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THE HIGHER THE GOAL, THE MORE YOU EAT: REFERENCE DEPENDENCE IN AN "ALL-YOU-CAN-EAT" RESTAURANT

by

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THE HIGHER THE GOAL, THE MORE YOU EAT: REFERENCE DEPENDENCE IN AN "ALL-YOU-CAN-EAT" RESTAURANT. (Working paper)

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Abstract

While many factors have been proven to affect eating behavior in all-you-can-eat restaurants, little attention has been paid to the influence of reference dependence on the quantity of food consumed in this context. This study conducted an experiment with 224 customers (90 tables) in a Korean BBQ buffet restaurant that had 2 menu options, a premium option and a standard option, with a price difference of about $3. Customers were randomly assigned to one of 3 experimental groups based on the option they initially chose: (1) participants who chose a premium option and paid a premium option price (2) participants who chose a premium option and were given a discount to pay at the standard option price and (3) participants who chose a standard option and were awarded a free upgrade from the standard to the premium option. The results indicate that when participants initially chose a premium option and were given a discount to pay at the standard option price, they had higher consumption volume as compared to those who chose a standard option and were awarded a free upgrade from the standard to the premium options. This study reveals that consumers set their reference point on how much to consume by factoring in their perceived meal characteristics. Consumers with the greater reference point end up consuming a significantly larger amount of food than those with a lower reference point. Our research provides compelling evidence that the reference-dependent preference affects consumers' decisions on how much to consume in an "all-you-can-eat" context.

Keywords: All-you-can-eat buffet, Reference point, Randomized control trial, Behavior economics

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Introduction

An all-you-can-eat buffet is a system of meal serving in which a single fixed price is charged for customers to access an unlimited quantity of food (Nahata et al., 1999). According to traditional economic theory, only marginal cost and benefit should affect how much a person chooses to eat. Therefore, in the context of all-you-can-eat buffets in which there is no marginal cost, the declining marginal utility should prompt the consumer to eat until their marginal utility is equal to zero, or when eating no longer provides any pleasure and they stop. Actual consumer eating behaviors, however, seem to be inconsistent with the theory. Many previous studies regarding all-you-can-eat buffets have presented evidence that buffets are related to overeating behaviors and contribute to weight gain and obesity (Casay et al., 2008; Levitsky et al., 2004; Stunkard & Mazer, 1978; Tepper et al., 2011).

Studies of the factors determining the amount of food consumed at buffet restaurants have shed light on the eating environment (Friis et al., 2017; Wansink & van Ittersum, 2013), pre or post meal payment (Siniver et al., 2013), and the effect of pricing (Just & Wansink, 2011). Nevertheless, a relatively small number of studies have addressed the role of reference dependence.

In addition to taking cues from the environment, eating behavior can also be influenced by internal factors such as personal consumption norms (Herman & Polivy, 2005; Arvola et al., 2008). In any given eating situation, Schwartz (1977) and Zlatevska and Spence (2016) have suggested that people usually consider features of the food and establish a baseline, a personal consumption norm, for how much food is an appropriate amount to consume for themselves. The commitment to comply to one's personal consumption norm will lead to them consuming the planned amount, and the higher the personal consumption norm, the more food consumed. One element that could explain people's need to adhere to their consumption goals is reference-dependent preference.

Reference dependence is a cornerstone of prospect theory which holds the idea that individuals evaluate the value of outcomes in terms of change in comparison to reference points rather than final outcomes. According to prospect theory, people generally want to achieve outcomes that are close to the reference point and avoid losses because outcomes that are considered losses compared to the reference point can cause more pain than an equal amount of gain can create pleasure (Kahneman & Tversky, 1979). While Tversky and Kahneman (1991) suggest that individuals mainly determine reference points by their current state (the status quo), recent literature has found plausible evidence that reference points vary depending

upon the context, and non-status quo reference points such as personal goals (Burdina, Hiller & Metz, 2017; Kiet et al., 2021) and expectations (Abeler et al., 2011) can serve as a point of comparison as well.

Applied to the present context, we hypothesized that, in an all-you-can-eat setting, a personal consumption norm acts as a reference point and the consumer sets their norm, or goal of how much to consume, by factoring in the perceived meal characteristics they expect to eat. In this sense, a consumer who sets their personal consumption norm high to consume a large amount will end up consuming a significant amount of food.

To test the hypothesis, this paper examined behavior in a Korean BBQ all-you-can-eat restaurant. This restaurant typically serves two menu options: a standard option (about $8 per individual) and a premium option (about $11 per individual). To analyze whether consumers set their reference point on how much to eat based on perceived meal characteristics they intended to consume, two groups of customers who eat the same option with different reference points were compared in order to measure the variance in the amount of consumption. The first group were customers who intended to eat the premium option and received a discount to eat premium at the standard option price. The second group were customers who intended to eat the standard option and were given a free upgrade to eat the premium at the standard option price.

The results of this experiment provide insight into the influences of reference effect on quantity consumption, which could lead to the discovery and development of appropriate measures to reduce overeating and to help restaurants to better understand consumer behaviors while increasing outside appeal and maximizing profits.

Background

Studies of eating in an all-you-can-eat setting have provided a review of the connection between buffet overeating (Stunkard & Mazer, 1978; Tepper et al., 2011), weight gain (Levitsky et al., 2004), being overweight (Duerksen et al., 2007; Wang et al., 2018), and obesity (Casey et al., 2008; Privitera et al., 2016). Stunkard and Mazer (1978), for example, documented that when compared with a regular restaurant setting, the amount of food consumed by customers who eat in a buffet setting was higher. Likewise, Tepper et al. (2011) showed that higher calorie intake occurred in a buffet style restaurant when consumers had access to a variety of foods than in a restaurant with a fixed price menu. Levitsky et al. (2004) found that first-year students gained a large amount of weight during their first year of college

due to eating at buffets in the college dining hall. Casey et al. (2008) reported a higher rate of obesity among people who were eating out frequently, especially at buffet restaurants.

In attempting to explain all-you-can-eat consumer eating behavior, several factors have been found to play an essential role in consumption decisions. For example, Wansink and van Ittersum (2007) suggested that people are likely to rely on consumption norms such as serving size to help them decide how much to eat. As such, by conducting an experiment in a Chinese buffet restaurant, Wansink and van Ittersum (2013) found that diners who used a small plate served 52% less food to themselves and consequently ate 45% less food than those who ate with a larger plate. Friis et al. (2017) revealed that setting up an eating environment by adorning buffet areas with green plants, using herbal scents, and helping customers visualize more vegetables in the buffet line can decrease unhealthy meal component consumption. Just and Wansink (2011), on the other hand, investigated the effect of pricing. They proposed that paying a higher fixed price in buffets leads to higher consumption. This is due to the sunk cost fallacy, or the intention to 'get their money's worth', which causes consumers to overeat in order to achieve a sense of satisfaction with the price they paid, because the decision on how much to eat is influenced not only by a hedonic utility from eating, but also by a transaction utility from receiving value in the deal. Subsequently, knowing that the cost per unit decreases as the amount of food consumed increases, buffet consumers eat until they feel they have been adequately compensated. Furthermore, Siniver et al. (2013) added that consumers' transaction utility can also change based on treatment quality, with a better treatment resulting in lower consumption. As such, in buffet restaurants where consumers consider the time of payment as an indicator for the quality of service (having to pay in advance before eating is a show of disrespect, whereas allowing them to pay after the meal is a sign of fairness), consumers who pay for the buffet meal after eating, then, eat less than those who pay before eating. However, it is probable that other aspects of meal experience, including customers' ability to consume what they perceive to be a sufficient amount of food, are also responsible for transaction utility change.

Polivy (2005) proposed that individuals impose a cognitive construct referred to as personal consumption norm considering their personal dietary restrictions to establish the standard for how much to consume and apply it in each eating situation. In general, personal norms reflect people's self-expectations; what they believe they ought to do, and their intentions to engage in actions (Parker, Manstead & Stradling, 1995; Schwartz & Tessler, 1972). Conformity to personal norms or self-expectations results in positive self-evaluation, whereas deviation leads to negative self-evaluation (Schwartz, 1977). Additionally, Norms

affect food purchase intentions and actual food consumption (Arvola et al., 2008; Lee and Yun, 2015; Ling, Shahzad, Abrar & Khattak, 2021).

The presence of a personal consumption norm is further supported by the empirical evidence provided by Zlatevska and Spence (2016). Their study compared the reported usual cake consumption, a proxy for personal consumption norm, between groups of subjects who elicited their norms before and after exposure to messages regarding the cakes' nutritional qualities. The findings found no difference in the personal consumption norms reported between these groups, suggesting people have their own personal consumption norms for what amounts of food are considered appropriate in each consumption situation. They also asked the subjects to indicate their intended consumption volume of the cake offered after being exposed to the messages and discovered that personal consumption norms influence intended consumption volume, i.e., the higher an individual's personal consumption norm, the higher the food consumption volume. They then conducted another experiment to assess whether personal consumption norms have a similar impact on actual food consumption using the same method to elicit personal consumption norm. The results confirmed the existence of personal consumption norm and the positive impact of personal consumption norm on actual food consumption volume.

In considering what motivates people to adhere to the consumption quantity they designate as personal consumption norms, it seems reasonable to assume that such behavior is driven by underlying psychological impulses. One that potentially meets the criteria for explaining this is reference-dependent preference.

To explain reference-dependent preference, prospect theory proposed the S-shape value function which suggests that people assess the value of outcomes in terms of gain and loss relative to a reference point, rather than an absolute outcome. According to prospect theory, individuals' value function is convex in the loss domain but concave in the gain domain, and the slope of the domain of losses is significantly steeper than gains. This value function structure signifies that the pain from losing is more painful than the happiness acquired from gaining the equivalent amount. Consequently, people avoid outcomes perceived as losses relative to reference points; a behavior known as loss-aversion (Kahneman & Tversky, 1979). When considering what determines the reference point, literature provides convincing evidence that the reference point can be formed from the status quo (Tversky & Kahneman, 1991), personal goals (Heath et al. 1999; Markle, 2018; Meng, 2019) and expectations (Abeler et al., 2011; Hack & Lammers, 2009; Shalev, 2000).

In many circumstances, people exhibit reference dependence by continuing actions in order to reach their reference goals because of loss-aversion. Camerer et al. (1997), for example, showed that cab drivers in New York City work longer hours on days with few customers because they try to close the gap between their actual and their target income which is set as a reference point. Abeler et al. (2011) found that the experimental subject would increase their effort to work longer if earnings expectations were high and consequently earn more money than those whose expectations were low. Burdina, Hiller and Metz (2017) documented that marathon runners make more effort and improve their performance when they have personal goals that are attainable. In the context of food consumption, Samdal et al. (2017) suggested that the use of goal setting as a behavior change technique can help consumers to change their behavior to have better consumption habits. Lara et al. (2014) found that setting a daily fruit and vegetable intake goal caused the experimental sample to eat more fruit and vegetables.

In a general food consumption context, it has been acknowledged that the perceived characteristics of food, such as food quality (Cavanagh, Kruja & Forestell, 2014), the healthiness of food (Cecchini & Warin, 2015; Provencher, Polivy & Herman, 2009; Wansink & Chandon, 2006), and price (Wansink, 2004; Gneezy et al., 2014), influences people expectation toward food and food consumption volume, and people sometimes use them to determine their personal consumption norms (Zlatevska & Spence, 2016). Hence, the supposition in this paper was that, in an all-you-can-eat setting, individuals may evaluate their personal consumption norm of how much to eat based on the perceived meal characteristics they intended to consume and demonstrate reference dependence with their norm being the reference point. Thus, based on consumption norm and reference dependent preference concepts, this study sought to answer the following hypotheses:

H1: People set their reference point of how much to eat based on the perceived meal characteristics that they intended to consume.

H2: The higher the reference point, the greater the volume of food consumed.

Theory

According to Just and Wansink (2011), after deciding to eat in an all-you-can-eat buffet, customers are motivated by a desire to increase their pleasure from eating (hedonic utility) and a desire to get a good deal (transaction utility). Regarding hedonic utility, it has an inverted-U shape, implying that consumers' hedonic utility increases at declining marginal rates until they

reach the point of fullness, $\tilde{q}$, and then decreases as they begin to feel discomfort. The hedonic utility can be expressed as

$$H = H(q) \quad (1)$$

where q is the quantity consumed, $H'(q) \gtreqless 0 \; if \; q \lesseqgtr \tilde{q}$ and $H''(q) < 0$. In terms of transaction utility, Just and Wansink (2011) suggest that it is a decreasing function of the average price of food consumed, p/q. Siniver et al. (2013), on the other hand, assert that transaction utility varies depending upon the way in which customers assess the quality of the experience. This study adds that it is also a function of the customer's reference point for consumption volume, r, expressed as

$$T = T(p/q, r) \quad (2)$$

where $T_{p/q} < 0; T_r > 0$ and $T_{(p/q)(p/q)} < 0$; $T_{(p/q)r} < 0$. It is assumed that throughout the course of the eating process, the customer would choose to eat to the level of q^* to maximize their overall utility:

$$U(q, p, r) = H(q) + T(p/q, r) \quad (3)$$

The first-order condition for utility maximization is

$$U_q = H'(q) - \frac{p}{q^2} T_{(p/q)} = 0 \quad (4)$$

In this respect, if there is no transaction utility, customers will stop eating when they are full. However, as rearranging (4)

$$H'(q) = \frac{p}{q^2} T_{\left(\frac{p}{q}\right)} < 0 \quad (5)$$

if transaction utility exists, $q^* > \tilde{q}$, the consumers will continue eating even if they reach the point of fullness. To consider the effect of reference point on the quantity consumed, we totally differentiate (4) with respect to q and r, resulting in

$$\frac{dq^*}{dr} = \frac{pq^2 T_{(p/q)r}}{H''q + 2pqT_{p/q} + p^2 T_{(p/q)(p/q)}} \quad (6)$$

Thus, given other factors, the higher the reference point the consumers set to eat, the more they will eat in an all-you-can-eat buffet.

The experiment

To test our hypotheses, the field experiment technique was employed. The experiment was carried out in cooperation with a Korean BBQ all-you-can-eat restaurant located in Khon Kaen, Thailand. The restaurant has two menu options: a standard option (about $8 per individual) and a premium option (about $11 per individual). The menu items in both options are mostly identical, except that the premium option has premium beef and additional side dishes included. The restaurant typically serves food in a tray that contains a predetermined weight of the items ordered, which are different depending on the type of food.

To order food, customers receive a menu listing the food items available, are briefly informed how much food per tray they will receive, and then instructed to write down the number of trays they would like to order for each item on the paper. Customers can order as much as they want anytime over a one and a half-hour period and any ordered food can be returned if the entire tray is left untouched. However, if there are any leftovers, a fine is charged based on the price of the whole tray.

Experimental design

This research used a randomized control trial design with one control condition and two treatment conditions of participants who eat the same option with different reference points (having intended to eat the standard option or the premium option). The experiment was conducted during dinner hours over 51 days. As the participants arrived at the restaurant, the experimenter led them to their table and introduced them to the menu and each option's price. Participants would be randomly assigned to one of the experimental groups based on the option they initially chose. To distract the participants from the study's real purpose, after they decided what option they wanted to have, the experimenter asked whether they would be willing to answer a customer survey about the meal experience to help the restaurant improve their service to provide a better customer experience[1]. In return for their help, the groups of

[1] Some customers who intended to eat the standard option declined to participate in the program since they did not eat meat. This group of customers was therefore excluded from our study.

participants who chose the premium option would get a chance to win a special deal by lottery draw with a 50 percent chance of winning. If they won, they would be assigned to the 1^{st} treatment condition, given a discount to pay at the standard option price, and eat the premium option. However, if they did not win, they would be assigned to the control condition in which no special deal was given. Likewise, the group of participants who chose the standard option would also get a chance to draw in a lottery with a 50 percent chance of winning a special deal. If they won, they would be assigned to the 2^{nd} treatment condition which was awarded a free upgrade from the standard to the premium option. If they did not win, they would not receive the upgrade to premium. The experimenter would not tell the participants about the special deal until they had finished choosing the option plan and agreed to complete the questionnaire. Of note is that in both treatment conditions, the meal's actual price was the same, approximately $8. The details of the experimental groups are presented in Table 1. To ensure that none of the drawing results would be public and affect nearby participants' consumption decisions, each table was arranged so that they pointed away from each other, and the lottery drawing process was done privately for each group or person.

[Table 1 about here]

Measurement

The amount of food eaten was counted from the number of trays ordered. For participants who arrived as a group, all would be assigned into the same experimental group. Generally, in a Korean BBQ all-you-can-eat restaurant, people who come as a couple or in a group would share the same pan and eat together. For this reason, we could not observe exactly how much each individual ate. Instead, we measured the amount of food the group consumed (trays) and the control was the number of people in the group and their demographic information.

Before having a meal, participants would be given a questionnaire which included questions on their demographic information: gender, age, and self-reported body weight (kg)[2]. The before meal questionnaire also contained a short question that asked for their hunger level on a 10-point scale (1 = not hungry at all; 10 = couldn't be hungrier). Once they finished their meal, a second questionnaire was given. The second questionnaire asked them to rate their

[2] Some participants might find it uncomfortable to directly state their weight. The questionnaire, therefore, asked them to specify the weight in a weight range (Less than 40 kg; 40-50 kg; 51-60 kg; 61-70 kg; 71-80 kg; More than 80 kg) and then converse their answers to the median of each range (for example, 45 kg for range 40-50 kg). The exception was for individuals who claimed to weigh less than 40 kg or above 80 kg, we employed 40 kg and 80 kg.

eating experience about their satiety: “How full are you?”, their perceived value: “How much do you think the meal is worth?”, and their level of satisfaction: “How satisfied are you with the meal?” on a 10-point scale (1 = Not at all; 10 = Extremely).

Method and results

Two hundred and twenty-four participants (ninety groups) were recruited for the study. Of this amount, 5 were eating alone, 102 came as a couple, 66, 40, 5, and 6 arrived together as a group of 3, 4, 5, and 6 persons, respectively.

To determine if there were differences between treatment and control conditions, we compared participants' demographic characteristics and hunger level across experimental groups based on the data collected from the questionnaires by estimating with a statistical t-test. Table 2 provides the results.

[Table 2 about here]

According to Table 2, the results reveal that participants in every experimental group are not distinct from one another because no significant difference was found in their demographic characteristics and hunger levels.

Inquiring into whether individuals set reference points based on perceived meal characteristics and the influence of reference point on the quantity consumed, we used OLS regression to estimate the effects of these explanatory variables such as participants’ characteristics and hunger level on the number of food items consumed and the number of main dishes[3] consumed. The models are given as:

$$\begin{aligned} Ntotal = \; & \alpha + \beta_1 Treatment1 + \beta_2 Treatment2 + \beta_3 Male_i + \beta_4 Female_i + \beta_5 Mage_i \\ & + \beta_6 Fage_i + \beta_7 Mweight_i + \beta_8 Fweight_i + \beta_9 Hungry_i + \varepsilon_i \end{aligned} \quad (7)$$

$$\begin{aligned} Nmain = \; & \alpha + \beta_1 Treatment1 + \beta_2 Treatment2 + \beta_3 Male_i + \beta_4 Female_i + \beta_5 Mage_i \\ & + \beta_6 Fage_i + \beta_7 Mweight_i + \beta_8 Fweight_i + \beta_9 Hungry_i + \varepsilon_i \end{aligned} \quad (8)$$

where a control group serves as a reference group for both specifications. ***Ntotal*** is the total amount of all food items consumed, which was measured by the number of trays. ***Nmain*** is the

[3] The main dish category includes meat, pork, and streaky pork. The main dish was analyzed because the price of these items is higher than others and people usually pay relatively high attention to them when making consumption decisions.

number of main dishes consumed, which was measured by the number of trays. Independent variables are defined as follows:

(1) $Treatment1$ – A dummy variable of experimental group: 1 if the participant is in the 1^{st} Treatment condition; 0 if otherwise.

(2) $Treatment2$ – A dummy variable of experimental group: 1 if the participant is in the 2^{nd} Treatment condition; 0 if otherwise.

(3) $Male_i$ – Number of males in the group.

(4) $Female_i$ – Number of females in the group.

(5) $Mage_i$ – Average age of males in the group.

(6) $Fage_i$ – Average age of females in the group.

(7) $Mweight_i$ – Average weight of males in the group.

(8) $Fweight_i$ – Average weight of females in the group.

(9) $Hungry_i$ – Average hunger level of people in the group.

From the fundamental hypotheses of the research: in an all-you-can-eat setting, consumers may use the perceived meal characteristics they intended to consume to set a reference goal of how much to take. Consumers who establish a greater reference point will adjust their consumption accordingly, resulting in them consuming substantially more food.

Table 3 displays the regression results for the total number of all food items and main dishes consumed. When the explanatory variables are controlled to specifically analyze the influence of reference-dependent preference on all food item consumption, the coefficient of *Treatment 2* is negative and strongly significant, indicating that the number of all food items consumed by participants in the 2nd treatment condition was lower than that of the participants in the control condition by on average 5.74 trays. On the other hand, even though the number of the 1st treatment condition is negative, it is not statistically significantly different from the control group. The results imply that participants in the control and the 1st treatment conditions who intended to eat the premium option ate more of all food items than those in the 2nd treatment conditions.

In terms of main dish consumption, when all explanatory variables were controlled, the coefficient of both *Treatment 1* and *Treatment 2* are negative and statistically significant,

indicating the number of main dishes consumed by participants in the 1st and 2nd treatments conditions was less than those in the control condition by 1.67 and 2.06 trays, respectively [4].

Besides the treatment effect, the number of people at the dining table, both male and female, and the hunger level are also statistically significant in determining the amount of main dish consumption. The addition of one man resulted in a 2.53-tray rise in main dish consumption. Similarly, an increase of one woman led to an increase of 1.69 trays in main dish consumption. A one scale rise in hunger level increased main dish consumption by 0.38 trays on average.

The fact that only the level of the main dish consumption, but not all food item consumption, of the 1st treatment condition is significantly lower than the control condition exhibits the effect of both sunk cost and reference dependence. For the sunk cost effect, as the meal price goes down, the consumption level of the participants in the 1st treatment condition is reduced, indicating a decrease in desire to reach a level of satisfaction with the money that they have spent. This holds true especially with the main dishes that are more expensive than other dishes. However, the intake of all food items is not significantly lower for subjects in the 1st treatment. This reflects that although people reduced their intake of the main dish because of sunk cost, they switched to other food items and managed to eat a lot of those items instead. Meanwhile, the consumption level of both main dishes and all food items of the subjects in the 2nd treatment condition who desired to eat the standard option but were upgraded to eat the premium option was statistically and substantially lower for the control group. The evidence from our experiment suggests that consumers employ their goals for quantity to be consumed as their referent points to determine how much to eat and demonstrate reference dependence by consuming food to a volume that is close to the amount set as a referent point.

[Table 3 about here]

The study then further tested for the effect of reference dependence on meal experience evaluation: satiety, perceived value, and satisfaction. Model specifications to identify the effect of reference dependence on these variables are as follows:

[4] Wald test was used to determine the difference between the coefficients of *Treatment 1* and *Treatment 2*. The results show that the two coefficients are not statistically different from each other at a significant level of 0.05 (p-value > 0.05).

$$Satiety = \alpha + \beta_1 Treatment1 + \beta_2 Treatment2 + \beta_3 Male_i + \beta_4 Female_i + \beta_5 Mage_i + \beta_6 Fage_i + \beta_7 Mweight_i + \beta_8 Fweight_i + \beta_9 Hungry_i + \varepsilon_i \quad (9)$$

$$Perceived\ value = \alpha + \beta_1 Treatment1 + \beta_2 Treatment2 + \beta_3 Male_i + \beta_4 Female_i + \beta_5 Mage_i + \beta_6 Fage_i + \beta_7 Mweight_i + \beta_8 Fweight_i + \beta_9 Hungry_i + \varepsilon_i \quad (10)$$

$$Satisfaction = \alpha + \beta_1 Treatment1 + \beta_2 Treatment2 + \beta_3 Male_i + \beta_4 Female_i + \beta_5 Mage_i + \beta_6 Fage_i + \beta_7 Mweight_i + \beta_8 Fweight_i + \beta_9 Hungry_i + \varepsilon_i \quad (11)$$

where ***Satiety*** is the satiety evaluation (average per group/person), ***Perceived value*** is the perceived value evaluation (average per group/person), and ***Satisfaction*** is the satisfaction evaluation (average per group/person). The independent variables are the same as those used in equation (7). Note that the control group serves as a reference group for all specifications. Table 4 presents the results.

[Table 4 about here]

From Table 4, when the explanatory variables were controlled, the evaluations of satiety, perceived value, and satisfaction of the participants in both the 1st and 2nd treatment conditions who paid a lower price for the meal are significantly higher than those in the control condition who paid a higher price. The satiety evaluation of the 1st and 2nd treatment condition increased by 0.61 and 0.59 from the control condition. The perceived value evaluation of the 1st and 2nd treatment conditions increased by 0.79 and 0.89 as compared to the control condition. For the satisfaction evaluation, the satisfaction score of the 1st and 2nd treatment conditions increased by 0.55 and 0.70 compared with the control condition. Nevertheless, there is a possibility that the reference points effect might cause these meal experiences to be different among treatment conditions. The researchers therefore performed the F-test to assess whether the coefficients of the 1st and 2nd treatment conditions were significantly different. The test result, however, found no statistical difference at a significant level of 0.05 (p-value > 0.05) in all models.

For the perceived value and the level of satisfaction, it should stand to reason that if a free special promotion were offered, either a discount to pay at the standard option price or a free upgrade from the standard to the premium option, people would regard the meal to be more worthy and feel more satisfied. However, one astonishing finding from these results is that the participants in the 1st treatment condition who consumed the same quantity of all foods

as those in the control condition and participants in the 2nd treatment condition who consumed less food than those in the control condition both reported higher levels of satiety than those in the control group. From this, we suspect that people might feel overwhelmed by the influence of the reward given and rate their satiety as being higher than it actually was. However, as it is outside the scope of this study, we were unable to determine the precise reason for this bias.

Conclusion

In this study, we examined the influence of reference dependence on the quantity consumed in an all-you-can-eat buffet context. In line with Zlatevska and Spence (2016), we discovered that when it comes to consumption volume, people set their quantity consumption goals, or personal consumption norms, with respect to the perceived meal characteristics that they intend to consume and use that as their reference point to determine how much to consume. Consequently, people tend to adjust the amount of food they consume according to their referent point and the higher the referent they set to consume, the more they increase their consumption level to reach their goals. This result is consistent with Heath et al. (1999) and Cramer (2009) who state that individuals who use goals to achieve something as their referent point usually classify the outcome as a success or failure in comparison to that point, and subsequently experience emotions depending on that classification. Failure to accomplish their goals makes individuals feel bad about themselves. Since, according to prospect theory, a loss is more painful than the enjoyment of the same amount of gain, individuals then put in more effort in such situations to achieve their goals. Nevertheless, the effect of reference dependence with the price and the effect of the price itself should be separated from each other. As the evidence in this study shows, although the main dish consumption of participants in the 1st treatment condition, given a discount, was lower than participants in the control condition, the total number of all food items consumed turned out to be the same. Therefore, contrary to a prior study (Just & Wansink, 2011), we suggest that if people have already set their goals to consume a more considerable amount, they don't need to decrease their consumption as the price of the meal goes down.

The limitation of this research is that, in terms of experience evaluation, the reduction in pricing in this study, whether through a free upgrade or a direct discount, is a decline in terms of the special promotion. As a result, we couldn't identify directly whether different referent points had a different effect on people's experience judgments. We only know that those who received the promotion, both those who participated in the first and second

treatments, had higher levels of satiety, perceived value, and satisfaction than those who did not, which was as expected.

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Table 1. Details of the experimental group.

	Expectation	**Eating**	**Price paid**
Experimental group			
Control condition	Premium	Premium	$11
1^{st} Treatment condition	Premium	Premium	$8
2^{nd} Treatment condition	Standard	Premium	$8

Table 2. Demographic characteristics and hunger level of participants.

	Control condition (N=30)	1st Treatment condition (N=30)	2nd Treatment condition (N=30)	*p-value* control = 1st Treatment	*p-value* control = 2nd Treatment	*p-value* 1st Treatment = 2nd Treatment
Characteristics						
Number of companions in the group	2.63	2.40	2.43	0.34	0.40	0.88
	(0.99)	(0.86)	(0.82)			
Number of males in the group	1.17	1.20	1.10	0.89	0.76	0.65
	(0.91)	(0.92)	(0.76)			
Number of females in the group	1.47	1.20	1.37	0.26	0.65	0.40
	(0.97)	(0.85)	(0.67)			
Age of males in the group	23.16	22.37	23.38	0.82	0.95	0.76
	(13.51)	(13.20)	(12.63)			
Age of females in the group	24.02	20.97	24.77	0.29	0.76	0.12
	(10.93)	(11.12)	(7.26)			
Weight of males in the group	57.46	57.48	58.33	0.99	0.90	0.91
	(27.39)	(27.60)	(28.08)			
Weight of females in the group	49.95	45.23	50.61	0.36	0.87	0.23
	(18.75)	(21.06)	(12.11)			
Hunger level						
Hunger level	7.29	7.69	7.86	0.27	0.12	0.61
	(1.51)	(1.30)	(1.53)			

Note: Standard errors are in parentheses. A scaled question is measured on a 10-point scale, with 1 = not at all and 10 = Extremely.

Table 3. The influence of reference-dependent preference on food consumption.

	Ntotal		Nmain	
	I	II	I	II
Treatment 1	-3.833	-2.621	-2.000**	-1.674***
	(2.546)	(1.667)	(0.765)	(0.598)
Treatment 2	-6.733**	-5.740***	-2.167***	-2.056***
	(2.546)	(1.673)	(0.765)	(0.601)
Male	-	9.740***	-	2.530***
		(0.996)		(0.358)
Female	-	7.391***	-	1.690***
		(1.222)		(0.439)
Mage	-	-0.037	-	-0.008
		(0.095)		(0.034)
Fage	-	-0.059	-	0.024
		(0.122)		(0.044)
Mweight	-	-0.012	-	-0.011
		(0.047)		(0.017)
Fweight	-	0.019	-	0.009
		(0.067)		(0.024)
Hungry	-	0.782	-	0.376*
		(0.530)		(0.190)
Constant	21.367***	-4.506	9.900***	1.494
	(1.800)	(5.434)	(0.541)	(1.951)
N	90	90	90	90
R^2	0.075	0.649	0.103	0.514

Note: Standard errors are in parentheses. *, **, and *** are shown statistically significant variables at p<0.1, p<0.05, and p<0.01, respectively.

Table 4. The influence of reference-dependence preference on satiety, perceived value, and satisfaction.

	Satiety		Perceived value		Satisfaction	
	I	II	III	IV	V	VI
Treatment 1	0.616***	0.613***	0.908***	0.792**	0.700**	0.551*
	(0.201)	(0.206)	(0.323)	(0.318)	(0.332)	(0.324)
Treatment 2	0.598***	0.586***	1.025***	0.885***	0.864**	0.698**
	(0.201)	(0.207)	(0.323)	(0.319)	(0.332)	(0.326)
Male	-	0.014	-	0.001	-	0.041
		(0.123)		(0.190)		(0.194)
Female	-	0.061	-	0.145	-	0.057
		(0.151)		(0.233)		(0.238)
Mage	-	0.016	-	-0.0002	-	0.004
		(0.012)		(0.018)		(0.018)
Fage	-	-0.028*	-	-0.022	-	-0.018
		(0.015)		(0.023)		(0.024)
Mweight	-	-0.006	-	0.009	-	0.005
		(0.006)		(0.009)		(0.009)
Fweight	-	0.016*	-	0.006	-	0.004
		(0.008)		(0.013)		(0.013)
Hungry	-	0.054	-	0.280***	-	0.317***
		(0.672)		(0.101)		(0.103)
Constant	8.850***	8.194***	7.411***	4.914***	7.544***	4.984***
	(0.142)	(0.673)	(0.229)	(1.036)	(0.234)	(1.059)
N	90	90	90	90	90	90
R^2	0.123	0.184	0.122	0.248	0.081	0.220

Note: Standard errors are in parentheses. *, **, and *** are shown statistically significant variables at p<0.1, p<0.05, and p<0.01, respectively. A scaled question is measured on a 10-point scale, with 1 = not at all and 10 = Extremely.

Appendix

Expanded Theory

According to Just and Wansink (2011), after deciding to eat in an all-you-can-eat buffet, customers are motivated by a desire to maximize their pleasure from eating (hedonic utility) and a desire to get a good deal (transaction utility). In terms of Hedonic utility, it has an inverted-U shape, implying that consumers' hedonic utility increases at declining marginal rates until they reach the point of fullness, $\tilde{q}$, and then decreases as they begin to feel discomfort from overeating. The hedonic utility can be expressed as

$$H = H(q) \tag{A.1}$$

where q is the quantity consumed, $H'(q) \gtreqless 0 \; if \; q \lesseqgtr \tilde{q}$ and $H''(q) < 0$. In term of transaction utility, Just and Wansink (2011) suggest that it is a decreasing function of the average price of food consumed, p/q. As Siniver et al. (2013) assert that transaction utility varies depending on other aspects of the deal, this study adds that it is also a function of the customer's reference point for quantity consumed, r, expressed as

$$T = T(p/q, r) \tag{A.2}$$

where $T_{p/q} < 0; T_r > 0$ and $T_{(p/q)(p/q)} < 0$; $T_{(p/q)r} < 0$. It is assumed that throughout the course of the eating process, the customer would choose to eat to the level of q^* to maximize their overall utility:

$$U(q, p, r) = H(q) + T(p/q, r) \tag{A.3}$$

The first-order condition for utility maximization is

$$U_q = H'(q) + \frac{d\,T(p/q, r)}{dq}$$

From,

$$\frac{d\,T(p/q,m)}{dq} = \frac{d(p/q)}{dq} \cdot \frac{d\left[T(p/q,r)\right]}{d(p/q)}$$
$$= p\frac{dq^{-1}}{dq} \cdot T(p/q)$$
$$= p\left[-q^{-2}\right]\left[T(p/q)\right]$$
$$= -\left(\frac{p}{q^2}\right)\left(T(p/q)\right)$$

Then,

$$U_q = H'(q) - \frac{p}{q^2}T_{(p/q)} = 0 \qquad \text{(A.4)}$$

In this respect, if there is no transaction utility, customers will stop eating when they are full. However, as rearranging (A.4)

$$H'(q) = \frac{p}{q^2}T_{(p/q)} < 0 \qquad \text{(A.5)}$$

if transaction utility exists, $q^* > \tilde{q}$, consumers will continue eating even if they reach the point of fullness. To consider the effect of reference point on the quantity consumed, we totally differentiate the (A.4) with respect to q and r, resulting in

$$\frac{dq^*}{dr} = -\frac{\frac{du_q}{dm}}{\frac{du_q}{dq}} = -\frac{\frac{d}{dm}\left[H'(q) - \frac{p}{q^2}T(p/q)\right]}{\frac{d}{dq}\left[H'(q) - \frac{p}{q^2}T(p/q)\right]}$$

$$= -\frac{\frac{d}{dm}[H'(q)] - \frac{d}{dm}\left[\frac{p}{q^2}T(p/q)\right]}{\frac{d}{dq}[H'(q)] - \frac{d}{dq}\left[\frac{p}{q^2}T(p/q)\right]}$$

$$= \frac{\frac{p}{q^2}T_{(p/q)r}}{H''(q) - \left[\frac{d}{dq}\left(\frac{p}{q^2}\right)\cdot T_{(p/q)} + \frac{d}{dq}\left(T_{(p/q)}\cdot\frac{p}{q^2}\right)\right]}$$

$$= \frac{\frac{p}{q^2}T_{(p/q)r}}{H''(q) - \left[-2pq^{-3}\cdot T_{(p/q)} - \frac{p}{q^2}T_{(p/q)(p/q)}\cdot\frac{p}{q^2}\right]}$$

$$= \frac{\frac{p}{q^2}T_{(p/q)r}}{H''(q) + 2\frac{p}{q^3}T_{(p/q)} + \frac{p^2}{q^4}T_{(p/q)(p/q)}}$$

$$\frac{dq^*}{dr} = \frac{pq^2T_{(p/q)r}}{H''q + 2pqT_{p/q} + p^2T_{(p/q)(p/q)}} \tag{A.6}$$

where $T_{(p/q)(p/q)} < 0,\ Tr > 0,\ T_{(p/q)} < 0,\ T_{(p/q)r} < 0,\ p \text{ and } q > 0$, therefore $\frac{dq^*}{dr} > 0$ or the higher the reference point the consumers set to eat, the more they will eat in an all-you-can-eat buffet.