I-192   HUMAN BEHAVIOR DURING EVACUATION:ANALYSIS OF EXPERIMENT

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INTRODUCTION
An experiment was conducted using the facilities of Ikebukuro Life
Safety Hall to estimate human behavior in the case of a disaster.   The
results of the experiment and the answers to the questionnaire which
was completed by the subjects of the experiment at the same time were
analyzed using the quantification theories 1 and 3 to find the factors
of human behavior.

ANALYSIS OF QUANTIFICATION THEORY 1
Using quantification theory 1, analyses were conducted using different
combinations of the categorized variables to find the most influential
factor.   The external criterion was the time required to get out of the
maze in both cases.   Table 1 gives the questions used for the analyses
while Table 2 gives the results of the analyses.   The squared multiple
correlation coefficient R^2 shows the ratio of representation of the
external criterion.   For example, the value of R^2 is approximate 0.77
in this case, i.e. 77% of the fluctuations of time can be explained by
the four factors.   The partial correlation coefficient shows the degree
of influence of each factors on the external criterion, excluding the
influence of the other factors.   Therefore, the results show that the
degree of restlessness greatly influence the time required to get out
of the maze and that this influence increases in accordance with the
longer the time required.   This means that once restlessness begins to
be felt, erroneous behavior increases and it becomes much more diffi-
cult to get out of the maze.   In the case of the other question, one
third of the subjects replied that their sense of restlessness was very
greatly affected and another third that it was greatly affected.

Table 1:EXAMPLE OF QUESTIONS

Q1: How restless did you feel when you didn't know where you were or where to go
Q2: How restless did you feel when it became dark.
Q3: How restless did you feel when time passed and you couldn't get out.
Q4: How restless did you feel when a door you thought would open didn't open.

Table 2:RESULTS OF ANALYSIS USING QUANTIFICATION THEORY 1

Item No.	category		category weight	Range	Part. cor. coe.
Q.1	Q11	very	-8.0		
	Q12	somewhat	32.9	47.9	0.546
	Q13	slightly	-14.9		
Q.2	Q21	very	-19.2		
	Q22	somewhat	14.9	35.7	0.496
	Q23	slightly	6.182		
Q.3	Q31	very	55.5		
	Q32	somewhat	-47.818	103.3	0.818
	Q33	slightly	6.182		
Q.4	Q41	very	45.0		
	Q42	somewhat	4.03	83.0	0.687
	Q43	slightly	-38.0		

Multiple correlation coefficient
     R = 0.877   R-square = 0.770

ANALYSIS OF QUANTIFICATION THEORY 3

Quantification theory 3 was also applied for the same questions. The eigenvalues and cumulative percentages are shown in Table 3. In this case, the first 3 axes were used for analysis purposes and, therefore, this analysis reflects approximately 74% of information. Figure 1 is a scatter diagram of the sample scores relative to the first and second eigenvalues. Considering the category weights as shown in Fig. 2 and contents of the categories, it can be said that the first axis represents whether or not restlessness is likely to be felt while the second axis represents those factors to which the subjects were more sensitive. Here, if a subject is plotted on the lower part of the diagram, the subject is likely to be restless, and if plotted on the left side of the figure, the subject is likely to be restless when they lost their way or position. Based on these standards, the subjects of the experiment can be classified into 3 groups, i.e. those sensitive to being lost, those sensitive to impacts and not sensitive in these aspects. Details of the analysis and a model for human behavior will be presented later.

Table 3:CORRELATION COEFFICIENTS AND EIGENVALUES

AXIS NO.	CORRELATION	EIGENVALUE	PERCENT	CUMMULATIVE PERCENT
1	0.7428705	0.5518565	27.6 %	27.6 %
2	0.7344133	0.5393629	27.0 %	54.6 %
3	0.6203852	0.3848777	19.2 %	73.8 %
4	0.4601724	0.2117586	10.6 %	84.4 %
5	0.3933659	0.1547367	7.7 %	92.1 %
6	0.2868569	0.0822869	4.1 %	96.2 %
7	0.2224404	0.0494797	2.5 %	98.7 %
8	0.1601030	0.0256330	1.3 %	100.0 %
9	0.0005836	0.0000003	0.0 %	100.0 %
10	0.0004590	0.0000002	0.0 %	100.0 %
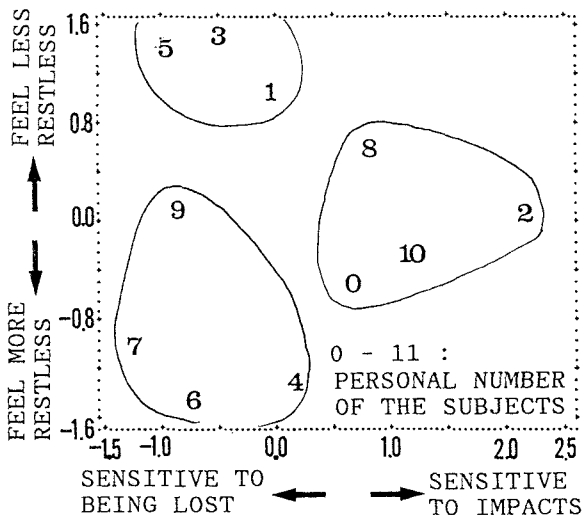
Fig.1:SCATTER DIAGRAM OF SAMPLE SCORES
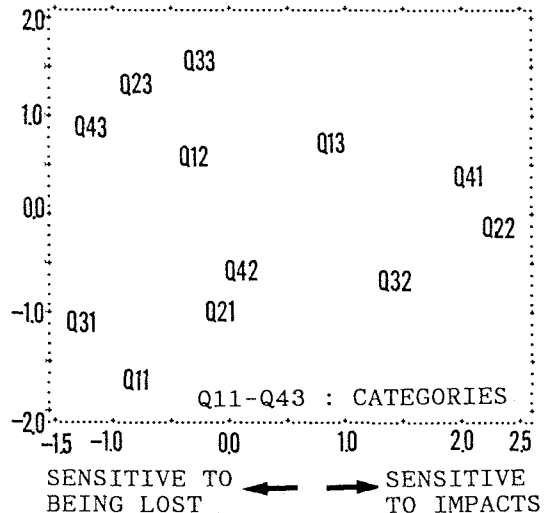
Fig.2:SCATTER DIAGRAM OF CATEGORY WEIGHTS