**A context-dependent view of anchoring: The Effect of Consumer Adaptation of Incidental Environmental Anchors on Willingness to Pay**

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**INTRODUCTION**

 A fairly common form of managing consumer price expectations is when companies use numbers in their marketing communications (e.g., product model numbers, numbers in product or place names, and numbers on license plates). In some cases, increasing numbers reflect better items. In others, they do not. For instance, a Canon A530 is not superior to an A460 digital camera. Likewise, Nokia 6110 is inferior to Nokia 6102. Though an average consumer is not knowledgeable about those numbers and how they are assigned to specific models (Gunasti and Ross Jr. 2010), we argue that they are there to serve a strategic mission. Those numbers potentially act as attempts at price guidance.

Consider BMW that uses car images with a European license plate displayed prominently in its print ads in Europe where the licenses are all in the format "L LL XXXX" where Ls are letters and Xs are numbers. There is clearly a correlation between the numbers in the license plates and the price of the cars. Specifically, if a zero is added to the number on the plate, the resulting number seems to be generally higher than the price for low and mid-priced models and generally lower than the price for high priced models. It is almost as if there is a not so subtle attempt at price guidance in the choice of numbers for the license plates.

This paper explores the effect of seemingly random numbers in marketing communications on consumers’ willingness to pay (WTP). More specifically, we examine the differential effect of incidental environmental anchors (IEA) on consumers’ WTP as a function of the product category. We suggest that although consumers are not aware of the link between the numbers and the price of the product, not only do they base their WTP on the random number but also adjust the numbers to resemble acceptable prices for a given product category. Taking a context-dependent view of anchoring, we suggest that consumers alter and adapt the anchors to fit them into appropriate value range and that range changes from context to another. In a series of experimental studies, we test and demonstrate that individuals’ price expectations, thus their WTPs, are affected by those ‘adapted’ incidental numbers.

**CONCEPTUAL FRAMEWORK**

Incidental Environmental Anchoring

The idea that use of numbers as anchors to manage individuals’ numerical estimates is not new. We have known for some time that when participants are given a number as an anchor and then asked to provide estimates, they are influenced by the random initial value (Tversky and Kahneman 1974). Selective accessibility framework argues that anchoring occurs in such cases because when individuals are asked a comparative question (e.g., whether the Mississippi river is shorter or longer than 70 miles), they take it as a hypothesis (Is the Mississippi river 70 miles long ?) and seek for anchor-consistent information (Mochon and Frederick 2013). Therefore, estimates are assimilated toward the anchor. Even in cases when the numerical value is not supplied by the experimenter but rather exists in the environment, numbers seem to influence judgments. For example, Krishna et al. (2006) show that consumers’ price estimates are higher for a camera if they are exposed to an extreme-priced product in the catalog. Their results suggest that one extreme cue can affect the reservation price for many related items and many product categories.

In the above examples, either the experimenter or the context supplies anchors that affect subsequent judgments. If a number is provided when there is a need to make numerical judgments, consumers retrieve anchor-consistent knowledge from memory, making the estimates close to the anchor. While a substantial body of research suggests that consumers’ numeric decisions are affected by experimenter or context-induced numbers that are activated before the decision is made, relatively less attention has been devoted to understanding when and how totally incidental numbers impact valuations. A recent exception is research by Critcher and Gilovich (2008) who show that even jersey numbers on football players affect the probability estimates of sacking the quarterback. Participants who saw the player wearing number 94 estimated his probability of sacking the quarterback in his next game higher than those who saw him wearing number 54. Numerical priming essentially suggests that any number in the environment at the moment of judgment may serve as an anchor. A minimal amount of attention to incidental numbers is sufficient to anchor numerical answers to unrelated questions (Wilson, Houston, Etling and Brekke 1996). Although Critcher and Gilovich (2008) provide important insights as to how incidental environmental anchoring (IEA) operates, their research does not discuss the potential anchor values that should be employed for different product categories to get intended reactions. The present research tries to fill this gap in the literature. Central to our hypothesis is that a consumer’s WTP is affected by incidental numbers that are in no way related to the price of the product. We posit and demonstrate that anchors exert context-specific effects in consumer-generated anchors.

Context-dependent Effects on Consumer Valuations

Individuals’ judgments are affected by the context of concomitant stimuli. Past research has shown that numerical values may take different meanings depending on the context and that the same number may lead to different evaluations (Parducci 1965). For instance, numerical values can be represented in alternative units and the type of unit used may impact consumers’ perceptions and judgments (Pandelaere, Briers, and Lembregts 2011; Zhang and and Schwarz 2012). The unit effect postulates that when individuals come across unfamiliar units (e.g., temperatures in the unfamiliar Celsius scale for Americans); they tend to translate those units into a familiar unit (e.g., Fahrenheit) to be able to make sense of the numbers. Since this conversion is rather difficult, consumers are likely to guesstimate rather than calculate the exact values. Pandelaere, Briers, and Lembregts (2011) argue that this imprecise conversion may render consumers vulnerable to anchoring effects. For instance, consumers tend to spend less in a foreign country if the value of that currency is lower than the value of their own currency (Raghubir and Srivastava 2002).

Frederick and Mochon (2012) have also alluded that context has a big impact on the ways in which anchoring operates. If individuals are to make estimates on two different items employing the same response scale, they tend to change the use of the scale to reflect the change in the items. So in a way, anchoring effects are due to the distortion of a particular response scale. For instance, when a 70 mile anchor is presented, estimates of the length of the Mississippi river are lower because individuals use a different number on the miles scale. In a similar vein, respondents who were first asked to estimate the weight of a wolf later judged ‘1000 lbs’ as bigger, pointing out larger animals when asked to specify an animal that weighs around 1000 lbs. The scale distortion theory of anchoring contends that numeric anchors do not affect the beliefs about the stimulus; rather the use of the scale is altered and adapted to fit the context.

Following this logic, we argue that anchoring effect is context-dependent and taking previous research on context and unit effects a step further suggest that individuals not only change the use of the scale to fit the context but alter the numbers altogether to fit into new domains. That is, the same numerical value may serve as a lower bound for item X whereas it is taken as an upper bound for item Y. Hence a customer may interpret 20 as an upper bound when evaluated in ounces for drinks but as a lower bound when evaluated in gallons for water tanks. The range of acceptable prices for a given product category determines the way in which the anchor value is used by the individual. Consumers adapt and distort these values to reflect a good enough anchor to base their judgments on. Though the relation between the incidental numbers and the price of the product is unknown by the consumer; when consumers’ WTP is asked, they use the readily available random numbers in their environment to make estimates. However, their use of such numbers is not straightforward. These anchors are malleable. Consumers unconsciously change these values to reflect possible acceptable prices for a given product category. Thus, we formally hypothesize that

H1: When acceptable prices for an expensive product are used as anchors, a lower value serves as a lower (an upper) bound for an expensive (a less expensive) product. A higher value serves as an upper (a lower) bound for an expensive (a less expensive) product.

H2: When acceptable prices for a less expensive product are used as anchors, a lower value serves as an upper (a lower) bound for an expensive (a less expensive) product. A higher value serves as a lower (an upper) bound for an expensive (a less expensive) product.

**METHOD**

Study 1a and b

Study 1 a and b test H1 and H2, respectively. H1 and H2 suggest that consumers’ WTP is affected by incidental numbers. Moreover, they interpret such values to resemble acceptable prices for different product categories. Past research has argued that the mere presence of a number is notsufficient to result in anchoring effects ( Mussweiler and Strack 2001 ), especially for items with strong internal reference points (IRP) (Dogerlioglu-Demir and Koçaş forthcoming). Dogerlioglu-Demir and Koçaş (forthcoming) begin the investigation by demonstrating that consumers’ WTP is affected by totally random numbers in the environment for weak IRP items. However, they note that numbers should be part of identity (e.g., product name) for IEA to work for products with stronger IRPs. Higher frequency and recency of purchases result in more focused, stronger IRPs (Mazumdar et al. 2005). Thus, it is more difficult to manage consumers’ price expectations by unobvious numerical cues in the environment. Dogerlioglu-Demir and Koçaş (forthcoming) demonstrate that for a product with a strong IRP (e.g., a hamburger meal), the IEA effect is weaker than for a product with a weak IRP (e.g., an average meal at a restaurant). When two separate numbers are used as anchors, while there is a significant difference in WTP for an average meal, there is no difference in WTP across conditions for a hamburger. The authors argue and show that numbers used as part of the product identity enhance IEA effectiveness for products with strong IRPs.

 In study 1 a and b, we utilized numbers 17 and 97 as anchor values. These numbers were used in Critcher and Gilovich (2008) to represent appropriate values for an average meal at an expensive restaurant. Therefore, we expect that while 17 will pull the WTP down and 97 will pull WTP up for the meal, 17 will pull the WTP up and 97 will pull WTP down for the burger.

Study 1a

Method

Drawing 59 participants from Amazon Mturk, we had half of the respondents report their WTP for an average meal at an expensive restaurant named Studio 17 and had the other half state their WTP for an average meal at Studio 97 (“How much would you be willing to pay for your own meal at this restaurant”).

Results and discussion

As hypothesized, we found a significant difference in WTP for an average meal at Studio 17 versus Studio 97 (*MStudio17\_meal* = 24.17, SD= 10.32; *MStudio97\_meal* = 33.43, SD= 21.94; *t*(57) = –.26, *p* < 0.01). When individuals see a restaurant named ‘Studio 17’, their expectations of price for an average meal is significantly lower than when they see a restaurant name ‘Studio 97’. Though the numbers are utilized as part of the restaurant name and there is no obvious price connection, anchoring effect holds.

Study 1b

Method

Since consumers’ WTP for a product with a strong IRP is affected by different anchor values only if the number is part of the product identity (Dogerlioglu-Demir and Koçaş forthcoming), we used numbers as part of the product name for the hamburger (the 17 vs. the 97 burger). We used 2 conditions (17 vs. 97) to test the effect of different anchors in the product names on consumers’ WTP for a product with a strong IRP. We recruited 80 participants from the United States using Amazon MTurk. This time, we used a hamburger meal ad and a slogan that read “Introducing the 17 (97) burger.” We specifically mentioned that “we used a random character generator to come up with such a name” to ensure that participants perceived the numbers as product names, not prices.

Results and discussion

We found a significant difference in WTP for the 17 burger versus the 97 burger (*M17burger* = 8.40, SD= 3.62; *M97burger* = 6.24, SD= 3.78; *t*(78) = 2.59, *p* < .01). As expected, whereas consumers interpret the number 17 as $17, they view the number 97 as $0.97 when they are operating in the burger domain. Therefore, 17 pulls WTP up and 97 pulls it down. As argued above, consumers tend to distort the numbers to make them look more like acceptable prices for a certain product category.

Study 2a and b

In study 1a and b, we found that the same numbers are interpreted differently depending on the context. To test whether this effect is due to the choice of numbers 17 and 97, which are more applicable to a meal than a hamburger, we conducted study 2 employing anchor values more applicable to a hamburger meal. Dogerlioglu-Demir and Koçaş (forthcoming) show that 98% of the prices quoted as average, lower bound, or upper bound for a hamburger meal fell in the 0.99 to 19.99 range. Therefore, in study 2, we employed 099 and 1999 as anchor values. We expect that while 099 will pull the WTP down and 1999 will pull WTP up for the burger, 099 will pull the WTP up and 1999 will pull WTP down for the meal.

Study 2a

Method

We drew 44 participants from the United States using Amazon MTurk and used a 2 condition (099 and1999) between-subjects design to test the effect of different anchors on consumers’ WTP for an average meal at an expensive restaurant using the same as in Study 1a. We asked our participants “How much would you be willing to pay for your own meal at Studio 099 vs. 1999?”

Results and discussion

We found a marginal significant difference in WTP for an average meal at Studio 099 versus Studio 1999 (*MStudio099\_meal* = 41.15, SD= 35.71; *MStudio1999\_meal* = 28.08, SD= 10.96; *t*(42) = 1.70, *p* < 0.09). As hypothesized, while consumers interpret the number 1999 as $19.99, they view the number 099 as $99 when they are operating in the meal domain. Therefore, while 099 pulls WTP up, 1999 pulls it down, demonstrating the context dependent nature of anchoring.

Study 2b

Method

We drew 72 participants from the United States using Amazon MTurk and used a 2 condition (099 and1999) between-subjects design to test the effect of different anchors on consumers’ WTP for a hamburger meal employing the same scenario as study 1b. We asked respondents “How much would you be willing to pay for the 099 burger vs. the 1999 burger?”

Results and discussion

We found a significant difference in WTP for the 099 burger versus the 1999 burger (*M099burger* = 5.33, SD= 2.94; *M1999burger* = 6.56 , SD= 2.00; *t*(70) = -1.96 , *p* < .01). As proposed, while 099 pulls WTP down, 1999 pulls it down, showing that consumers take 099 as the lower bound and 1999 as the upper bound when it comes to burger prices (see table 1for results of study 1and 2).

Table 1 Results of Study 1 and 2

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| --- |
| **Meal Domain (17&97)** |
|  | Anchor 17 | Anchor 97 | Statistics |
|  | *Mean WTP* | *SD WTP* | *Mean WTP* | *SD WTP* | *N* | *t* | *p* |
| **Meal (1a)** | 24.17 | 10.32 | 33.43 | 21.94 | 59 | -0.26 | 0.01 |
| **Burger (1b)** | 8.40 | 3.62 | 6.24 | 3.78 | 80 | 2.59 | 0.01 |
| **Hamburger Domain (099&1999)** |
|  | Anchor 099 | Anchor 1999 | Statistics |
|  | *Mean WTP* | *SD WTP* | *Mean WTP* | *SD WTP* | *N* | *t* | *p* |
| **Meal (2a)** | 41.15 | 35.71 | 28.08 | 10.96 | 44 | 1.70 | 0.09 |
| **Burger (2b)** | 5.33 | 2.94 | 6.56 | 2.00 | 72 | -1.96 | 0.01 |

**CONCLUSION**

Taken together, the results from this study along with previous studies provide strong support for our theorizing and hypothesized effects. Importantly, we find that consumers employ random numbers in their environment to make numerical valuations. The same numbers, however, may refer to different values depending on the context. Though unconsciously, consumers tend to alter, distort and finally adapt these numbers to make them reasonable prices for a given product category.

These findings have several important managerial implications. First, right numbers must be selected to create intended anchoring effects. Consumers have ranges of acceptable numbers especially when it comes to product prices with which they have some familiarity, and only numbers within this range are potential right numbers. Second, it is highly likely that an intended anchor may change unit in the customer's perception, and end up working as an anchor in the undesired direction. As our empirical work demonstrates, 17 is a better anchor for profit maximization than 97 in a burger domain whereas the reverse is true in a meal domain. Similarly, 099 is a better anchor for profit maximization than 1999 in a meal domain whereas the reverse is true in a burger domain, that is, the WTP is higher when 1999 is used rather than 099.

To build on this example further, we also carried out an exploratory study which we report here briefly where we consider anchors 1999, 2999, 3999 and 4999 in a burger domain (N=329) as in Study 2b . Although the numbers 1999, 2999, 3999 and 4999 are increasing nominally, these numbers are consecutively further away from the acceptable range of prices. Hence, our findings in the previous studies suggest that the larger numbers are more likely to operate as less than $10 compared to more than $10 in an anchoring context. Hence, 4999 is more likely to be perceived as $4.99 rather than $49.99, especially when compared to 3999 ($3.99 vs. $39.99) or 2999 ($2.99 vs. $29.99). Our empirical study lends some support for this prediction. Although the differences are marginally significant, there seems to be a trend in the expected direction. The mean (and SD) of WTP for anchors 1999, 2999, 3999 and 4999 are 7.70 (2.83), 7.17 (3.37), 7.23 (5.81) and 6.83 (4.01). Hence, although 2999 to 4999 may seem like better anchors for profit maximization, consumers' adaption of context dependent perceived prices in the range of $2.99 to $4.99 lead to a decrease in reported WTP. To conclude, we can claim that there are potentially worse anchors in the right direction that practitioners must watch for when choosing numbers to be used in marketing activities.

**REFERENCES**

Critcher, Clayton R., and Thomas Gilovich. (2008) “Incidental environmental anchors.” *Journal of Behavioral Decision Making* 21, 241-251.

Dogerlioglu-Demir, Kivilcim and Cenk Koçaş (forthcoming) “Seemingly incidental anchoring: the effect of incidental environmental anchors on consumers’ willingness to pay.” *Marketing Letters.*

Frederick, Shane W., and Daniel Mochon (2012) "A scale distortion theory of anchoring." *Journal of Experimental Psychology,* 141 (1), 124-133.

Gunasti, Kunter, and William T. Ross Jr. (2010) "How and when alphanumeric brand names affect consumer preferences."  *Journal of Marketing Research*, *47*(6), 1177-1192.

Krishna, Aradhna, Mary Wagner, Carolyn Yoon, and Rashmi Adaval (2006) Effects of extreme-priced products on consumer reservation prices. *Journal of Consumer Psychology* 16(2), 176-190.

Mazumdar, Tridib, S. P. Raj, and Indrajit Sinha. (2005) Reference price research: review and propositions. *Journal of Marketing,* 69(4), 84-102.

Mochon, Daniel, and Shane Frederick (2012). A scale distortion theory of anchoring

*Journal of Experimental Psychology*, 141 (1), 124–133.

Mussweiler, Thomas and Fritz Strack. (2001) The semantics of anchoring. *Organizational Behavior and Human Decision Processes* 86(2), 234-255.

Pandelaere, Mario, Barbara Briers, and Christophe Lembregts (2011) "How to make a 29% increase look bigger: The unit effect in option comparisons." *Journal of Consumer Research* 38(2), 308-322.

Parducci, Allen (1965). Category Judgment: A Range-Frequency Model. *Psychological Review, 72 (6),* 407–418.

Raghubir, Priya, and Joydeep Srivastava (2002). Effect of Face Value on Product Valuation in Foreign Currencies. *Journal of Consumer Research,* 29 (3),335–347.

Tversky A, Kahneman D (1974) Judgment under uncertainty: heuristics and biases. *Science,* 185(4157),1124-1131.

Wilson, Timothy D., Christopher E. Houston, Kathryn M. Etling, and Nancy Brekke (1996) "A new look at anchoring effects: basic anchoring and its antecedents."*Journal of Experimental Psychology.* 125 (4), 387-402.

Zhang, Y. Charles, and Norbert Schwarz (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.