A Fundamental Study on Complementary Application Method of Nomothetic and Idiographic Approaches on Impression Evaluation

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Abstract: The purpose of this study is to show that a mutual complementary use of nomothetic and idiographic approaches can make the interpretation of result in *Kansei* study abundant. As an example, we did an experiment of the impression evaluation on clock. We used semantic differential (SD) technique as nomothetic approach and personal attitude construct (PAC) Analysis as idiographic approach.

In PAC Analysis, subjects elicit free associations about object. And they estimate the degree of the similarity about all pairs of associations items. Cluster analysis is applied by the similarity matrix of each subject. Then they are asked to interpret their own clusters and describe its contents. The results of each case reveal the individuality.

Generally, SD technique gives image construct among subjects. But, it has three restrictions：ⅰ)Factors related to impression are not always cleared；ⅱ)Validity of results in Factor analysis；ⅲ)The individuality of interpretation on adjective words is difficult to detect. PAC Analysis can complement ⅰ) by exploring each subject's evaluation construct (Free-PAC). To complement ⅱ) and ⅲ), we conducted PAC Analysis using adjective words in SD technique, instead of free association (SD-PAC).

Ten subjects conducted impression evaluation by SD technique and two PAC Analyses. Major Findings were as follows：(a) SD technique showed that the first factor (impression on shape) didn't have any differences between like and dislike for clock. But, the second factor (value judgement) has difference between the preferences for clock；(b)Free-PAC detected the evaluation about clock's practical aspect, which was overlooked in SD technique；(c)SD-PAC showed that almost subject's evaluation related impression on shape to value judgement.

***Key words*:** *Semantic Differential (SD) technique, Personal Attitude Construct (PAC) Analysis, Nomothetic approach, Idiographic approach, each complement*

1. Introduction

As a research approach of *Kansei* study, we think there are two approaches. That is nomothetic approach and idiographic approach. The aim of nomothetic approach is to discover the general laws which are applied to all the people. This approach's data is gained by many subjects. On the other hand, idiographic approach intends to attain the unique knowledge or insight about the subject or the case. And data is obtained from one subject or one case. Each approach has merits and demerits. If researcher uses only one approach in investigating certain phenomenon, researcher can know the result gained by one approach, but the result by the other approach. If researcher uses two approaches complementary, he (she) may be able to know the result gained by two approaches and make the interpretation abundantly.

Therefore, in this paper, we hope to show that a mutual complementary use of nomothetic and idiographic approach can make the interpretation of the result in *Kansei* study abundant. We selected a clock for experiment of clock as an example.

2. Method

We used Semantic Differential (SD) technique for the nomothetic approach [1]. SD technique began with Osgood's linguistic study, it has been also used the method for grasping the image construct of the object [2] [3]. And we used Personal Attitude Construct (PAC) Analysis for the idiographic approach [4]. This analysis aims to seek individual's attitude, image or cognition to object (e.g. classroom climate [5], sexual need and behavior [6]).

2.1 Semantic Differential (SD) technique

First, the evaluation object must be decided. The evaluation object can be used sensory things as color, shape or smell. And images as social (to a city and a political party etc), product or person can also be object. Secondly you must prepare some pairs of the adjective words which are suitable for ornamenting the evaluation object and then, you divine these pairs into several ranks and make them scale. Many subjects are made to answer these scales. Finally, by conducting factor analysis to scales, you can search image construction of the evaluation object.

2.2 Personal Attitude Construct (PAC) Analysis

This analysis aims to gain rich information on an individual or a case by as follow.

i) Subjects elicit free associations about object.
ii) They rate important rank of free association items and researcher (or experimenter) record associate rank of those items.
iii) Subjects estimate the degree of the similarity about all pairs of association items.
iv) Cluster analysis is applied by the similarity matrix of each subject. Then they are asked to interpret their own clusters and describe its contents.
v) Finally experimenter conducted comprehensive interpretation by using all data gained to that point.

By above procedure, researcher intends to gain rich information on an individual or a case.

2.2 Differences between two methods

The plain difference between two methods is as follow. In SD technique, subjects are given the evaluation

scale and aren’t asked how to interpret the scale. On the other hand, in PAC Analysis, subjects are made to produce evaluation scale by themselves and asked how to interpret the evaluation object by the scale. On table1, we showed the differences between SD technique and PAC Analysis.

Table.1 Differences between SD technique and PAC Analysis; evaluation scale and interpretation of evaluation scale

	SD technique	PAC Analysis
Evaluation scale	given	produce by subjects
Interpretation of evaluation scale	Subjects aren't asked how to interpret the pairs of adjective words.	Subjects are asked how to interpret association items.

2.3 Two method’s restriction and mutual complement

SD technique and PAC Analysis have more differences. To compare restrictions of SD technique with that of PAC analysis, differences between two methods will become clear. SD technique’s restrictions are as follow.

a. Not always getting clear answer about factors related to impression

Although impression to the same object is not always equally to everyone, in SD technique, researcher uses common scales (the pairs of the adjective words) to all subjects. Therefore, in SD technique, researcher can’t always get clear answer about what influences impression.

b. The validity of factor analysis’s result

Researcher can’t know whether the result of factor analysis fits each subject’s construct of impression evaluation or not.

c. Difficult to detect individual difference in interpreting the pairs of the adjective words

Subjects don’t always interpret the pairs of the adjective words equally. Also some subjects may have unnecessary pairs to evaluate objects or need necessary pairs to.

Although SD technique has these restrictions, it is useful method to search impression evaluation construct common with subjects. On the other hand, in PAC analysis, researcher can’t apply the result from one subject to other subjects. But, this method gives detail information on one subject.

Therefore, to solve restriction “a.”, comparing factor analysis’s result gained by SD technique with individual’s evaluation construct gained by PAC Analysis, may be useful. Comparing results, researcher will be able to explore each subject’s factors influenced on impression evaluation.

However, restriction “b.” and “c.” can’t complement PAC Analysis based on free association. Therefore, we conducted another PAC analysis which used the pairs of adjective words instead of free association. The following, we transcribed PAC Analysis based on free association as **Free-PAC** and used the pairs of the adjective words

instead of free association as **SD-PAC**.

By comparing the result of factor analysis with the SD-PAC's cluster construct based on the pairs of adjective words, it will be possible that whether the result of factor analysis matches the individual's evaluation construct or not. And also, it will be possible that individual difference in interpretation of adjective words can detect. Fig.1 shows that Free-PAC and SD-PAC complement SD technique.

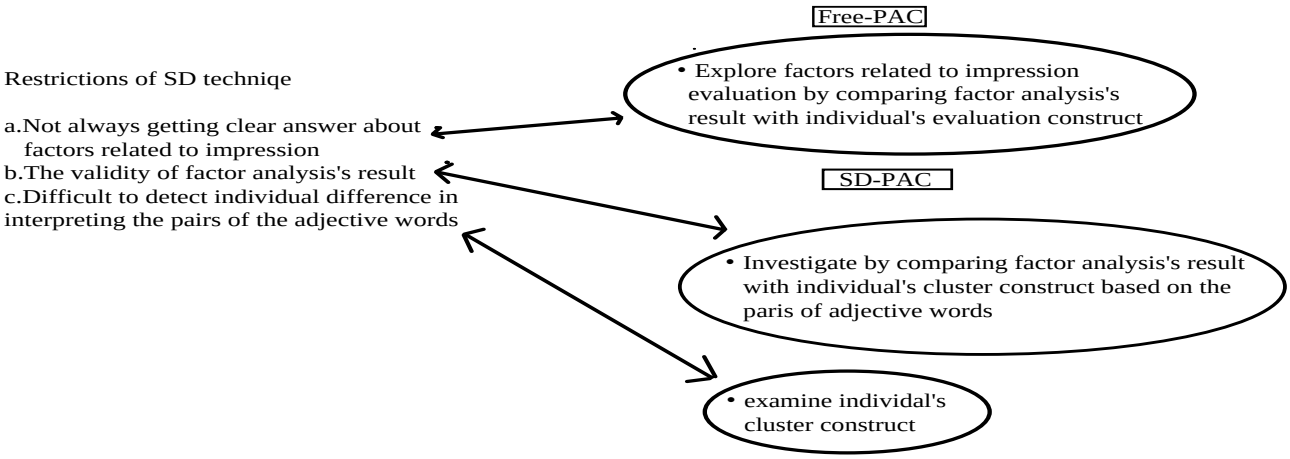

Fig.1 Free-PAC and SD-PAC complement SD technique

SD technique also complements two PAC analysis's restriction. The restriction is that researcher can't judge how the result of PAC Analysis differs from general tendency. SD technique gives judgment flame to judge general tendency. Comparing individual data (PAC Analysis's data) with general tendency, individual data is made to interpret easy. Fig.2 shows the mutual complement relation among SD technique, Free-PAC and SD-PAC.

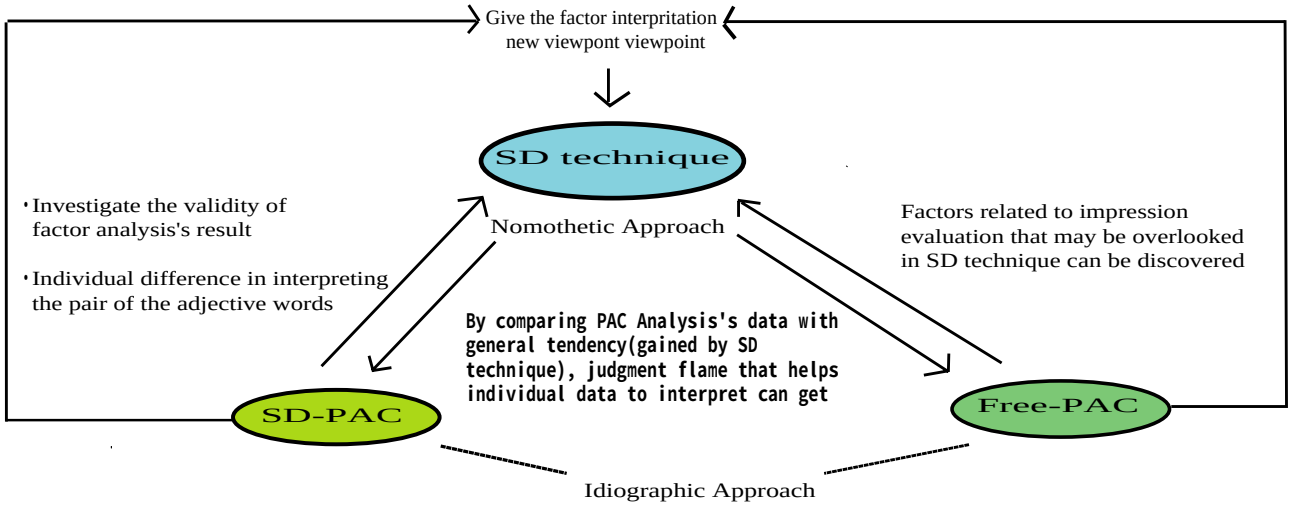

Fig.2 Mutual Complement relationship among three methods

2.4 The evaluation experiment to clock: object and subjects and procedure

2.4.1 Object

We used metal alarm clock made by IDEA INTERNATIONAL CO. as an object of impression evaluation (See

Fig.3).

Fig.3 Metal alarm clock (an object of impression evaluation in this study)

2.4.2 Subject

Ten subjects (five men and women) participated in this experiment. Table2 shows the average and SD of age.

Table2. Subjects's average age and SD

	Total	Man	Woman
N	10	5	5
M	23.0	23.2	22.8
SD	1.25	1.3	1.3

＊M stands for mean and SD stands for Standard Deviation.

2.4.3 Procedure

Each subject conducted impression evaluation by SD technique and two PAC Analyses. But, taking order effect into consideration, each subject was randomly assigned the order of impression evaluation method. In each method, before started impression evaluation by each method, subjects were asked to observe clock in hand for one minute. After this subjects were asked to evaluate in each method. And at the end of experiment, subjects were asked if they liked the clock. Experiment was conducted individually. One experiment took about two hours to three hours.

3. Results and Discussions

We mentioned the result of three impression evaluation method individually.

3.1 SD technique

We prepared ten pairs of adjective words as scales, but we excluded four pairs. Because three pairs were detected floor effect and one pair showed very low communality. And then we conducted factor analysis again using the rest of six pairs. As the method of factor analysis, we conducted as follow; prior communality estimates was one, factor method was principal component. By the second factor, cumulative contribution was 67.38 %, so we judged that using two factors might be appropriate. Table3 showed factor loadings after varimax rotation.

Table3. Factor loadings after varimax rotation

scales	the 1st factor	the 2nd factor	communality
sober-gay	-0.53	0.03	0.29
boring-interesting	-0.06	0.96	0.93
beautiful-dirty	0.17	0.79	0.66
square-round	0.9	0.32	0.92
unfamiliar-familiar	0.45	0.52	0.47
blunt-sharp	-0.88	-0.1	0.78
variance explained by each factor	2.1	1.94	4.04

We interpreted the first factor as “impression on shape”. Because we considered that it represented impression by observing or touching the clock. And we interpreted the second factor as follow. Whether people think a certain object interesting or not, beautiful or not, is depended on their preference. Preference related to each person’s value judgment. Therefore, we named the second factor as “value judgment”. We analyzed further by using each factor’s factor score. We divided subjects into two groups by the preference for the clock and compared two groups by conducting ANOVA in each factor. The preference for the clock was showed in table4 and the mean and the standard deviation of each factor score was in table5.

Table4. The Preference for the clock

	Like	Dislike
Man	1	4
Woman	4	1

N=10

Table5. Mean and standard deviation of each factor score

	Impression on shape		Value judgment	
	Like	Dislike	Like	Dislike
N	5	5	5	5
M	0.1	-0.1	0.87	-0.87
SD	0.76	1.28	0.5	0.3

In the first factor, significant difference was not detected ($F(1, 8) = 0.09$ $p>.10$) between two groups, but in the second factor the average of like group scientifically exceeded the average of dislike group ($F(1, 8) = 44.15$ $p<.01$). We considered that the preference for the clock and impression on shape didn’t have relation to each other, but that the preference for the clock had relation to value judgment.

3.2 Free-PAC

In SD technique, two factors, shape(Factor Ⅰ) and value judgment(Factor Ⅱ) which may be related to impression evaluation. But, in Free-PAC, the factor other than theirs was discovered. This was clock’s practical aspects.

However, the pairs of adjective words stood for the evaluation of clock’s practical aspects was appeared when

the pairs used in SD technique was selected as evaluation scales. In this study, we made the standard of selecting the pairs. The standard was as follow. ⅰ) More than two experiment cooperator(the number of cooperator is four) produced in common ⅱ) related to matter-of-fact evaluation ⅲ) related to comprehensive impression. So, we didn't choose the pairs related to clock's practical aspects.

Considering above facts, if we included practice aspects in scales of SD technique, the result might be changed. However, four of ten subjects didn't observe the practice aspects (See table6). And evaluation to clock's practical aspects was negative (e.g. difficult to use or understanding) in spite of the preference for the clock.

Table6. Features which each subject observed

feature / preferenc	looks	looks + practice
like	2	3
dislike	2	3

N = 10

Considering these results, the judgment of the preference was much influenced by whether individual's preference matched clock's shape(e.g. looks and the feel of material) or not. Although in the result of SD technique, we interpreted that shape and preference had no relation, considering from the result of Free-PAC, both might have relation.

3.3 SD-PAC

3.3.1 Examination of factor analysis's validity

One purpose of SD-PAC was examined whether the result of factor analysis gained by SD technique matched each subject's evaluation construct or not. As the result of the factor analysis, we named the first factor "impression on shape" and the second factor "value judgment". The pairs of adjective words which showed high loading to the first factor were "sober-gay", "square-round" and "blunt-sharp", to the second factor "dirty-beautiful" and "boring-interesting".

We judged the validity of factor analysis by examining following things. ⅰ) In individual's cluster construct (gained by SD-PAC), was there the cluster corresponding to each factor. ⅱ) If there was correspondent in the cluster, the pairs of the adjective words included in the cluster matched the pairs showed high loading each factor (See Fig.4).

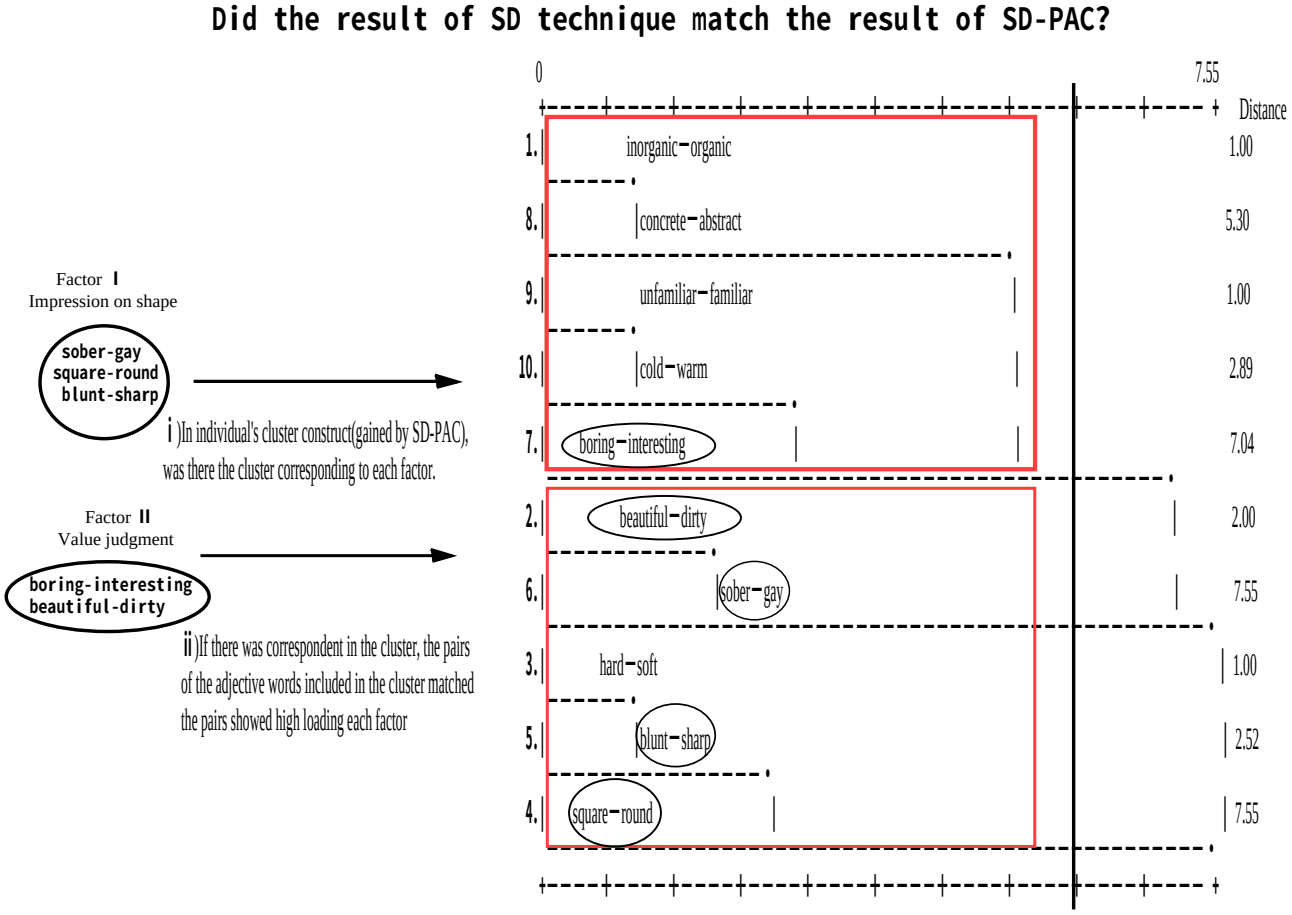

Fig.4 Examination of factor analysis's validity

Although we excluded four pairs in SD technique, in SD-PAC we used these pairs. Therefore, comparing the result of SD technique with SD-PAC had some restrictions.

Impression on shape (Factor Ⅰ) was discovered in each subject's cluster construct. But, which pairs were related to the evaluation on shape was different among subjects.

"Dirty—beautiful" and "boring—interesting" which showed high factor loading to the second factor were not belong to the same cluster and didn't make the cluster related to value judgment(except for subject B). Only one pair("dirty—beautiful" or "boring—interesting") was mixed other pairs (stood for clock's looks) and made the cluster related to value judgment.

In common with the result of Free-PAC, we discovered that evaluation for clock's looks and value judgment had connection in individual level (This relation could not be detected in SD technique.).

3.3.2. Validity of adjective words influenced by individual difference

In SD-PAC, we also aimed at examining that whether if subjects interpret pairs of adjective words equally or not. And did some subjects need pairs for evaluation or have unneeded pairs for evaluation? First, we investigated former.

Table7. The result of how to interpret each pairs

	Gender/Prefer	hard-soft	sober-gay
Subject A	male/dislike	the sense of touch	unnecessary to evaluate
Subject B	male/dislike	impression of the touch by looking	color,shine
Subject C	male/dislike	the feel of a material	how much factors(number of shape) are consisted of shape
Subject D	male/dislike	the sense of touch. Because of metal	judgment by preference
Subject E	female/dislike	the special quality of matelial, and shape	impression at a glance. sober stands for simple
Subject F	female/like	from looks and the sense of touch	evaluation for comparing color and looks to my taste
Subject G	female/like	atomosphere as somehow	shape and color
Subject H	female/like	impression of looks and after touching	simple or not
Subject I	female/like	shape	shape
Subject J	male/like	the feel of a material after touching	shape and construction of the feeling of a material

		inorganic-organic	boring-interesting
Subject A	male/dislike	image on whole of the clock	clock's atomosphere
Subject B	male/dislike	shape. feel square or circle	be excited with me or not
Subject C	male/dislike	the feeling of a material	evaluation for device(look at time operate)
Subject D	male/dislike	shape	judgment by preference
Subject E	female/dislike	because material is metal	if use the clock, I feel enjoyning or not
Subject F	female/like	imagine the meaning of shape	judge looks, funcions and operarion overall
Subject G	female/like	shape, character(on dial) and the quality of material	shape
Subject H	female/like	feeling from first impression	feeling from first impression
Subject I	female/like	shape	sense is good, but too simple. So I don't fell interesting
Subject J	male/like	shape and the quality of material	unnecessary to evaluate

		cold-warm	concrete-abstract
Subject A	male/dislike	the feeling of a material on looks	clock's atomosphere
Subject B	male/dislike	from whole shape(lines and faces etc)	what associate from the clock
Subject C	male/dislike	normal as machine or not. If clock is too warm, it is abnorı	It is easy or difficult for the clock's device
Subject D	male/dislike	the quality of material	shape
Subject E	female/dislike	looks. Because material is metal	From feeling which clock has only necessary things as its parts, I feel abst
Subject F	female/like	color and the sense of touch	shape stands for something or not
Subject G	female/like	shape or luster	shape
Subject H	female/like	impression from a glance and touch	rouse creativity or not
Subject I	female/like	the sense of touch and shape	shape
Subject J	male/like	the sense of touch and shape	shape

		dirty-beautiful	square-round
Subject A	male/dislike	about stain	the outer flame of an edge
Subject B	male/dislike	clock is made properly or not	treatment of an edge
Subject C	male/dislike	about stain	evaluation on shape
Subject D	male/dislike	This pair's interpretation is changed as conditions on that c	shape
Subject E	female/dislike	luster	judge by looking an edge
Subject F	female/like	about stain	shape
Subject G	female/like	shape and color. And luster, dial's color and character	shape and character of dial
Subject H	female/like	looks and keeping clean or not in using this clock	the sense of touch
Subject I	female/like	about stain	shape
Subject J	male/like	unnecessa unnecessa unnecessary to evaluate	shape

		unfamiliar-familiar	blunt-sharp
Subject A	male/dislike	unnecessa unnecessa unnecessary to evaluate	an edge
Subject B	male/dislike	want to put this clock beside me or not	luster
Subject C	male/dislike	evaluation I want to buy or not	shape
Subject D	male/dislike	judgment by preference	shape and luster
Subject E	female/dislike	buy or not	shape
Subject F	female/like	judgment by comparing my taste	shape
Subject G	female/like	familiar to shape or not	luster
Subject H	female/like	want to touch	evaluation for touching an edge
Subject I	female/like	shape	shape
Subject J	male/like	shape and the feeling of a material match my taste or not	clock's features(shape and the feeling of a material etc) are clear or not

＊Reverse display stands for unnecessary pairs to evaluate

Table 7 showed that each subject how to interpret each pairs in short words. From this, it was said that some interpretations of the pairs were common, other were uncommon. For example, "dirty－beautiful" was interpreted that this meant whether clock was dirty or not by four subjects, but other six interpreted shiny, shape or color, and so on. These results showed that the interpretation of pairs was not equally among subjects.

And from the fact that subject A and J answered that they had pairs which were unnecessary to evaluate, we guessed the existence of unnecessary pairs for evaluation.

Further, as necessary pairs for evaluation, there were pairs to evaluate clock's practice aspects (from the result of Free-PAC).

4. Conclusions

We conducted impression evaluation experiment to metal alarm clock as the model case. As the method of impression evaluation, we used SD technique and two PAC analyses (Free-PAC and SD-PAC). In Free-PAC, we detected evaluation for clock's practice aspects that were overlooked in SD technique. In SD-PAC, we examined if the result of SD technique matched each subject's evaluation construct. And also we examined whether if each subject's interpretation of the pair of adjective words was equally or not. The result showed as follow. The result of SD technique didn't match each subject's evaluation construct. The interpretation of pairs was not equally among subjects. And also some subjects reported that there were unnecessary pairs to evaluate. Free-PAC and SD-PAC complemented the restriction of SD technique. That complement was due to SD technique. Free-PAC and SD-PAC gives us rich information about each subject. But those don't give general tendency. Without general tendency, the interpretation of each subject's data becomes difficult. The result of SD technique gave general tendency. Therefore, SD technique and two PAC analyses complemented each other.

Finally, we pointed out the meaning of complementary application of nomothetic and idiographic approach. Table8. represents the important rank of pairs of adjective words(scales). This important rank was gained from

Table8. The important rank of scales

scales \ subject	A	B	C	D	E	F	G	H	I	J
hard-soft	5	7	7	1	4	3	1	7	1	1
sober-gay	9	5	4	7	1	6	9	10	4	8
inorganic-organic	1	4	5	2	9	1	7	1	9	5
boring-interesting	7	9	1	10	2	7	5	3	7	10
cold-warm	6	3	6	3	6	10	4	8	6	2
concrete-abstract	2	10	10	4	7	8	8	9	5	3
dirty-beauty	10	6	3	9	10	2	3	4	8	9
square-round	4	1	8	5	5	4	10	2	2	4
unfamiliar-familiar	8	8	2	8	3	9	6	5	10	7
blunt-sharp	3	2	9	6	8	5	2	6	3	6

each subject when they evaluated the clock by SD-PAC. To examine the coincidence of the important rank, we calculated Kendall's coefficient of concordance [7]. We calculated three cases (all subjects, the group of preferring clock, the group of disliking), but significant difference was not detected in each case(all：W = 0.12,S =10.84；preferring W = 0.26,S=11.57；disliking W=0.11,S=5.12：W stands for Kendall's coefficient of concordance, and S stands for Friedman Test to examine significant of W). This showed that the importance rank of scales differed among subjects.

SD technique as Nomothetic approach takes less time and effort than PAC analysis as idiographic approach. If we used only SD technique in this experiment, the time to conduct the experiment would take 20 minutes per

subject. Actually, it took about two hours per subject, because we used SD technique and two PAC analyses. To consider the efficient of data collecting, it may be better that researcher only uses nomothetic approach. But, as showing table8, even the important rank of scales differed among subjects. Moreover, the result of Free-PAC and SD-PAC showed that factors related to impression evaluation that was overlooked in SD technique and interpretation of scales differed too. And the result of group data (the result of SD technique) didn't always match the result of individual's data (the result of SD-PAC). That is, people's feeling (*Kansei*) is various even they evaluate the same object. And, to approach this variety, only one use of nomothetic approach is insufficient. To approach it, it is useful to use nomothetic approach and idiographic approach each complementary.

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