The Effect of Outliers on Consumer Choice

The Honors Program
Senior Capstone Project
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ABSTRACT

This research investigates the effects of an extreme value (outlier) on a consumer's reference price, and ultimately, the consumer's choice. In a controlled experiment two hundred Bryant University students were presented with a choice task to select a cell phone plan from a set of plans described by price and six other features. Some choice sets contained a moderate outlier, an extreme outlier, or both a moderate and extreme outlier. Students who saw any of the outliers expected to pay an average of $4.40 more and ultimately chose a higher priced plan. However, there was no significant difference between reference price change or plan choice and the type of outlier seen. In addition, even students who recognized that the outlier was an inferior choice were still influenced by its presence in the choice set. The results of the study display two major outcomes useful to marketers. First, consumers will be willing to pay more for a product or will choose a product that costs more, if they see *any* type of outlier when making a choice. Second, irrelevant information is encoded, processed and used in decision making even when consumers recognize that it should not be used.

INTRODUCTION

The American Marketing Association defines consumer decision making as the process by which consumers collect information about choice alternatives and evaluate those alternatives in order to make choices among them. The decision process consists of five steps: need recognition, information search, evaluation of alternatives, purchase and post purchase behavior (Duncan, 2006). This process involves complex cognitive or mental activity, a simple learned response, or an uninvolved and uninformed choice that may even appear to be stochastic or probabilistic. This project focuses on steps three and four, evaluation of alternatives and purchase.

Much research has been conducted in an effort to examine factors that have an influence on consumer's decision making when making a purchase. There are numerous factors that have an effect on consumer choice; five factors that have the most impact are: consumers' level of involvement in the decision, the time available to make the decision, costs of the product or service, the degree of the information search, and the quality and price of alternatives in the consumer's consideration set (Duncan, 2006). This project addresses how this last factor, the quality and prices of products in the consideration set. Specifically, are consumer's choices influenced by non-relevant price information?

This non-relevant price information can be classified as an outlier. An outlier is any extreme value that differs from the norm and lies outside of the overall pattern of a normal distribution (American Marketing Association). This research proposes that the presence of price outliers will have an effect on consumer choice. There are two main categories of price outliers. First, the price of the product may be of high/low quality with a related high/low price for that quality or, the price of the product may not match the quality. This last category can be referred to as an inferior outlier, which is the type of outlier used in this experiment in order to examine reference price change.

A reference price can be defined as, "the price that buyers use to compare the offered price of a product or service" (American Marketing Association). The reference price may be a price last paid, a typical price, a price one expects to pay, or it may be the price of an alternative product. Therefore, a reference price may be internal or external, internal meaning a memory based price

and external meaning a price determined based on observing stimuli (such as a suggested retail price). Reference prices are also highly adaptable depending on the situation. When exposed to new conditions the price that a consumer expects to pay may change. In this research, consumer reference prices will be measured based on their perception of price-quality tradeoffs of various cell phone plans. Additionally, the effect that outliers have on consumer choice of cell phone plans will also be analyzed and interpreted.

Past research has shown that consumer's internal reference prices are not permanent and are adjusted when evaluating products and or services. However, little research has been conducted as to whether or not outliers contribute to the fluctuation of reference prices. We will first examine prior research that has been conducted on the measurement of reference prices as well as consumer price/quality tradeoffs and outliers. We then discuss the hypotheses developed for the experiment as well as the methodology and the survey used for the data collection. We then present the results and discuss implications for future companies and marketers.

LITERATURE REVIEW

Reference Prices

There is currently sufficient evidence from marketing literature to strongly support the reference price concept. A reference price is the price that buyers use to compare the offered price of a product or service. The reference price may be internal, such as a price in a buyer's memory, or it may be external, such as the price of an alternative product, or a price encountered during search. One theory that has been developed is Sherif and Hovland's Assimilation Contrast Theory which says that if a consumer sees a brand's price that is within the latitude of acceptance, the price is assimilated into the range and becomes acceptable. A price that is outside of the acceptable range is not assimilated and therefore becomes noticeable.

Glenn Mayhew and Russell Winer (1992) presented observed comparisons of the impact of internal and external reference prices on brand choice. Internal reference prices as presented, are memory-resident prices based on actual, fair or other price concepts. External reference prices are observed stimuli such as regular prices that stores usually display with a sales price for comparability. The main theory used for this analysis was Adaptation-Level Theory which states

that people adapt to the level of past stimuli and judge new stimuli in comparison with that adapted level. The existence of internal reference prices is motivated by this theory. External reference prices however, are provided by observed stimuli in the purchase environment, much like a suggested retail price.

Yogurt data from a single source was used to examine the hypothesis that both internal and external reference prices affect purchase decisions. To investigate the hypothesis through the use of choice models, variables were created to represent internal and external reference prices. *Preg* was the price of the brand before any discounts, *Pstore* was the price that the store charged for the good, and *Pintref* was the price the consumer would expect to encounter for the brand. When *Pstore* was less than *Pintref*, the consumer perceived a gain relative to the internal reference price. When *Pstore* was greater than *Pintref*, the consumer perceived a loss relative to the internal reference price.

The price variables were statistically significant in the models run based on the yogurt data. Therefore, these results supported the hypothesis that internal and external reference prices do affect purchase decisions. The results also coincided with Adaptation-Level Theory.

Ratman and Bass (1988) concluded that reference prices have a consistent and significant impact on consumer demand. This was supported by tests conducted by the two on their work with aggregate data and statistical models. Lattin and Bucklin (1989) also used a model for measuring and estimating reference points for price and promotional activity and found that reference prices change based upon exposure to new stimuli. The idea that internal reference prices utilize past prices as part of the consumer's information set was supported by Dickson and Sawyer's (1986) test where they asked consumers in a supermarket how much an item cost (after they put it in their cart) and only 47% knew the price. Third, according to the Prospect Theory, consumers react differently to price increases and price decreases relative to the reference price.

There were three major purposes of Ratman and Bass' study. The first was to examine the implications of reference price formation on the results of the traditional theory of consumer choice. The second was to gain information as to the meaning behind reference price induced

behavior, and the third was to provide direction for forming models that incorporate the effects of reference prices. The main theory used in the experiment was the Economic Theory of Consumer Choice. This theory examines the trade-offs and decisions people make in their role as consumers as prices and incomes change.

There were two hypotheses tested. The first was that all marginal gain and loss terms were equal to zero. The second was that reference point formation has no effect on retail demand. These hypotheses were tested via the application of a theoretical model on egg demand in Southern California. The results of the study showed that consumers do experience, and more importantly, do act on perceived gains and loses as a result of comparing an internal reference price with an actual price. This experiment provides support to the aspect of price reference points that we will be measuring, because the reference prices did change based on perceived gains or losses which shows that reference prices are adaptable and do in fact change.

Outliers

It is generally accepted that consumers form internal reference prices about items, and that those standards influence their purchase behavior. However, less information has been collected with regard to whether or not outliers have an effect on a consumer's decision making process. An outlier is a statistical term. It refers to observations in a distribution of data that deviate so much from the other observations as to arouse suspicions that it was generated by the same mechanism and, therefore discarding the outlier observations might be considered (Lozano, 2005). In consumer search it can be considered as a discrepant value that should be ignored for the research process.

In one study, the anchoring effect was tested by researchers Itamar Simonson and Aimee Drolet (2003). The anchoring effect is a process where consumers make estimates by starting from an initial value that is adjusted to yield a final answer. In the study, respondents were shown four products, and were asked to enter the highest (and lowest) price at which they would buy (and sell) the product. The arbitrary anchor was tested by asking respondents to consider the last two digits of their social security number as a possible price. The actual price of the product was the independent variable and the price the respondents would purchase (or sell) the product for was

the dependent variable. The results of this study showed that willingness to purchase judgments are influenced by price anchors.

The most influential study however, was conducted by Michael Kamins, Xavier Dreze and Valerie Folkes (2004). It is agreed that consumers form internal reference prices about items, and that those standards influence their purchase behavior. However, this study questioned if the same would apply in an auction context. In an auction setting, seller supplied reference prices might have little or no impact because other buyers supply pricing cues and those prices are subject to change. The seller supplied reference prices serve as static anchor points regarding the value of that specific item up for sale in a volatile price environment. Also, these reference prices may have less credibility and little influence when consumers have the additional price information that other consumers provide when bidding for an item.

There were three hypotheses in this experiment. The first was that auctions with only a high reserve bid result in higher final prices than do auctions with only a low price signal (minimum bid). The second was that auctions with a reserve price and a minimum bid result in higher final outcomes than those with only a minimum bid, but result in similar final outcomes to those with only a reserve price. The third was that auctions without any seller-supplied price signals attract more bidders and have a higher final outcome than auctions requiring only a minimum bid.

To test these hypotheses, a study was conducted by manipulating the objects for sale and auction conditions for 192 auctions conducted on eBay. The presence or absence of either a minimum bid or a reserve price for an item was manipulated. The auction was also manipulated so that half involved US coins, and the remainder involved foreign coins. The dependent variables were the final price for the item, the number of bidders and number of bids per bidder.

The auctions were placed within the collection subcategory of coins in eBay. The coins were described in identical terms either using weight or count. The following week's auction involved identical lots except that poundage and count were doubled. Hence, within a given experimental design, eight different auctions could be held. Weekly, the experimental conditions were randomized. To arrive at a realistic minimum bid and reserve price, 20 pretest auctions were

held without a reserve or minimum bid. Ten were conducted with only domestic coins, and ten were conducted with foreign coins. The results were then used to set minimum and reserve prices.

Results indicated that seller-supplied reference prices do influence final price of an item. Hypotheses one, two and three were all supported. When a seller specified a higher external reference price, the final bid was greater than when the seller specified a low external reference price. When both high and low reference prices were provided, the external influenced the bid more.

HYPOTHESES

Reference Prices

While consumer's use internal reference prices to determine what they will ultimately pay, those prices are not "set in stone" and can vary. One influence on internal reference prices is externally supplied reference prices. Adaptation Level Theory suggests the mechanism by which internal reference prices would be influenced by external reference prices. Thus, although an outlier notably should be ignored, Adaptation Level Theory suggests that it won't be ignored and that it will influence the consumer's reference price. Therefore, our first hypothesis is:

> H1a: Consumers' price reference points will change more if they are exposed to outlier alternatives than if they see no outliers.
>
> H1b: Consumers' price reference points will change more if they are exposed to extreme outlier alternatives than if they are exposed to moderate outlier alternatives.
>
> H1c: Consumers' price reference points will change more if they are exposed to both moderate and extreme outlier alternatives than if they are exposed to only one.

Consumer Choice

Past research suggests that reference prices do have an effect on choice. To the extent that outliers influence reference prices, then outliers will also have an effect on consumer choice. Therefore our second hypothesis is:

H2a: Consumers' chosen alternative will be of higher price if they are exposed to outliers than if they see no outliers.

H2b: Consumers' chosen alternative will be of higher price if they are exposed to extreme outlier alternatives than if they are exposed to moderate outlier alternatives.

H2c: Consumers' chosen alternative will be of higher price if they are exposed to both moderate and extreme outlier alternatives than if they are exposed to only one.

METHODOLOGY

In order to test the hypotheses, an experiment was conducted with Bryant students through the distribution of a survey. The primary task was for respondents to select a cell phone plan from a list. Cell phone plans were chosen as the product for reference price measurement for several reasons. First, preliminary studies indicated that many students were somewhat familiar with, as well as interested in cell phone plans and most students have cell phones or have been exposed to cell phone plans at some point in time. Additionally, much data was available via the Internet which served as a reference for cell phone plans currently available for purchase as well as their respective features and prices. Finally, these preliminary studies indicated that choosing a cell phone plan is a task they can relate to and are somewhat knowledgeable about.

Instrument

After cell phone plans was selected for the domain of the experiment, data was collected on current cell phone plans available in the market. Research was conducted via the Internet, specifically from Consumer Reports available online. This allowed for the development of a grid of six cell phone plans (named Plan A through F) with seven associated features. The features chosen were: monthly fee, length of contract, number of minutes included, text messaging availability, activation fee, termination fee, and the cost for additional minutes. These seven features were chosen because results of the pretest showed that they were the most important features students look for in a cell phone plan.

In addition to the original six plans in the grid, two other plans were developed to serve as outlier conditions. These outliers differed both in price and quality from the other six plans. Additionally, this difference was of mismatch quality, meaning that that price for the outliers did not match the quality of the features available with it. Higher priced plans with sub-par features

for the cost served as the outliers. The price for each of the outliers was determined by results of the pretest. In the pretest, students were asked what they would expect to pay for both a low-end and a high-end plan. As the table below shows, the average that students would expect to pay for a low-end plan is $35.43 and the price they expect to pay for a high-end plan is $82.57.

	N	Min	Max	Mean	Std. Deviation
Low end fee	35	10	80	35.43	16.377
High end fee	35	40	200	82.57	33.789
Valid N	35				

Figure 1 - Expected Monthly Fees: Pretest Results

Because the price of $99.99 for the moderate outlier is $17.42 higher than what students said they would pay for a high-end cell phone plan, $99.99 was deemed fit for a moderate outlier. In addition, this price of $82.57 is $67.42 less than the price of $149.99 set for the extreme outlier; which is roughly three times larger than the difference between what students would pay for a high-end plan and the price of $99.99 for the moderate outlier. Therefore, $149.99 was deemed appropriate for an extreme outlier.

Three additional grids were developed for the three outlier conditions: moderate outlier, extreme outlier and both outliers. Students were randomly assigned to an outlier condition and saw only the grid for that condition. The survey was split into three parts. In the first part, students were asked two questions regarding cell phone plans, how much they knew about cell phone plans and to provide a fee for both a low-end and a high-end cell phone plan. The additional grids contained the same six original cell phone plans; however each also contained an outlier in it. In the first grid a moderate outlier was added and named Plan G. In the second, an extreme outlier was added and named Plan H; and in the third both the moderate and the extreme outliers were added. All of the plans can be seen in the grid below, which is the grid for the two outlier conditions. The no outlier condition contained plans A through F, the moderate outlier condition contained plans A through G, and the extreme outlier condition contained plans A through F and H.

Plan	Monthly Fee	Length of Contract	Number of Minutes Included	Text Messaging	Activation Fee	Termination Fee	Cost per additional minute
A	29.99	1 yr	200	$.15	$25	$100	$0.45
B	39.99	1 yr	450	$.10	$25	$150	$0.40
C	45.99	1 yr	600	$.10	$45	$150	$0.45
D	49.99	2 yr	650	$.05	$25	$200	$0.35
E	55.99	1.5 yr	800	unlimited	$50	$200	$0.30
F	69.99	2 yr	1000	unlimited	$50	$250	$0.35
G	99.99	3 yrs	700	$.10	$70	$300	$0.45
H	149.99	4 yrs	800	$.10	$90	$300	$0.45

Figure 2 – Both Outlier Conditions

In the second part of the survey, students were provided with a fictional scenario and asked what they would expect to pay for a cell phone plan in that particular situation. The same situation was used in the pretest followed by a question that asked students if they found the scenario plausible. 79% of students said that they did in fact find the scenario plausible; therefore, it was used in the final surveys. The scenario was:

> Mom and Dad are dissatisfied with their current cell phone plan and have asked you to choose a new one. They are concerned about the quality and price and want to make sure that the best plan is chosen. Mom and Dad have told you that if you pick a satisfactory plan with the best value, they will reward you; however, only after they have determined if the plan is the best.

Next, students were provided with a list of seven features for cell phone plans and asked which two were the most important for them when purchasing a cell phone plan. On the second page of the survey the grid was displayed and students were asked to choose which plan they would recommend to their parents. Next, students were asked to explain why they chose the plan they did, what they thought about the overall prices and plans in the grid, and what they would now expect to pay for a cell phone plan. Finally, students were asked to provide some demographic information; specifically, gender, major, and year in school. A copy of the survey can be seen in Appendix A.

Procedure

Prior to distributing the survey to the designated sample of Bryant students, it was pre-tested with forty-three students in two sections of Professor Carol DeMoranville's Foundations of Marketing class. After obtaining and analyzing the results of the pretest, the final survey was edited and distributed to students in a variety of classes at Bryant University.

Because it was critical to obtain data from students with different majors as well as students representative of each class, the surveys were distributed in both business core and liberal arts classes. Five Bryant University professors were contacted and upon agreement, distributed surveys in their classes. The five professors who aided in the distribution of surveys in their classes were: Martha Kuhlman in her Introduction to Cultural Studies class, Alan Olinsky in both his Multivariate Statistics and Statistics II classes, Alexandra Rodriguez in her Consumer Behavior classes, Hakan Saraoglu in his Finance class, and John Visich in his Global Management classes. After the data was collected, it was coded and tabulated in preparation for analysis with SPSS software.

Before each survey was administered, each potential respondent was asked whether or not they would mind filling out a survey. If the respondent said that they did not want to participate, did not complete the survey. If potential respondents said they would fill out a survey, they were told that the survey was for an Honor's Program student's Capstone Honors Project, and that results were confidential. The respondents were not told the purpose of the study because it may have biased. However deception was not used to gain information from the respondent. When the respondents filled out the surveys, they were given privacy, ample time to complete the survey, and were not asked to provide their names. When a respondent completed his or her survey, his or her responses were not immediately read, but were numbered and separated by the class they were administered in. This procedure resulted in 201 usable surveys.

RESULTS

Characteristics of Sample

As the chart below shows, the sample was taken from students in five different classes at Bryant. This sample consisted of 201 Bryant students, 51% which were female and 49% which were

male. Within that sample, 22% of students were freshmen, 31% were sophomores, 29% were juniors and 18% were seniors (as can be seen in Appendix B). The sample also consisted of students from a variety of majors.

Class Distributed In		Frequency	Valid Percent
Valid	Management	38	18.9
	Stats II	22	10.9
	Consumer Behavior	62	30.8
	Intro to Cultural Studies	44	21.9
	Multivariate Stats	35	17.4
	Total	201	100.0
Missing	System	2	
Total		203	

Figure 3 – Survey Distribution

There were too many different majors for a reliable chi-square analysis, so majors were collapsed into four categories: Business Quantitative, Non-Business Quantitative, Liberal Arts and Sciences, or Undecided. The nature of the choice task may have made it easier for students with quantitative backgrounds. Therefore it was imperative to distinguish those with quantitative backgrounds such as Finance, Accounting or Actuarial Mathematics from those with non-quantitative backgrounds such as Marketing, Management or International Business. The chart below shows the number and percentages of students based on their major:

		Frequency	Percent	Valid Percent
Valid	Business Quantitative	62	30.5	30.8
	Business Non Quantitative	96	47.3	47.8
	Arts and Sciences	28	13.8	13.9
	Undecided	15	7.4	7.5
	Total	201	99.0	100.0

Figure 4 – Major Re-coded

Initial Analysis

We first examined whether demographics influenced choice. Chi-square tests were conducted to see if the nominal variables gender, major and year in school had an effect on which cell phone

plan was chosen. In the analysis, cell phone plan choice served as the dependent variable. Gender, major and year in school served as the independent variables. The table below summarizes the chi-square output from SPSS testing the relationship between gender, major, year in school and cell phone plan choice:

Variable	**Chi Square- Pearson's Significant**
Gender	**0.59**
Major	**0.13**
Year in School	**0.99**

Figure 5 - Significance Values for Demographics

Pearson's Chi-Square significance of 0.59 indicates that gender did not significantly influence cell phone plan choice since it was not significant at an alpha level of 0.10. Because chi-square analyses for year in school as well as major had large percentages of data counts less than five per cell, data needed to be recoded. In the sample, few students chose the lower price plans, plans A B and C. As seen in Appendix C, 2.5% of students chose Plan A, 12% chose Plan B and 5% chose Plan C therefore; those three plans were collapsed into one category of "Low price plans". Using the collapsed choice variable, neither major ($p = 0.13$) or year in school ($p = 0.99$) had a significant effect on plan choice.

Reference Prices

Hypothesis one predicted that the price that consumers expect to pay for a cell phone plan will change based on seeing an outlier. To test this hypothesis, an independent sample-t test was conducted, between those who saw no outliers (Grid 1) and those who did see an outlier (Grids 2, 3 and 4). The dependent variable was the difference in price change. Students who saw no outlier had a difference of $0.12 between their initial expected price and the post-task expected price. Students who saw any type of outlier had a difference of $4.40 between the pre-task and post-task expected prices; this data can be seen in Appendix D. With a significance of 0.061, (as seen in Appendix E) the t-test for equality of means indicated that this difference was statistically

significant. Thus, hypothesis one is supported. The price that consumers expect to pay for a cell phone plan will increase more if they see an outlier.

H1b predicted that if a consumer sees an extreme outlier, the change in reference price will be more pronounced. This was tested with another independent sample t-test, except in this case, the grid with moderate outliers (Grid 2) was tested against the grid with the extreme outlier (Grid 3). The dependent variable as in the prior test, was the difference between prices students were willing to pay before and after the choice task. With a significance of 0.53 (as seen in Appendix F), the t-test for equality of means shows the difference was not significant. Therefore there was not a significant difference in reference price change between those who saw a moderate outlier and those who saw an extreme outlier. Thus H1b is not supported.

H1c predicted that seeing *both* a moderate and an extreme outlier will have the most pronounced effect on reference price change. This was tested with an ANOVA (analysis of variance) test. In this test, the grids with outliers (Grids 2, 3, and 4) were used as the independent variable. The dependent variable again, was the difference in price change. With a significance of 0.75 the ANOVA test was *not* significant at an alpha level of 0.10. Therefore, there was not a significant difference in reference price change between those who saw two outliers and those who saw only one. Those who saw two outliers were not likely to pay more for a cell phone plan. This data can be seen Appendix G. Thus, H1c was not supported.

<u>Plan Choice</u>

Hypothesis 2a predicted that consumer choice will be affected by seeing an outlier. To test this hypothesis a Chi Square Analysis was conducted to determine whether or not plan choice was affected by seeing an outlier. Because very few respondents chose either Plan A or Plan C we collapsed the three lower priced plans (A, B and C) into one category. Thus the choice variable had four categories: ABC, D, E, and F. The outlier variable had two categories: outlier or no outlier. Pearson's Chi Square significance of 0.06 was significant at the 0.10 alpha level (as seen in Appendix H). Therefore, H2a was supported; seeing an outlier during evaluation does influence consumer choice.

As seen below, when no outlier was seen 31.4% of students chose plans A, B of C. However, for those who saw a moderate, extreme or both outliers, only 16.3%, 12.5% and 17.8% chose those plans. The percentages of students who chose each of the plans *were* relatively similar between those who saw a moderate outlier and those who saw an extreme outlier. However, students who saw both outliers were much more likely to choose Plan F (24.4%) which was the highest priced non-outlier plan.

Plans			Grid Form				Total
			No Outliers	Moderate Outlier	Extreme Outlier	Both Outliers	No Outliers
	ABC	Count	16	8	7	8	39
		% within Grid Form	31.4%	16.3%	12.5%	17.8%	19.4%
	D	Count	8	7	9	5	29
		% within Grid Form	15.7%	14.3%	16.1%	11.1%	14.4%
	E	Count	23	29	35	21	108
		% within Grid Form	45.1%	59.2%	62.5%	46.7%	53.7%
	F	Count	4	5	5	11	25
		% within Grid Form	7.8%	10.2%	8.9%	24.4%	12.4%
Total		Count	51	49	56	45	201
		% within Grid Form	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 6 – Plan Choice and Outlier Condition

H2b predicted that if a consumer sees an extreme outlier, the affect on consumer choice will be greater. This was tested with another Chi Square analysis, where the dependent variable was plan choice and the independent variable was Grid 2 (moderate outlier) versus Grid 3 (extreme outlier). Pearson's Chi Square significance of 0.937 was not significant at an alpha level of 0.10 (as seen in Appendix I). Therefore, the effect on plan choice was not greater when an extreme outlier was seen and H2b was not supported.

H2c predicted that, seeing both a moderate and an extreme outlier will have the most profound effect on consumer choice. This was tested with another Chi Square analysis, where the dependent variable was plan choice and the independent variable was Grid 2, Grid 3 and Grid 4. Pearson's Chi Square significance of 0.306 was not significant at an alpha level of 0.10 (As seen

in Appendix J). Therefore, according to *chi-square* analysis, H2c was not supported. The effect on plan choice was not the most profound when a student saw both a moderate and an extreme outlier and the second expected outcome also did not occur.

Additional Analysis

Because the outliers were inferior outliers in that the high price was accompanied by low quality, there was a chance for students to notice them and comment on them; and in fact, many did. Out of the entire sample of two hundred students roughly fifty-four (27%) specifically noted that plans G and H were poor choices (eg: outliers). This was interpreted through analysis of questions seven and eight on the survey. These questions asked students what they thought of both the prices and the features available in the grid they saw. In some cases, students were very straightforward saying that prices seemed reasonable except for Plan H. If that occurred, that student was identified as recognizing an outlier. If there were any discrepancies or possible outlier recognition was not apparent, that student was excluded from the analysis.

The table below is a breakdown of students in each outlier condition who were able to identify an outlier. The percentages shown represent those students who chose either plans E or F, the two highest priced, non-outlier plans. To exemplify, of those students who saw an extreme outlier and recognized the outlier, 73% still chose Plan E or Plan F.

	Yes (explicitly recognized an outlier)	**No (did not recognize an outlier)**
Moderate Outlier	50%	76%
Extreme Outlier	73%	69%
Both Outliers	70%	72%

Figure 7 – Outlier Recognition vs. No Outlier Recognition

As the results show (with exclusion of moderate outliers) students who were able to recognize an outlier were just as likely to choose a higher priced plan that those who did not recognize an outlier. While the numbers for students who recognized outliers only equate to roughly 27% of the entire sample the results are very informative in that even students who knew they were seeing outliers chose a higher priced plan.

IMPLICATIONS

The effects predicted by Adaptation Level Theory were supported for reference price change. It appears that consumers do use past experiences and current information when determining what they would expect to pay for a product or service. These reference prices ultimately influence what a consumer decides to purchase. Those students who observed either a moderate, extreme or both a moderate and extreme outlier raised the price that they would expect to pay for a cell phone plan by an average of $4.40. In addition, that reference price ultimately affected the consumer's choice of cell phone plan to that to one of a higher price. While both reference price and plan choice were affected by seeing an outlier, there was no significant effect based on type of outlier seen (moderate or extreme) or number of outliers seen (either one or two).

The results of this study have some important news and insights for marketers whose buyers come into contact with an extreme value (in either price or features). It is assumed that a buyer evaluates several options when deciding on which product they want to purchase and the associated prices of those products. However, when an outlier is seen, consumers may think about purchasing other products that were not originally in their consideration set. Thus, the consumer who sees an outlier with an extremely high price may consider purchasing a product that costs more than he or she was initially planning on paying. The findings of this study suggest that this does, in fact, occur. Thus, in business-to-business and business-to-consumer selling, companies and salespeople can generate more revenue by showing the buyer extreme, high priced products that are outside the buyer's price range. While the buyer may not necessarily choose the outlier, research suggests that he or she will choose a product that is at the higher end of his or her budget.

A second important issue for marketers is that consumers encode and process information even when it is irrelevant. In this study, the outliers were inferior outliers, that is, they consisted of poor quality features and a high associated price. In all actuality, these outliers should have served as erroneous information to the students and in a perfect world students would have realized that they should ignore those outliers during the choice task. However this was not the case; students' choices were influenced by seeing an outlier even when they recognized and stated the outlier was an inferior choice. In addition, there was no significant difference in both

plan choice and reference price change between those who saw a moderate outlier and those who saw an extreme outlier.

This knowledge is rather concerning for consumers' welfare because it reveals that even seeing a moderate outlier that is not so obvious may increase the amount of money a consumer is willing to spend and will actually spend on a product. Yet for marketers, the benefit is that it may not take a great deal of effort to get consumers to spend more money because consumers are often not aware that they are being influenced and, those who are aware, *are still* influenced. Future research could explore whether the *order* in which outliers are seen has an effect on reference price change as well as product choice. In addition, future research could examine if a low priced product with poor quality would decrease the price a consumer is willing to pay as well as their product choice.

Limitations in this study included that the sample size was smaller than it could have been if more time was available. The sample of solely Bryant students was only representative of a small portion of the entire population of consumers and therefore results may not be able to be generalized over an entire population. Therefore, should similar research be conducted, a larger sample should be accounted for.

While it understood that there are numerous factors that may affect what a consumer is willing to pay for a product as well as what they ultimately choose, it can be confidently stated that outliers *do* have an effect on both of these variables. Holding all of these internal and external factors constant, consumers will be willing to pay more for a product or will choose a product that costs more, if they see *any* type of outliers. This can allow marketers to place products strategically so that consumers are forced to come in contact with outliers. While chilling for consumers, this will greatly benefit marketers. Consumers should therefore think, "Am I really going to pay more for this?" before making a purchase.

APPENDICIES

Appendix A – Both Outlier Conditions Survey

CELL PHONE PLANS

We are interested in your opinions about cell phone plans. Please answer each of the following questions to the best of your ability. There are no right or wrong answers, we are just interested in what you think.

1. In general, how familiar are you about cell phone plans, features and rates?

   ❒ I know nothing ❒ I know very little
   ❒ I know a moderate amount ❒ I know a lot

2. Based on your knowledge, what is the typical range of monthly fees for cell phone plans?

   Low end fee_____ High end fee_____

* * *

Now we are going to ask you questions about cell phone plans. Please answer as if you were in this scenario:

Mom and Dad are dissatisfied with their current cell phone plan and have asked you to choose a new one. They are concerned about the quality and price and want to make sure that the best plan is chosen. Mom and Dad have told you that if you pick a satisfactory plan with the best value, they will reward you; however, only after they have determined if the plan is the best.

3. About how much money per month would you expect to pay for the cell phone plan that your parents asked you to select? _____

4. Of the features in the following list, which **two** are the most critical for you when purchasing a cell phone plan? (Please check only 2)

   ❒ Price
   ❒ Length of contract
   ❒ Number of minutes
   ❒ Text message availability
   ❒ Activation fee
   ❒ Early termination fee
   ❒ Other _____

* * *

Plan	Monthly Fee	Length of Contract	Number of Minutes Included	Text Messaging	Activation Fee	Termination Fee	Cost per additional minute
A	29.99	1 yr	200	$.15	$25	$100	$0.45
B	39.99	1 yr	450	$.10	$25	$150	$0.40
C	45.99	1 yr	600	$.10	$45	$150	$0.45
D	49.99	2 yr	650	$.05	$25	$200	$0.35
E	55.99	1.5 yr	800	unlimited	$50	$200	$0.30
F	69.99	2 yr	1000	unlimited	$50	$250	$0.35
G	99.99	3 yrs	700	$.10	$70	$300	$0.45
H	149.99	4 yrs	800	$.10	$90	$300	$0.45

Your search for cell phone plan information resulted in the plans shown above:

5. Which of the plans would you recommend to your parents?_____

6. Please explain why you chose that plan:
_____
_____
_____

7. What do you think of the features of these plans?
_____
_____
_____

8. What do you think of the prices of these plans?
_____
_____
_____

9. If you had to actually choose a new cell phone plan, about how much money per month would you expect to pay? _____

* * *

The following questions are for classification purposes only

10. Gender: ❒ Male ❒ Female
11. What year are you? ❒ Freshman ❒ Sophomore ❒ Junior ❒ Senior
12. What is your major? _____

Appendix B- Sample Characteristics

		Frequency	Valid Percent
Valid	Male	99	49.3
	Female	102	50.7
	Total	201	100.0
Missing	System	2	
Total		203	

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Freshman	44	21.7	21.9	21.9
	Sophomore	63	31.0	31.3	53.2
	Junior	59	29.1	29.4	82.6
	Senior	35	17.2	17.4	100.0
	Total	201	99.0	100.0	
Missing	System	2	1.0		
Total		203	100.0		

Appendix C- Plan Choice

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Plan A-$29.99	5	2.5	2.5	2.5
	Plan B-$39.99	24	11.8	11.9	14.4
	Plan C-$45.99	10	4.9	5.0	19.4
	Plan D-$49.99	29	14.3	14.4	33.8
	Plan E-$55.99	108	53.2	53.7	87.6
	Plan F-$69.99	25	12.3	12.4	100.0
	Total	201	99.0	100.0	
Missing	System	2	1.0		
Total		203	100.0		

Appendix D- Reference Price Change

Grid Seen	Mean
No Outlier	**0.12**
Outlier	**4.40**

Appendix E- SPSS Output for H1a

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
Difference between initial and final	Equal variances assumed	10.757	.001	-1.585	196	.114	-4.519	2.850	-10.140	1.102
	Equal variances not assumed			-1.891	121.982	.061	-4.519	2.390	-9.250	.213

Appendix F- SPSS Output for H1b

	Grid Form	N	Mean	Std. Deviation	Std. Error Mean
Difference between initial and final	Moderate Outliers	49	-2.76	21.116	3.017
	Extreme Outlier	55	-5.20	19.143	2.581

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
Difference between initial and final	Equal variances assumed	.030	.863	.619	102	.537	2.445	3.948	-5.385	10.275
	Equal variances not assumed			.616	97.541	.539	2.445	3.970	-5.434	10.324

Appendix G- SPSS Output for H1c

Grid	**Mean**
Moderate Outlier	**2.76**
Extreme Outlier	**5.20**
Both Outliers	**5.23**

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	197.891	2	98.946	.281	.756
Within Groups	51089.588	145	352.342		
Total	51287.480	147			

Appendix H- SPSS Output for H2a

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.229(a)	3	.065
Likelihood Ratio	6.887	3	.076
Linear-by-Linear Association	7.166	1	.007
N of Valid Cases	201		

a 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.34.

			1 vs 2,3,4		Total
			No Outlier	Any Outlier	No Outlier
ABC_D_E_F	1.00	Count	16	23	39
		% within 1 vs 2,3,4	31.4%	15.3%	19.4%
	4.00	Count	8	21	29
		% within 1 vs 2,3,4	15.7%	14.0%	14.4%
	5.00	Count	23	85	108
		% within 1 vs 2,3,4	45.1%	56.7%	53.7%
	6.00	Count	4	21	25
		% within 1 vs 2,3,4	7.8%	14.0%	12.4%
Total		Count	51	150	201
		% within 1 vs 2,3,4	100.0%	100.0%	100.0%

Appendix I- SPSS Output for H2b

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.414(a)	3	.937
Likelihood Ratio	.414	3	.937
Linear-by-Linear Association	.182	1	.670
N of Valid Cases	105		

a 1 cells (12.5%) have expected count less than 5. The minimum expected count is 4.67.

			Grid Form		Total
			Moderate Outliers	Extreme Outlier	Moderate Outliers
ABC_D_E_F	1.00	Count	8	7	15
		% within Grid Form	16.3%	12.5%	14.3%
	4.00	Count	7	9	16
		% within Grid Form	14.3%	16.1%	15.2%
	5.00	Count	29	35	64
		% within Grid Form	59.2%	62.5%	61.0%
	6.00	Count	5	5	10
		% within Grid Form	10.2%	8.9%	9.5%
Total		Count	49	56	105
		% within Grid Form	100.0%	100.0%	100.0%

Appendix J- SPSS Output for H2c

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.167(a)	6	.306
Likelihood Ratio	6.792	6	.341
Linear-by-Linear Association	.138	1	.710
N of Valid Cases	150		

a 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.30.

			Grid Form			Total
			Moderate Outliers	Extreme Outlier	Both Outliers	Moderate Outliers
ABC_D_E_F	1.00	Count	8	7	8	23
		% within Grid Form	16.3%	12.5%	17.8%	15.3%
	4.00	Count	7	9	5	21
		% within Grid Form	14.3%	16.1%	11.1%	14.0%
	5.00	Count	29	35	21	85
		% within Grid Form	59.2%	62.5%	46.7%	56.7%
	6.00	Count	5	5	11	21
		% within Grid Form	10.2%	8.9%	24.4%	14.0%
Total		Count	49	56	45	150
		% within Grid Form	100.0%	100.0%	100.0%	100.0%

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