Differences in Product Selection Depends on Situations: Using Earphones as an Example

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Abstract: Conventional research on decision support focuses on rational decision-making. However, consumer decision-making is considered ambiguous and varies depending on the situation and context. Therefore, the authors investigated the differences in selection results depending on the usage of products. Specifically, the authors examined the variation in the choice of earphones according to place and situation of use. Multiple comparisons showed that the number of types of earphones selected did not differ significantly depending on the place of use, but differed greatly according to the usage situation. The number of earphones selected varied depending on the place and situation of use. In particular, it was suggested that the use of earphones had a significant influence on choice, which may lead to decision support for product selection.

Keywords: Decision-Making, Interaction Process, Product Selection

1. Introduction

Since the 1990s, the widespread use of the Internet and cell phones have increased the access to information. In addition, the spread of e-commerce sites has made it possible for people to purchase products online without having to go to the actual stores. In this way, we are surrounded by a vast array of products and services, and the size of the market is increasing. Therefore, there is a need for a method to support consumers in their selection of products that match their preferences.

Conventional research on decision support assumes that decision-makers have clear goals and criteria, and make rational decisions according to them. However, in actual decision-making, the criteria often change dynamically depending on the situation and context, and people are required to make decisions based on their own sensitivity. However, few studies have considered decision-making as a dynamic process and have clarified its characteristics.

To clarify the characteristics of the dynamically changing decision-making process, the authors investigated the influence of interaction with product information on the selection result [1][2]. Specifically, we investigated how the order in which product attributes were presented change the outcome in the selection of a watch. We found that most participants chose different products depending on their interactions with the product information. In this way, the authors clarified the variations in the selection results depending on the order of presentation of product attributes in previous studies. Although these studies did not consider the usage of the product, consumers' choices are thought to vary depending on the usage of the product in an actual purchase.

In this study, we investigated the change in selection results depending on the use of the product. We consider the differences in the choice of earphones depending on the place and situation in which the product is used.

2. Related Research

For studies on decision-making, researchers in decision science have used a model of rational judgement in which people choose alternatives based on the notion that a certain alternative has the highest expected utility [3]. The Analytic Hierarchy Process (AHP) proposed by Saaty for rational decision-making[4]. The AHP is a method that shows rationality and guides decision-making by quantitatively measuring the importance of evaluation criteria. The method has been applied to many decision support systems [5]. In this way, conventional decision-making research does not assume decision-making in which the criteria change depending on the situation.

However, Simon argues that human decision-making is not completely rational and has limitations, what he calls 'limited rationality'[6]. Many studies, including behavioural economics, claim that human decision-making is influenced by emotional factors. Motterlini points out that the decision-maker's criteria are dynamic
and change depending on the situation, and that actual decisions are made emotionally [7]. Underhill states that consumers’ buying behaviour ‘is becoming less and less likely to be influenced by the situation outside the store [8]. This means that consumers do not come to a store with a clear idea of what they want to buy. Rather, they come with ambiguous desires and are influenced by the impressions and information that they receive in the store. Thus, people’s preferences are now considered to be formed during the decision-making process instead of predetermined [9].

As mentioned above, consumer decision-making is ambiguous, and the resulting choice varies depending on the situation and context. Therefore, the authors investigated how product selection results change depending on the order in which the product attributes are presented [1] [2]. As a result, participants who had a clear image of the product they wanted chose a very similar product, while those who were not particular about the product tended to select a product with low similarity. A comparison of the results between men and women showed that women were more influenced by the interaction with product information than men, and that the variability of the selection results was greater. In these studies, we focused on watches and did not consider the place and situation of use. However, in actual purchases, the products to be selected vary depending on the usage.

In this study, we examine the effects of place and situation on the choice of earphones.

3. Experimental Method

In the experiment, 432 wireless and wired earphones were prepared. Twenty-one male and female participants in their teens and twenties, either graduate or undergraduate students, participated in the experiment. The following 11 attributes were extracted: manufacturer, price, type, colour, water-resistance, noise cancellation, codec, battery life, charging time, high resolution, and cord length. A part of the actual presentation screen is shown in Table 1.

Next, the earphones were used in five places: on the move, at home, in cafes, at the gym (where sports are played), and at university. The earphones were used in four situations: listening to music, entertainment (including videos, games, and radio), making online calls, and studying. The 5 × 4 combinations of places and situations are listed in Table 2. First, the participants were asked to select a combination that they might use among those listed in Table 2. Combinations that were unlikely to be used were not selected. Next, the participants were asked to choose products from the selected combinations without specifying the order of selection. After all the products were selected, the participants were asked to fill out a questionnaire on their earphone preferences, the time spent using earphones per day, and the number of earphones they currently own.

In conducting this study, the necessary procedures were performed in accordance with the ethical rules for research involving humans at the Faculty of Science and Engineering, Chuo University.

| No. | Name | Picture | Manufacturer | Price | Type | Color | Codec | Battery life (h) | Charging time (h) | Waterproof |
|-----|------|---------|---------------|-------|------|-------|-------|-----------------|-----------------|------------|
| 1   | SONY WF-1000XM3 SM A | ![Image] | SONY | 26400 | Completely wireless | Black | SBC / AAC | 9 | 2.5 | IPX5 |
| 2   | SONY WF-SP800N SONY | ![Image] | SONY | 26400 | Not supported | Black | SBC / AAC | 6 | 1.5 | None |

Table 1. Presentation screen

| Location | Music | Entertainment | Online Drinking | Studying |
|----------|-------|---------------|-----------------|---------|

Table 2. Combinations of places and situations

4. Results

Table 3 shows the number of earphones selected according to the situation and place. The table shows that the average value is high for listening to music and entertainment, suggesting that the choice of earphones likely changes depending on the place in these situations. On the other hand, the mean values for gym and online drinking were less than 1, indicating that many of the participants did not use earphones while in the gym and online drinking.

The investigation on how the results of product selection change depending on the place and situation in which the product was used showed that only two participants (No. 4 and 21) made choices that were not influenced by both place and situation. Four participants (No.1, 5, 13, 18) made different choices depending only on the situation and not on the place, and one participant (No.19) made different choices depending only on the place and not on the situation. Therefore, most participants chose different earphones depending on the place or situation.
5. Analysis Method

To test whether there is a difference in the selection results depending on the place and situation in which the products are used, multiple comparison tests were conducted using the Tukey method. The Turkey method is a multiple comparison method that assumes normality and equivariance.

Table 2. Number of types selected by situation and location

| No. | Location                  | Situation         | On the move | Home | Cafes | Gyms | College | Music | Entertainment | Online Drinking | Studying |
|-----|---------------------------|-------------------|-------------|------|-------|------|---------|-------|---------------|----------------|---------|
| 1   | 1                         | 1                 | 1           | 1    | 1     | 1    | 5       | 4     | 0             | 0              | 0       |
| 2   | 3                         | 3                 | 2           | 1    | 3     | 5    | 4       | 0     | 1             | 4              | 4       |
| 3   | 1                         | 2                 | 1           | 0    | 1     | 2    | 2       | 1     | 1             | 1              | 1       |
| 4   | 1                         | 1                 | 1           | 1    | 1     | 1    | 1       | 1     | 1             | 1              | 1       |
| 5   | 1                         | 1                 | 1           | 1    | 1     | 2    | 1       | 0     | 0             | 1              | 1       |
| 6   | 1                         | 2                 | 0           | 2    | 2     | 1    | 1       | 1     | 2             | 2              | 2       |
| 7   | 2                         | 2                 | 1           | 1    | 2     | 5    | 3       | 1     | 1             | 1              | 1       |
| 8   | 1                         | 3                 | 0           | 1    | 2     | 4    | 1       | 0     | 1             | 1              | 1       |
| 9   | 3                         | 4                 | 1           | 3    | 5     | 4    | 1       | 4     | 4             | 4              | 4       |
| 10  | 2                         | 1                 | 2           | 0    | 2     | 4    | 2       | 0     | 2             | 2              | 2       |
| 11  | 2                         | 1                 | 0           | 0    | 1     | 3    | 3       | 0     | 1             | 3              | 3       |
| 12  | 3                         | 1                 | 0           | 1    | 1     | 4    | 3       | 1     | 3             | 3              | 3       |
| 13  | 1                         | 1                 | 1           | 1    | 1     | 3    | 2       | 0     | 2             | 2              | 2       |
| 14  | 1                         | 3                 | 1           | 1    | 0     | 4    | 2       | 0     | 1             | 1              | 1       |
| 15  | 2                         | 2                 | 2           | 1    | 2     | 5    | 2       | 0     | 0             | 0              | 0       |
| 16  | 2                         | 2                 | 2           | 0    | 0     | 3    | 3       | 1     | 3             | 3              | 3       |
| 17  | 2                         | 2                 | 2           | 0    | 2     | 4    | 4       | 0     | 4             | 4              | 4       |
| 18  | 1                         | 1                 | 0           | 1    | 1     | 4    | 2       | 1     | 2             | 2              | 2       |
| 19  | 1                         | 2                 | 1           | 1    | 2     | 1    | 1       | 0     | 1             | 1              | 1       |
| 20  | 2                         | 0                 | 2           | 1    | 2     | 4    | 1       | 0     | 2             | 2              | 2       |
| 21  | 1                         | 1                 | 1           | 0    | 1     | 1    | 1       | 1     | 1             | 1              | 1       |
| Ave.| 1.62                      | 1.71              | 1.14       | 0.67 | 1.48  | 3.38 | 2.24    | 0.52  | 1.90          | 1.49           |
| Var.| 0.55                      | 0.91              | 0.73       | 0.23 | 0.66  | 1.66 | 1.29    | 0.26  | 1.49          |

6. Analysis Result and Discussion

The results of multiple comparisons are shown in Figures 1 and 2. Figure 1 shows the test results for the place, in which the horizontal axis represents the place and the vertical axis represents the mean of the number of earphones selected. Figure 2 shows the test results for the situation, in which the horizontal axis represents the situation and the vertical axis represents the mean of the number of earphones selected. In both cases, * is 5% significant and ** is 1% significant, indicating a difference in the means.

Figure 1 shows that the average number of earphones selected for use in the gym is lower than in the other places. The difference is 5% significant with university and 1% significant with home and while travelling. This can be attributed to the fact that there are no opportunities for entertainment, online drinking, or studying at the gym. There were no significant differences in the other categories, suggesting that place of use had little influence on choice.

Figure 2 shows that the average number of choices is higher when listening to music than in other situations, and there is a difference between entertainment (5% significance) and online drinking and studying (1% significance). The mean number of earphones selected for listening to music was higher than that for other situations. In particular, many participants tended to choose wireless earphones when they were on the move or at the gym, and wired earphones when they were at home or in a café. The mean number of earphones selected for an online drinking party was 1%, which was significantly lower than that for the other situations. The reason for this may be that online drinking parties are often held at home, and earphones are not used in many cases.

Finally, when we compared the number of choices according to place and situation, we found that the difference in the number of choices by place was small, while the difference in the number of choices by situation was large. This suggests that the situation in which earphones are used has a significant influence on the choice of earphones.

![Figure 1 Test results for location](image1)

![Figure 2 Test results for situation](image2)
7. Conclusion

In this study, we investigated the variation in the selection of earphones depending on the place and situation of use. Multiple comparisons showed that the number of types of earphones selected was dependent on the place of use but not on the situation of use. Thus, it became clear that the results of product selection vary depending on the place and situation of use. The results suggest that the use of earphones has a significant influence on the choice of earphones, which may lead to decision-making support for product selection.

In the future, we aim to use the findings of this study to propose a method of providing product information that is tailored for each individual. It is also necessary to conduct experiments with a larger number of participants, taking into account consumer attributes and their expertise on the product. Moreover, it is important to consider more products and services as targets.

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