A STUDY OF THE IMPACTS OF CUSTOMIZATION ON CONSUMER BEHAVIOR,

PREFERENCES, AND WILLINGNESS TO PAY

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by

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ABSTRACT

With the growing importance of eCommerce and its influence on consumer preferences, companies have created value for consumers by offering online customization of their products. Traditional economic theory poses that consumers gain utility from the functional benefits of goods and services. This paper investigates the concept of non-functional utility, in the frame of product customization.

The authors test if the act of customizing a product creates additional value for the consumer when the customization does not add functional utility to the product. This was measured in two different ways, through a trivial and non-functional customization of a mug, and non-functional customization of a premium automotive vehicle online, to simulate real-world consumer choice behavior. Utility was quantified by the effects on willingness to pay, after non-functional changes were made.

The purpose of this study is to uncover new ways companies can serve their customers and create the most value in their products and increase firm profits.

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Alexandra graduated from Franklin and Marshall College in Lancaster, Pennsylvania with a B.A. in Economics, and a minor in Anthropology. Prior to earning her M.P.S. in Applied Economics and Management with a concentration in Applied Behavioral Economics and Individual Choice and Behavioral Marketing at Cornell University, she worked in advertising and marketing strategy.

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ACKNOWLEDGMENTS

TABLE OF CONTENTS

Introduction

Do consumers want something more if they have made it their own? Is there a measurable monetary value consumers subconsciously place on the act of customization? We studied the effects of product customization on consumer preferences and Willingness to Pay (WTP) to find out.

With the growing importance of eCommerce and its influence on consumer preferences, companies have created value for consumers by offering online customization of their products. For example, a consumer can design Nike shoes online to reflect their preferences, and consequently pay much more for the custom design. This practice of online customization is also seen widely in the automotive industry, with online car builders on a brand's website that allow consumers to build their ideal car before purchasing it. We are interested in studying the consumer behavior that drives the value created by customizing a product. Traditional economic theory suggests that a person will value a product based on the functional utility it will give them (Franke, Keinz & Steger, 2009). We want to see if there is any non-functional value created by the act of customization, leading to a higher rate of purchase and WTP.

There are many applications of such research, especially as the ecosphere of a consumer's goods continues to become more and more tailored to individual preferences and customized products begin to become expected as the norm. Armed with this research, companies can learn how to best serve their customers and create the most value in their products and increase the firm's profits. Additional implications that inform innovative product development could be gleaned, as well.

1

Background

        In this research, we studied if the act of customizing a product creates additional value for the consumer when the customization does not add functional utility to the product. This will be measured in two different ways, through a trivial and non-functional customization of a mug, and a more salient but still non-functional customization of a premium automotive vehicle online, to simulate real-world consumer choice behavior.

Purpose

        The purpose is to gain insights into irrational consumer behavior by applying insights from Behavioral Economics to our research question. Traditional economic theory poses that consumers gain utility from the functional benefits of goods and services (Franke, Keinz & Steger, 2009). However, we theorize that consumers also place emotional value on their own actions, in making an item reflect themselves (Robison and Siles, 2000). We aim to test if a very small, non-functional change affects willingness to pay, and if more involved customization affects willingness to pay for a similar product.

Research Assumptions

        In conducting this research we are assuming that our sample of study participants is generally representative of the population of US consumers. We also assume that participants have no knowledge of the research hypotheses and answer/behave truthfully. The auction phase of the study is designed to be incentive-compatible in order to achieve truthful revelation of preferences (Davis & Holt, 1993).

Research Hypotheses

We hypothesize that customizing a product increases a consumer's willingness to pay for a product. A person who has the option to "customize" a mug, by choosing which side of the mug they would like the handle to be twisted to, will pay more for the mug than someone who is not given the choice.

Literature Review

Past research in customization has explained the additional value of customization to consumers in terms of creating a closer fit for consumer needs or desires (Franke, Keinz & Steger, 2009). This is what we have referred to as the functional utility explanation of the value of customization. Few studies, however, have investigated other potential factors that can affect consumers' willingness to pay for a customized product.

According to Atakan, Bagozzi, and Yoon (2014), the form of the customization activities and the type of control consumers have over the products often vary between the design and realization stages. In the design stage, consumers engage in activities that require them to create, choose, or specify the form, layout, colors, and so on. They conclude that consumers normally gain greater satisfaction when they physically invest themselves in the product during the realization stage. During the design stage, consumers form a cognitive bond with the product, when they are able to manipulate the product to symbolize their self-identity (Atakan, Bagozzi & Yoon, 2014). That conclusion forms the basis of our hypothesis: that an individual will value a good more highly if they are involved in customizing the good even if it does not offer any particular functional advantage. Even non-functional customization can lead to a form of ownership over the good, creating value much like the endowment effect (Kahneman, Knetsch & Thaler, 1991).

Additionally, Norton Machong and Ariely's (2012) "IKEA effect" also supports the notion that non-functional change affects consumers' willingness to pay. In their explanation, the "IKEA effect" refers to the increase in valuation of self-made products. Participants saw their amateurish creations - of both utilitarian and hedonic products – as similar in value to the creations of experts, and expected others to share their opinions. They conducted several experiments to show that labor increases valuation of completed products not just for consumers who profess an interest in "do-it-yourself" projects, but even for those who are relatively uninterested (Norton, Mochonb & Ariely, 2012).

In addition to the retailing industry, technology companies also employ customization to enhance profits. In the 2017 annual report of Boston Consulting Group, Abraham, Mithelmore and Collins (2017) take leading e-commerce players such as Amazon and Alibaba as examples to show how they use customer data to continually tailor interactions and create powerful feedback loops. While some of this customization is passive and purely functional, customers also have the opportunity to make some direct changes to how they interact with the sites. In the example of Alibaba, the company offers personalized search results, products recommendations, payment app, and so on. Abraham demonstrates the power of engaging consumers one-on-one to build enduring—and self-reinforcing— relationships (Abraham, Mitchelmore & Collins , 2017). Thus customization can be thought of as a way to build the relationship between customers and producers.

In the paper "Contingent Response to Self-Customization Procedures: Implications for Decision Satisfaction and Choice", Valenzuela, Dhar and Zettelmeyer (2009) define self-customization as the process by which consumers seek to customize offerings to their own preferences. He proposes that differences in self-customization procedures potentially influence

(1) the product configuration favored, (2) the degree of decision difficulty in product customization, (3) the degree of satisfaction with the customized option, and (4) the degree of willingness to purchase. They cite several studies that allow self-customization through the use of either a by-attribute or by-alternative (selecting among alternative package) method. They show that consumers tend to choose an intermediate (compromise) option significantly more often when they customize a product using the by-attribute method than when using the by-alternative method (Valenzuela, Dhar & Zettelmeyer, 2009). In our research we focus exclusively on the by-attribute method to look at what factors impact customers' WTP for customized goods.

In addition to the decision satisfaction from customization, Coelho and Henseler (2012) discusses the creation of customer loyalty from customization. He argues that customization increases perceived service quality, customer satisfaction, customer trust, and ultimately customer loyalty toward a service provider. Customization has both direct and mediated effects on customer loyalty and interacts with the effects of customer satisfaction and customer trust on loyalty (Coelho & Henseler, 2012). In what follows, we will build upon this literature by testing specifically for an increased willingness to pay for non-functional customization of products.

Study Design

Lab Experiment

In Phase 1, participants will be randomly assigned to the treatment and control groups. This randomization will be done through the Qualtrics software. The treatment group will be asked to customize a hypothetical car displayed on their computer screen. They will decide on

aesthetic elements of the car they are designing by clicking on buttons for the options they choose (car color, leather, wheel design, and interior trim). Participants not selected for the treatment will go through the survey and will be able to look through the same images but will not have the option to customize the car. An example of the survey is attached.

In Phase 2, participants will be asked to participate in a 12th price auction for a mug. The auction mechanism will be explained and demonstrated with several examples. In this auction the 11 highest bids will receive the mug at a price equal to the 12th highest bid. This mechanism is used because it has been demonstrated to reveal valuation (Davis & Holt, 1993). The treatment group will have the option to choose if they want to receive the mug with the handle on the right or the left. This change will be executed by the researchers when the mugs are presented to the participants. This customization is clearly non-functional as the mug may be rotated with almost no effort once delivered, and the participant will not be using the mug at the time of delivery. The control group will participate in the same auction but will not be given the option to choose the side of the handle on their survey. Each participant was endowed with $30 they could use for the auction, retaining any money not used to pay for the mug. An example of the survey is attached.

In Phase 3, the survey will show all participants an image of the base-model of the car from Phase 1. They will be told the price of the base-model and asked how much they are willing to pay for a customized version of that car. Demographic and behavioral information will be collected in this survey, as well. An example of the survey is attached.

Online Survey

In order to increase the sample size for the car study, surveys from Phase 1 and 3 were duplicated and conducted online through Amazon Mechanical Turk (Mturk). Several changes

were made to remove brand logos from car images to account for potential biases based upon brand. Additionally, in Phase 3 participants were asked how much they believe the base model of the vehicle is worth and how much in total they were willing to pay for the customized car in order to make seamless comparisons in WTP. A total of 400 observations were collected and analyzed.

Methodology

In this section a discussion of the sample, and the analytical procedure of a study designed to test the research hypothesis are presented and discussed.

The Sample

A total of 96 persons joined our mug experiment. Participants were recruited from an email list of those interested in participating in economic experiments. The list includes a mix of students and staff at Cornell University. Of the 96, 48 people in the test group, and the remaining people in the control group. They were asked to enter their WTP during the experiment.

A total of 400 completed questionnaires were collected for the car survey administered on MTurk. The data were collected via online surveys throughout the United States. Half of them are in the test group, and they were asked to customize their cars. The other people in the control group were not asked to customize. They all were asked to enter their demographic information, behavioral questions, and WTP for the car. The goal of the surveys were to capture individual choices under different circumstances, including whether they want to customize, whether they buy their car from a dealership, whether they search online before buying a car and so on.

Analysis

As noted previously, the research investigates the hypothesis that a person who has the option to "customize" a mug, by choosing which side of the mug they would like the handle to be twisted to, will pay more for the mug than someone who is not given the choice. For purposes of the current research, we test our hypothesis to discover the relationship between customization and WTP.

Our test of whether non-functional customization truly motivates customers to pay more for products in our mug experiment is described as follows. Due to the exploratory nature of our experiment, we use an independent sample t-test to analyze data in control and treatment groups respectively. Comparing the values of the means from two groups, we test whether people in our customization groups have a higher WTP. If the mean value for WTP in test group is statistically significantly higher than the mean WTP for the control group, we can see customization truly impacts customers' expectation and behaviors.

In order to test our hypothesis using the car surveys, we believe that it is reasonable to assert that multiple factors impact customers' WTP. We test including covariates of greatest theoretical importance. The regression equation is shown below:

The fitting the regression equation shown below:

$$= \; + \;_1 \; + \;_2 \; + \;_3 \; + \;_4 \; + \;_5 \; + \;_6 \; + \;_7$$

Where:

y= Expected Price you pay in total for a customized version of this car (in $USD)

= Constant

$_1$= Customization

$_2$ = Whether a brand-loyal person

$_3$= Annual Income

8

$_4$ =Status of current car

$_5$ = Gender

$_6$ =Whether go to dealership first

$_7$ =Whether search online first

Descriptive Statistics

The demographic information for control group and test group shows that our samples in two groups are similar:

Descriptive Statistics for Mug Experiment		Control Group	Test Group
Gender	Male	25%	31%
	Female	75%	69%
Marital Status	Single	88%	85%
	Married	13%	15%
Race	Caucasian	38%	48%
	African American	17%	15%
	Asian	25%	23%
	Hispanic	8%	4%
	Other	13%	10%
Income	Low ($0-$24,999)	25%	15%
	Medium($25,000-$99,999)	29%	52%
	High($100,000+)	46%	33%

Demand Curves for Mug

Figure 1 represents demand curves for the test group and control group in the mug experiment. The demand curves for mugs show the relationship between the bid price and percentage of bidders. Those two curves show exactly what percentage bidders would be willing to buy mugs at various prices under two groups.

According to the demand curve for mug control group, 10% bidders of our sample are willing to buy the mug at 5 dollars; 40% bidders of our sample are willing to buy the mug at 3 dollars; 70% bidders of our sample are willing to buy the mug at 1 dollar.

Under the treatment group, bidders have the option to choose if they want to receive the mug with the handle on the right or the left. According to the demand curve for mug treatment group, 10% bidders of our sample are willing to buy the mug at 8 dollars; 40% bidders of our sample are willing to buy the mug at 5 dollars; 70% bidders of our sample are willing to buy the mug at 2 dollars.

Comparing the two curves, we can see that bidders are willing to bid a higher price in the treatment group for the customized mug than the control group.
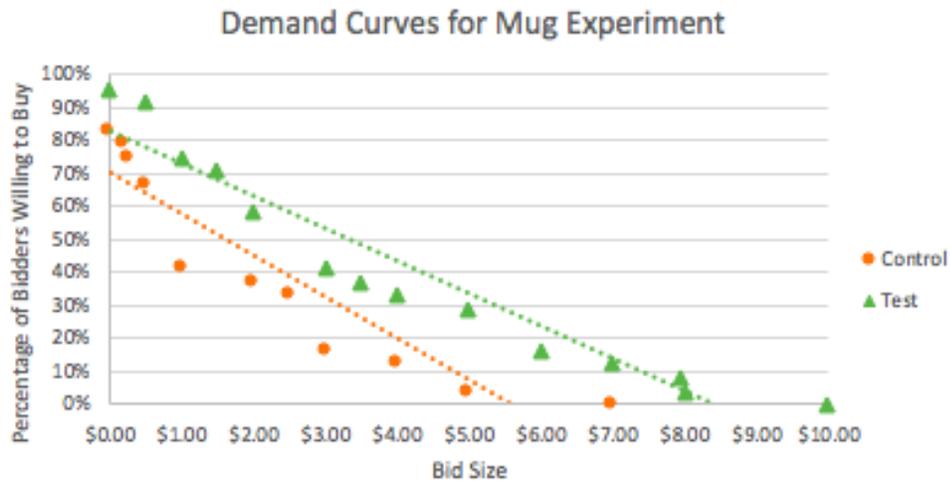

Figure 1.

Results

Group Statistics - Mug

	Whether They Customize the Mug	Number	Mean	Standard Error Mean
How much customers are willing to purchase the mug	Yes	24	3.6433	0.56012
	No	24	1.8729	0.38932

Table 1.

From the Group Statistics, we can see the expected average price of the mug from the customization group is almost twice that from the control group.

T-test for Mug WTP

The Independent Samples Test consists of two parts: the Levene's test and t-test.

The output in the Independent Samples Test table includes two rows: Equal variances assumed and Equal variances not assumed. If Levene's test indicates that the variances are equal across the two groups (i.e., p-value large), we will rely on the first row of output, Equal variances assumed, when we look at the results for the actual Independent Samples t Test (under t-test for Equality of Means). If Levene's test indicates that the variances are not equal across the two groups (i.e., p-value small), we will need to rely on the second row of output, Equal variances not assumed, when we look at the results of the Independent Samples t Test (under the heading t-test for Equality of Means).

According to the steps introduced above, Sig. (Levene's test) = 0.065 > 0.05, so we can't reject the null hypothesis of equal variances. We can conclude that the variance in expected prices of the customization group is not significantly different from that of the control group.

Now we look at the first row of output, and Sig. (t-test) = 0.013 <0.05, which implies that the p-value is small. Hence, there is a significant difference in mean expected price between two groups.

The sign of the mean difference corresponds to the sign of the t value. The positive t value here indicates that the mean expected price of the mug from the customization group is significantly greater than the mean for the control group. In other words, the average expected price for the customization group is $1.77 larger than that for the control group, which means the expected price of customized products is higher than that of non-customized products.

II.   CAR Analysis

ANOVA

	df	SS	MS	F	Significance F
Regression	7	10473453982	1496207712	5.927291146	1.45E-06
Residual	389	98194062941	252426897		
Total	396	1.08668E+11			

Table 2.

Test of Hypothesis for Car Model

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%
Interception (α)	37053.83	6622.63	5.60	0.00	24033.20	50074.46
Customization (β_1)	-1041.37	1609.67	-0.65	0.52	-4206.10	2123.36
Whether a brand-loyal person(β_2)	1860.45	526.11	3.54	0.00	826.07	2894.83
Annual Income (β_3)	1584.31	463.17	3.42	0.00	673.67	2494.94
Status of Current Car (β_4)	-2164.11	926.38	-2.34	0.02	-3985.45	-342.78
Gender (β_5)	-765.15	1599.93	-0.48	0.63	-3910.74	2380.44

Whether go to dealership first (β_6)	-181.17	500.87	-0.36	0.72	-1165.92	803.58
Whether search online first (β_7)	-1091.58	711.49	-1.53	0.13	-2490.42	307.26

Table 3.

$$\hat{y} = \beta + \beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5 + \beta_6 + \beta_7$$

Should be:

$$\hat{y} = 37053.83 - 1041.37 + 1860.45 + 1584.31 - 2164.11 - 765.15 - 181.17 - 1091.58$$

In the ANOVA (Analysis of Variance), the significance F is nearly equal to 0.0000, obviously smaller than $p = 0.05$. Hence the regression model is significant.

According to the multiple regression model for car survey, the p-value of whether a brand-loyal person, annual income, status of current car are nearly equal to $0.0001 < 0.05$, which implies p-value numbers are small so all these three factors are significantly correlated to the expected price of the customized car.

However, the p-value of customization, gender, whether they go to dealership first, and whether search online first are all over 0.05, which means those four factor don't impact the expected price of the customized car significantly.

Our data for car experiment provide little or no evidence that customization is correlated with WTP. This result is opposite with result from mug experiment. After looking at our multiple regression model for car survey, we notice that incomes, whether a brand loyal person, status of current car are most correlated with WTP. A car is a much more expensive and useful product than a mug. The nature of a car leads people to consider more factors before buy a car. Income plays the most important role for customers when giving an expected price for car instead of customization.

Furthermore, coefficients for customization, status of car, gender, whether to go to dealership first, and whether search online first are negative, which implies that all factors we considered in this model have negative correlations with the expected price of the customized car (though the key variables are insignificant). The negative coefficient for customization shows the paradox between customization and WTP, indicating that people tend to want to pay less for customization. This result is opposite to our second hypothesis that a person who customizes an automotive vehicle online by picking non-functional aspects of the car they would like will pay more on top of the base price of the car than someone who just looks at information about the same car features. In our survey, we required participants to choose different customized sets for cars. Customization for car may bring a burden for customers. Alternatively, the control group may have assumed they would have the opportunity to customize the vehicle given the hypothetical nature of the experiment. If this were the case, those who were asked to make some light customization in the treatment condition may feel that they were receiving fewer options than is normally offered.

The negative coefficient for gender shows that females tend to pay less than males for a car. Also, those who go to dealership first and those that search online first tend to pay less for the car.

Implications and Applications

Companies that want to stand out will focus on customer centricity over product centricity. In understanding the value that customizing a product gives the customer, firms can implement behavioral techniques into their strategy to become more customer centric. These insights can also be applied to gain customer loyalty and increase retention through delightful experience (in customizing the product).

Based on the results from the mug customization, the study suggests that customization may be more valuable for low-margin and cheaper products. Customization that is inexpensive for the company could be offered at a small premium to increase WTP and profit margin. An important factor to consider when designing product customization is the expectation of the consumer for the purchasing experience. Upon analyzing our findings, we theorize that when consumers do not expect to be able to customize a product, such as a mug, and then they are giving the choice, this increases the value of the product. In the case of customizing a car, where in the real world the expectation is for a more involved experience than we were able to replicate in our survey, it may be that the customization experience was lower than consumers' expectations, therefore lowering the value they placed on the vehicle.

Companies in commoditized industries, where the products lack much differentiation and instead often compete on price, can apply the behavioral insights from the mug customization part of this study to their respective industry challenges.

As ecommerce and consumer preferences for instant gratification grow, companies are focusing more attention and resources on finding ways to make the customer purchasing experience more seamless and personalized. Because the customization of the mug was less salient, these insights indicate that companies should aim to serve their customers with a shopping experience that deploys customization in a more subtle way. For example, something as simple as ordering a cup of coffee on the Starbucks app, an experience that is not overtly a customization, could inherently add more value to the consumer's experience.

We recommend the application of these insights in many industries. However, we caution the implementation of customization experiences only after deeper research on consumer behavior, motivations, and expectations is completed. At the same time, we would not

recommend that automotive companies discontinue using online vehicle builders just because the results from the car part of our study proved statistically insignificant.

Discussion

Limits on the budget restricted the sample size of the study. The insignificance of the car data from the lab experiment may be explained by the small sample size. The hypothesis may have been found to be significant if a larger sample size was obtained and multiple trials were run for each phase.

Results regarding the car study may have been affected by the subject's perception of the car brand. Certain brands are recognizable even when logos are removed, so more can be done to control for consumer biases. To control for this variability, it may be necessary to give the subjects a choice of brands in the same class of cars. Additionally, the price nature of a vehicle may affect WTP. Considering that a car is likely one of the most expensive items an average consumer will purchase, the the percent change in WTP for customization is less significant to the total price of the car, as a result this does not communicate the value of customization effectively.

In the mug study, it can be shown that bids for the treatment group were significantly higher than in the control group. The mug, being an inexpensive item, makes the effects of customization on WTP easily identifiable. In hopes of finding more powerful insights on customization, this study could be recreated to focus on affordable products where changes in WTP for customization have potential to significantly impact total product price.

Conclusion

The results from mug experiment provide supports that customization brings additional value to products and customers have the propensity to pay more for customized products. However, our car experiment shows that customization is not significantly correlated with customer's willingness to pay (WTP). In the meantime, we find that realistic situations, such as annual income and status of current car, deeply impact a customer's WTP.

According to Franke, Stege, and Keinz, they argue that customers are not able to specify their demands and preference precisely. Then, they introduce that "customization will be powerful if customers have (1) better insight into their own preferences, (2) a better ability to express their preferences, and (3) greater product involvement" (Franke, Keinz & Steger, 2009). In our experiment and survey, mug is much cheaper than car. They are different in the nature of usage. Mug can satisfy customers' needs for drinking and there are many other cups can substitute mug. In comparison to mug, cars basically provide us convenience to travel and the price of cars varies greatly. Annual income and personal interests essentially determine whether people are willing to pay higher for a customized car.

Thus, firms and producers should carefully think whether customization is a good choice for their product. As Franke, Stege, and Keinz's report, customers do not always explicitly express what kind of customization they want (Franke, Keinz & Steger, 2009). In order to gain the greatest value and profits from customization, firms should choose products that are not easily susceptible to realistic situations, including personal income and interests.

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