

A Study of the Dietary Behavior (Part 10)

—An Analysis of Image Patterns of Dishes—

Kimiko NAGANO

Summary To study the tendency of food intake behavior that moves according to the changes of social structure, I surveyed the images of dishes. The survey was conducted in December, 1993, with the cooperation of eighty-nine students of the Nutrition Course at Tezukayama Junior College, and ninety-six mothers whose daughters attend the college. To investigate the changes of dietary behavior as time goes on, we used the same method that we had in 1982, and compared the result with that in 1982.

The method of our survey was based on the system of seven score evaluation by S.D method and the following results are noted :

- 1) The mean age of the student group is 19.7 years and that of the mother group is 45.8. The discrepancy of age among the mother group is 18 years.
- 2) The patterns by categorical words are classified into three types ;
Type A is represented by the image of 'tasty' ~ 'dislike'.
Type B is represented by the image of 'low-priced' ~ 'high-priced'.
Type C is represented by the image of 'modern' ~ 'classic'.
- 3) The characteristic of Type A is that the scores tend to converge on one response, and the range in which the students chose the items in the questionnaires is becoming a little bit narrower. This pattern is found in all the twelve kinds of dishes.
- 4) The characteristic of Type B is that the scores converge on the center. Compared with the results of 1982, however, the range of distribution of the responses the students made has become broad. Generally, the sense of economy students show when they buy foodstuffs seems to have become keen.
- 5) The characteristic of Type C is that a wide distribution in the choice of items. As for the scale of 'modern' ~ 'classic', the image the mothers have concerning 'modern' is that of new dishes. In contrast the students do not have such an image as the mothers do.
- 6) In conclusion, an x-axis of the first factor can be termed a 'foreign-traditional' factor, and a y-axis of the second factor an 'economic' one by a factor analysis.

Key Words — dishes, image, semantic differential method, categorical scale, age group.

INTRODUCTION

To analyse various styles of food intake in our time, I have been studying the image patterns for dishes which are considered the important factor affecting our dietary behavior(1-6). In this study, taste in food, dietary habit, and handing down of dishes are the main objects of my research, which are analysed in time series. The purpose of the present paper is to make out the tendency and course of our dietary life so that the results of my research can be utilized in the nutrition guidance and the education of healthy diet.

I analysed the data of the surveys carried out in 1982 and 1993, on the hypothesis that the patterns of what images people conjure up for dishes will vary among age-groups and the eras in which they live.

METHODS

I distributed a questionnaire to the students of the Nutrition Course at Tezukayama Junior College and the mothers whose daughters attend the college. For the accuracy of the survey, we placed a limitation on the participants; one person per family. I got effective responses from 89 students and 96 mothers. The survey was conducted in December, 1993, with the method of self writing. The questionnaire was made up of the questions concerning twelve kinds of dishes we often take in our daily life (Table 1), and the S.D method was used to obtain statistical data from eight categorical words (relative stimulus words). The instruments and the methods of analysis were the same as in 1982 (Table 2).

Table 1. Twelve kind of Dishes

A	Chawanmushi	: thick custard soups
B	Gratan	: gratin
C	Maabodoufu	: maboutofu
D	Yakiniku	: grilled meat
E	Shiraae	: vegetables dressed with white-bean paste
F	Subuta	: sweet and sour pork (chinese style)
G	Howaitoshichu	: white stew
H	Tonkatsu	: fried pork
I	Sakana no munieru	: fish munieru
J	Tori no karaage	: french-fried chicken
K	Saba no misoni	: mackerel cooked with miso
L	Ebi furai	: fried shrimps

Table 2. Relative categorical words

a~a'	dislike	~taste
b~b'	foreign style	~japanese style
c~c'	low-priced	~high-priced
d~d'	modern	~classical
e~e'	usual	~guest
f~f'	for old aged	~for young
g~g'	luxury	~plain
h~h'	simple	~difficult

Each categorical scale was divided into seven thresholds with the center (which stands for 'neutral') scoring four points. The results of the responses were processed and then the mean±standard deviation was calculated for each categorical scale.

I examined the data using a t-test to discover if the differences between the students and the mothers and at the same time between those who participated in 1982 and those in 1993 are statistically different. And the difference were proved to be statistically different at the 0.01 level. Finally the factor analysis was made based on the correlation coefficients between the variables.

RESULTS

The frequency distribution of the age group is shown in Table 3; the mean age of the students is 19.7 years and that of the mothers is 45.8 ranging between 39 and 57. The images of dishes: The results of the surveys conducted in 1993 and in 1982, which were based on the eight categorical words, are shown in Table 4.

The values are arranged in rank order with the maximum value at the top, on the basis of those of the students. The minimum and maximum values are shown in Table 5, and the patterns of the images on the categorical scale in Figure 1, and three typical types of the images and the most common image of 'simple~difficult' from the viewpoint of the process of cooking in Figure 2 respectively.

Table 3. The frequency distribution of age in population

object	age	n	M±SD
student group	19	26	
	20	62	
	21	1	
		89	19.7±0.47
mother group	39~40	6	
	41~45	39	
	46~50	43	
	51~	8	
		96	45.7±3.28

Table 4. The results of each group for students, and mother and both of 1993 and 1982 according to eight categorial words.

1993			1982			1993			1982		
Dishes	Student	Mother	Dishes	Student	Mother	Dishes	Student	Mother	Dishes	Student	Mother
<dislike~taste>						<usual~guest>					
D	5.8±1.3	5.6±1.3	B	5.9±1.2	4.8±1.7**	A	4.2±1.2	4.2±1.3	A	4.9±1.0	4.4±1.2**
B	5.8±1.4	5.1±1.5**	D	5.9±1.2	5.9±0.9	D	3.7±1.3	3.5±1.4	L	4.1±1.0	4.3±1.1
G	5.7±1.6	5.1±1.4**	L	5.8±1.4	5.9±1.1	L	3.4±1.1	3.8±1.4	D	4.0±1.1	4.1±0.8
J	5.7±1.5	5.4±1.5	H	5.6±1.2	4.8±1.0**	F	3.3±1.0	3.0±1.1	I	3.8±1.1	3.7±1.0
L	5.7±1.2	5.6±1.2	J	5.6±1.5	5.1±1.1	I	3.2±1.0	3.3±1.2	B	3.6±1.1	3.5±1.1
A	5.6±1.4	6.0±1.2	A	5.4±1.3	6.2±0.7**	B	2.9±1.0	3.0±1.1	F	3.5±0.9	3.4±0.9
C	5.4±1.4	4.6±1.4**	G	5.0±1.6	5.0±1.1	H	2.9±1.1	2.9±1.3	E	3.5±1.3	3.5±1.4
H	5.2±1.5	5.3±1.5	F	4.8±1.4	5.1±1.0	C	2.8±1.0	2.6±1.1	H	3.5±0.8	3.5±0.7
I	5.1±1.5	4.9±1.1	C	4.8±1.3	4.3±1.5	G	2.7±1.1	2.7±1.2	G	3.4±0.9	3.4±1.1
K	5.1±1.6	4.8±1.5	I	4.4±1.2	4.6±1.2	J	2.7±1.2	2.8±1.3	K	3.3±0.8	2.9±1.1
F	5.0±1.8	5.6±1.3**	E	4.0±1.5	5.4±1.2	E	2.7±1.3	3.4±1.5**	J	3.1±1.0	3.2±1.0
E	4.9±1.5	5.2±1.5	K	4.9±1.5	4.0±1.3	K	2.6±1.1	2.6±1.2	C	3.0±0.8	2.9±0.9
<foreign style~japanese style>						<for old aged~for young>					
E	6.7±0.6	6.6±0.8	A	6.5±0.6	6.2±0.8	B	6.0±1.1	5.6±1.3**	B	5.8±1.0	5.0±1.4**
A	6.6±0.7	6.5±0.7	E	6.2±0.8	6.2±0.8	D	5.7±1.2	6.0±1.0	D	5.5±0.9	5.4±1.0
K	6.5±0.7	6.1±1.0**	K	5.8±0.9	5.7±0.9	H	5.3±0.9	5.6±1.1	G	5.4±1.1	5.2±1.1
C	3.8±0.8	3.6±1.1	D	3.7±1.2	3.6±1.0	L	5.1±0.9	5.0±1.1	F	5.3±0.9	5.4±0.8
F	3.7±1.0	3.1±1.2**	J	3.0±1.1	3.1±1.1	J	5.1±0.9	5.4±1.1	H	5.3±1.1	5.3±1.1
D	3.7±1.6	2.8±1.4	H	2.8±1.4	2.5±1.1	G	4.9±1.1	4.9±1.5	J	5.0±0.8	5.2±1.0
J	3.4±1.5	3.0±1.3**	I	2.6±1.3	2.7±1.0	F	4.7±0.9	5.4±1.1**	L	4.8±1.0	5.0±0.8
H	3.2±1.9	2.2±1.3**	L	2.5±1.1	2.6±1.3	C	4.6±1.0	4.7±1.2	C	4.6±1.2	4.6±1.4
I	2.3±1.2	2.8±1.3**	G	1.8±1.2	2.1±1.2	I	4.5±0.9	4.6±1.3	I	4.3±1.3	4.5±1.1
L	1.6±0.8	2.1±1.2**	F	1.7±0.7	1.9±1.0	A	3.2±1.0	3.4±1.1	A	3.2±0.9	3.2±0.9
G	1.4±0.8	2.0±1.0**	B	1.6±1.0	1.9±0.8	K	2.8±1.0	2.8±1.1	K	2.9±0.9	2.9±0.9
B	1.2±0.5	1.7±0.9**	C	1.5±0.6	1.9±1.0**	E	2.5±1.1	2.4±1.3	E	2.6±1.1	2.7±1.1
<low-priced~high-priced>						<luxury~plain>					
D	5.3±1.1	5.3±1.1	L	4.8±0.9	5.4±1.0**	E	5.1±1.1	5.0±1.2	E	4.5±1.0	4.8±0.9
L	4.4±1.1	4.7±1.3	D	4.7±1.2	5.5±1.0**	C	4.4±0.9	4.6±1.0	K	4.3±1.0	4.6±0.8
H	4.0±1.0	3.7±1.1	A	4.4±1.0	4.4±1.1	K	4.4±0.8	4.7±1.0	C	4.2±1.1	4.4±0.5
A	3.9±1.0	4.0±1.0	G	4.4±0.8	3.9±1.1**	J	4.1±0.7	4.3±0.8	J	4.0±1.1	4.3±0.7
B	3.9±0.9	3.7±0.9	B	4.3±0.8	4.2±1.1	G	4.0±0.7	4.1±0.6	A	4.0±1.1	3.9±0.7
F	3.9±0.9	4.0±1.0	I	4.3±0.7	4.1±0.9	I	4.0±0.7	4.1±0.7	F	4.0±0.9	4.0±0.6
G	3.7±0.8	3.5±1.1	H	4.2±0.8	3.6±0.9**	A	4.0±0.8	3.9±0.6	G	3.9±1.3	4.0±0.8
I	3.7±1.0	3.7±1.5	F	4.1±0.9	3.9±0.7	F	4.0±0.8	3.9±0.8	H	3.9±0.8	3.9±0.5
K	3.4±1.1	3.2±1.1**	K	3.8±0.9	3.2±1.1**	B	3.9±0.5	3.9±0.6	I	3.9±0.9	3.9±0.8
J	3.3±1.0	2.9±1.1**	J	3.6±0.7	3.0±0.9**	H	3.8±0.7	3.9±0.8	B	3.8±0.8	3.9±0.6
C	3.1±1.1	2.7±1.1	E	3.4±1.1	3.2±1.2	L	3.7±0.9	3.5±0.9	L	3.6±1.0	3.7±1.2
E	2.6±1.1	2.8±1.3	C	3.3±0.9	2.8±0.9**	D	2.9±1.0	3.3±1.1**	D	3.5±0.8	3.1±1.2**
<modern~classical>						<simple~difficult>					
E	5.4±1.1	5.8±1.0	E	5.2±1.0	5.2±1.2	A	4.6±1.3	4.2±1.4**	A	4.9±1.2	4.9±1.3
A	5.3±1.1	5.2±1.0	A	5.1±0.7	5.3±0.9	F	4.4±1.3	4.3±1.5	G	4.8±1.1	4.0±1.2**
K	5.3±1.0	5.4±1.1	K	4.8±0.8	4.7±0.8	B	4.4±1.3	4.5±1.5	B	4.7±1.1	4.8±1.4
F	3.5±0.9	2.8±1.0**	F	3.5±1.1	2.8±0.8**	K	3.9±1.3	3.2±1.4**	F	4.5±1.0	4.4±1.1
C	3.5±0.9	3.2±1.1	D	3.3±1.0	2.9±0.9**	L	3.8±1.3	3.7±1.4	I	4.3±1.1	3.7±1.0**
H	3.2±1.0	2.8±1.2**	J	3.3±1.0	2.9±0.9**	G	3.6±1.3	3.5±1.5	K	4.2±0.9	3.3±1.1**
J	3.1±0.9	2.6±1.1**	C	3.2±1.0	2.6±0.9**	H	3.4±1.2	3.4±1.4	E	4.2±0.2	4.3±1.4
I	3.0±1.1	2.8±1.0	H	3.2±1.0	3.1±1.0	I	3.3±1.2	3.4±1.3	C	3.9±1.3	3.4±1.3**
D	3.0±1.1	2.2±1.1**	I	3.2±1.1	3.0±0.8	J	3.0±1.2	2.8±1.3	H	3.7±0.9	3.7±1.1
L	2.8±1.0	2.7±1.2	L	3.0±1.0	3.1±1.2	E	3.0±1.6	4.4±1.7**	L	3.6±1.0	3.9±1.1
G	2.3±1.0	2.1±0.9	G	2.4±1.2	2.4±0.8	C	3.0±1.3	3.0±1.4	J	3.5±1.0	3.3±1.3
B	1.9±1.0	1.9±1.0	B	2.3±1.1	2.4±1.2	D	2.1±1.2	2.1±1.1	D	3.2±1.3	2.9±1.1

dishes A~L : twelve kind of dishes (Tab.1)

M±SD

**p<0.01

Table 5. The minimum and maximum value

categorical ward	student group		mother group	
	1993 n=89	1982 n=36	1993 n=96	1982 n=34
a~a'	4.9~5.8	< 4.0~5.9	4.6~6.0	< 4.0~6.2
b~b'	1.2~6.7	> 1.5~6.5	1.7~6.6	> 1.9~6.2
c~c'	2.6~5.3	> 3.3~4.8	2.7~5.3	< 2.8~5.5
d~d'	1.9~5.4	> 2.3~5.2	1.9~5.8	> 2.4~5.3
e~e'	2.6~4.2	< 3.0~4.9	2.6~4.2	> 2.9~4.4
f~f'	2.5~6.0	> 2.6~5.8	2.4~6.0	> 2.7~5.4
g~g'	2.9~5.1	> 3.5~4.5	3.3~5.0	= 3.1~4.8
h~h'	2.1~4.6	> 3.2~4.9	2.1~4.5	> 2.9~4.9

a-h :Tab.2 reference
value : mean

1. Pattern by categorical words

The patterns are classified into three groups as shown in Figure 1.

Group A converges on a~a' and e~e', Group B centers on c~c', g~g', and h~h', and Group C runs from one end to the other on the categorical scale just like b~b', d~d', and f~f'.

1) Pattern A

<tasty-dislike>

This pattern is plotted in the range of 'tasty' for all the twelve dishes in 1993. As for the image 'tasty' the student group conjures up, Yakiniku (grilled meat) scores highest, and gratin comes next, and then white stew. As for the mothers' favorite dishes, Chawanmushi (thick custard soups) comes first, and then come Ebi furai (fried shrimps), Yakiniku, and white stew.

In 1982 the scores of 'Shiraa' (vegetables dressed with white-bean taste) and 'Saba no misoni' (mackerel cooked with miso) of the student group, and those of 'Saba no misoni' and 'Maabodoufu' of the mother group were ranging from the values of 4.5 and 3.5, which is identified as 'neutral', but these dishes have shifted to 'slightly tasty' in 1993.

The measurements of all the dishes range between 4.6 and 6.0 (4.6-6.8 in 1982); the scores cluster around 'slightly tasty' and 'very tasty'.

When the two age groups are compared, the score of the student group ranges from 4.9 to 5.8, while that of the mother group from 4.6 to 6.0. The range of 'tasty' image of the student group is narrower than that of the mother group.

Regarding seven dishes out of twelve, it was confirmed by a t-test that the differences

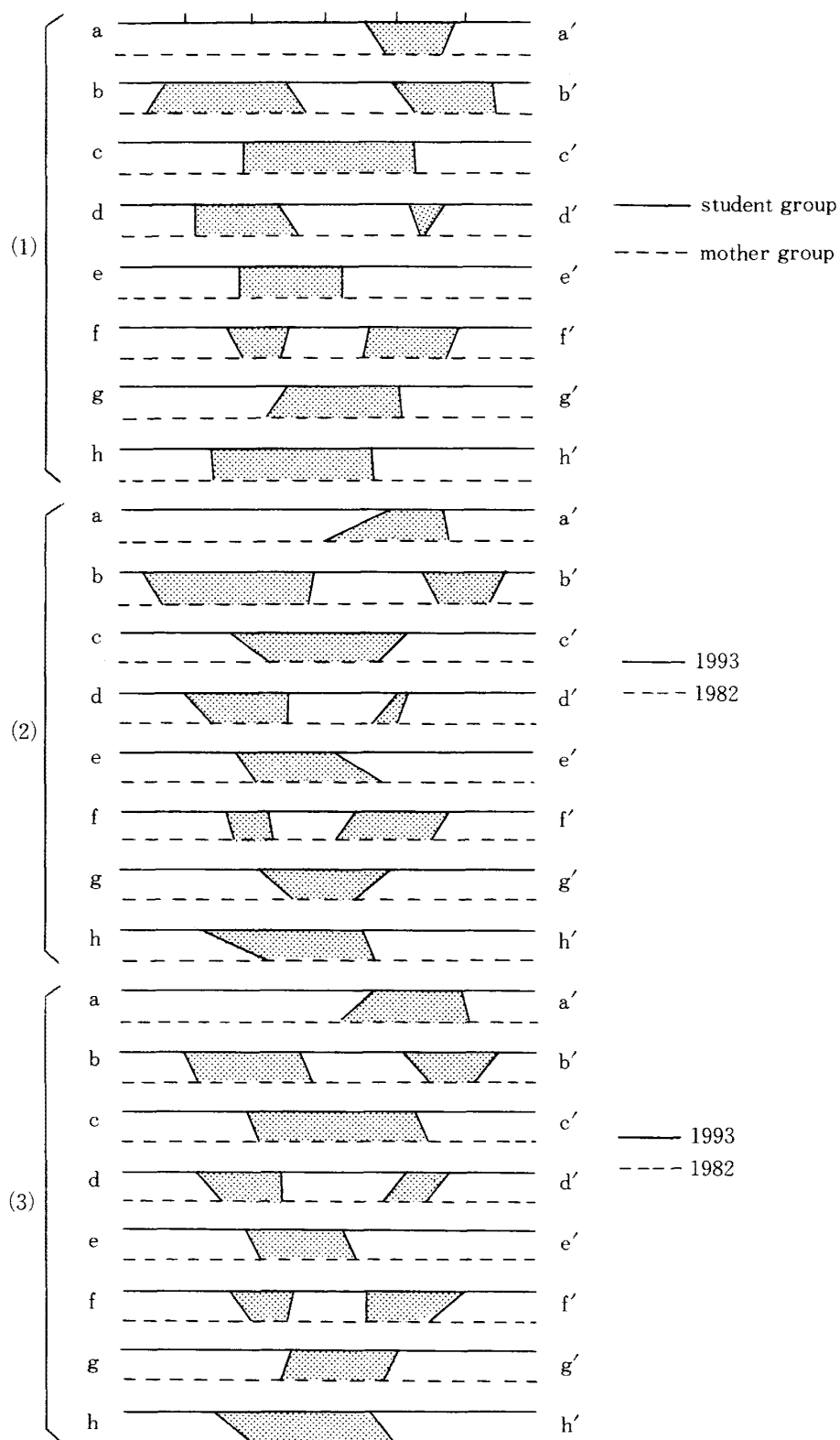


Fig. 1. The pattern of image by categorical scale
 (1) Student and mother group in 1993, (2) Student group in 1993, 1982, (3) Mother group in 1993, 1982, a~h: eight categorical words

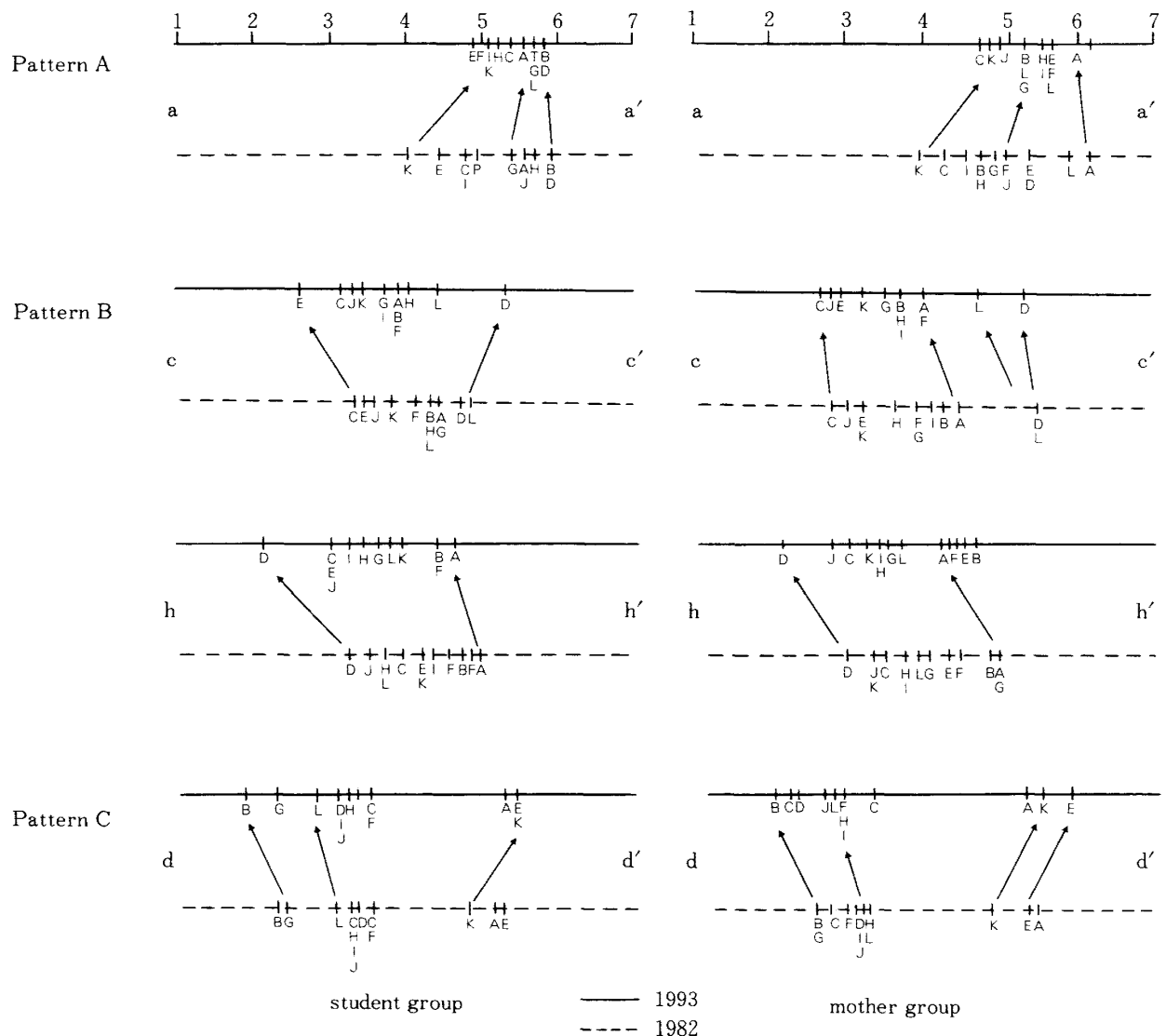


Fig. 2. Three patterns of the image for twelve kind of dishes
 categorical scale: 1-7 very, 2-6 pretty, 3-5 slightly, 4 neither,
 a~a': dislike ~ taste, c~c': low-priced ~ high-priced, d~d': modern ~
 classical, h~h': simple ~ difficult, A~L: twelve kind of dishes.

between the student and the mother group were statistically significant. As for the image 'Tasty' the students have, 'Maabodoufu', 'Gratin', 'White stew', 'Saba no misoni', and 'Tori no karaage' rank high. But this is not the case with the mothers. Their favorite dishes are 'Subuta', 'Chawanmushi' and 'Siraee'.

2) Pattern B

<low-priced ~ high-priced>

The ranges of distribution of not only the student group (2.6-5.3) and the mother group as well (2.8-5.3) are broader than expected. Both the groups tend to feel

'high-priced' when they have an image of 'Yakiniku', and 'low-priced' when they have an image of 'Siraae' and 'Maabodoufu'. The 'low-priced' image is due to the fact that their main ingredient is bean curd. The mothers are apt to feel 'high-priced' when they have an image of 'Ebi furai'.

To conclude, the differences between the values of the mothers and the students can be recognised as statistically significant. When the data in 1993 was compared with those in 1982, a 'slightly high-priced' feeling the mothers have of all the dishes was proved to be weaker, shifting to a 'low-priced' feeling. The feeling of the students, on the other hand, extends in both ways to 'low-priced' and 'high-priced' based on the type of dishes. This is true of a 'luxury' - 'plain' feeling, though its range is narrow.

<simple ~ difficult>

The participants are liable to respond to these questions from the viewpoint of their art of cooking. The range was between 2.1 and 4.6, which means that 'plain' image is prevalent among all the participants. The only exception was the 'slightly-difficult' image conjured up by the students when they 'Chawanmusi' in mind.

'Yakiniku', whose image is 'tasty', 'luxury', 'high-priced' and 'for young', has a clear 'plain' image.

The same is true of 'Saba no misoni' in the case of the mother group and the difference between the student and the mother group was proved to be statistically significant by a t-test.

'Siraae', which has the image 'Japanese style' just as 'Sabano misoni' in the case of the student group, has moved to 'slightly-plain' by the margin of 1.4 points from the mother group's.

Compared with the data of 1982, the new data, as a whole, have moved to 'slightly-plain' image. 'White stew' and 'Gratin' in the case of the student group and 'Gratin' in the case of the mother group have come to be less 'difficult' image this time.

3) Pattern C

<modern ~ classic>

This pattern is divided into two parts; 'classic' and 'modern' images in both of the age groups. 'Siraae', 'Chawanmusi' and 'Saba no misoni', which have a clear 'Japanese-style' image, still have 'classic' image, and 'Gratin' and 'White stew', which have a 'pretty foreign style' image, have now a clear 'modern' image. There is a close resemblance between the two results obtained in 1993 and 1982.

As for 'Subuta' and 'Maabodoufu', the students are found somewhere between

'modern' and 'neutral', while the mothers still have a clear 'modern' image. In the case of 'Yakiniku', however, both the groups have the same image, 'modern'.

The four dishes, 'Yakiniku', 'Subuta', 'Tori no karaage', and 'Tonkatsu' (fried pork) are concerned, the difference between the two age groups proved to be statistically significant at the 0.01 level. To sum up, the images, 'foreign' ~ 'Japanese style' and 'for the old' ~ 'for the young' are peculiar to Pattern C.

2. Range of categorical words

The value 0.9 on the scale of 'dislike' ~ 'tasty' in the case of the student group indicates the narrowest range among the scales concerning the twelve kinds of dishes (Table 5). The value 1.5 comes next, which is on the scale of 'low-priced' ~ 'high-priced' in the case of the mother group. The examples of wide range are 'foreign-style' ~ 'Japanese-style' and 'for the old' ~ 'for the young'. The same is true of the results in 1982. As a general tendency, the ranges on the categorical scales have become narrower than those in 1982, and 'dislike' ~ 'tasty' and 'modern' ~ 'classic' are the conspicuous features in the responses of the students, while 'dislike' ~ 'tasty' and 'low-priced' ~ 'high-priced' in the responses of the mothers. In contrast, the examples of the images whose ranges on the categorical scale have become wider than in 1982, are 'foreign-style' ~ 'Japanese-style' and 'luxury' ~ 'plain' in the case of the students, and 'foreign-style' ~ 'Japanese-style', 'usual' ~ 'guest', 'luxury' ~ 'plain' and 'simple' ~ 'difficult' in the case of the mothers.

Generally the change of the patterns is more striking in the students than in the mothers.

3. Factor Analysis

Factor analysis was used to analyse the relationship between the twelve variables. (Fig. 3). The cumulative contribution ratio of the extracted factor is 95 percent.

'Chawanmushi' and 'Sabano misoni', which have a clear image of 'Japanese style', are located in the first quadrant, and 'Muniere', 'Gratin' and 'Tonkatsu', which have an image of 'foreign-style' and are written with katakana (square Japanese syllabaries) are located in the second and third quadrants. From these results, the x-axis can be considered a factor of 'foreign-sty-

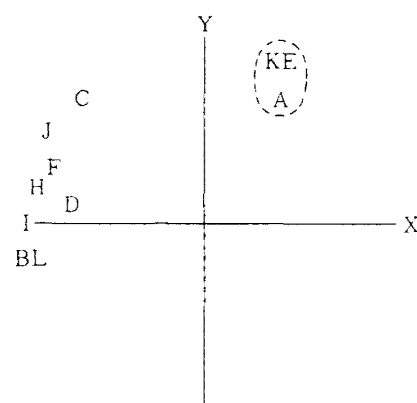


Fig. 3. The factor structure of the student group. A~L: Twelve kind of dishes.

le' dishes and 'traditional' as well. The second factor involves the items referring to 'luxury' and 'plain', which can be considered the economic factor. Nisioka et al (7), have already reported the same results.

DISCUSSION

The inner structure of images of dishes is affected deeply by social conditions and individual dietary habits, and so the analysis of the results is very hard. But the measurement of images is my primary concern as a means of analysing food intake behavior in the recent tendency of socialization and simplification of cooking.

The patterns of image : to investigate the changes of the image patterns in time series, I selected, as I had done in 1982, twelve kinds of dishes eight response words concerning the dishes on categorical scales.

Three characteristic patterns have been obtained :

Pattern A, in which the values converged on one-end in the case of 'tasty ~ dislike', with the result that the range tends to become narrower than in 1982, especially the range became narrower in the students than the mothers. The reason for this may be that all the participants think of the dishes selected as their favorites and they have had familiarity with the dishes since infancy. The students feel tasty for dishes using edible fats and oil like 'Yakiniku', 'Gratin' and 'White stew', and the mothers show a clear 'tasty' image in the case of fairly light meals like 'Chawanmusi' and 'Shiraa' for their physiological reasons. The survey of this kind must be continued to see whether the same results will be obtained when the students reach the age of their mothers.

Pattern B distributes equally in both ways on the scale, just like 'low-priced' ~ 'high-priced'. And the patterns of the students have remarkably changed when compared with the results in 1982. This may be explained that their sense of the prices for meals and food and their interest in purchasing of food items have become so keen.

There are several different points among the dishes. Meals using expensive meat have clearly a 'high-priced' image, while those using 'Toufu' have a 'low-priced' image, which is peculiar to the mothers. As for the categorical scale of 'simple' ~ 'difficult', the score of 'difficult' is low, for we can get a diversity of foodstuffs and preprocessed food lately.

As for Pattern C on the scale of 'modern' ~ 'classical' and 'for the old' ~ 'for the young', the scores of the students are lower than the mothers. This may be that the students were not keenly aware of these stimulus words and they are quite accustomed to the various kinds of cuisine served both at restaurants at home. At the same time, the

influence of family members can not be neglected, though nowadays the phenomena such as the decrease of family members in number, and the contracted disparity of age among family members make it impossible to get information about cooking from the old people.

As discussed above, it is obvious that images of dishes are effected by many factors found in daily life. The change of the images of dishes has also a close relation with the act of cooking itself. It is my duty to investigate how the images of dishes will change in the future and how the information about cooking done in daily life will be handed down from generation to generation, offered in the family.

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