Does exerting effort lead to endowment effect?

Authors:

Shreya Roy Choudhury 53437371

KIM Min Ki 53274854

CHANG Ming Yin 53999411

YEH Yun Ting 53999343

HSU Chien Jui 53999447

JUNG Yang Sik 52065991

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Abstract

In this study, we examined the relationship between effort exerted and endowment effect. We conducted this experiment within two separate groups of people in order to test whether endowment effect exists within subjects without having any effort put and compared the degree of endowment effect exhibited with the subjects who were required to exert effort. The experiment is designed through modifying the original experiment conducted by Knetsch (1989) by using coffee mug and chocolate bar for our experiment. Our study found that there is a positive relationship between endowment effect and effort exerted by our subjects and it also revealed that the effect was higher in females compared to males. The association between endowment effect and effort can be attributed to people's inherent tendency to be loss averse. The relationship between effort put and loss aversion can be explained using the attachment theory and effort justification theory in social psychology. Therefore, our findings not only provide an important insight for explaining economic anomalies, but also testify a theory in social psychology using an economic method.

Section I: Introduction

The endowment effect is a phenomenon where the willingness to pay is not equal to the willingness to accept. People tend to put a higher value on things that are their own. There have been numerous studies regarding the endowment effect, such as a study conducted by List (2003), revealed that market experience helps eliminate endowment effect. While Gchter et al. (2007), found that people exhibiting endowment effect on risky assets also tend to exhibit for riskless assets. In this paper we investigate if effort leads to higher endowment effect. We specifically chose effort, as we think the higher the effort put, the higher the attachment experienced for the good and thus the higher the endowment effect. It is likely that the findings from this experiment can shed some new light on the factors leading to endowment effect.

We conducted this experiment on a group of students from City University of Hong Kong. The students were asked to do some tasks and received a gift in return. At the beginning of the experiment, the students were made aware of the prize they would receive on completion of the task and thus they would exert effort in order to obtain the prize. Later, they were provided the opportunity to exchange the prize they earned from completing the task with another good of similar monetary value, and see how many of them are interested to exchange. Another group of students were provided with the product, without having completed any kind of tasks beforehand, were also given the option to exchange the product with another good of similar monetary value. This experimental design would allow us to test whether exerting effort causes the students to exchange less or not.

Endowment effect is intricately associated with loss aversion. People tend to put a higher value on things they need to give up in order to compensate themselves from the loss generated from it. On the other hand, when buying goods, people are reluctant to pay any higher than the market price

of the good. Such behavior creates discrepancies in the market and distorts the market efficiency to some extent. Keeping this in mind, we hypothesize that the students who need to complete the task in order to get the prize, would not exchange it for other goods compared to those who were not required to complete any tasks. Our hypothesis is based upon the results observed in the previous experiments done by Tversky and Kahneman (1991) on loss aversion. If people spend a lot of time on achieving something, in this case completing the task to get the prize, they are likely to develop a sense of attachment to it and would be unwilling to give it up for another good of similar monetary value. Thus we think the experiment results should be consistent to our hypothesis; students who need to complete the tasks would show higher endowment effect compared to those who do not need to complete any tasks. The rest of the paper is structured in the following way: section I talks about the experimental design, section II outlines the experimental results, section III discusses the fisher exact test followed by discussion in section IV and conclusion in section V.

Section II: Experimental design

To test whether people put extra value on the good which they had a hard time getting than a "free lunch", we randomly divided subjects into two groups with different treatments. To strictly test the existence of endowment effect and its relationship with effort input, we followed the experiment in the paper of Knetsch (1989), using mugs and chocolate as tested goods.

We recruited students from City University of Hong Kong as our experiment subjects using online and on campus advertising. There were in total 80 subjects recruited, including 71 undergraduate and 9 postgraduate students from different academic and nationality backgrounds. They were randomly divided into two groups, the effort group and the non-effort group. In the effort group,

subjects were asked to solve a series of questions, which was considered as putting efforts, before obtaining the goods, with half of them given cups first and another half given chocolate first. And in the second group, subjects were directly given goods without any prerequisites, with half of them given cups first and half of them given chocolate first, same as the first group.

For the first treatment in the effort group, we firstly distributed a set of papers with instructions and questionnaires to the subjects and asked them to read it by themselves. There were two versions of instructions with one stating a cup would be given as a reward and the other stating a chocolate would be given. The questions were randomly designed into ten simple math questions and an English grammar question. The time limit for completing them was ten minutes. Conversations between subjects were not allowed. In the instructions, we made them aware that they would obtain a cup (chocolate) as a reward for completing the questions. Once they fulfilled the questions, we delivered the cup (chocolate) to them and asked them to observe it for 1 minute. After 1-minute observation, subjects were asked to answer two simple questions regarding the cup (chocolate). The observation process was meant to let them keep the good and make them feel that they are endowed with the good. And for the two questions, they were simply designed into the ones which did not require effort to answer them thus they wouldn't put further effort in it. And next we took out the chocolate (cup) and asked them whether they would like to exchange the cup (chocolate) for chocolate (cup). In the end, subjects could take the goods they chose back home.

And for the second treatment in the non-effort group, we also distributed a set of papers with instructions and questionnaires to the subjects and asked them to read it. There were also two versions of instructions with one stating a cup would be given and the other stating a chocolate would be given. Conversations between subjects were not allowed. Here we directly delivered the cup (chocolate) to the subjects instead of asking them to complete questions in treatment 1. The

following procedures were the same as in treatment 1. Subjects were asked to observe the cup (chocolate) for 1 minute and answer two simple questions regarding the cup (chocolate). And then we took out the chocolate (cup) and asked them whether they would like to exchange the cup (chocolate) for chocolate (cup). In the end, subjects could take the goods they chose back home.

After conducting two treatments, we then computed how many people have made exchange in percentage respectively in two groups and interpreted the data. Firstly, to see whether endowment effect existed, we looked into the percentage of subjects who made exchange in two groups. If there was no endowment effect, around 50 percent of the subjects should have made exchange. Conversely, if endowment effect did exist, there should have been fewer than 50 percent of subjects making exchange. Thereby, we measured the extent of endowment effect based on the percentage of subjects who made exchange. Secondly, we compared the extents of endowment effect of two groups to identify the difference of endowment effect between the one exhibited with effort input and the other with no effort input. Furthermore, we also separated the data into male and female to evaluate the different extents of endowment effect exhibited according to gender difference.

As our intention in making subjects complete questions before obtaining the good in treatment 1 is only to ensure that they make effort in obtaining the good, the quality of effort does not count as an influential factor in determining endowment effect. Therefore, we will not check whether their answers are correct or not here. The appendix contains the questionnaire we used for the experiment.

Section III: Experimental results

Table I. Summary Statistics for the Experiment: Effort and Non-Effort

Variable	Cup*	Chocolate*	%Traded
Pooled Sample (n=80)			
Cup for Chocolate	27	13	32.5
Chocolate for Cup	13	27	32.5
Effort (n=40)			
Cup for Chocolate	15	5	25
Chocolate for Cup	4	16	20
Non-effort (n=40)			
Cup for Chocolate	12	8	40
Chocolate for Cup	9	11	45

Cup* and Chocolate* refer to the final good the subject has chosen.

The data in Table I show the summary of statistics of the experiment categorized into effort and non-effort groups. Cup (chocolate) for chocolate (cup) means that cup (chocolate) is given first, and chocolate (cup) is asked for exchange later. It can be found that percentage of subjects willing to trade the good are relatively high for the non-effort group compared to the effort group. In the overall pooled sample, the percentage of people traded cup for chocolate was 32.5 percent (13 of 40), and the percentage of people traded chocolate for cup was 32.5 percent (13 of 40) as well. In the effort group, for the subjects given the cup first, 25 percent of them exchanged with the chocolate (5 of 20), whereas for the subjects given the chocolate first, 20 percent of them exchanged with the cup (4 of 20). In the non-effort group, for the subjects given the cup first, 40 percent of them exchanged with the chocolate (8 of 20), whereas for the subjects given the chocolate first, 45 percent of them exchanged with the cup (9 of 20). From the statistics itself, it can be seen that the effort group tend to keep the initially endowed good (cup or chocolate) twice as the non-effort group on average. Also the fact that the percent traded for two goods of effort

and non-effort group are similar within each group is revealing the fact that cup and chocolate are good substitutes.

Table II. Summary Statistics for Gender Difference in Trading

Variable	% Traded	Male Traded%	Female Traded%	Absolute Value of Difference
Cup for Chocolate (n=40)				
Effort	20	18.18	22.22	4.04
Non-effort	40	22.22	54.55	32.33
Chocolate for Cup (n=40)				
Effort	15	18.18	11.11	7.07
Non-effort	45	62.50	33.33	29.17

To investigate further, we try to probe into whether gender is one of the factors that has influence on the extent of endowment effect. Since the number of male and female respectively is not equal for four cases, we compare the difference by ratio (=the number of traded gender/the number of all the gender in that specific group).

As we can see from table II, the difference between male and female is insignificant for the effort groups since both males' and females' traded percentage are relatively close to each other with around only 4-7% discrepancy. Besides, the figures of male traded ratio and female traded ratio respectively are not much deviated to the traded percentage of the whole sample in the effort group, which can be explained that there is no clear effect of gender on endowment effect. In comparison, the difference for non-effort groups is much more obvious. As we can see from the cup-for-chocolate group, female's trading ratio is more than 30% higher than male's, which implies that gender may be one of the factors that influences the degree of endowment effect.

We can conclude that in the effort case, gender does not seem to play an important role in the endowment effect; on the other hand, different genders show different outcomes in the non-effort group case.

Section IV: Fisher's exact test

To analyze the experiment results in more details, the hypothesis testing was conducted by using Fisher's exact test. Theoretically, this practice is appropriate for all sample sizes. This method is to test the independence of 2 X 2 table and by observing the contingency table, the association between different treatments and outcomes can be identified. In this section, three different null and alternative hypotheses will be tested in order to determine the relationship between endowment effect and effort put by different subjects. According to appendix 1 and 2, there is an example of contingency table and formula for calculating the p-value. Through using the following table and formula in the appendix, the p-value will be calculated in order to determine the level of significance at the 5% confidence interval.

Table III. The association between endowment effect and effort

	With Effort	Without Effort	Total	
No endowment effect	7	17	24	
Endowment effect	33	23	56	
Total	40	40	80	p-value: 0.027*

**Two-tailed test p-value*
H_0: There is no association between endowment effect and effort
H_1: There is association between endowment effect and effort

Firstly, the relationship between endowment effect and effort by all the subject regardless the gender is investigated. From the Table III, the p-value is calculated as 0.027. At 5% significant level, since the calculated p-value is less than 0.05, we reject the null hypothesis. Thus, it can be concluded that there is association between endowment effect and effort by subjects.

Table IV. The association between endowment effect and effort put by Male

	With Effort	Without Effort	Total	
No endowment effect	5	7	12	
Endowment effect	18	10	28	
Total	23	17	40	p-value: 0.297*

**Two-tailed test p-value*
H_0: There is no association between endowment effect and effort put by Male
H_1: There is association between endowment effect and effort put by Male

Secondly, the relationship between endowment effect and effort by male is investigated. From the Table IV, the p-value is calculated as 0.297. At 5% significant level, since the calculated p-value is greater than 0.05, we failed to reject the null hypothesis. As a result, it can be concluded that there is no association between endowment effect and effort by male subjects.

Table V. The association between endowment effect and effort put by Female

	With Effort	Without Effort	Total	
No endowment effect	2	10	12	
Endowment effect	15	13	28	
Total	17	23	40	p-value: 0.0408*

**Two-tailed test p-value*
H_0: There is no association between endowment effect and effort put by Female
H_1: There is association between endowment effect and effort put by Female

Lastly, the relationship between endowment effect and effort by female is investigated. From the Table V, the p-value is calculated as 0.0408. At 5% significant level, since the calculated p-value is less than 0.05, we reject the null hypothesis. This indicates that there is no association between endowment effect and effort by female subjects.

Section V: Discussion

Endowment effect is commonly explained by the nature of loss aversion. That is, people's reluctance to lose encourages them to keep the goods rather than to trade, thus endowment effect appears. In this study, we have further confirmed a strong relationship between endowment effect and effort exerted. Therefore, it is reasonable to claim that effort exerted leads to greater sense of loss aversion. The relationship between effort put and loss aversion can be explained using the attachment theory and effort justification theory in social psychology. Effort justification theory states that, people feel more attached to objects that they had to put more effort to obtain in order to mentally justify their hard work. Once they have obtained the good, it creates a sense of

ownership for that good. The attachment theory can be used to further illustrate this concept. According to this theory, "ownership creates a valenced association between the self and the good" (Bretherton I, Munholland KA, 1999), meaning people associate the good as a part of their individuality, and this it creates a strong sense of attachment to it, and losing the good would create a great sense of loss within them. As people tend to be loss averse, they do not give up the good and keep the good that they were initially endowed with. It may seem presumptuous to assume that only such a short interaction between the subject and the good can lead to such high degree of attachment, leading to loss aversion. However, our statistical analysis indeed show that the subjects exerting effort exhibited higher degree of endowment effect, compared to the non-effort group and thus it indicates that there is relationship between effort and endowment effect and the only reasonable explanation is the association between effort and attachment created. Also, from List [2003] it was found that people exhibited endowment effect in the sports card trading market within a very short period of time and thus it is possible to develop attachment for a good, even though the time span of acquiring it is very small, leading to higher endowment effect. Therefore, our findings not only provide an important insight for explaining economic anomalies, but also testify a theory in social psychology using an economic method.

Section VI: Conclusion

To conclude results of this study, the Fisher exact test provided strong evidence that there is association between endowment effect and effort put by all subjects. It also identified the weak relationship between the endowment effect and effort put by male subjects. This result is consistent with an existing study conducted by Wieland, A., Sundali, J., Kemmelmeier, M., & Sarin, R.

(2014), suggesting that male intends to have lower endowment effect than female does. Last but not least, there is evidence that high endowment effect exists along with effort put by females.

Based on our findings, there are still some aspects that we could extend further. For instance, the specific relationship between effort exerted and the endowment effect still remains unknown. And we could see if the relationship between the two factors is proportional by conducting experiments that require different level of effort. The amount of time spent by subjects is considered as level of effort and in our experiment, subjects are required to complete the questionnaire in 10 minutes. In this case, further research can be conducted through using different time period for subjects, such as five minutes, 15 minutes etc. Furthermore, we could identify whether the "nature of work" as well influences people's endowment effect. Since we adopted tasks to be completed independently and relatively uninterestingly this time, we could conduct experiments requiring different style of effort to see its relevance. Finally, our study still has limitations regarding small sample size and narrow sample background. In addition, the significant discrepancy between male and female in the decision to choose chocolate or mugs in the effort group suggests that chocolate and mugs might not be perfect substitutes to each other. These limitations should be emphasized and improved in the further studies.

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Appendix:

Appendix 1. Contingency table in fisher's exact test

	Column 1	**Column 2**	**Total**
Row 1	**a**	**b**	**a+b**
Row 2	**c**	**d**	**c+d**
Total	**a+c**	**b+d**	**n (a+b+c+d)**

Appendix 2. Formula for p-value

$$p - value = \frac{(a+b)!\,(c+d)!\,(a+c)!\,(b+d)!}{(a+b+c+d)!\,a!\,b!\,c!\,d!}$$

Appendix 3. Effort Group instructions and questionnaire

Instruction

Welcome to our experimental study on decision-making. In this experiment, you will be required to complete a test. At the end of the test if you answer all questions correctly you will receive a **CUP** as a prize for completing the test. You will have 10 minutes to complete this test.

Your decisions will be anonymous and kept confidential.

If you have any questions, please feel free to ask our assistant any time. Please DO NOT communicate with any other participants.

Instruction

Welcome to our experimental study on decision-making. In this experiment, you will be required to complete a test. At the end of the test if you answer all questions correctly you will receive a **CHOCOLATE** as a prize for completing the test. You will have 10 minutes to complete this test.

Your decisions will be anonymous and kept confidential.

If you have any questions, please feel free to ask our assistant any time. Please DO NOT communicate with any other participants.

Question 1

Please write the sum of following 5 numbers in each row in the last column **without using a calculator**.

(6 marks for each x 10)

156	73	67	13	472	
322	16	98	161	3	
52	34	78	67	31	
3	9	78	118	32	
1	67	300	123	214	
81	5	136	52	7	
231	56	13	8	10	
45	91	3	265	229	
309	202	101	11	6	
4	69	74	0	43	

Question 2

Please find out 4 sentences with grammatical errors among sentences A-H.

(10 marks for each x 4)

It was April in the city of Peking, the fourth month of the solar year of 1852, the third month of the moon year, the two hundred and eight year of the Manchu, the great Ch´ing dynasty. Spring was late and the northern winds, carrying their load of fine yellow sand from the Gobi desert, blew cold as winter over the housetops. Sand drifted down into the streets, sand whirled in eddies and filtered through doors and windows. (A)It silted into corners and lay upon tables and chairs and in the crevices of garments, it dried upon the faces of children when it wept, and in the wrinkles of old people.

In the house of the Manchu Bannerman, Muyanga, in Pewter Lane, the sand was more than usually tiresome, for the windows did not fit tightly and the doors hung loose upon their wooden hinges. On this particular morning Orchid, his niece and the eldest child of his dead brother, sat up in the large Chinese bed she shared with her younger sister and frowned when she saw the sand lying upon the red quilt like tinted snow. In the moment she crept out softly from the bedclothes, so that she might not awaken the sleeper. Under her bare feet she felt the sand on the floor and sighed. (B)Only yesterday she had swept the house clean, and all was to be swept again as soon as the wind died.

(C)She was a handsome girl, this Orchid, seeming tall than she was because she was slender and held herself erect. Her features were strong but not coarse, her nose straight, her eyebrows clear, her mouth well shaped and not too small. Her great beauty lay in her eyes. They were long and large and exceedingly clear, the black and the white pure and separate. (D)Yet such beauty might have been meaningless except for the natural spirit and intelligence that informed her entire being, although she still was very young. She was self-controlled, her strength apparent in the smoothness of her movements and the calm of her manner.

In the sand-gray light of the morning she dressed herself swiftly and noiselessly, and putting aside the blue cotton curtains that served as a door, she went into the main room and from that into the small kitchen adjoining it Steam rose from the large iron cauldron set into the earthen strove.

"Lu Ma," so she greeted the serving woman. "You are early this morning." (E)Self-control was in the extreme gentleness of her pretty voice, held resolutely low.

From behind the stove a cracked voice replied. "I could not sleep, Young Mistress. What shall we do when you leave us?"

Orchid smiled. "The Emperor´s Dowager Mother may not choose me-my cousin Sakota is far more beautiful than I am." She looked behind the stove. Lu Ma was crouched there, feeding wisps of dried grass into the fire, making the most of every blade of the scanty fuel.

"You will be chosen." (F)The old woman´s stone were definite and sad, and emerging at this moment from behind the stove, she looked desolate, a small hunchbacked Chinese, her blue cotton garments faded and patched, her bound feet stumps, her face shrunken into a net of brown wrinkles outlined with pale sand. Sand lay on her gray hair and frosted her eyebrows and the edge of her upper lip.

Appendix 4. Non Effort Group Instructions

Instruction

Welcome to our experimental study on decision-making. In this experiment, you will receive a **CUP.**

Your decisions will be anonymous and kept confidential.

If you have any questions, please feel free to ask our assistant any time. Please DO NOT communicate with any other participants.

Instruction

Welcome to our experimental study on decision-making. In this experiment, you will receive a **CHOCOLATE.**

Your decisions will be anonymous and kept confidential.

If you have any questions, please feel free to ask our assistant any time. Please DO NOT communicate with any other participants.
