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# Influence of Interaction with Product Information on Selection Results

– On making decisions when purchasing gifts –

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**Abstract:** The authors have investigated the influence of interaction with product information on selection results in product purchase. In the previous study, the authors investigated cases the participants selected watches themselves to wear, however in this study we conduct similar investigation on decision making when purchasing gifts. As a result of comparing with the previous study, even when purchasing gifts, it was found that the selection result varies depending on the interaction of product information. Next, we investigated on gender differences. As a result, we found that the selection result was more likely to change for females than males by interaction with product information. Finally, we compared the price variance of selected products with the previous study. As a result, males showed that prices are set to a certain extent when purchasing their own, whereas there are variations in the budget for gifts. On the other hand, females do not change the budget for gifts, however in the case of their own, the price range tends to vary.

**Keywords:** *Decision Making, Interaction Process, Clustering, Choice Overload*

## 1. INTRODUCTION

In recent years, it is said to be an information excess society. Since the 1990s, with the spread of the Internet and mobile phones, we have become able to easily obtain a lot of information. Furthermore, the EC site has become widespread, so that people can obtain products via the Internet without going to physical stores. In this way, there are enormous products and services around us, and the market scale is getting bigger and bigger. Accordingly, the preference of each customer is also diversified, and it is demanded to recommend products suitable for each customer's preference from among various kinds of products. Consumers prefer situations with many choices, and it is thought that the quality of life will be improved with many choices. However, it is reported that the purchase rate and satisfaction level of consumers decrease as the number of options increases, and this phenomenon is called Choice Overload [1].

As a factor of Choice Overload, the increase in choices makes it impossible to sufficiently process information on each choice, which increases the stress [2]. As one way to deal with many choices, it is considered important to narrow down the choices based on attributes. Iyengar also states that when choosing from a number of attributes, in what order to choose, it will be the key to dealing with

many alternatives [2]. When purchasing goods, consumers evaluate various attributes in their heads in the order that suits them, and it is considered that they finally decide products to purchase. Therefore, the authors investigated the influence of interaction with product information on selection results [3] [4]. Specifically, with the subject of watches, we examined how the product selection result changes according to the order of presenting product attributes. Furthermore, the similarity of the selected watch was analyzed using mathematical quantification theory class III. As a result, many participants found that the products selected are different by interaction with product information. In the previous study, we investigated cases the participants selected watches themselves to wear, however in this study we conduct similar investigation on decision making when purchasing gifts. Furthermore, we compare it with the result of the previous study.

## 2. RELATED STUDIES

Regarding decision making, researchers in decision-making science have used rational judgment models to choose based on the idea which choice has the greatest expected utility [4].

However, Simon argues "bounded rationality" as a

person's decision is not perfectly rational but limits [5]. Furthermore, Fujii pointed out the limit of the optimization method in consensus building [6]. Optimization means a method that raises people's satisfaction as an average. Fujii cited as not having enough consistency for each person's preference as its problem. Inconsistency of preference has been verified in psychology of decision making. A typical study is an empirical study related to the "framing effect" [7]. Framing effect is a phenomenon that decision making is totally different depending on expression and situation even with the same choice.

In addition, Underhill states that consumers' purchasing behavior is "the possibility that decisions on what to buy will depend on the situation outside the store is getting lower and lower" [8]. Consumers do not come to the store after clearly deciding what to buy, they come to the store with the ambiguous desire, and it depends on the impression and information in the store. In this way, people 's preference has come to be thought to be formed in the decision - making process rather than being fixed in advance.

Lepper et al. revealed the phenomenon that purchasing willingness declines when there are too many choices [1]. In addition, Iyengar carried out experiments on the selection order based on attributes, taking cars as an example [10]. In the experiment, she compared consumers who purchase cars of the same type into groups that choose from options with many options and groups that choose from options with few options. As a result, it is reported that the group chosen in descending order is fatigued by the comparison of choices, and the satisfaction level for the finished car is low. In this way, it can be seen that the burden and satisfaction level of the consumer changes depending on the order of presenting the attributes.

As mentioned above, consumer decision making is ambiguous, and when there are many choices, it is considered that the products to be selected are different depending on the presentation order of the product attributes. Therefore, the authors investigated how

product selection results change depending on the presentation order of product attributes [3] [4]. First, cluster analysis of target products was carried out using mathematical quantification theory class III, and the watches similarity was visualized by mapping the watch selected by the participants. As a result, it was found that participants with clear image of desired products selected products with high similarity, and the distance of the mapped products was close. On the contrary, participants who were not particular about products selected products with low similarity, the mapping of the products was disjointed, and the distance was shown to be far. Next, comparing the results of men and women, it was suggested that women are more susceptible to interactions of product information than men, resulting in greater variation in selection results.

Therefore, in this study, we analyze the decision making when purchasing gifts in the same way and compare them with the results of previous research. We will clarify the differences between the case of selecting items themselves to wear and choosing gifts.

### 3. EXPERIMENTAL METHOD

In this experiment, the subject product was an accessory and participants selected a necklace as a gift for the mother. We prepared 250 sample images of accessories, and the price range was 100,000 yen or less. The participants were graduate students or university students, 15 males and 15 females in their twenties (30 in total). We extracted eleven attributes such as brand, price, chain (color, material), pendant (color, material), chain length, limited item etc. as attributes of necklace. A part of the actual presentation screen is shown in Table 1.

Next, we selected three attributes of price, chain color, pendant material, and the selection order of these three attributes was switched and presented to the subjects. In other words, one person selected the neckless by six patterns, and we examine the difference of the finally selected watch. The A pattern is price → chain color → pendant material, B pattern is price → pendant material

**Table 1:** Presentation Screen

No	Brand	Design	Price	Chain Color	Chain Material	Pendant Color	Pendant Material	Pendant Material	Pendant Material	Chain Length	Limited Item	Pendant Shape
39	4°C		¥19,000	Silver	Silver	Silver Blue	Silver Cubic Zirconia	Silver	Other Stone	42	Online	Drop
40	4°C		¥18,000	Gold	Gold	Gold	Yellow Gold Diamond	Gold	Diamond	40	None	Square
41	4°C		¥24,000	Gold	Pink Gold	White	Pearl	Only Stone	Pearl	40	Online	Ball

→ chain color, C pattern is chain color → price → pendant material, D pattern is chain color → pendant material → price, E pattern is pendant material → price → chain color, F pattern pendant material → chain color → price. For example, in the case of A, we first ask the participants the upper limit of the price and narrow down the number of necklaces. Show the narrowed necklaces to the participants, then ask their favorite chain color. Show the more narrowed necklaces to the participants, finally decide the pendant material, and ask them to select the necklace to be finally purchased. Also, we asked as to whether gift experience, which pattern was easy to select, and which accessories participants liked the most among accessories participants finally chose.

#### 4. EXPERIMENTAL RESULT

As a result of investigating how the product selection result changes according to the presentation order of product attributes, the participants who selected the same necklace all were 0 in both males and females, and all the members selected different necklaces according to the patterns. Experimental results of participant 1, men who selected two kinds of necklaces and participant 2, women who selected all different necklaces, are shown in Tables 2 and 3.

The participant 1 selected two kinds of necklaces 129 and 202 depending on the patterns. For selected attributes "chain" is "gold", "price" is unified to "20,000 yen". "Decoration" is "yes" or "only stone", and the necklace to choose according to this difference is different. Participant 2 selected all different necklaces that is 26, 32, 82, 141, 167 and 238, and the combinations of attributes of "price", "chain", and "decoration" were uneven, too.

#### 5. ANALYSIS METHOD

Next, in order to investigate the similarity of necklaces selected by six participants, we performed cluster analysis of target products using mathematical quantification theory class III. Mathematical quantification theory class III is a method to find a small number of latent variables from many observation variables. By applying this method, we obtained relational expressions that examine latent variables. Mathematical quantification theory class III is equivalent to principal component analysis using category data. This is often used for the purpose of grouping subjects such as questionnaire respondents. In this experiment, target products are mapped using this method, and the similarity of selection results is

**Table 2:** Experimental result (Participant 1)

A	Price(yen)	Remaining	Chain	Remaining	Pendant	Remaining	Final Selection
	~20,000	129	Gold	57	Stone Only	7	202
B	Price(yen)	Remaining	Pendant	Remaining	Chain	Remaining	Final Selection
	~20,000	129	Included	12	Gold	4	129
C	Chain	Remaining	Price(yen)	Remaining	Pendant	Remaining	Final Selection
	Gold	134	10,000~20,000	32	Stone Only	2	202
D	Chain	Remaining	Pendant	Remaining	Price(yen)	Remaining	Final Selection
	Gold	134	Included	35	10,000~20,000	4	129
E	Pendant	Remaining	Price(yen)	Remaining	Chain	Remaining	Final Selection
	Included	64	~30,000	26	Gold	13	129
F	Pendant	Remaining	Chain	Remaining	Price(yen)	Remaining	Final Selection
	Included	64	Gold	37	~20,000	6	129

**Table 3:** Experimental result (Participant 2)

A	Price(yen)	Remaining	Chain	Remaining	Pendant	Remaining	Final Selection
	~7,000	36	Gold	20	Included	7	141
B	Price(yen)	Remaining	Pendant	Remaining	Chain	Remaining	Final Selection
	~10,000	57	Stone Only	22	Gold	12	167
C	Chain	Remaining	Price(yen)	Remaining	Pendant	Remaining	Final Selection
	Silver	111	5,000 ~	98	No Stone	32	26
D	Chain	Remaining	Pendant	Remaining	Price(yen)	Remaining	Final Selection
	Silver	111	Included	47	5,000~15,000	16	32
E	Pendant	Remaining	Price(yen)	Remaining	Chain	Remaining	Final Selection
	Included	52	~10,000	1	Gold	1	238
F	Pendant	Remaining	Chain	Remaining	Price(yen)	Remaining	Final Selection
	Stone Only	46	Gold	38	~5,000	31	82

investigated.

In this experiment, we classify 250 necklaces using this method and clarify whether the necklaces selected by the participant are in a near category or a far category. In this analysis, 3 attributes (price, chain, decoration) were used, and the price range was classified into 6 stages. Thus, it should be noted that the sample scores may be perfectly matched. In the mapping of the sample scores, the relative distances represent relationships, and the closer the necklaces are to each other, the higher the similarity of the necklaces. In order to gather and group those mapping distances close to each other, perform cluster analysis using sample scores. For the analysis, the Ward method, which is a hierarchical method, was used.

#### 6. ANALYSIS RESULT AND DISCUSSION

Cluster analysis classified 250 necklaces into 4 clusters. The number of necklaces in each cluster is 96 in cluster 1, 69 in cluster 2, 80 in cluster 3, and 10 in cluster 4.

First, we compare gender differences of degree of variation in selection results of each participant with previous studies.

The cluster classification results for the necklace are shown in Table 4. This table shows the number of clusters to which the necklace selected by participants belongs in 6 patterns and the number of male and female. According to Table 4, it is understood that the number of clusters to which females are classified is larger than that of men. For watches investigated in previous studies, the number of clusters to which females are also classified is larger than men. From this, it was found that the selection result was more likely to change for females than for men by interaction with product information as in previous

studies.

Second, Table 5 shows the result of comparing price variations of selected products with previous studies. In Table 5, it is indicated as percentage whether the price specified by the six patterns is "less than 5,000 yen", "5,000 yen more and less than 10,000 yen", "10,000 yen or more", and further for each participant. The average of the standard deviations of the prices of the products has also calculated. Based on the range of the price of the table and the result of the standard deviation, it is shown that the price is set to some extent when males buy their own (watches), whereas the price of the gifts (necklaces) has varies. On the other hand, although females do not change the budget of gifts (necklaces), in the case of their own (watches) it turned out that price ranges tend to vary.

**Table 4:** Cluster classification result

The number of clusters	1	2	3	4
Male	4	5	6	0
Female	0	7	8	0

**Table 5:** Result of comparing price

	Necklaces		Watches	
	Male	Female	Male	Female
Less than 5,000 yen	53%	53%	80%	35%
5,000 yen more and less than 10,000 yen	7%	27%	5%	30%
10,000 yen or more	40%	20%	15%	35%
Standard Deviation	1.28	1.43	0.63	1.63

## 7. CONCLUSION

In this study, we investigated the influence of the selection process on product purchase on the results when purchasing gifts. Specifically, when buying a necklace to be presented to a mother, it was investigated whether there was a change in the item to be selected depending on the order of presentation of the product attribute, and compared with the result of the previous study.

First, even when purchasing gifts, it was found that the selection result varies depending on the interaction of product information. Depending on the presentation order of product attributes, the products selected by all the participants changed.

Second, gender comparisons were conducted on variations in selection results. As a result, similarly to the previous study, it was found that the selection result was more likely to change for females than males by

interaction with product information.

Thirdly, we compared the price variance of selected products with the previous study. As a result, males showed that prices are set to a certain extent when purchasing their own, whereas there are variations in the budget for gifts. On the other hand, females do not change the budget for gifts, however in the case of their own, the price range tends to vary.

In the future, we will make the best use of the findings of this study and aim to propose a method of providing product information suitable for individuals. In addition, it is necessary to experiment with more participants taking account of consumer attributes and expertise on products etc. For items targeted as well, studies on products and services other than necklaces handled in this study are required.

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