to meet or exceed certain round-numbered scores on board exams. In these examples, while people's performance might change, the goal or benchmark itself tends to be stable, either within an individual or across individuals competing in the same domain. Overall, then, we suggest that the greater salience and maintenance of round (vs. precise) numbers will lead consumers to learn an association between round numbers and stability.

Finally, because round (vs. precise) numbers are easier to process (King & Janiszewski, 2011) and have more useable representations of magnitude (Dehaene, 2011), people naturally change precise numbers into round numbers while processing numerical information (Schindler & Kirby, 1997). These changes include truncation, rounding, and estimation. For instance, a car's horsepower of 197 HP could be truncated by dropping the last digit to process "190 HP," or the 197 could be rounded to its nearest round value, "200 HP." Additionally, to calculate 23×31, people tend to estimate 20×30 instead (Siegler & Booth, 2005). We suggest that these common tendencies to actively change precise numbers also encourages a greater learned association between round (vs. precise) numbers and stability.

In sum, these findings suggest that round (more than precise) numbers are linked to stability. We contend that this difference will influence consumers' perceptions of products that incorporate numerical descriptions. Often, judgments and decisions are colored by accessible associations related to target stimuli under consideration (Bettman, Luce, & Payne, 1998; Higgins & King, 1981). For instance, when consumers lift a heavy product, this physical experience semantically activates the concept of importance, which then spills over into related judgments of power and influence (Jostmann & Lakens, 2009; Zhang & Li, 2012). Similarly, phonemes in product names arouse certain associations (e.g., smallness), which sway judgments of related product features (e.g., healthfulness; Yorkston & Menon, 2004). Likewise, we believe that the activated concept of stability under a round number will especially affect consumers' perceptions of products' lasting performance (i.e., how long its benefits last), because stability is relevant when assessing a product benefit that tends to wear off over time. Next, we formally re-state our predictions.

H1. Consumers' perceptions of a product characteristic's lasting performance are greater when the characteristic is described with a round (vs. precise) number.

H2. This effect is due to consumers' associations of round (vs. precise) numbers with stability and related concepts.

H3. When judgments of the lasting performance of a product characteristic's benefits are considered in decisions, consumers will express higher preferences for products with the characteristic described using a round (vs. precise) number.

We conducted three studies to test our framework. Study 1 shows that round numbers enhance preferences when consumers desire endurance of product benefits, but it reduces preferences when consumers wish the aftereffects of a product to terminate sooner. Study 2 supports our proposed mechanism in a mediation analysis. Finally, study 3 assesses the effect on perceptions of a product that is actually consumed.

Study 1: Judgments and preferences for energy drinks

We examine caffeine in energy drinks as our domain in studies 1A and 1B. In study 1A, we sought to support H1, by showing that a round (vs. precise) amount of caffeine bolsters perceptions of how long two consequences of caffeine last: a positive benefit (energy) and a negative aftereffect (urge to urinate). Further, in study 1B, we wanted to test the implications on preferences (H3). We expected that an energy drink with a round (vs. precise) amount of caffeine will improve preference for the drink when participants focus on the length of the caffeine's desirable benefit (energy), but this should not occur when focusing on length of an undesirable aftereffect (urge to urinate).

Study 1A: Judgments of lasting performance

Study 1A had a 2 (number: round vs. precise caffeine description) × 2 (consequence valence: positive vs. negative) between-subjects design. Participants (N = 153, 52% female, M_{Age} = 33.48) from Amazon.com's mTurk panel were asked to evaluate an energy drink, whose caffeine content was described as either 100 or 102 mg (round vs. precise number). After reading this description, there was a between-subjects manipulation of consequence valence. Half the participants were asked to rate how long this energy drink would increase their energy level (positive consequence), whereas the other half of participants were asked to rate how long this energy drink would increase their urge to urinate (negative consequence). We chose these two consequences, because while energy delivery is the main claimed benefit of caffeine consumption, the urge to urinate is a well-known, undesirable aftereffect that is not directly related to amount of energy delivered. In answering the question on length of consequence, all participants were asked to think about how long the consequence (energy or urge to urinate) would last, in hours, before it subsided, and they rated this on a 7-point scale (1 "for 1 h"; 7 "for 7 h"). Per H1, we predict that both the desired energy and the undesired urge to urinate will be perceived as lasting longer under a round (vs. precise) caffeine number description.

Results

The dependent measure, perceived length of consequence, was subjected to a 2 (round vs. precise number) × 2 (positive vs. negative consequence) ANOVA. Consistent with our predictions, there was a significant main effect of number type ($F(1, 149) = 8.08$, $p = .005$). A round (vs. precise number) increased the perceived length of both the positive consequence (M_{Round} = 3.50 vs. $M_{Precise}$ = 2.92; $t(149) = 2.24$, $p = .02$) and the negative consequence (M_{Round} = 2.62 vs. $M_{Precise}$ = 2.15; $t(149) = 1.77$, $p = .07$), although the effect for the negative consequence failed to achieve the conventional level of significance, see Table 1. In this study, we did not predict an interaction of the two manipulations, and indeed no significant interaction emerged ($F(1, 149) = 0.93$, $p > .76$). As an aside, there was a significant main effect of positive versus negative valence of consequences ($F(1, 149) = 20.28$, $p < .001$), but this effect is not relevant for our theorization, and merely reflects that energy drinks are generally perceived as producing energy longer than the urge to urinate.

Study 1B: Product preferences

We next wanted to test the implications on product preferences (H3) in study 1B. To that end, we used the same stimulus and procedure and drew from the same participant population as study 1A (mTurk), but we had a different dependent measure. As in study 1A, participants (N = 154, 48% female, M_{Age} = 32.42) read a description about an energy drink whose caffeine content was described with a round or precise number (100 vs. 102 mg, between-subjects). Then, they were instructed to *think about how long* a consequence of the caffeine, energy or urge to urinate (between-subjects), would last. After reading the scenario, participants evaluated their attitudes and purchase intentions for the energy drink on a four-item (α = .95), seven-point scale (anchored: 1—very negative, very unfavorable, very unlikely, not inclined at all; 7—very positive, very favorable, very likely, very inclined). In study 1B, we predict an interaction of the two manipulations; the round (vs. precise) caffeine description will enhance product preference

Table 1
Study 1A and 1B results.

	Positive–energy		Negative–urge to urinate	
Study:	Round	Precise	Round	Precise
Study 1A: Judgments of perceived length	M = 3.50, SD = 1.42	M = 2.92, SD = 1.11	M = 2.62, SD = 1.03	M = 2.15, SD = 0.85
Study 1B: Product attitudes	M = 4.37, SD = 1.29	M = 3.25, SD = 1.85	M = 3.68, SD = 1.62	M = 4.36, SD = 1.60

when participants focus on the length of energy, but the round (vs. precise) caffeine description will decrease preference when participants focus on the length of an urge to urinate.

Results

The preference measure was subjected to a 2 (round vs. precise number) × 2 (positive vs. negative consequence) ANOVA. The main effect of valence of consequence was not significant ($F(1, 150) = 0.67$, $p > .41$). Thinking about a negative (vs. positive) product consequence could arouse general negativity, but the urge to urinate is an expected and fairly harmless aftereffect of caffeine consumption. Given that the drink has an accompanying benefit of increased energy, this might explain why there was no main effect of valence of consequence. However, according to our framework, we expected that participants would incorporate their thoughts about the *length* of the consequence in their product preference. Correspondingly, there was no main effect of round versus precise number ($F(1, 150) = 0.69$, $p > .40$), but more importantly, we found a significant interaction of the manipulations ($F(1, 150) = 12.03$, $p = .001$). As predicted, when consumers focused on the length of energy gained, preferences were greater in the round versus precise numerical description ($M_{Round} = 4.37$ vs. $M_{Precise} = 3.25$; $t(150) = 3.06$, $p = .003$). However, when participants focused on the length of the negative aftereffect, preferences were greater in the precise versus round numerical description ($M_{Round} = 3.68$ vs. $M_{Precise} = 4.36$), though this result did not achieve the conventional level of significance ($t(150) = 1.85$, $p = .06$), see Table 1.

Discussion

Studies 1A and 1B show that a round (vs. precise) number in product descriptions increases the perceived length of a product's consequences (H1) and can also increase preference for the product (H3). Moreover, we found that a round (vs. precise) number directionally *decreased* product preference when participants focused on the length of a negative aftereffect of the caffeine, urge to urinate. This reversal helps to address two alternative explanations. First, our findings are unlikely to be driven by a general liking for round numbers (King & Janiszewski, 2011), which would predict a boost in product preference for round (vs. precise) numbers when considering either caffeine consequence (energy or urge to urinate). Second, while some past work has found that consumers form particular inferences about marketers that use precise versus round numbers (Jerez-Fernandez et al., 2013; Thomas et al., 2010; Zhang & Schwarz, 2012), this seems unable to explain the crossover interaction pattern that we observed. We next test our proposed mechanism, related to differences in numbers' associations to stability.

Study 2: Mediating role of stability associations

Study 2 uses a mediation analysis to test our hypothesized mechanism (H2) that round (more than precise) numbers activate the concept of stability and this affects perceived lasting performance and product attitudes in a serial relationship. Additionally, to assess a fluency-based account for the results, we measure processing fluency. In this study, we present a round or precise amount of caffeine in an energy drink and focus on the main purpose for product consumption, increased energy. Since this consequence is positive, we expect that the concept of stability, activated by a round number, will enhance perceptions of lasting performance and improve product attitudes. However, we believe that a round (vs. precise) number should not affect participants' processing fluency.

Method

For course credit, undergraduate students (N = 66, 41% female) participated in a study that had a 2-cell (number: precise vs. round) between subjects design. Study 2 adapts study 1's energy drink scenario, with two changes. First, to generalize the effects, we used the round and precise numbers of 200 and 203 mg. Thus, across studies, we use caffeine levels that are in the real-world range of today's products (e.g., Red Bull = 88 mg, Rock Star = 240 mg). Second, we included additional measures to test our proposed process mechanism. As in study 1A, we first asked participants to judge the length of time the energy drink would maintain increased energy. Then, participants responded to the same four items ($\alpha = .90$) from study 1B on product attitudes and purchase intentions for the energy drink. To establish the association between numbers and stability, we next asked participants to indicate the extent to which they agreed or disagreed with three statements ($\alpha = .92$) using 7-point scales anchored by 1 (*strongly disagree*) and 7 (*strongly agree*). These items were: "200 (203) feels" . . . "stable," "durable," and ",balanced." Note that whereas our first measure assessed how long participants thought the product's energy would last, this measure assessed the extent to which associations of stability came to mind with the *number* under consideration. Finally, to assess the fluency account, we asked participants to rate their fluency in processing the caffeine information on a 3-item, 7-point scale (1 = easy, 7 = difficult to process/comprehend/understand; Lee & Aaker, 2004).

Results

As expected, the round versus precise condition had higher judgments of perceived length of product benefits ($M_{Round} = 3.84$; $SD = 1.20$ vs. $M_{Precise} = 3.21$; $SD = 1.31$; $t(64) = 2.05$, $p < .05$) and higher preferences ($M_{Round} = 3.34$, $SD = 1.24$ vs. $M_{Precise} = 2.68$, $SD = 1.21$; $t(64) = 2.20$, $p < .05$). Moreover, participants rated a stronger feeling of stability for the number 200 (vs. 203) ($M_{Round} = 3.72$, $SD = 1.22$ vs. $M_{Precise} = 2.94$, $SD = 1.26$; $t(64) = 2.53$, $p < .05$). Finally, ease of processing the caffeine information did not differ significantly between conditions ($M_{Round} = 4.91$, $SD = 1.57$ vs. $M_{Precise} = 4.54$, $SD = 1.78$; $t(64) = .90$, $p > .37$), and the effects of round (vs. precise) number on perceived lasting performance, attitudes, and stability held when controlling for this measure.

We conducted a serial mediation analysis (PROCESS macro model 6; Hayes, 2013) in which type of number (round vs. precise), stability association, perceived energy length, and product attitudes served as independent variable, mediator 1, mediator 2, and dependent variable, respectively. This analysis showed that when type of number, and both the stability association and perceived energy length were used to predict product attitudes in a serial relationship, the effect of the type of number was no longer significant (β = .03, *SE* = .16; *t*(62) = .23, *p* > .80). Instead, both the stability association (β = .27, *SE* = .07; *t*(62) = 3.53, *p* < .001) and perceived energy length (β = .64, *SE* = .07; *t*(62) = 8.29, *p* < .001) served as significant predictors working in sequence, and the indirect effect was significant (β = .31, *SE* = .13; 95% CI = [.10–.65]), see Fig. 1.

Discussion

Study 2 supports our hypothesized mechanism that round numbers activate associations of stability (H2), which in turn influences perceptions of product lasting performance (H1) and product preferences (H3). The results also reduce the plausibility of a fluency-based mechanism for our effects.

Study 3: Lasting performance of consumed products

Study 3 tests whether our predictions also operate in perceptions of a product that is actually consumed. We predict that people will perceive a greater length of product benefit if a round (vs. precise) number is used to describe the product's key characteristic. We also expected that this enhanced perceived duration would affect the desire to repeat consumption of the product in the future. To that end, participants consumed a tablet, "mberry," which has an enjoyable flavor altering effect, and we measured how long participants thought this effect lasted.

Method

For course credit, undergraduate students (N = 67, 47% female) participated in a study that had a 2-cell (number: precise vs. round) between-subjects design. Participants were told that they would consume a tablet, mberry, which has an effect of making sour foods taste sweet (www.mberry.us). Consistent with the actual product's claims, participants were told that the tablet contains an active ingredient, miraculin, that alters taste perception for some time (Litt & Shiv, 2012). This product domain is appropriate for our investigation, because the length of the product's effect is commonly addressed in product reviews (see Amazon.com). In a between-subjects manipulation of number type, participants were told that the tablet contains 100 (vs. 103.97) mg of miraculin. Next, participants consumed the tablet and sampled some sour foods (lemons, oranges, etc.) for 20 min to experience the flavor altering effects. While going through this list of food items, participants looked at an information sheet on which they were asked to monitor how long the miraculin was lasting on them. This was done to ensure that participants' subjective experiences would be top-of-mind throughout the task. At the end of the 20 min, participants indicated how long they felt like the tablet endured in its effect (1 = very short, 7 = very long), and how likely they would be to use an mberry tablet in the future (1 = not at all likely, 7 = very likely).

Results

As expected, participants felt like the tablet had a longer lasting effect in the round (M = 4.71, SD = 1.22) versus precise (M = 4.08, SD = 1.33) condition (*t*(65) = 2.01, *p* < .05). Moreover, the round number condition also had a higher likelihood of consuming the tablet in the future (M_{Round} = 5.28, SD = 1.93 vs. $M_{Precise}$ = 3.5, SD = 2.11; t(65) = 3.49, *p* < .01).

Discussion

Study 3, in the domain of a flavor altering tablet, replicated our proposed effect for a product that was actually consumed. Thus, even when consumers have direct experience to assess the length of benefits, the type of number used in the product description (round vs. precise) affects subjective feelings. Study 3 also showed that the effect carries over into repeat

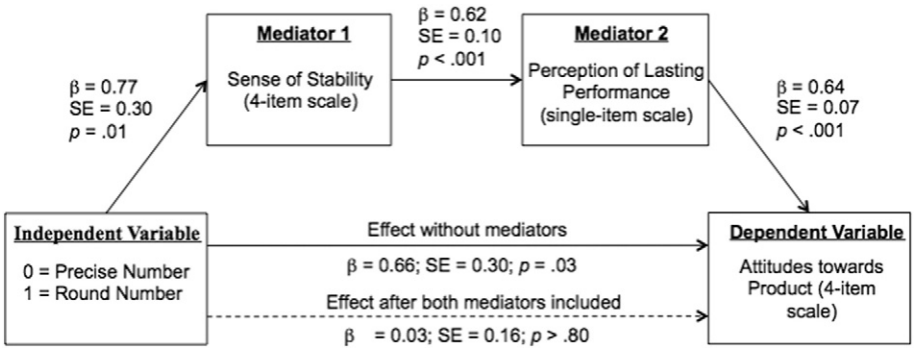

Fig. 1. Mediation analysis in study 2.

consumption likelihood. In sum, this study demonstrates the robustness of our hypothesized effect.

General discussion

This research shows that describing product characteristics in round (vs. precise) numbers increases the perceived length of the product's benefits and enhances product preferences. Past research has found differences in feelings, processing, and inferences for round versus precise numbers (Janiszewski & Uy, 2008; King & Janiszewski, 2011; Thomas & Park, 2013; Wadhwa & Zhang, 2014; Zhang & Schwarz, 2012; Xie & Kronrod, 2012). We suggest that as consumers accumulate life experiences in using numbers, they learn different associations for round versus precise numbers. We contend that an effortless association between round numbers and stability spills over into consumers' related judgment of products' lasting performance. We leave to future work to further examine how this association emerges for individuals.

The greater association between round (vs. precise) numbers and stability might also improve product perception in other ways that marketers value. Future research might test whether our findings could apply also to perceived durability of product features. For instance, consumers might expect a 20-watt (vs. 23-watt) CFL light bulb to have a longer product life. The effects might also generalize to pricing applications, wherein consumers perceive a price to have a more imminent change when it is precise (vs. round). A movie theater that has ticket prices of $10 (vs. $9.87 or $10.13) might be expected to maintain this price longer, despite inflation and cost increases.

These extensions as well as our paper's findings might have several moderators to further explore. While we tested our effects using Arabic numerals (e.g., "100"), consumers also regularly encounter written and spoken numbers ("one hundred"), and since previous research has found that these different types of numerical information are processed differently in the brain (Dehaene & Cohen, 1995; McCloskey & Macaruso, 1995), the learned association between round numbers and stability that we found might not emerge under these other formats. Further, cultures also present differences in number processing (Dehaene, Bossini, & Giraux, 1993) and have different symbolic meanings and superstitions concerning numbers (Hoon, 1997), such as the unlucky 13 in the West and the lucky 8 in China. All of our studies were conducted on U.S.-based participants, so it will be important to examine cross-cultural differences in number associations. A boundary condition might also occur in pricing applications, wherein the ".99" ending is common and has unique inferences and perceptions (Schindler & Kirby, 1997). Rather than seeing a ".00" versus ".99" ending as differing in associations to stability, consumers might instead focus on the price magnitude.

Another venue for future research is to discover how product perceptions are affected by other symbolic associations related to round and precise numbers. For instance, because people rely on affect more when processing round (vs. precise) numbers (Wadhwa & Zhang, 2014), would consumers perceive products as more hedonic and less utilitarian the more the product has round (vs. precise) numbers in its descriptions? Perhaps, the use of round numbers in products like computers, cars, and diet foods draws attention to enjoyable and experiential uses for the product. Precise (vs. round) numbers could also trigger a greater association to science and mathematics, which could increase how "tech-savvy" a product or brand seems. We hope that our findings can spur future research on these and other ideas.

Acknowledgments

The authors thank Dengfeng Yan, Nicole Votolato Montgomery, the Editor, the Associate Editor, and three anonymous reviewers for their helpful feedback on earlier versions of this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.jcps.2015.11.004.

References

Bettman, J. R., Luce, M. F., & Payne, J. W. (1998). Constructive consumer choice processes. *Journal of Consumer Research*, *25*(3), 187–217.

Dehaene, S. (2011). *The number sense: How the mind creates mathematics.* Oxford University Press.

Dehaene, S., & Cohen, L. (1995). Towards an anatomical and functional model of number processing. *Mathematical Cognition*, *1*(1), 83–120.

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

Dehaene, S., Bossini, S., & Giraux, P. (1993). The mental representation of parity and number magnitude. *Journal of Experimental Psychology: General*, *122*(3), 371.

Faro, D. (2010). Changing the future by reshaping the past: The influence of causal beliefs on estimates of time to onset. *Journal of Consumer Research*, *37*(2), 279–291.

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach.* Guilford Press.

Higgins, E. T., & King, G. (1981). Accessibility of social constructs: information processing consequences of individual and contextual variability. In N. Cantor, & J. F. Kihlstrom (Eds.), *Personality, cognition, and social interaction* (pp. 69–121). Hillsdale, NJ: Erlbaum.

Hoon, A. S. (1997). Chinese consumers' perception of alpha-numeric brand names. *Journal of Consumer Marketing*, *14*(3), 220–233.

Ilyuk, V., Block, L., & Faro, D. (2014). Is it still working? Task difficulty promotes a rapid wear-off bias in judgments of pharmacological products. *Journal of Consumer Research*, *41*(3), 775–793.

Isaac, M. S., & Schindler, R. M. (2014). The top-ten effect: Consumers' subjective categorization of ranked lists. *Journal of Consumer Research*, *40*(6), 1181–1202.

Janiszewski, C., & Uy, D. (2008). Precision of the anchor influences the amount of adjustment. *Psychological Science*, *19*(2), 121–127.

Jerez-Fernandez, A., Angulo, A. N., & Oppenheimer, D. M. (2013). Show me the numbers: Precision as a cue to others' confidence. *Psychological Science*, *25*(2), 633–635.

Jostmann, N. B., Lakens, D., & Schubert, T. W. (2009). Weight as an embodiment of importance. *Psychological Science*, *20*(9), 1169–1174.

King, D., & Janiszewski, C. (2011). The sources and consequences of the fluent processing of numbers. *Journal of Marketing Research*, *48*(2), 327–341.

Labroo, A., Dhar, R., & Schwarz, N. (2008). Of frog wines and frowning watches: Semantic priming, perceptual fluency, and brand evaluation. *Journal of Consumer Research*, *34*(6), 819–831.

Lee, A. Y., & Aaker, J. L. (2004). Bringing the frame into focus: The influence of regulatory fit on processing fluency and persuasion. *Journal of Personality and Social Psychology*, *86*(2), 205–218.

Litt, A., & Shiv, B. (2012). Manipulating basic taste perception to explore how product information affects experience. *Journal of Consumer Psychology*, *22*(1), 55–66.

McCloskey, M., & Macaruso, P. (1995). Representing and using numerical information. *American Psychologist*, *50*(5), 351.

Meyers-Levy, J., & Zhu, R. J. (2007). The influence of ceiling height: the effect of priming on the type of processing that people use. *Journal of Consumer Research*, *34*(2), 174–186.

Monga, A., & Bagchi, R. (2012). Years, months, and days versus 1, 12, and 365: The influence of units versus numbers. *Journal of Consumer Research*, *39*(1), 185–198.

Pope, D., & Simonsohn, U. (2011). Round numbers as goals: evidence from baseball, SAT takers, and the lab. *Psychological Science*, *22*(1), 71–79.

Rosch, E. (1975). Cognitive representations of semantic categories. *Journal of Experimental Psychology: General*, *104*(3), 192–233.

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

Schindler, R. M., & Yalch, R. F. (2006). It seems factual, but is it? Effects of using sharp versus round numbers in advertising claims. *Advances in Consumer Research*, *33*(1).

Siegler, R. S., & Booth, J. L. (2005). Development of numerical estimation. *Handbook of mathematical cognition* (pp. 197–212).

Thomas, M., & Park, J. (2013). The precision effect: How numerical precision influences everyday judgments. *Johnson School Research Paper Series* (pp. 23–2013).

Thomas, M., Simon, D. H., & Kadiyali, V. (2010). The price precision effect: Evidence from laboratory and market data. *Marketing Science*, *29*(1), 175–190.

Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review*, *117*(2), 440–463.

Wadhwa, M., & Zhang, K. (2014). This number just feels right: The impact of roundedness of price numbers on product evaluations. *Journal of Consumer Research*, *41*(5), 1172–1185.

Welsh, M. B., Navarro, D. J., & Begg, S. H. (2011). Number preference, precision and implicit confidence. *Annual Meeting of the Cognitive Science Society (33rd: 2011: Boston, USA). CogSci 2011*.

Xie, G., & Kronrod, A. (2012). Is the devil in the details? The signaling effect of numerical precision in environmental advertising claims. *Journal of Advertising*, *41*(4), 103–117.

Yorkston, E., & Menon, G. (2004). A sound idea: Phonetic effects of brand names on consumer judgments. *Journal of Consumer Research*, *31*(1), 43–51.

Zhang, M., & Li, X. (2012). From physical weight to psychological significance: The contribution of semantic activations. *Journal of Consumer Research*, *38*(6), 1063–1075.

Zhang, Y. C., & Schwarz, N. (2012). How and why 1 year differs from 365 days: A conversational logic analysis of inferences from the granularity of quantitative expressions. *Journal of Consumer Research*, *39*(2), 248–259.