QUANTITATIVE APPROACH TO A CROSS-SOCIETAL RESEARCH; A COMPARATIVE STUDY OF JAPANESE CHARACTER*

PART II

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1. Introduction

In comparative studies, it is not sufficient merely to compare marginal distributions of responses, because this cannot clarify the system of thought which expresses characteristics of various groups. Differences in the system of thought form a barrier to mutual understanding and consequently result in the lack of communication. In the case of difference on scale values, we can still understand each other as long as they are measurable on the same scale. While we can understand why others have different opinions, those not measurable on the same scale are beyond mutual understanding. This is the reason we need comparative studies.

Let us consider first if the problem mentioned above exists in the relation between Japanese and Japanese-Americans. A comparison was made between groups of Japanese and Japanese-Americans of various age levels concerning the response to the two questions, i.e., those who answered "would adopt" to the question of adoption and those who mentioned "repaying moral indebtedness" as "morally important." As shown in Fig. 1, very different configurations were obtained.

In Japan, responses to both questions increase monotonically with age, while among Japanese-Americans an inverse relation between the two responses is observed. That is to say, those who chose "repaying moral indebtedness" increase with age while those who said "would adopt" decrease. This indicates that the systems of thought which determine responses to these two questions are different.

Let us consider the following example as a case where the systems

* The results of our study were based on the analysis of two bodies of data: 1. The four national surveys on Japanese national character conducted by the Research Committee on the Study of Japanese National Character. 2. A Sample survey of Japanese-Americans in Hawaii conducted in 1971 by the Research Committee on the Study of Japanese-Americans in Honolulu, Hawaii.

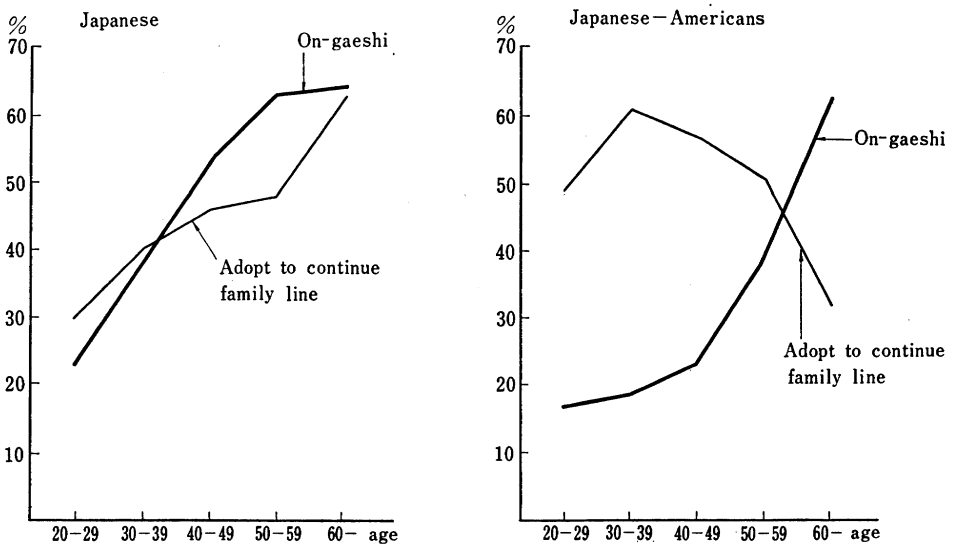


Fig. 1 Comparison of Japanese and Japanese-Americans by scale representation.

If you have no children, do you think it necessary to adopt a child in order to continue the family line, even if there is no blood relationship? Or do you not think this is important?

Would adopt	Would not adopt	Depends on circ.	Other	D.K.	Total

(Card shown) If you are asked to choose two out of this list that are important, which two would you point out?

(a) Oya-koko (filial piety, to be dutiful to one's parents)
(b) On-gaeshi (repaying moral indebtedness)
(c) Respecting individual rights
(d) Respecting freedom

of thought are different even when the marginal distributions are the same. Suppose we have two questions, their systems of thought may be clarified by the cross tabulation of these two questions. Let questions be I and II, and responses be dichotomous (α_1, α_2), and (β_1, β_2). A and B are groups, and consist of 100 people.

The marginal distributions are exactly the same and there is no difference between groups A and B on questions I and II. If we take cross tabulations, however, very different patterns are obtained as in

Table 1 Example of marginal distribution (1)

	I		II		Total
	α_1	α_2	β_1	β_2	
A	50	50	50	50	100
B	50	50	50	50	100

Table 2 Example of cross tabulation (1)

A

I \ II	β_1	β_2	Total
α_1	50	0	50
α_2	0	50	50
Total	50	50	100

B

I \ II	β_1	β_2	Total
α_1	0	50	50
α_2	50	0	50
Total	50	50	100

Table 2.

In group A, α_1 with β_1, and α_2 with β_2 are related respectively, whereas in group B, α_1 with β_2, and α_2 with β_1 are related respectively. In a case like this, mutual understanding between groups A and B is quite difficult.

The following example is similar to the one just mentioned, though a little more likely than the above hypothetical case. (Tables 3 and 4)

Table 3 Example of marginal distribution (2)

	I		II		Total
	α_1	α_2	β_1	β_2	
A	60	40	60	40	100
B	60	40	60	40	100

Table 4 Example of cross tabulation (2)

A

I \ II	β_1	β_2	Total
α_1	50	10	60
α_2	10	30	40
Total	60	40	100

B

I \ II	β_1	β_2	Total
α_1	20	40	60
α_2	40	0	40
Total	60	40	100

In this example, it is shown that a strong relation exists between α_1 and β_1, and α_2 and β_2 respectively in group A, and between α_1 and β_2, and α_2 and β_1 respectively in group B.

These are examples of cases having two questions. In order to see the relation among many questions, a factor analytic method should be applied, as shown in Appendix. This is what we call *quantification on response pattern* (by Guttman-Hayashi). This method is a variation of principal component analysis based on the data expressed by category-response-reaction. To clarify such a relation, "giri-ninjo" questions are used as examples, since "giri-ninjo" is one of the major characteristic of Japanese.

2. Giri-ninjo question*

The following questions are used as the ones related to "giri-ninjo." It is our understanding that "giri-ninjo" should not be viewed as a combination of two terms, "giri" and "ninjo," but as one unified term. Expressing one idea, Japanese do not necessarily determine their action with "giri-ninjo" in their mind, but rather, they do so by considering various other matters. However, even when an action has not been taken from the standpoint of "giri-ninjo," it often becomes necessary to express "giri-ninjo" feelings afterwards or to take "giri-ninjo" type care toward the action to maintain good human relations. On the other hand, even when they think from a "giri-ninjo" standpoint, they do not necessarily behave in accordance with "giri-ninjo." They oscillate between demonstraing "giri-ninjo" behavior at one time and not doing so at another.

And, on the whole, survey data indicate that there is a tendency to show "giri-ninjo" type behavior more frequently than not. Therefore, when we consider the problem of the Japanese "giri-ninjo," it should be a complex and multi-faced consideration, and it should be realized that reducing everything to "giri-ninjo" would lead to misunderstanding.

Next, let us to list the questionnaires we used. And in the following discussion, the notations, young, middle, and older, will be used for three adult age groups of 20 to 34, 35 to 49, and 50 and over respectively.

Giri-ninjo questionnaires Response: ○ traditional × non-traditional

1. Suppose that a child comes home and says that he has heard a rumor that his teacher had done something to get himself into trouble, and suppose that the parent knows this is true. Do you think it is better for the parent to tell the child that it is true, or to deny it?
   ○ (a) Better to deny × (b) Better to affirm
2. (Picture shown) Imagine this situation. Mr. M was orphaned at an early age and was brought up by Mr. A a kind neighbor. The A's gave him a good education, sent him to a university, and now Mr. M has become the president of a company. One day he gets a telegram saying that Mr. A, who brought him up, is seriously ill and asking if he would come at once. This telegram arrives just at the moment when he is going to an important meeting which will decide whether his firm is to go bankrupt or to survive.
   (Card of alternative shown) Which of the thing written on this card do you think he should do?

* The phrase *giri-ninjo* may be loosely defined as "duty and affection." Broadly speaking, it refers to a "traditional" Japanese stance toward human relationship. The point is not that Japanese always act on the basis of *giri-ninjo* standards, but our surveys over the years have found that such standards are likely to be applied to behavior more often than not. We tested this style of "traditionalism" with a battery of seven questions.

○ (a) Leave everything and go back home.
× (b) However worried he might be about Mr. A, he should go to the meeting.

3. The last question supposed that Mr. A had taken him in as an orphan in his youth and brought him up. Supposing that it had been his real father who was on his death-bed. Which would have been your answer then?
○ (a) Go home × (b) Attend meeting

4. Suppose that you were the president of a company. The company decides to employ one person, and then carries out an employment examination. The supervisor in charge reports to you, saying,
"Your relative who took the examination got the second highest grade. But I believe that either your relative or the candidate who got the highest grade would be satisfactory. What shall we do?"
In such a case, which of them would you employ?
(Card shown)
× (a) One with the highest grade ○ (b) Your relative

5. In the last question we supposed that the one getting the second highest grade was your relative. Suppose that the second was the son of parents who had been your benefactor.
Which of them would you employ?
× (a) One with the highest grade ○ (b) Son of your benefactor

6. Suppose you are working in a firm. There are two types of department chiefs. (Card shown) Which of these two would you prefer to work under?
× (a) A man who always sticks to the work rules and never demands any unreasonable work, but on the other hand, never does anything for you personally in matters not connected with the work.
○ (b) A man who sometimes demands extra work in spite of rules against it, but on the other hand, looks after you personally in matters not connected with the work.

7. (Card shown) If you are asked to choose two out of this list that are important, which two would you point out?
○ (a) Oya-koko (filial piety, to be dutiful to one's parents)
○ (b) On-gaeshi (repaying moral indebtedness)
× (c) Respecting individual rights
× (d) Respecting freedom

For each question, circle, "○," represents the response which is regarded as traditional (i.e. "giri-ninjo" type) and "×" represents non-traditional (i.e. not "giri-ninjo" type).

First of all, to simplify the matter, let us assign 1 to those who give "giri-ninjo" type responses and 0 to those who give "non-giri-ninjo" responses. By adding up the scores, we may have a scale for measuring "giri-ninjo" upon which we can base our comparison. This idea is slightly different from "○" and "×" representations mentioned above. In doing so, the response to the second question with that to the third, the fourth with the fifth, and the response to the seventh question were pooled respectively, and 1 was given to those combinations which were considered to be "giri-ninjo" type as in the Table 5. Thus, the scale values will be used are from 0 to 5, and the results are shown in Fig. 2. Later we will show the validity of giving

Table 5 Scale values for response categories

	Question	Response category	Scale value
1	1	(a)	1
2	2 × 3	(a) in 2 and (b) in 3	1
3	4 × 5	(a) in 4 and (b) in 5	1
4	7	(a) and (b) in 7	1
5	6	(b)	1

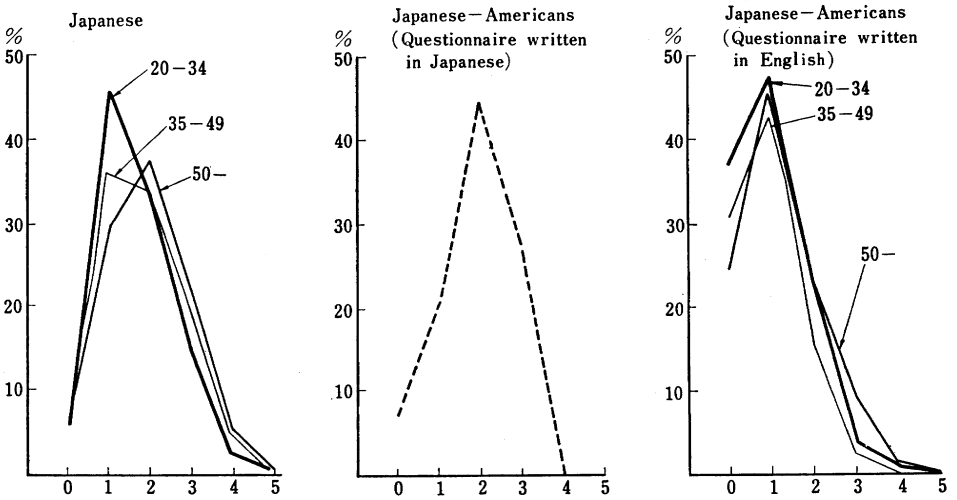


Fig. 2 Distribution of scale values (so-called Giri-ninjo scale in traditional sense).

numerical values in this way.

In the meantime, we analyzed the response patterns of seven questions, which measure "giri-ninjo," by the *quantification method* described in Appendix. This method reveals that the scale construction mentioned above is appropriate to Japanese. In other words, if the strength of relation among those "giri-ninjo" type responses are calculated and formed into a scale in the analysis of response pattern, such a way of giving numerical values will be demonstrated to be valid.

For the sake of reference, note that those Japanese-Americans who chose questionnaire written in Japanese were 29 in all and the details are shown in the following Table 6 and the classification of Japanese-Americans by age as in the following Table 7.

As you see in Fig. 2, it is clear that Japanese and Japanese-Americans differ considerably at the scale value 0 where only several percent Japanese versus some 30 percent Japanese-Americans. There are several percent Japanese in every age group, who are not at all in "giri-ninjo" bound, while the percentages on other scale values gets larger with age. Among those over 50 years old, nearly 40 percent have scale value 2. But, Japanese-Americans groups show differences at scale

Table 6 The distribution of number of Japanese-Americans who chose the questionnaire written in Japanese, and their generation distribution

Age	No. of sample
Older (50 and over)	26
Middle (35 to 49)	2
Young (20 to 34)	1
Total	29

Generation	No. of sample	Remark
1st generation	10	46 years and over in Hawaii 8 36-45 in Hawaii 1 22-25 in Hawaii 1
2nd generation	18	
3rd generation	1	

value 0, though not so much differences are observed at other scale values. This is a different tendency from Japanese group. It can also be said that Japanese indicate far more liking of "giri-ninjo" than Japanese-Americans. For example, let us to take young Japanese group. We can recognize that it differs greatly from Japanese-Americans at scale value 0 and are obviously much more "giri-ninjo" bound than Japanese-Americans of the same age group.

The distribution of those Japanese-Americans who responded to the questionnaire written in Japanese—mostly those over 50 years of age—is very much similar to that of Japanese of the same age group, though the height of the mode is not the same. This indicates that these two kinds of samples are in different cultural regions and have had dissimilar influence. However, it is quite interesting that they still show similar distribution.

Table 7 Generational distribution by age

Generation / Age	1st generation	2nd generation	3rd generation	Total
Young (20-34)	2 (1.3)	25 (16.3)	126 (82.4)	153 (100)
Middle (35-49)	2 (1.3)	119 (78.3)	31 (20.4)	152 (100)
Older (50-)	7 (5.7)	115 (93.5)	1 (0.8)	123 (100)
Other (?)	1	4	1	6
Total	12 (2.8)	263 (60.6)	159 (36.6)	434 (100)

3. Pattern classification of giri-ninjo question I

By treating the responses to each question separately—there are seven questions and eight responses—a pattern classification is used according to the *quantification method.*

First, let us indicate the results of Japanese and Japanese-Americans, separately as a whole. In this case, $L=8$ in Appendix. Figures signify code numbers of question items. Generally speaking, "○" shows the traditional response category, and "×" shows non-traditional response category. ${}^1X$ is the latent vector of response categories corresponding to the maximum latent root and ${}^2X$ is that corresponing to the second maximum latent root.

In Fig. 3, the upper left figure shows the result of Japanese, and the upper right is the one of Japanese-Americans. The latent roots in the Japanese are 0.22 and 0.19. The third maximum latent root is 0.13 and smaller. The latent roots are 0.22 and 0.21 in the Japanese-Americans. The third maximum latent root is 0.15 and smaller.

The comparison is very interesting. Apparently those two are different. However in the Japanese, the first axis ${}^1X$ means the discrimi-

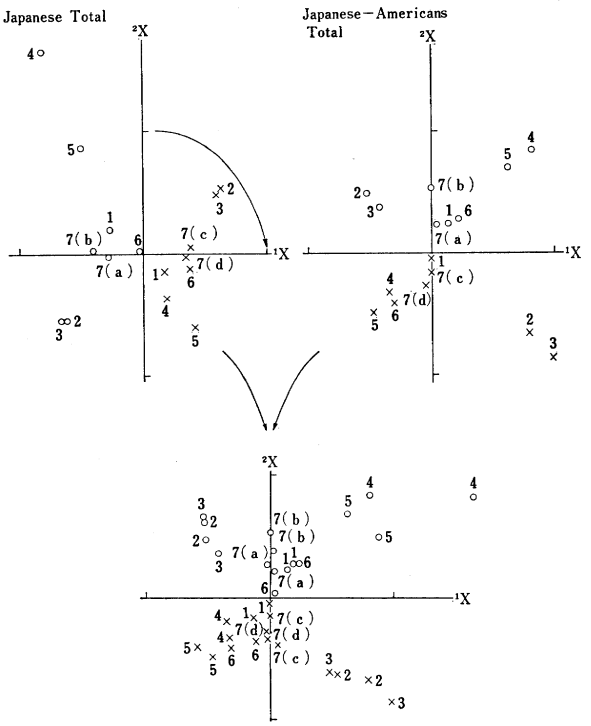


Fig. 3 Comparison of Japanese and Japanese-Americans on the results calculated by quantification method.

nation of traditional and modern. In other words, this is the axis which clearly indicates the, so called, "giri-ninjo" versus "non-giri-ninjo" responses. If we use a general expression, we may call it personal, private, or human relations orientated. Left side is traditional and the right side is modern. The second axis shows realistic orientated traditional and human orientated modern. This is caused by interrelation of responses in questions 2 and 3 which asked respondents to compare the two attitudes, i.e., "attending company meeting" and "go home because of the benefactor's of parent's illness," indicating what they think they should do.

These questions 2 and 3 are similar to questions 4 and 5, however, the results obtained are quite different. "Giri-ninjo" in questions 2 and 3 is not that of a realistic view point but related to stereo-typed "giri-ninjo," while "giri-ninjo" in questions 4 and 5 can be called to be rather utilitarian and ostentations. And also, it is interesting that "non-giri-ninjo" responses to questions 2 and 3 are combined with "giri-ninjo" responses to questions 4 and 5—the opposite tendency also holds—to form the second dominant axis. In a two dimensional space, we can recognize three clusters consisting of questions 4 and 5, 2 and 3, and others respectively among "giri-ninjo" responses. On the other hand, corresponding clusters appear among "non-giri-ninjo" responses but they are not of clear shapes.

Remark Japanese-Americans. ${}^{1}X$ corresponds to the second axis ${}^{2}X$ of the Japanese. ${}^{2}X$ corresponds to the first axis ${}^{1}X$ of the Japanese. However, the quite similar interrelations are shown in two dimensional space, i.e., relative position of the response categories are quite similar in two dimensional space. This is clearly revealed by overlapping the two groups after the clockwise rotation of 90 degrees of the Japanese (see Fig. 3). An interesting point is that there are some differences in systems of thought but not totally dissimilar—that is, in the large, the Japanese and the Japanese-Americans show the similar interrelationships of responses in their constellations—however, the two groups differ in how and what they emphasize in their thinking.

We proceed to show the analysis by the age groups. Fig. 4-1 shows the results of the Japanese. Note that of young Japanese group. ${}^{1}X$ does not give the meaning of traditional versus modern. The figures of middle and older groups are quite the same and ${}^{1}X$ shows the meaning of traditional versus modern.

Fig. 4-2 shows the results of Japanese-Americans. The young and middle groups show similar figures. But the older group gives quite different figure. This figure is found to be similar to the figure of older Japanese, where ${}^{1}X$ shows the meaning of traditional versus modern.

According to the scale expression of the degree of "giri-ninjo"

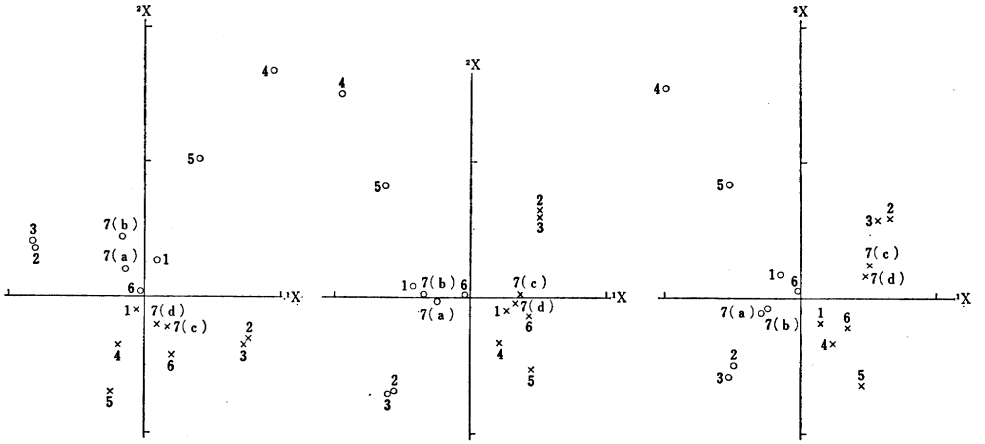


Fig. 4-1 Comparison of three Japanese age groups.

among Japanese-Americans already shown, age differences are not so great, yet the fact that large differences appear at this point should be recognized. Thus, we found older Japanese-Americans have similar interrelationships of responses with older Japanese but have the different distribution function on "giri-ninjo" scale. And this group of older Japanese-Americans seems to have the same system of thought as Japanese as a whole. But other groups of Japanese-Americans indicate a system of thought in different quality.

Let us turn to the relationships among different age groups of Japanese. This is indicated in Fig. 5. The figure of young Japanese is obtained approximately by the clockwise rotation of 60 degrees of that of older Japanese in Fig. 5. And an interesting comparison is the one between Japanese-Americans group of 20–49 and Japanese group of over 35-year-old. The relative relationship of all the possible combinations of data shown here are the same, however, the qualitative difference

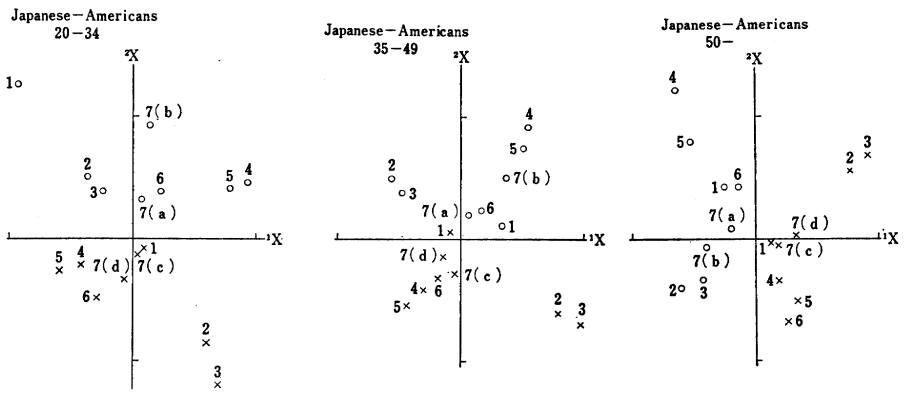


Fig. 4-2 Comparison of three Japanese-Americans age groups.

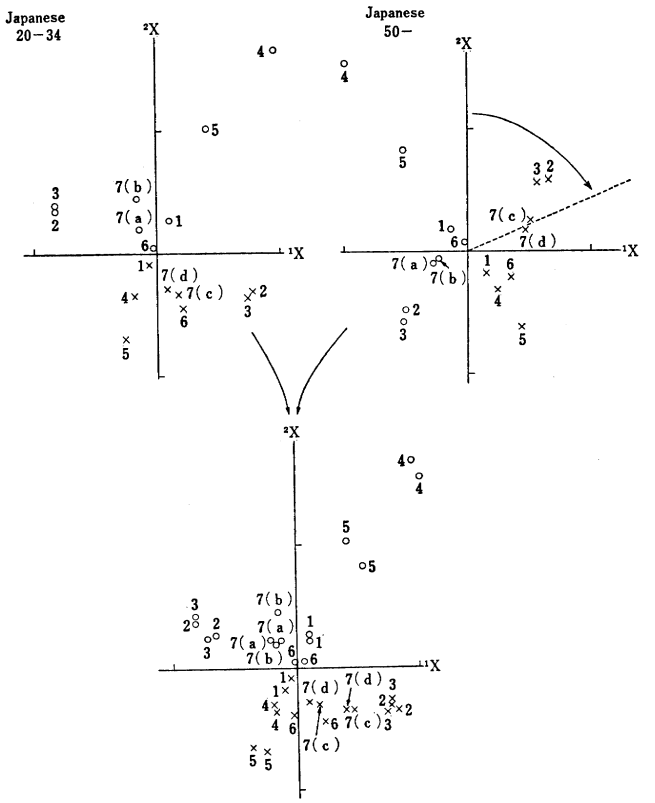


Fig. 5 Relationship of two Japanese age groups.

in emphasis, the difference in systems of thought, is observed.

Some questions may remain because the maximum latent root and the second maximum latent root of Japanese-Americans as a whole are close to each other. So, the results of various age groups will be examined next.

Among Japanese, the difference between the maximum latent root and the second maximum latent root is small at the young group but is

Table 8 Maximum latent roots and second maximum latent roots

		Maximum latent root	2nd maximum latent root
Japanese	Young	0.21	0.19
	Middle	0.23	0.18
	Older	0.23	0.18
Japanese-Americans	Young	0.24	0.20
	Middle	0.23	0.22
	Older	0.24	0.21

large at other age levels. As for Japanese-Americans, the difference is small at the middle group but is large at two other groups. It is very noteworthy that the changing feature of configuration of points is systematic and remarkable, even though the difference between the maximum latent root and the second maximum latent root may be small. Therefore, the above stated point can be regarded as valid.

Thus we have the following ordered rank relations. As two extremes, we take older Japanese and young Japanese-Americans. For example, we take older Japanese as left extreme and young Japanese-Americans as right extreme. Then, we can put other age groups between these extremes. From the left, older Japanese, middle Japanese (this group is almost equal to older Japanese), older Japanese-Americans, young Japanese, middle Japanese-Americans, and young Japanese-Americans. If the clockwise rotation of axis proceeds in this order, roughly speaking, the constellation of response categories in each group coincides in turn, which means the constellation does not change but rotates. This is the argument to be applied when responses to "giri-ninjo" questions are obtained as above and is shown schematically in Fig. 6. So, it may also be interesting to see whether such a rotation also appears when applied to non-Japanese people.

The next step would be the third latent vector. ${}^3X$ is the corresponding vector to the third maximum latent root (see Fig. 7). Let us examine Fig. 7 where ${}^3X$ is plotted for Japanese and Japanese-Americans, respectively. If they are on 45 degree line, they have the same structure. The remarkable difference between the Japanese and the Japanese-Americans is shown in questions 6 and 7 (b) plotted by

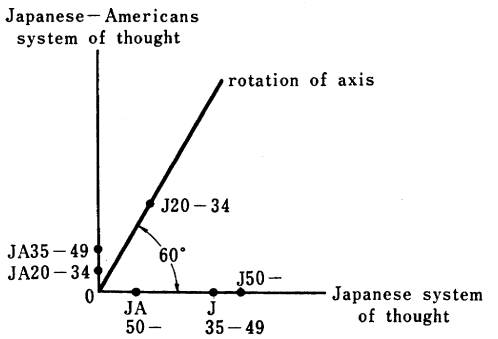


Fig. 6 Schematic diagram of age groups.

The distance from the origin 0 shows the degree of giri-ninjo scale. The distance is the larger, the degree is the higher. The distance between points shows the similarity of giri-ninjo opinion.

J : Japanese

JA: Japanese-Americans

"×" and "○" respectively. Question 6 for Japanese is extreme but is not so for Japanese-Americans. Question 7 (b) for Japanese-Americans is extreme but is not so for Japanese. That is to say, choosing "non-ninjo chief" (answer category (a) to question 6) shows a unusual feature for Japanese, but is not isolated for Japanese-Americans, and choosing "repaying moral indebtedness" (answer category (b) to question 7) shows a unusual feature for Japanese-Americans. To deny the question of "a teacher's bad deed" ((a) in question 1) is extreme and particularly distinct among Japanese-Americans. These are very noteworthy.

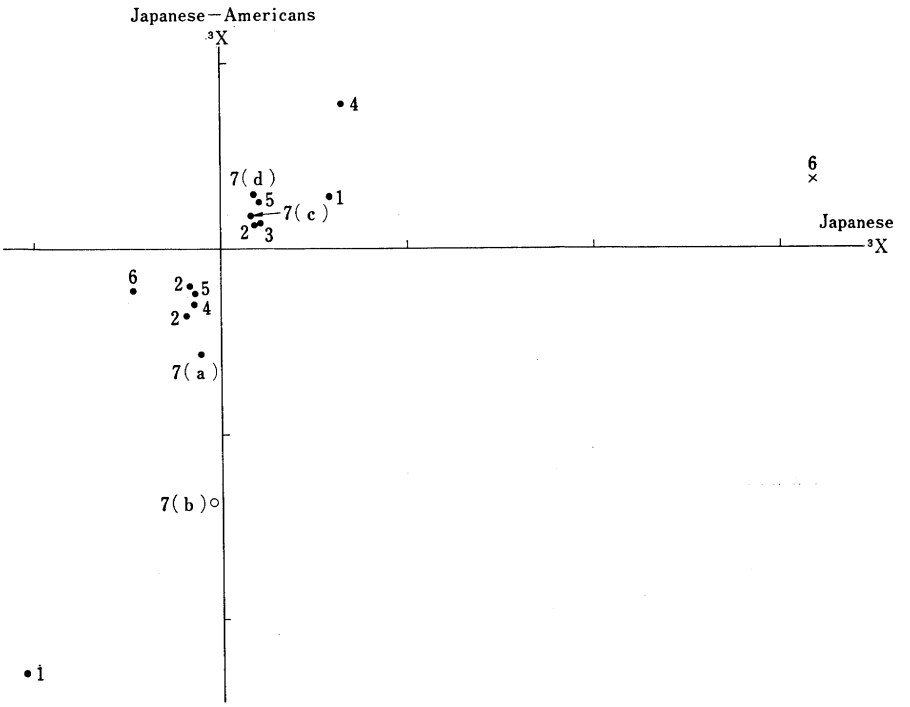


Fig. 7 The corresponding vectors to the third maximum latent root.

4. Reliability of pattern classification of giri-ninjo question

We have so far observed differences between Japanese and Japanese-Americans and it is important to examine the reliability of such results. The Japanese survey data we have used were obtained in 1968 through a nation-wide survey. Using exactly the same questionnaire and same procedure, nation-wide survey was conducted in 1963 also. And we performed the same calculation, and the result is shown in Fig. 8, which is obviously very similar to that of the survey in 1968 (shown in Fig. 3) and the pattern is a reliable one. (If we superimpose

Fig. 8 over Fig. 3, they are almost identical.)

The comparison of latent roots is as follows.

Table 9 Latent roots

Year	Maximum	2nd maximum	3rd maximum
1963	0.24	0.19	0.14
1968	0.22	0.19	0.13

The marginal distributions on scale value are found to be quite similar (see Fig. 9) in 1963 and 1968. The feature of opinion structure of the Japanese is found not to have change during this period. So the comparison between Japanese (1968) and Japanese-Americans is said to be feasible.

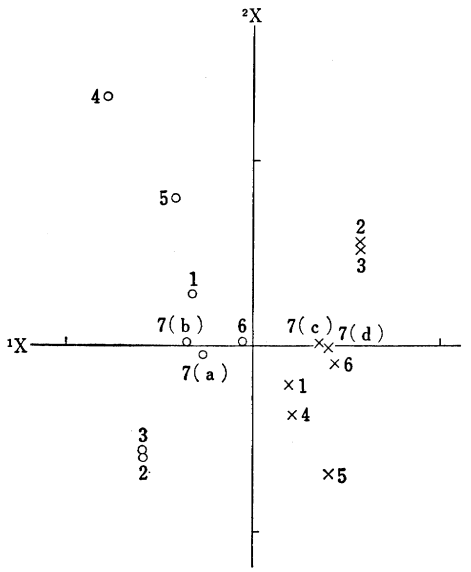


Fig. 8 Japanese (1963)

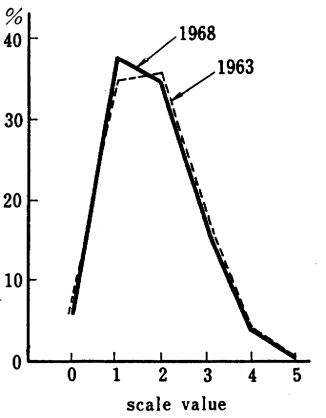


Fig. 9 Marginal distribution

5. Pattern classification of giri-ninjo question II

Using the same set of questions, we made a different analysis. The reason is to see whether and how the attitude will be changing concerning the two pairs of questions, question 2 with question 3 and question 4 with question 5. The following is the list of response categories.

	Traditional	*Modern*
Question 1	○ To deny	× To agree
Question 2×3	◎ In case of a relative's illness, attend meeting. In case of a benefactor, go home.	× Attend meeting in both cases.
	○ Go home in both cases.	
Question 4×5	◎ In case of a relative, take the best applicant. In case of a benefactor, take his son.	× Take the best applicant in both cases.
	○ In case of a relative, take the relative and in case of a benefactor, take his son.	
Question 6	○ Ninjo chief	× Non-ninjo chief
Question 7	○ Moral indebtedness	× Individual's right
	○ Dutiful to parents	× Freedom

Response which sound strange for Japanese

Question 2×3	△ In case of a parent, go home. In case of a benefactor, attend meeting.
Question 4×5	△ In case of a relative, take the relative. In case of a benefactor, take the best applicant.

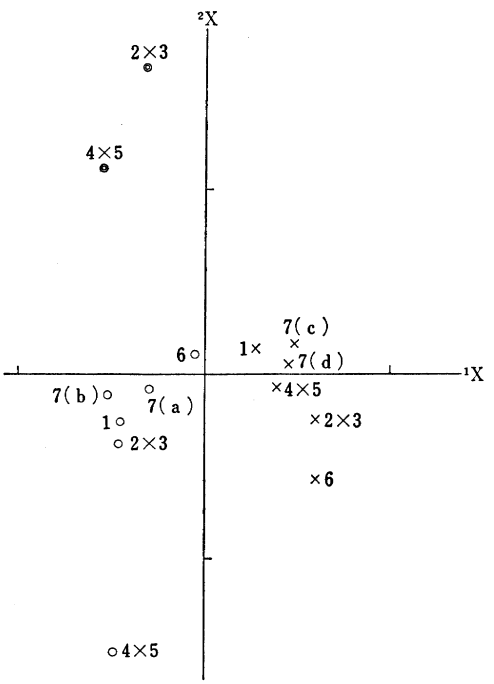


Fig. 10-1 Japanese (1968).

In the above list, those marked with "◎" represent the response pattern which has been called the model of "giri-ninjo" type in Japan, "△" indicates the response pattern which sound rather strange for Japanese, and other response alternatives are only taken up as listed here.

The result for Japanese is shown in Fig. 10-1. On ${}^1X$, "giri-ninjo" type and others are separated. This is exactly the same as the separately treated responses which were reported previously. On ${}^2X$, those which have been regarded as typical responses among "giri-ninjo" type responses (those marked by "◎") discriminate themselves from the rest, or from the general "giri-ninjo" responses of other questions.

But on the "non-giri-ninjo" responses, such a clear distinction does not appear along ${}^2X$. In other words, a very clear-cut constellation emerges on a two dimensional plane. To check the reliability of this constellation, the results of 1963 analysis is also shown in Fig. 10-2. It can be noticed that it is of exactly the same shape. From the facts mentioned above, we can say that it is reliable among Japanese.

The result of Japanese-Americans is shown in Fig. 10-3. In the constellation, "giri-ninjo" responses separate themselves from the rest along ${}^1X$, and typical "giri-ninjo" responses (those marked by "◎") separate themselves from the rest of "giri-ninjo" type responses along ${}^2X$. On the whole, the constellation is similar to that of the Japanese.

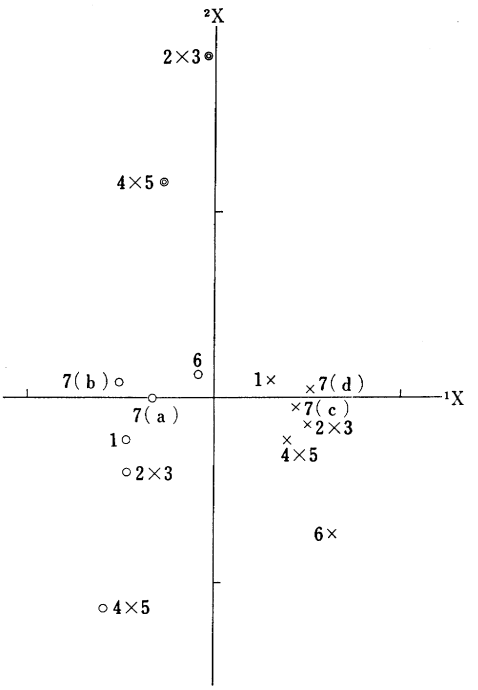


Fig. 10-2 Japanese (1963).

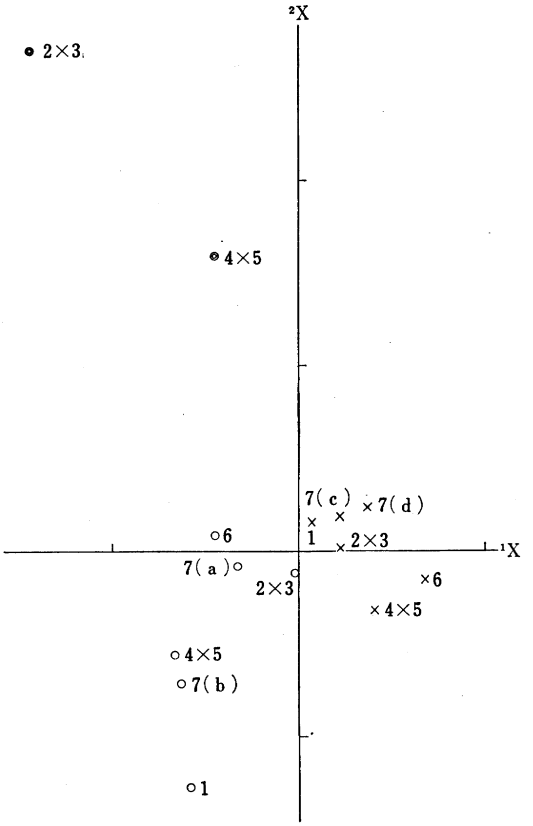


Fig. 10-3 Japanese-Americans.

However, if we put into this form, the clear differences observed in the numerical scaling earlier are not to be found. But, if we look closely enough, some differences may be observed on ${}^1X$ as well as on ${}^2X$. For example, as for the Japanese-Americans, responses to "teacher's bad deed" and "repaying moral indebtedness" of questions 1 and 7 respectively are at the far end of the negative side on ${}^2X$, while they cluster all in the center, thus not characteristic, for the Japanese sample. The fact that the opposite extremes of questions 2×3 and 4×5 marked with "◎" are in the same area as those questions marked with "○" is quite natural in the Japanese sense. We may say that the differences in the system of thought of Japanese and Japanese-Americans are obvious here with the results mentioned above. The latent roots are shown below, but not much difference can be observed.

Now, let us perform an analysis including those responses which sound rather strange to Japanese, those marked by "△," in questions 2×3 and 4×5. That is to say, these include "to go home" in case of a parent but not in the case of a benefactor in the question 2×3, and

Table 10 Latent roots

	Maximum latent root	2nd maximum latent root
Japanese (1963)	0.26	0.20
Japanese (1968)	0.24	0.19
Japanese-Americans	0.25	0.20

employment in case of a relative rather than the best applicant but take the best applicant in case of a benefactor's son in question 4×5.

First, let us to compare the marginal distribution of these two questions in Table 11. Not much difference exist for those responses marked by "△," but relative difference is shown up in both questions for those responses marked by "◎."

Table 11 Marginal distribution of responses

Question 2×3 (%)

	◎	○	×	△	Others	Total
Japanese	13	32	35	11	9	100
Japanese-Americans	3	46	23	12	16	100

Question 4×5 (%)

	◎	○	×	△	Others	Total
Japanese	23	14	52	2	9	100
Japanese-Americans	16	21	49	4	10	100

The results of pattern classification are shown in Fig. 11 and Fig. 12. A similar trend to what has been shown before appear in general, but the question is the location of responses marked by "△." For Japanese, they cluster around the center, which may be regarded as so-called random-error-responses. But for Japanese-Americans, they are far off the center. It is worth while to note that those responses in question 4×5 are at the right end of ^1X, the least "giri-ninjo" side, and those responses in question 2×3 are at the opposite end of the typical "giri-ninjo" responses which are marked by "◎." In other words, those which are considered to be strange in Japan are at the opposite ends of "giri-ninjo" responses, indicating the difference in systems of thought for Japanese and Japanese-Americans on this point.

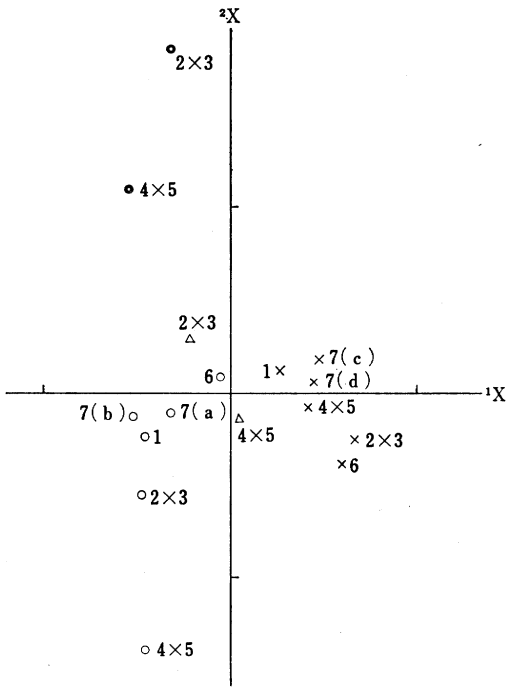


Fig. 11 Japanese.

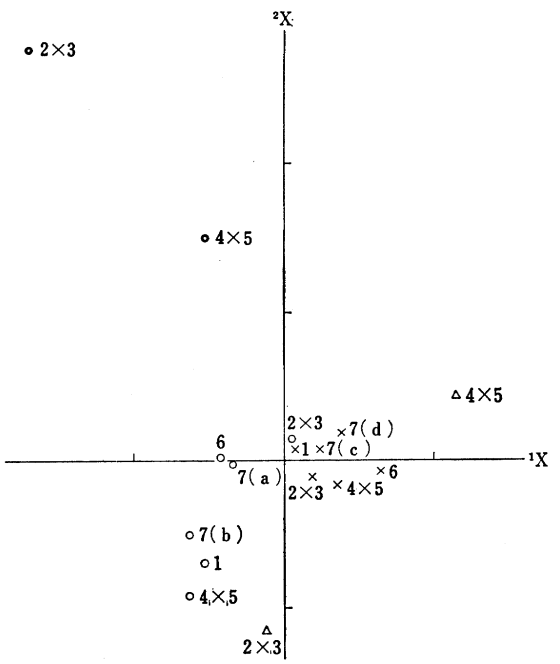


Fig. 12 Japanese-Americans.

6. Response structure of other question items

Here we have taken up those questions which permit intermediate responses instead of straight "yes" or "no," since they are applicable primarily to the surveys in Japan. It is realized that a great difference exists between Japanese and Japanese-Americans in Hawaii on these questions. In addition, the question which showed big differences between the two countries, i.e., whether or not to teach money is important, is included. Responses are divided into three; "○" indicates Japanese, "△" for non-Japanese, and "×" for intermediate. The "○" and "×" in question 4 can not be determined so easily but an effort is made to follow the pattern. In question 6, "△" have more Japanese feature in traditional sense, however, we treat "○" as more Japanese since there are far more "○" in present day Japan.

In order to simplify the matter, the expression, "Japanese-unJapanese" will be used in the following discussion. Although we believe another interpretation may be more appropriate, we shall hold it for later discussion.

The list of questions is given below.

1. If you had no children, would you think it desirable to adopt a child in order to continue the family line, even if there is no blood relationship? Or do you not think this is important?
   - ○ 1) Would adopt
   - △ 2) Would not adopt
   - × 3) Depends on
2. If you think a thing is right, do you think you should go ahead and do it even if it is contrary to usual custom, or do you think you are less apt to make a mistake if you follow custom?
   - △ 1) Go ahead
   - ○ 2) Follow custom
   - × 3) Depends on
3. Here are three opinions about man and nature. Which one of these do you think is closest to the truth? (Show answer sheet)
   - ○ 1) In order to be happy, man must follow nature.
   - × 2) In order to be happy, man must make use of nature.
   - △ 3) In order to be happy, man must conquer nature.
4. Please choose from among the following statements the one with which you agree most. (Show answer sheet)
   - △ 1) If individuals are made happy, then and only then will the country as a whole improve.
   - ○ 2) If the country as a whole improves, then and only then can individuals be made happy.
   - × 3) Improving the country and making individuals happy are the same thing.
5. Some people say that if we get good political leaders, the best way to improve the country is for the people to leave everything to them, rather than for the people to discuss things among themselves. Do you agree with this, or disagree?

○ 1) Agree
× 2) Depends on
△ 3) Disagree

6. In raising children of elementary school age, some people think that one should teach them that money is the most important thing. Do you agree with this or not?
○ 1) Agree
△ 2) Disagree

On these questions, we applied the mathematical method of pattern classification as in the previous sections. The latent roots are as follows.

Table 12 Latent roots

	Maximum latent root	2nd maximum latent root
Japanese	0.27	0.23
Japanese-Americans	0.24	0.21

Not much difference between Japanese and Japanese-Americans is observed.

In Fig. 13, we can see that Japanese, unJapanese, or intermediate responses are neatly separated along ${}^1X$, while unJapanese and in-between responses are divided into upper and lower parts along ${}^2X$. In this case, a very clear-cut configuration is obtained when Japanese responses are laid between the other two types as if they were not influenced by ${}^2X$. ${}^1X$ is Japanese-unJapanese axis.

It was mentioned that Japanese responses and unJapanese responses are separated along ${}^1X$ axis. But, when the content of those responses is closely examined, it is more appropriate to say that the response categories on the left side of Fig. 13 are rural opinions and those on the right side are urban opinions. In our survey result, those responses dominated in rural area of Japan are the following; "will follow nature"; "will adopt" to the question of adoption (as farming is based on stable asset and it is necessary to find an heir for the family); "individuals can be happy only after the nation improves" (Total→Individual); "will leave politics to good politician"; "will teach that money is important" (money is regarded as extremely important in rural areas). Therefore, it is more understandable for Japanese people to term it as "urban-rural" or "modern-traditional" rather than "Japanese-unJapanese" for the axis ${}^1X$ in this case.

${}^2X$ is an axis which distinguishes the straight forward thinking from the deliberate thinking and withholding responses.

As Fig. 14 shows the results of Japanese-Americans, it is unlike the case of "giri-ninjo" question. We find this as a different case from

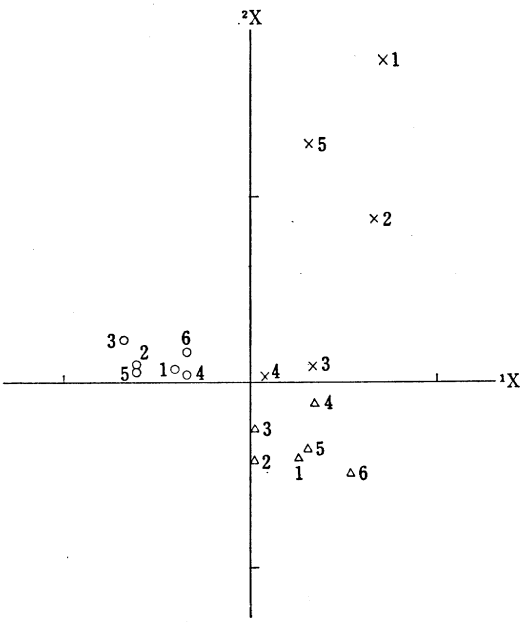


Fig. 13 Japanese (1968).

that of Japanese. This can be seen along ${}^1X$, and intermediate responses are not clearly observed along ${}^2X$. This means that the content of intermediate responses are not the same as that of Japanese. Yet, the intermediate responses are in the relatively similar places as those of Japanese, whereas "○" and "△" are intermingled to produce a very different constellation. Therefore, their inner meaning should be interpreted quite differently.

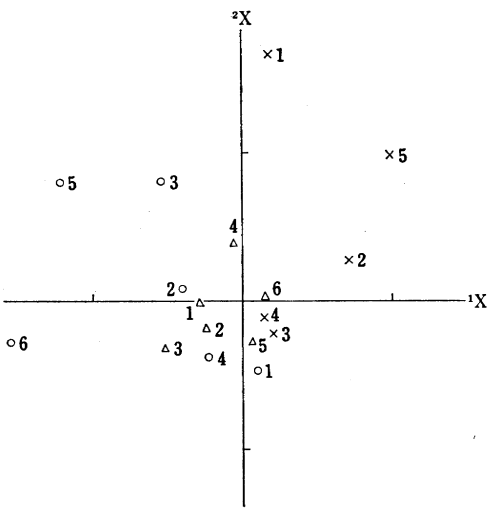


Fig. 14 Japanese-Americans.

Those "○" of Japanese responses are concentrated in a small area, while those of Japanese-Americans scattered. The same is true with "△." This states that responses are highly related and cohesive in "○" and "△" responses for Japanese. Thus, it shows that Japanese-Americans have different system of thought.

Besides, the difference in the systems of thought is quite of another quality from what we obtained concerning the "giri-ninjo" questions. It is not the difference in the place of emphasis in a structure.

This is probably related to what was discussed earlier in which we mentioned that it is more appropriate to call "urban-rural" (including "modern-traditional" as discussed earlier) instead of Japanese-unJapanese in Japan. As for the Japanese-Americans, it may be more proper to say that intermediate responses and others are separated (though not very neatly) along ${}^1X$.

By closely examining the intermixed constellation of Japanese-Americans, one can observe that "not adopt" of question 1 is close to "follow custom" and "go ahead" of question 2—apart from intermediate responses—as well as to the response that "individual's happiness follows that of the country's improvement" of question 4. Also, "would adopt" is close to "don't leave everything to political leaders" of question 5. All of these make it difficult to understand only from a Japanese view point of "Japanese-unJapanese," "modern-traditional," or "urban-rural." In Japanese-Americans, the remnants of Japanese things are mixed with environment, socio-economic status, education, complex adaptation mechanisms in the process of assimilation to the American society.

As we proceed the discussion, we note here that the scores are assigned to individuals just as the scores assigned to categories (see in Appendix).

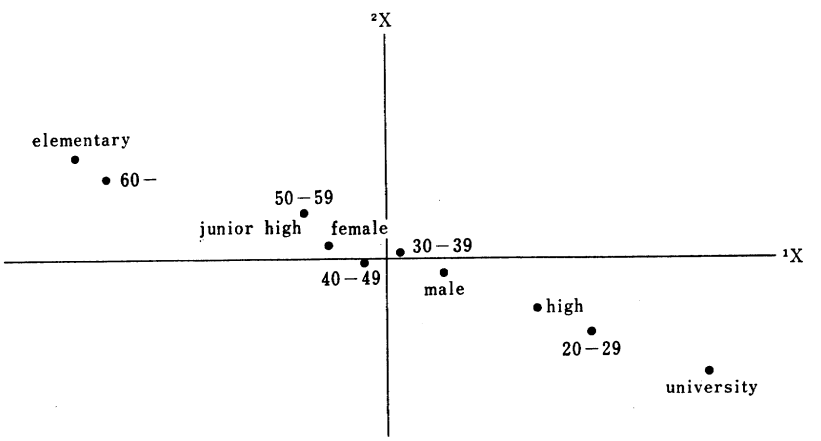


Fig. 15 Japanese.

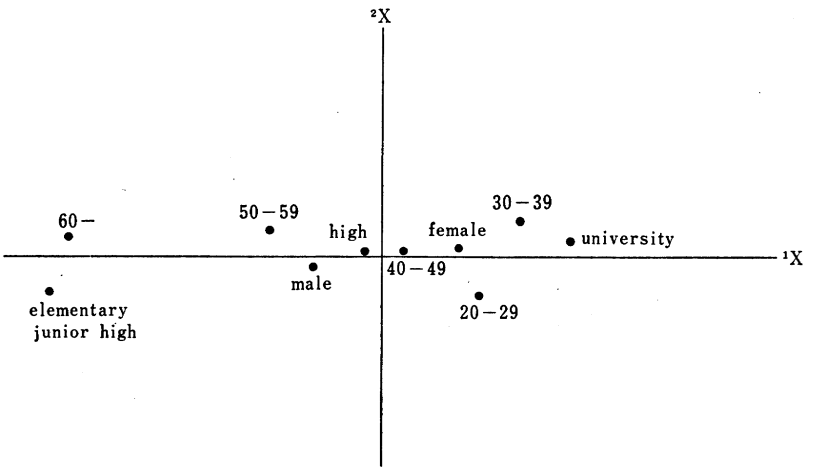


Fig. 16 Japanese-Americans.

In the Figs. 15 and 16, the average scores of individuals for the demographic categories are plotted for Japanese and Japanese-Americans respectively. We should note that most of the scores are scattered along ${}^1X$. And as for the Japanese-Americans, all of the average scores are around zero on ${}^2X$. This means that responses are evenly scattered and there are no characteristics in groups along ${}^2X$. But with respect to Japanese, there is a decreasing linear relation which can be understood as that more unJapanese responses and fewer intermediate responses are observed among college graduates as well as high school graduates and the twenties. If we compare them with Japanese-Americans, the contents of response patterns are not so similar as we discussed previously. But as we see in the above figures, those constellations are quite similar in which the college graduates and the twenties (Hawaiian sample includes their thirties), and the primary school graduates and the over sixties are holding both ends along ${}^1X$ though the relative position of male and female is opposite. But the remarkable point in this analysis is that the demographic categories are scattered in similar way for Japanese and Japanese-Americans though the contents are different.

For the sake of reference, comparisons are made between Japanese and Japanese-Americans, as well as among various age groups by using the number of Japanese responses (those marked with "○") as the scale value. The results are shown in Figs. 17 and 18, which clearly indicate that the shapes of distributions are entirely different. It is quite natural that Japanese gave far more Japanese responses and it also obvious that Japanese responses increase with age. The mode moves systematically from 1 of twenties to 3 of sixties. On the other hand, the mode for Japanese-Americans change neither with age

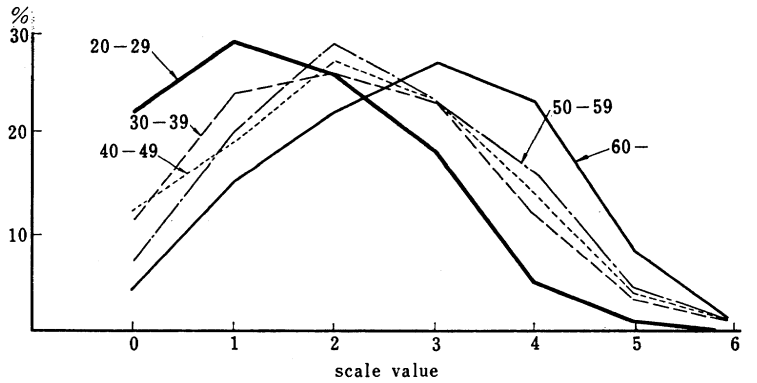


Fig. 17 Japanese.

nor so systematic (over 60-year-old is in the middle). But it is worth to note that the mode has very high percentage at scale value 1, and the percentage of scale value 0 (the most unJapanese responses) is much higher among Japanese-Americans. We can notice that those with scale value 3 or more are much higher among Japanese. We can see a distinct difference in distribution pattern if we measure it by a yardstick of Japanese immage. For example, on ^1X axis in Figs. 15 and 16 of both Japanese and Japanese-Americans, we found that the college graduates with their twenties versus primary school graduates with the over sixty years of age. But, if we use the Japanese scale value, Japanese-Americans over 60 are not at the end but in the middle. In other words, those over 60 do not indicate what Japanese think as

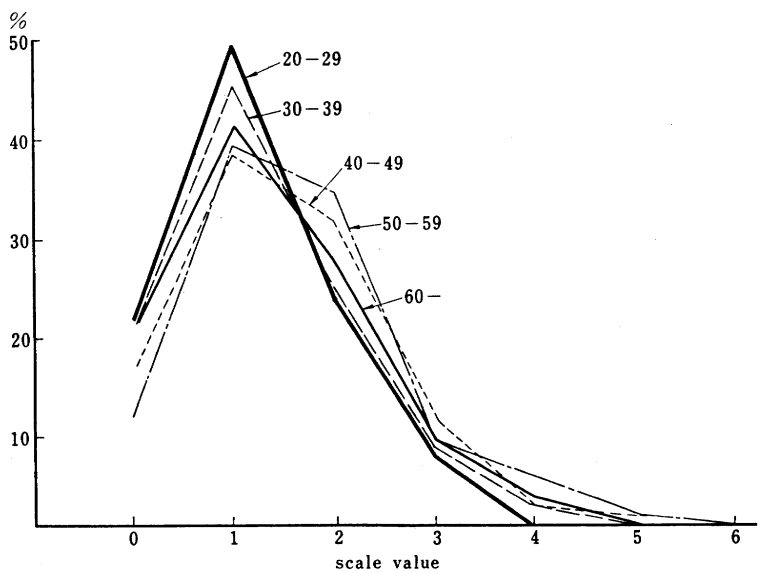


Fig. 18 Japanese-Americans.

Japanese characteristics, while 40–59 age group shows more Japanese characteristics. Such a discrepancy is fascinating and should be related to what was discussed earlier.

Now it is apparent that it is necessary to take different scale values in order to measure for Japanese-Americans over 60 and in their twenties to occupy both ends. But as mentioned previously, the content of such a scale value is considered to be difficult to grasp only from a Japanese view point.

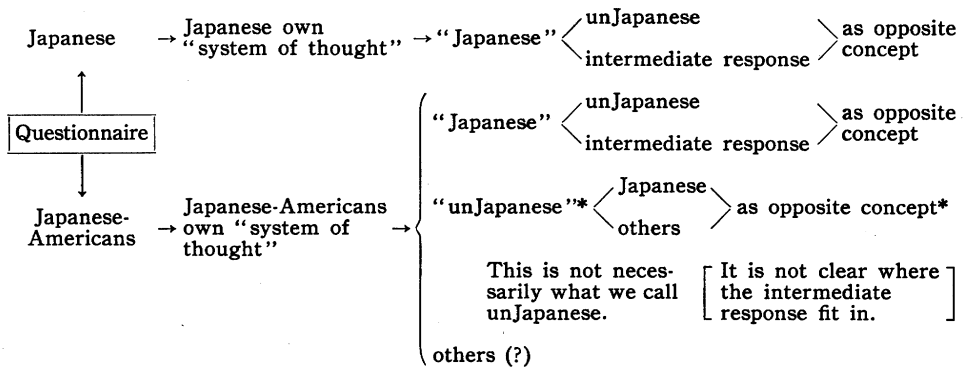
7. Some discussions

Let us examine the previously mentioned situation more closely from a view point of Japanese-unJapanese. Some groups of Japanese-Americans may give responses from a similar viewpoint as Japanese but some may not. As they are all mixed in our sample, the constellation which looks neat to us may not emerge when they are treated as a whole.

Also, the questionnaire we constructed is largely quite "Japanese." For Japanese, an emphasis is placed on the common understanding of "Japanese" ways in short, and then set up "unJapanese" ways as its opposite. Then responses will be obtained by weighing one against the other. On the other hand, this is not necessarily the case for Japanese-Americans in Hawaii who may be looking at things from a different angle. Some Japanese-Americans might view things by emphasizing the unJapanese side in which people may think of "Japanese" and some other "unJapanese" aspects as their opposite.

At any rate, no matter where the interview took place, the first thing that came to mind was each individual's own "system of thought." Therefore, they ended up with being discrepant from each other. The scheme is summarized in the following Table 13.

Table 13 Response types for Japanese and Japanese-Americans



* Note: Because of this, the constellation of Japanese responses is not maintained.

It is insufficient to compare the marginal distribution of responses on the questions constructed only from one side and of scale values constructed from a fixed view point. It is essentially important for cross-cultural study to be aware of this point. The analysis by the response pattern classification method reveals these complicated features and thus, gives us light for the further study.

Appendix II

*Quantification on response pattern**:

Factor analytic method on qualitative data (we may call this as "Principal components analysis in qualitative case")

This is one method of classification of individuals based on the similarity of responses to questions having several categories. This method is especially important here as no other method exist for classification.

The response pattern of individuals is shown in the following table. We assume that individuals are interviewed with L questions and give only one response to each question.

In order that individuals with similar response patterns may be located in roughly the same area as well as categories having similar characteristics, we want to classify individuals and categories simultaneously.

From this, we can find the configuration of both the individuals and categories in multi-dimensional Euclidean space in order to be able to make inference on them.

Inferences can be make easily if we have these configurations in one-dimensional space. This means that we can summarize the information on similarity among the individuals and among categories on one axis. If the configurations cannot be summarized on one axis, we shall have to interpret configurations in multi-dimensional space. So, we will start our interpretation in one-dimensional space and then continue to multi-dimensional space.

We define $\delta_i(j)$ as

$$\delta_i(j)=\begin{cases} 1, & \text{if the } i\text{th type checks in the } j\text{th category} \\ 0, & \text{otherwise} \end{cases}$$

* The original paper is found in the *Proc. Inst. Statist. Math.*, Vol. 4, No. 2, pp. 19–30, under the title "Theory and Example of Quantification (II)." This is closely related to Guttman's "Scale analysis (A. Stouffer ed., *Measurement and prediction*, Princeton University Press 1952)."

—Spatial representation of individuals (types) and response categories in question items based on the information of response pattern—

		A	1	2	···	L
		B	1 2 ··· k_1	k_1+1 ···	···	··· R
D	E	C / F	c_{11} c_{12} ··· c_{1k_1}	c_{21} ··· c_{2k_2}	···	c_{L1} ··· c_{Lk_L}
l_1	s_1	1	V	V		V
l_2	s_2	2	V	V		V
l_3	s_3	3	V	V		V
·	·	·				
·	·	·				
·	·	·				
l_Q	s_Q	Q	V	V		V

N.B. 1. "V" sign shows the response category of an individual.
2. The categories contain neither D.K. nor others. Those who check in (D.K. or others mentioned above) show no sign. Thus the number l's of responses in the question items of types are generally different.
A: item (question) B: consequtive number
C: category D: total of sign
E: frequency F: response type (individuals)

where $i=1, 2, \cdots, Q$ and $j=1, 2, \cdots, R$, and

$$R=\sum_{j=1}^{L} K_j \ ; \ K_j \text{ is the number of categories in the } j\text{th item}$$

$$l_i=\sum_{j=1}^{R} \delta_i(j) \ ;$$

$$n=\sum_{i=1}^{Q} s_i \ ; \qquad \bar{l}n=\sum_{i=1}^{Q} l_i s_i$$

where L is the number of items, s_i is the number of respondents fall into the ith type, and n is sample size.

We want to quantify types (individuals) and categories by assigning numerical values to them to maximize the correlation coefficient between individuals and categories. This is the idea of simultaneous grouping of individuals and categories and also is considered to be one method of taxonomy of individuals and categories based on response pattern.

So, let types be $1, 2, \cdots, Q$ and categories be $1(C_{11}), \cdots, k_1(C_{1k_1})$, $k_1+1(C_{21}), \cdots, R(C_{Lk_L})$. Then we require $y_1, y_2, \cdots, y_Q$ given to types and $x_1, x_2, \cdots, x_R$ given to categories to maximize correlation coefficient ${}^1\rho$ between x and y, where

$${}^1\rho=C_{xy}/\sigma_x\sigma_y$$

$$\sigma_x^2=\sum_{i=1}^{Q}\sum_{j=1}^{R} \delta_i(j)s_i x_j^2/(\bar{l}n)-\left\{\sum_{i=1}^{Q}\sum_{j=1}^{R} \delta_i(j)s_i x_j/(\bar{l}n)\right\}^2$$

$$\sigma_y^2=\sum_{i=1}^{Q} s_i l_i y_i^2/(\bar{l}n)-\left\{\sum_{i=1}^{Q} s_i l_i y_i/(\bar{l}n)\right\}^2$$

$$C_{xy}=\sum_{i=1}^{Q}\sum_{j=1}^{R}\delta_i(j)s_i x_j y_i/(\bar{l}n)-\left\{\sum_{i=1}^{Q}\sum_{j=1}^{R}\delta_i(j)s_i x_j/(\bar{l}n)\right\}\left\{\sum_{i=1}^{Q}\sum_{j=1}^{R} s_i l_i y_i/(\bar{l}n)\right\} .$$

And in order to maximize ${}^1\rho$, it is to solve

$$\frac{\partial {}^1\rho}{\partial x_k}=0 , \quad \frac{\partial {}^1\rho}{\partial y_e}=0 , \qquad (k=1, 2, \cdots, R;\ e=1, 2, \cdots, Q)$$

which implies

$$\sum_{j=1}^{R} h_{jk}x_j={}^1\rho^2\sum_{j=1}^{R} f_{jk}x_j , \qquad (k=1, 2, \cdots, R)$$

where

$$f_{jk}=\begin{cases} -b_{jk} ; & (j\neq k) \\ d_k-b_{jk} ; & \text{otherwise} \end{cases}$$

$$h_{jk}=a_{jk}-b_{jk}$$

$$a_{jk}=\sum_{i=1}^{Q}\frac{\delta_i(j)\delta_i(k)}{l_i}s_i$$

$$b_{jk}=\frac{1}{\bar{l}n}\sum_{i=1}^{Q}\delta_i(j)s_i\cdot\sum_{i=1}^{Q}\delta_i(k)s_i$$

$$d_k=\sum_{i=1}^{Q} s_i\delta_i(k) , \qquad \bar{l}n=\sum_{i=1}^{Q} l_i s_i .$$

For further convenience, the matrix representation

$$HX={}^1\rho^2 FX$$

will be used in the following discussion where the elements of the matrix H are h_{jk}, those of the matrix F are f_{jk}, and X is a column vector. Then calculate the latent vector corresponding to the maximum latent root of ${}^1\rho^2$, where we can set $\bar{x}=\frac{1}{\bar{l}n}\sum_j\sum_i\delta_i(j)s_i x_j=0$ and $\sigma_x^2=1$ without loss of generality. And we obtain

$$y_e=\frac{1}{{}^1\rho}\frac{\sigma_x}{\sigma_y}\left(\frac{1}{l_e}\sum_{j=1}^{R} x_j\delta_e(j)\right) , \qquad (e=1, 2, \cdots, Q)$$

which implies

$$y_e=\frac{1}{l_e}\sum_{j=1}^{R} x_j\delta_e(j) \text{ in case of } \frac{1}{{}^1\rho}\frac{\sigma_x}{\sigma_y}=1 .$$

This method is equivalent to that of maximizing $\eta^2=\sigma_b^2/\sigma^2$, where σ_b^2 is between type variance and σ^2 is total variance (σ_w^2 is variance within type and is equal to $\sigma^2-\sigma_b^2$).

We generalize this idea to multi-dimentional quantification. We want to quantify types (individuals) or categories by assigning numerical vectors to them to minimize the within generalized variance, $|W|$, with the total variance being constant. In other words, it is to minimize $|W|/|VT|$, where $|VT|$ is generalized total variance with respect to vector ${}^sX_i$ (or ${}^sY_j$) for $s=1, 2, \cdots, S$ and for all i (or j), and S is the number of dimension of the space.

The process mentioned above is described in details as below. We consider to maximize $1-|W|/|VT|$ under the condition that the non-diagonal elements in matrix W vanish, and this implies to maximize $1-|\widetilde{W}|/|VT|$ where $\widetilde{W}$ is the diagonal matrix of W. As $|\widetilde{W}|/|VT|\geqq|\widetilde{W}|/|\widetilde{VT}|$ and $|VT|\leqq|\widetilde{VT}|$ hold, $1-|\widetilde{W}|/|\widetilde{VT}|\geqq 1-|\widetilde{W}|/|VT|$. Thus, it is desirable to quantify the individuals and the categories, (in other words, to require vector x_i (or y_j) for all i (or j)), so as to minimize $|\widetilde{W}|/|\widetilde{VT}|$, or to maximize $1-|\widetilde{W}|/|\widetilde{VT}|$. This reduces to maximize $\prod_s^S {}^s\eta^2$ for ${}^s\eta^2$ is the correlation ratio with respect to ${}^sX_i$ for all i, and which is equivalent to maximize $\prod_s^S {}^s\rho^2$ where ${}^s\rho$ is the correlation coefficient between ${}^sX_i$ and ${}^sX_j$ for all i and j.

Thus, it leads us to solve the latent equation $HX=\rho^2FX$, and ${}^iX$ is the latent vector corresponding to the ith largest latent root of H. Generally speaking, the smaller for S is the more desirable, (for example, S between three and five). However, we do require that the minimum dimension, or minimum S, makes ${}^s\rho^2$ small. In some cases, we can take $\sigma_{sx}^2={}^s\eta^2$, where $s=1, 2, \cdots, S$, without loss of generality, and when this assumption holds, it is also useful to describe some concentration ellipsoids and to classify the individuals and categories into several groups. In the classification, some methods of statistical numerical taxonomy are available with computer programs.

In order to visualize the result of above calculations, we would like to represent in the following two-dimensional Euclidean spaces. In doing so, we take two-dimensional vector $({}^1X, {}^2X)$, for ${}^1X$ and ${}^2X$ are the corresponding latent vectors to the maximum latent root, ${}^1\rho^2$, and the second maximum latent root, ${}^2\rho^2$ respectively.

In the two-dimensional spaces, the nearer the points show that the relations in response of the categories are the closer. That is to say, in Fig. I, categories A and B have very close relation while A and C do not. Those who check in category A have a strong tendency to check in category B and not to check in category C. So, the distance

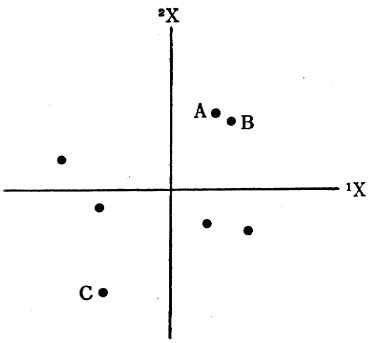


Fig. I

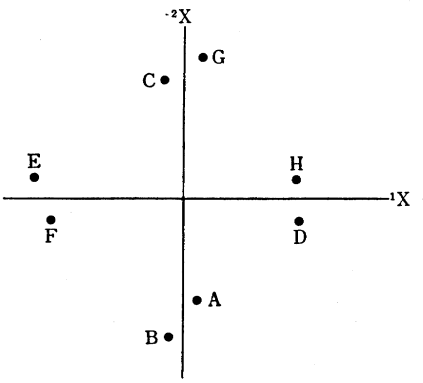


Fig. II

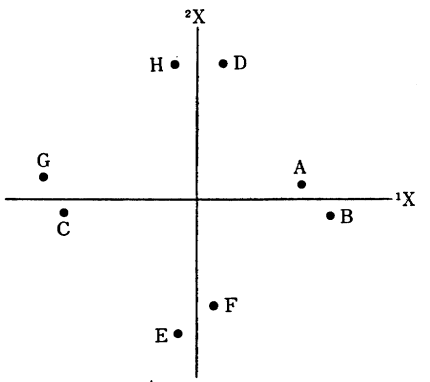


Fig. III

between points corresponds to the similarity of categories in responses.

In Figs. II and III, the response categories *A, B, C, D, E, F, G, H* have the same relative positions in two-dimensional space and show the same configuration. And the counter-clockwise rotation of axis of Fig. III by 90 degrees coincides with Fig. II, where ^1X in Fig. III corresponds to ^2X in Fig. II and ^2X in Fig. II corresponds to ^1X in Fig. III.

However, the meaning is different because ^1X is more powerful in expression of correlation of responses than ^2X in both figures. That is to say, the discriminant power on ^1X is larger than on ^2X since the latent root, or correlation ratio, is larger on ^1X than ^2X. More precisely, for the group of respondents from which the Fig. II is obtained, those who check in the response categories (*D, H*) will less possibly to check in (*E, F*) than those who check in (*A, B*) to check in (*C, G*), while for the group of respondents from which Fig. III is formed, those who check in (*A, B*) have less possibility to check in (*C, G*) than those who check in (*D, H*) to check in (*E, F*). Thus, between these two groups of respondents, we can observe some differences in their way of thinking, that is the difference of concept which is commonly

shared in each alternative response categories is viewed differently in both groups of respondents.

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