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# PSYCHOLOGICAL ELEMENTS FOR CONSIDERATION IN DEVELOPING ELDERLY-FRIENDLY PRODUCTS

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## ABSTRACT:

The aim of the present study is to identify the elements towards which psychological design should be oriented when developing elderly-friendly products. The authors analyzed, by image evaluation, three items that have been developed at a particular company as elderly-friendly products in the process of their design. The analysis extracted, as a result, affinity and status as factors common to these items. Next, we attempted to determine whether these two factors represented important elements for the elderly with regard to more general product design as well. To that end, an analysis was conducted, via the main factor method, about the image that a user demands regarding the design and function of a particular daily use product. As a result we found

that, of the seven factors extracted, three were strongly related to status, and that the other four were closely related to affinity.

# 1. INTRODUCTION

Elderly-friendly products are those designed with the elderly's physical and psychological characteristics in mind of the elderly. To obtain guidelines on the development of elderly-friendly products, the authors have focused on the psychological and physical elements of the users to which attention should be paid when designing these kinds of products. As regards psychological factors, we pointed out that affinity and status should be regarded as two such elements in our previous analysis of cameras available in the market via image evaluation (Nakayama et al. 2004). However, it remained unclear whether these elements could be specified for other products as well.

This paper describes our analysis, using image evaluation, of products as objects of a given company's design development. This analysis is intended to be a step towards determining whether these elements have generality as concerns in design development. Also, we analyzed images representing user demands in terms of the design, the function and other aspects of an everyday product.

# 2. PSYCHOLOGICAL DESIGN ELEMENTS IDENTIFIED BASED ON EXAMPLES OF ELDERLY-FRIENDLY PRODUCTS

## 2.1 EVALUATION METHOD

We conducted an analysis of three example products (utensils for retort-packed food [Fig. 1], a walker [Fig. 2], and a bed-type mechanical massager [Fig. 3]) that had been developed by a particular company as elderly-friendly products, by evaluating the images of these products according to a five-grade system. The items used for obtaining this evaluation comprised mainly those which we used in a previous analysis of cameras by image evaluation. The items relating to affinity and status are "security—insecurity," "friendly—unfriendly," "feels high-quality—feels cheap," "high-performance feel—low-performance feel" and "high-status feel—low-status feel." Additionally, the following design-related reference items were included: "round—angular," "warm feel—feels cold," "new—old" and "original—commonplace."

The subjects comprised 50 elderly persons (26 male and 24 female) of ages 65 to 73, and 50 young persons (25 male and 25 female) of ages 18 to 25. The evaluation was conducted in two periods in August 2004 and July 2005. It involved showing the photographs of the three above-mentioned elderly-friendly products to the subjects, explaining the design concepts and other details to them, and quantifying their impressions of these products via the SD (semantic differential) method followed by thus conducting a factor analysis.


Fig1: Case 1: Utensils for Retort-packed Food

Fig 2: Case 2: A Walker

Fig 3: Case 3: A Bed-Type Mechanical Massager

## 2.2 ANALYSIS RESULTS

Fig. 4 shows the results of the image evaluation by the elderly persons (average evaluation scale values). Values given to the three products varied significantly in terms of the evaluation items: “round—angular,” “new—old” and “original—commonplace.” In contrast, the differences in values were small in terms of such items as “ warm feel—cold feel” and “high-status feel—low-status feel” Fig. 5 shows results of the image evaluation by the young people. The values given to the products varied significantly in terms of the items “round—angular,” “ warm feel—cold feel” “new—old” “high-performance feel—low-performance feel” and “original—commonplace.” These results indicate that the items strongly evaluated by the elderly persons were mainly design-related, while the young persons strongly evaluated not just design-related items, but the whole range of items.

We conducted a factor analysis (using the main factor method) of the values given by the elderly persons. The results of this analysis are shown in Table 1. As shown in this table, the analysis extracted—as evaluation factors for the three products—some factors showing "affinity" ("warm feel" "security" and "friendly"), as well as others showing "status" ("feels high-quality" "high-performance feel" and "high-status feel"). While our previous image evaluation of cameras extracted affinity as the number one factor, and status based on a feeling of achievement ( Philip Kotler 1990) as the second, the present analysis extracted status as the first factor, and affinity as the second. This means that status is the most important factor in product design. On the other hand, however, the factor score for affinity given by the elderly persons was higher than the corresponding score given by the young persons, as shown in Table 2. This suggests that the importance of affinity as an evaluation factor is higher for elderly people than for young people. Regarding status as the first factor, the degree its importance as an evaluation factor is about the same for the elderly and the young.

Next, we determined the average evaluation scale values for each of the products evaluated that belong to the first and second factors. The relationship between these factors, thus determined, is shown in Fig. 6. For all three products, the elderly's average evaluation scale values of the evaluation items belonging to the first factor (status) and the second factor (affinity) are found in the first quadrant, indicating that both affinity and status are positive. As regards the evaluation by the young persons, the values for status are high in case 3 (a bed-type mechanical massager) and case 1 (utensils for retort-packed food), while the corresponding values for affinity are rather low; in case 2 (a walker), the value for status is low, and that for affinity is rather high. This means that in comparison to the elderly persons, the young persons based their evaluation on their own clear product images regarding affinity and status.

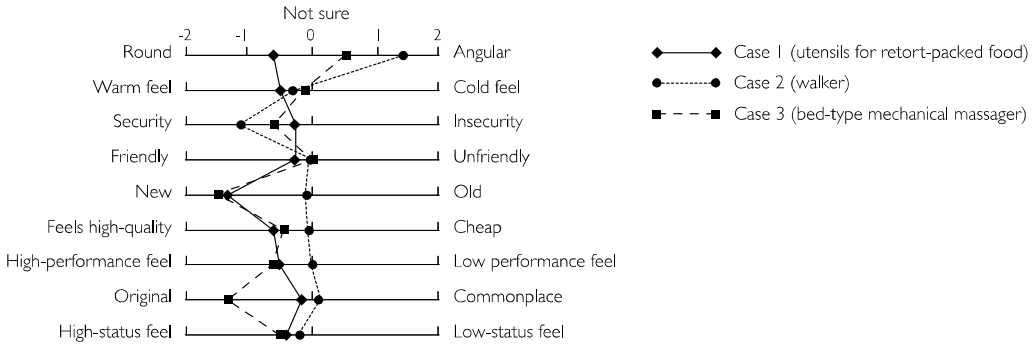


Fig4: Image Evaluation Scale Values Given by the Elderly Persons to the Three Products

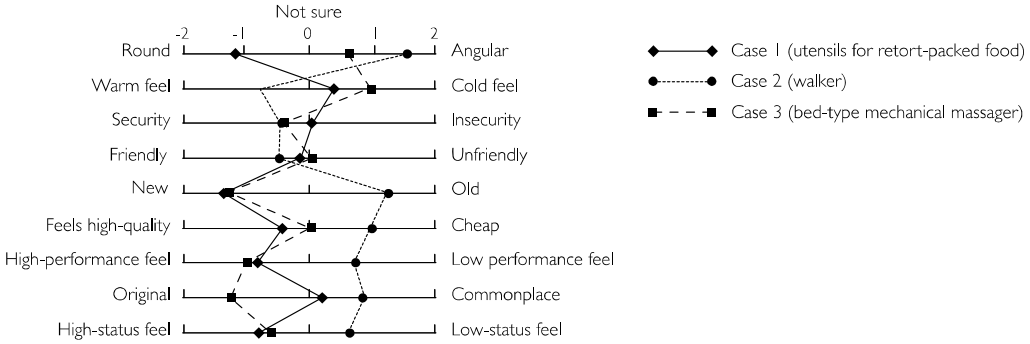


Fig5: Image Evaluation Scale Values Given by the Young Persons to the Three Products

Table 1: Factor Loads in Evaluation of the Images of the Three Products, Formed by the Elderly Persons

| Evaluation item \ Factor | 1 | 2 | 3 |
|---|---|---|---|
| Feels high-quality | 0.723 | 0.062 | 0.145 |
| High-performance feel | 0.697 | -0.017 | 0.072 |
| High-status feel | 0.511 | 0.045 | 0.283 |
| Warm feel | -0.033 | 0.648 | 0.103 |
| Security | 0.176 | 0.605 | -0.123 |
| Friendly | -0.053 | 0.537 | 0.120 |
| Round | 0.216 | 0.107 | 0.651 |
| New | 0.374 | -0.056 | 0.370 |
| Original | 0.324 | -0.049 | 0.015 |

Table 2: Factor Scores for the Young and Elderly Persons

| Attribute \ Factor | 1 | 2 | 3 |
|---|---|---|---|
| Young persons | -0.088 | -0.106 | -0.009 |
| Elderly persons | 0.084 | 0.102 | 0.008 |

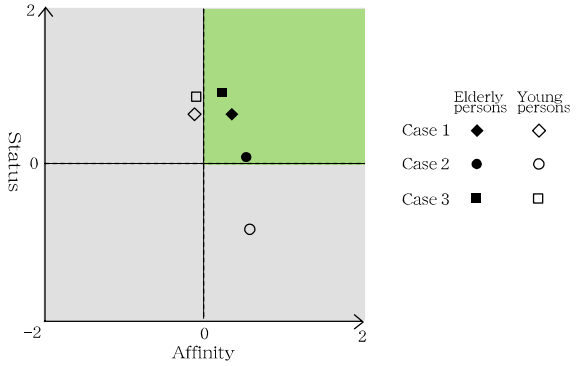


Fig 6: Relationship Between Affinity and Status, as Indicated by Average Evaluation Scale Values

# 3. IMAGE EVALUATION OF A CELLULAR PHONE

As discussed above, our study extracted two factors (affinity and status) based on an impressionistic evaluation of three elderly-friendly products ("evaluation images"). Next, we attempted to determine whether these same factors could be extracted from the images of an everyday product's with desirable design, function and other aspects that are considered desirable ("demand images"). To do this, we conducted a subjective evaluation of the demand images of a cellular phone as an everyday product, and performed a factor analysis on this evaluation. A cellular phone was chosen as the target of evaluation because it is used by many people, and is of great interest to many others even if they do not use it themselves; also, it is a tool that is used by users individually, and requires a number of sophisticated operations.

## 3.1 EVALUATION METHOD

To analyze the design, function and other aspects of cellular phone demand images, we set 29 evaluation items, as shown in Table 3, including those related to affinity and status. Some evaluation items, such as "can enjoy with other people," "use of the product together with other people" and "talk while seeing the other person's face," are concerned with human relationships. Also, there are items representing previous experience (such as "have seen the phone before" and "different from the one I have seen before"), as well as others representing operability (such as "many functions," "sophisticated operations I can do myself," "various uses based on my inventiveness" and "I recognize my own improvement"). As evaluation items related to design, we set such items as "friendly," "interesting," "high-quality feel," "brand image" and "feels heavy." The subjects were asked to choose what they would desire about the design and function of a cellular phone, if they were to buy one. Their responses to the 29 evaluation items were coded according to a five-grade system, quantified via the SD method, and subject to a factor analysis.

Subjects were comprised of 55 elderly persons (26 male and 29 female) of ages 60 or more, and 50 young persons (28 male and 22 female) of ages 18 to 25. The evaluation was conducted over June to July 2005.

## 3.2 ANALYSIS RESULTS

The factor analysis (by the main factor method) was performed on the image evaluation scale values given by the elderly persons as regard the design, function and other aspects of the cellular phone. The factors extracted in this analysis are shown in Table 3.

As for the first factor, the evaluation items with high factor loads include such items as “enjoying images on the cellular phone together with others,” “sophisticated operations I can do myself,” “use of the product together with other people,” “various uses based on my inventiveness,” “many functions” and a “feeling of status higher than that which I had for the one I used before.” These can be categorized as factors related to attempts to achieve a sense of accomplishment through self-development. The first factor involves some items representing affinity between people. This is assumed to be due to the demand image of a cellular phone as an instrument that facilitates communication. Table 4 shows the factor scores obtained for the young and the elderly persons. As shown in the table, the factor score for the young persons is positive and high, while that for the elderly persons is a negative value. This indicates that, compared to elderly people, young people have a stronger desire for a sense of accomplishment through the attainment of self-development, as represented by the first factor.

As for the second factor, the items with higher factor loads include “feeling of brightness,” “feeling of softness,” “warm feel” and “round.” These items can be categorized as ones of affinity which represent limited sensory stimuli, and therefore create impressions or feelings of affinity. Table 4 shows that, regarding this factor, the score for the elderly persons is high, while that for the young persons is low. This indicates that compared to the young, the elderly have a greater desire for impressions or feelings of affinity.

As for the third factor, the items with higher factor loads include “attention from other people,” “recognition of my improvement in operation,” “brand image” and “a feeling of higher status resulting from possession.” These can be categorized as representing a sense of accomplishment. While both the first and third factors involve this sense of accomplishment, however, the latter is different from the former in that it indicates desire for a higher status in comparison with other people. In the above, the first factor was interpreted as attempts to achieve one’s sense of accomplishment through self-development. By contrast, the third factor can be categorized as one trying to achieve a high-status feel in comparison with others, in addition to self-development. For both elderly and young persons, the score for the third factor approximates to zero. This indicates that the factor is sought by the young and elderly to similar extents.

As for the fourth factor, the items with higher factor loads are “friendly” and “a feeling of attachment that grows with use.” These can be categorized as representing affinity. The “a feeling of attachment that grows with use” item may be interpreted as a sense of accomplishment that results from the feeling that the user now possesses his/her phone in the true sense of the word. However, we think it more appropriate to interpret it as an item representing affinity, i.e. attachment, that grows over the use period. While both the second and fourth factors involve affinity, however, the latter is different from the former in that it indicates desire for an image of affinity between people as realized in human relationships. Comparison between the young and elderly persons regarding this factor reveals that the factor score for the young is high, while that for the elderly is low. This indicates that affinity as represented by the fourth factor is sought more strongly by the young than by the elderly. This result is contrary to our previous assumption that the elderly has more desire for the image of affinity between people. The result suggests that product design that satisfies a desire for affinity between people is demanded by the young at least as strongly as by the elderly.

As for the fifth factor, the items with higher factor loads are “have seen the phone before” and “Relationship with vogue” Contrary to our anticipation that “Relationship with vogue” would be categorized as an item representing a sense of accomplishment, it is likely better interpreted as an item representing a desire for affinity, i.e. to have something which others have. Accordingly, the factor can be categorized as one representing affinity.

Regarding this factor, the score for the elderly persons is high, while that for the young persons is low. This indicates that the elderly have a stronger desire for affinity as represented by the fifth factor.

As for the sixth factor, the “classic” factor is important. This can be categorized as representing affinity and, as such, is similar to the fifth factor. For both the elderly and young persons, the score for the sixth factor approximates to zero. This indicates that the factor is sought by the young and elderly to similar extents.

Regarding this factor, the score for the elderly persons is high, while that for the young persons is low. This indicates that the elderly have a stronger desire for affinity as represented by the fifth factor.

As for the seventh factor, the “feels high-quality” item has a higher factor load. This can be categorized as representing a sense of accomplishment. While being a sensuous evaluation

image, the “feels high-quality” item also indicates attempts to attain self-development. Also, the score for this factor approximates to zero for both the elderly and young persons. This indicates that the factor is sought by the young and elderly to similar extents.

As discussed above, we extracted seven factors. Analysis of these factors suggests that the first, third and seven factors are related to status, while the second, fourth, fifth and sixth factors are related to affinity.

Table 3: Factor Loads for Demand Images Formed by the Elderly Persons About the Cellular Phone

| Evaluation item \ Factor | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Enjoyment with other people | 0.717 | 0.056 | 0.057 | 0.315 | -0.001 | 0.051 | -0.172 |
| Sophisticated operations I can do mysel | 0.608 | -0.151 | 0.066 | 0.053 | -0.139 | -0.122 | 0.072 |
| Use together with other people | 0.602 | 0.196 | -0.063 | 0.278 | 0.126 | 0.126 | -0.136 |
| various uses based on my inventiveness | 0.574 | -0.205 | 0.009 | 0.218 | -0.007 | 0.147 | -0.128 |
| many functions | 0.536 | -0.093 | -0.069 | 0.002 | 0.064 | 0.263 | 0.122 |
| Interesting | 0.532 | 0.115 | 0.051 | 0.096 | 0.018 | -0.111 | 0.147 |
| Feeling of status higher than that towards the one I used before | 0.518 | 0.150 | 0.414 | 0.048 | -0.044 | -0.168 | 0.297 |
| Feeling of brightness | 0.251 | 0.767 | -0.164 | 0.248 | 0.075 | -0.009 | 0.006 |
| feeling of softness | -0.255 | 0.594 | -0.073 | -0.023 | -0.126 | 0.127 | -0.149 |
| warm feel | -0.021 | 0.543 | 0.132 | 0.263 | -0.034 | 0.059 | 0.022 |
| Round | -0.001 | 0.533 | 0.053 | -0.122 | 0.285 | 0.201 | 0.079 |
| Attention from other people | 0.222 | -0.003 | 0.656 | 0.142 | -0.259 | -0.078 | -0.044 |
| Recognition of my improvement in operation | 0.047 | -0.034 | 0.651 | 0.250 | 0.182 | -0.191 | 0.348 |
| Brand image | -0.150 | -0.041 | 0.531 | -0.146 | 0.077 | -0.001 | -0.072 |
| Feeling of higher status resulting from possession | 0.407 | 0.005 | 0.523 | 0.050 | -0.125 | 0.192 | -0.067 |
| Friendly | 0.236 | 0.211 | 0.026 | 0.777 | 0.019 | 0.129 | 0.014 |
| Feeling of attachment which grows with use | 0.288 | 0.029 | 0.087 | 0.511 | -0.112 | -0.105 | 0.160 |
| Experience of having seen the phone before | -0.075 | 0.133 | -0.026 | -0.035 | 0.674 | -0.146 | -0.238 |
| Relationship with vogue | 0.180 | -0.074 | -0.053 | -0.199 | 0.530 | 0.358 | -0.180 |
| Classic | -0.224 | -0.060 | -0.087 | 0.019 | -0.053 | 0.825 | 0.140 |
| Feels high-quality | 0.034 | 0.120 | -0.007 | 0.068 | -0.156 | 0.123 | 0.678 |
| No irritation even with rather slow responses in operation | -0.430 | 0.185 | -0.125 | -0.105 | 0.205 | -0.059 | -0.147 |
| Different from the one I have seen before | 0.405 | -0.014 | 0.074 | -0.110 | -0.234 | -0.128 | 0.021 |
| Talk while seeing the other person’s face | 0.318 | 0.142 | 0.114 | -0.109 | -0.101 | 0.083 | 0.029 |
| Not fastidious with products | -0.280 | -0.039 | -0.012 | 0.055 | 0.382 | 0.173 | -0.122 |
| Preference for truly excellent products | 0.150 | 0.170 | 0.256 | 0.080 | -0.071 | 0.168 | 0.205 |
| A low price | -0.071 | 0.166 | 0.013 | -0.042 | -0.210 | 0.099 | -0.017 |
| Feeling of heaviness | -0.020 | -0.077 | 0.058 | -0.007 | -0.064 | -0.032 | -0.097 |
| Feeling of showiness | 0.048 | 0.080 | 0.015 | 0.001 | 0.012 | 0.018 | -0.013 |

Table 4: Factor Scores for the Young and Elderly Persons

| Attribute \ Factor | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| Young persons | 0.445 | -0.219 | 0.069 | 0.232 | -0.377 | -0.063 | -0.061 |
| Elderly persons | -0.437 | 0.215 | -0.067 | -0.227 | 0.369 | 0.062 | 0.060 |

## 4.CONCLUSION

To clearly identify the psychological elements to which attention should be given when producing elderly-friendly design, the authors analyzed, by image evaluation, three products (utensils for retort-packed food, a walker and a bed-type mechanical massager) as objects of design development. This analysis resulted in the extraction of certain factors common to these items. Some of these factors ("warm feel" "security" and "friendly") are assumed to represent affinity, while others ("feels high-quality," "high-performance feel" and "high-status feel") are assumed to represent status.

Next, we conducted an analysis of the demand images about the design, function and other aspects of an everyday product (a cellular phone). The results show that the first factor can be interpreted as indicating attempts to achieve a sense of accomplishment through self-development, the second factor as representing a feeling of familiarity, the third factor as indicating desire for a higher status in comparison with other people, the fourth factor as indicating desire for affinity in human relationships, the fifth factor as representing affinity, in the sense of a desire for proven products that do not have any novel elements; the sixth factor as indicating desire for familiarity; and the seventh as indicating desire for self-development, as in the first factor. Accordingly, it is assumed that there is a strong relationship between status and the first, third and seventh factors. Also, there is a relationship between affinity and the second, fourth, fifth and sixth factors. As discussed above, the results of the present study confirm that elderly-friendly products are generally based on the elements of affinity and status; and that they play an important role in design development.

## REFERENCES:

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