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A Study of the Factors Involved in the Liking and Disliking of the Szondi Pictures

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A STUDY OF THE FACTORS INVOLVED IN THE LIKING AND DISLIKING OF THE SZONDI PICTURES

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Edward J. Lambert

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This thesis, directed and approved by the candidate's committee, has been accepted by the Graduate Committee of the University of New Mexico in partial fulfillment of the requirements for the degree of

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INTRODUCTION

The Szondi test. The Szondi test contains the pictures of the faces of forty-eight European mental patients. These forty-eight pictures are divided into six sets of eight pictures each. The pictures in each set are supposed to represent eight different psychiatric, diagnostic categories. When taking the test, the subject is asked to choose the two most "liked" and the two most "disliked" pictures from each set. The selected pictures are recorded in their proper psychiatric categories according to "liked" or "disliked" on a profile chart. The form of this profile together with several scores derived from it form the basis for the analysis of the subject's personality and dynamic adjustment.

Szondi's rationale. Lipot Szondi, a Hungarian psychiartist, constructed the test in order to prove experimentally his theory about the role of latent recessive genes in influencing a person's psychological reactions. None of Szondi's publications have been translated into English. However, Klopfer and Borstelman (26) have stated Szondi's frame of reference as follows:

> According to Lipot Szondi, each one of the eight clinical syndromes pictured in the test is hereditary. Szondi assumes (a) that certain mental illnesses -- namely, those represented in the test -- are carried

> from generation to generation through the medium of recessive genes and (b) that these recessive genes influence manifest physical appearance such as can be shown in photographs.

Judging from the design of the test, Deri's (10) book and other available sources this seems to be a fair statement of Szondi's basic assumptions.

Deri's rationale. In her book concerning the test, Deri (10) does not discuss Szondi's theory of the genetic origin of instincts. She calls the test a projective technique and describes it as follows:

> It conceives of the personality as consisting of a number of need-systems (or drives) and reflects the quantitative distribution of tension in these specific need-systems plus the way the person handles these need-tensions.

Szondi's categories and scoring system are still used. These imply (1) that the pictures are defined stimuli, (2) that the pictures in each category are equivalent stimuli, (3) that the subject, at least unconsciously, recognizes the meaning of these stimuli and responds to them according to his need, and (4) that his responses can be measured.

The Szondi "factors". The postulate of eight distinct diagnostic categories is basic to the interpretation of the test as it is now scored and analyzed. The validity of these eight "factors" has been questioned on a logical basis for some time. The unreliability of diagnoses based

upon "typical clinical syndromes" has formed the basis for much of this logical doubt. More recently, the experimental studies of Lubin and Malloy (28) and Gordon (16) have shown that Szondi's eight categories are not valid as statistical factors.

THE PROBLEM

Statement of the problem. The purpose of this study is (1) to find the independent, common factors underlying the "liking" and "disliking" of the Szondi pictures and (2) to determine if these factors can be identified by superficial aspects of the pictures.

Importance of the study. The Szondi test is being used at the present time for individual diagnosis. It has been shown experimentally that Szondi's categories do not represent statistically significant scales (16, 28), but it is known that some relationship exists between the liking of certain Szondi pictures and the disliking of others (16). A factor analysis of this relationship between the pictures should provide a means for objective interpretation of a person's reactions to the pictures and may provide the basis for a re-evaluation of the theory behind the test.

REVIEW OF THE LITERATURE

Literature on the Szondi test. The basic manual for the Szondi test is Lipot Szondi's book, Experimentelle Triebdiagnostik (32) whereas his Schicksalanalyse (33) gives a detailed presentation of his theories on the psychological function of the lantent recessive genes. Susan Deri's Introduction to the Szondi Test (10) contains detailed instructions for the administration of the test and presents her rationale for its use as a projective technique. This book has served as the English language manual for the test.

Reports of American experimental studies of the Szondi technique began to appear in 1950. The majority of the studies thus far published have been conducted by Guertin. He has shown that the stimulus value of the Szondi pictures is not unique (16). In an other study he reported that the intra-factor imbalance had proved to be significantly above the level of chance expectancy, but the over all factor loadings did not significantly vary from chance (18). Guertin, Wilsen, and Rabin (21) have found that the ranges in the preference value of the pictures in the Szondi categories vary greatly.

Two of Guertin's studies are of particular interest here as they are concerned with the meaning of Szondi's

categories. In the first study, twenty-four subjects of dull normal intelligence were given half of the Szondi test. The next day twelve of the subjects were retested with the same half of the test while the other twelve received the other half of the Szondi. Those who received the same half of the test showed a picture-for-picture agreement of 70.83 per cent. Those who received a different half upon retesting showed an agreement of 25 per cent with the original half. This figure is not significantly different from chance and indicates a reliability not different from zero. Guertin concluded that the Szondi categories cannot be considered adequate for explaining all test behavior (20).

In the second study, two pictures from each category were used. It had been previously determined that these pictures had the highest preference values in their respective categories. One hundred abnormal subjects were asked to rank the twelve pictures in order of preference from high to low. Tetrachoric correlations between the preference values were computed. Centroid factoring of the resulting intercorrelation matrix produced an unrotated factor matrix containing five group factors. These factors were sufficient to account for almost 50% of the variance. The factor constitution of the pictures of the same diagnostic category was no more similar than that of pictures from different categories (19).

Fosberg (14) devised a method of testing the sensitivity of the sexual and paroxysmal vectors of the Szondi test. He divided his subjects into a control group and an experimental group. The control group was composed of 100 normal men and women and 100 men and women N P patients. The experimental group contained twenty normal men and women and ten male N P patients. Each member of the control group took the Szondi test. In the paroxysmal study, Szondi tests were administered to the ten male N P patients before electro-shock therapy and again after shock. In the sexual study, the twenty normal men and women took the Szondi ten times, five times within twelve hours of a sexual episode and five times when they had not had sexual relations for forty-eight hours or more. No significant differences were found (1) on comparing the distribution of Szondi paroxysmal factors before and after shock; (2) between N P controls and the N P experimental group; (3) between sexual vector scores of pre- and post-orgasm tests; or (4) between normal controls and the normal experimental group. These results do not substantiate the Szondi theory of decrease in the selection of vector cards with the decrease of tension in that vector.

Slopfer and Borstelman (26) had subjects respond to the Szondi pictures by two methods: (1) free associated description and (2) matching them with descriptions based

on Szondi's categories. They found that most of the Szondi pictures, more than 50%, do not have a demonstrable associative valence of the kind described by Szondi. Using a descriptive method similar to the one used in the Klopfer and Borstelman study, Davis and Raimy (9) found that the stimulus value for cards in a given Szondi category is neither common to nor unique to that category but apparently belongs to cards in other categories as well.

Lubin and Malloy (28) used the chi square method and the t test to analyse the choice reactions of 100 psychiatric patients to the Szondi pictures. The results show that there is no consistently positive pattern of interrelationships embracing all six pictures for any of the eight factors. All factors include certain pairs of pictures that seem significantly related, but the relations are not always positive. Also, significant correlations between photographs of different factors were found.

Gordon (16) has tested the significance of the intercorrelations between the forty-eight Szondi pictures. The source of the correlations will be discussed later in this paper. On the basis of the significance of the intercorrelations within a Szondi constellation, he has found that at least six of these constellations cannot represent factors in the statistical sense of the word, and that there are significant correlations between pictures

representing different Szondi categories. The subjects in the Gordon study were normal men and women. His results confirm the findings of Lubin and Malloy who used abnormal subjects. Gordon has concluded that the Szondi "constellations may be considered to represent little other than groupings of photographs of people who have been assigned the same diagnostic label," and "the Szondi test should not be used for individual diagnosis until a more meaningful scoring method has been developed and validated."

Literature on facial expressions as seen in pictures. Gordon's (16) study has shown that significant relationships exist between the Szondi pictures. Investigation of these relationships led to the belief that such relationships might be explained on the basis of superficial aspects of the pictures. The stimulus value of facial expressions as seen in pictures must be considered in making such determinations.

F. H. Allport (1) in an early investigation found that a wide range of ability existed among subjects for reading facial expressions, and that scores were fairly evenly distributed according to the normal probability curve.

There were several early studies of the interpretation of facial expression using the Piderit faces. Buzby

(4) reported that judgment of specific expressions is better than the judgment of more general expressions, and he found that the upper part of the face is more important for correct judgment of facial expression than the lower part of the face. Jarden and Fernberger (24) found that suggestion aided in the recognition of the emotions supposedly represented by the Piderit faces. Fernberger (12) ran a study in which false suggestions were made as to the emotions expressed by the faces. Some expressions were judged more correctly after false suggestion, others were not. He concluded that the perception of emotional states by facial expression is of the nature of social meanings, and that they are more dependent on stimulus-attention than anything characteristically intrinsic in the facial expression.

Frois-Wittman (15) conducted a study in which judgments were made as to the facial expression of fifty-nine composite drawings, finding that the distribution contained a wide scatter and one or several points of high frequency.

Jenness (25) compiled a review of the work done on the recognition of facial expressions of emotions up to 1931. He came to the conclusion that in the experiments so far performed there are a large number of contradictions. Some of the experiments had been of a superficial nature, and no general agreement on basic results could be reached.

Maddin and Hollingworth (29) investigated the manner in which the photographs of forty Caucasian adolescents were judged for physical attractiveness by ten Caucasians and ten Chinese. The results indicated that physical attractiveness seemed to possess certain elements which are common to both Chinese and Caucasians, and other elements which are characteristic of each race. The judgments revealed that Jewish and Chinese stereotypes are as readily discernible as are the physical qualities of straightness of hair and fullness of face. The intercorrelation of each Caucasian judge with the other nine Caucasian judges was .407. For Chinese judges it was .373. These figures indicate a large amount of individual variability.

Vinacke (36) has found that there is more agreement as to facial expression when the situation causing the expression is known than when only the facial expression is seen. The candid camera pictures used in this study were of Caucasian faces. The subjects were Japanese, Chinese, and Caucasian college students in Hawaii. There were no consisten differences between the judgments of the three groups. Women consistently agreed on the nature of the expression to a somewhat greater degree than did the men.

Farnsworth (11) asked student subjects to judge fifty-six face photographs as to whether the persons pictured were Japanese or Chinese. Stanford students were able to make these judgments at a slightly better than chance level while University of Chicago students were not. This result may have been influenced by the presence of more Chinese and Japanese in the Stanford area, but the success of the Stanford students was so slight as to have little or no prognostic value. Shortly before the study was begun, an article had appeared in Life magazine telling how to distinguish Japanese from Chinese. A check showed that the reading of this article did not influence the success of the students' judgments.

Carter (5) found that the predjudice of the judges did not significantly affect the classification of pictured persons into three categories -- Medeterranean, Jewish and North Europeans. These results were opposed to those found in an earlier study by Allport and Kramer (2). Lindzey (27) has reported that the high in prejudice will be more accurate in identifying Jewish and non-Jewish faces than the low in prejudice, and that they will be more confident in their identification.

Coleman (8) conducted a study of the judgment of facial expressions as shown in motion pictures. Students judged the expressions under three conditions: (1) when

the full face was shown, (2) when only the upper part of the face was shown, and (3) when only the lower part of the face was shown. It was found that for certain facial expressions of emotion the correspondence between judgments based on the upper face and the full face was greater than the correspondence between judgments based on the lower face and the full face. For others, the correspondence was greater between judgments based on the lower face and the full face than those based on the upper face and the full face. In general, identification of facial expressions of emotions were not made more reliably from either the mouth region or the eye region.

Hanawalt (22) in a study of the role of the upper and lower parts of the face as a basis for judging facial expressions in posed expressions and candid camera pictures, concluded that one half of the face is as good a basis for judging facial expression as the other. But it usually appears that the lower half furnishes better cues for identifying the happy expressions while the upper half is superior for surprise and fear. Neither half approached closely to the criterion of full-face judgment.

McCurdy (3) using composite pictures has found that the right half of the face contributes more to the total expression than does the left half of the face.

Samuels (31) has made an analysis of the properties of facial patterns which form the basis for various psychodiagnostic judgments. Schematized faces systematically varied were used. The judgment of 247 subjects indicated that valid differences existed in the patterns. However, when real photographs were selected to match the measurements of the features in the schematic faces, the lack of uniformity of the judgments, as well as the reasons given by the subjects for them, suggested that other cues were more important than the controlled cues. In all cases, the judgments made by women were slightly better than those made by men.

A test of the ability to recognize faces was conducted by Howells (23). Subjects were asked to identify, from a group of portraits on a chart, persons whose photographs were previously seen on cards. The reliability of identification (Brown's formula) was .88. The following correlations were found: identification scores with intelligence .27; with grades .33; with the Allport A-S test .24; with a test of perception of geometrical forms .14. It was discovered that masking the lower part of the face in the pictures lowered the scores more than masking the upper face. Women's identification scores were slightly superior to men's.

Fields (13) in a study to determine the relationship between the ability to judge facial expressions and personal adjustment found that every individual was able to discriminate at least seven of the twenty expressions presented. Above this base level of common achievement scores of performance tended to follow the curve of normal distribution. Sex differences in the ability to discriminate facial expressions were not significant. There is a positive correlation of .24 between discrimination and social adjustment. This is not high enough to warrant individual prediction. No correspondence was shown to exist between discrimination of facial expression and emotional adjustment scores.

It is evident that there are many aspects involved in the interpretation of facial expressions as seen in pictures that are not fully understood at present, but certain conclusions can be drawn. While the meaning of specific facial expressions is confused, it has been shown that the more general facial expressions such as happiness and unhappiness are usually agreed upon. Extreme stereotypes, as denoted by facial characteristics, are generally distinguishable. When the superficial aspects of pictures of faces are to be used for identification, it is apparent that only gross or clearly agreed upon aspects may be considered.

PROCEDURE

The factor problem. The purpose of factor analysis is to reduce the number of variables needed to explain the intercorrelations. Factor analysis has two distinct advantages to offer that are not present in other analytical procedures. These are: (1) it yields evidence as to the strength, not the mere presence or absence, of association between variables; (2) no suppositions are required as to which are dependent or independent variables.

The choice of the method to be used for the factor analysis is an important consideration. There are several methods of factor analysis in current use. The process itself owes its existence to the early work of Charles Spearman. The method of two factor analysis which developed is largely of historical interest. The general factor which he postulated as a basis for this method has been shown to be of an artificial nature. The addition of new variables to the original matrix will often completely change the form of the general factor. In other words, the factor is general only in relation to a specific matrix.

The Holzinger bifactor approach and the bipolar system of Burt are historically related to the Spearman two-factor method. In the Holzinger method, the general factor is first extracted, and then the residual matrix is broken

down into submatrices to aid in the computation of the group factors. This method results in one general factor and one or more non-overlapping group factors, all of which are positive. The bipolar system also removes a general factor as its first step, but later group factors do not have positive loadings only because in this method the first factor takes out more variance than in the bifactor method. In fact, the second factor has negative and positive loadings which balance out to about zero. The actual process of factor extraction used in these two methods has been fully illustrated by Thomson (34). The point of interest here is that both methods "accept the first general factor taken out as the foundation which determines the shape of later factors and treats it as a real, final factor not to be interferred with or divided up by rotation" (6, p. 136).

The principle components method developed by Hotelling and the Lawley method of maximum likelihood both result in very accurate factor estimates. The completion of the principle components method results in the same number of factors as there are tests. In the maximum likelihood method a first approximation is determined by a centroid, and then these loadings are operated on by a successive approximation method applying a correction each time the process is repeated. These two procedures employ by far the most computational work of any of the methods in current use.

The most commonly used and seemingly the most universally useful method of factor analysis is Thurstone's (35) multiple factor analysis procedure which involves the centroid method of factorization. This is the method of extracting factors in which the sum of all elements of each residual matrix is approximately zero before reflection. Thurstone's system, the principle components method, and the lawely procedure have as an intregal part their process the rotation of factor coordinates for simple structure. This is important for, as Cattell (6, p. 145) says, "experience has shown factor patterns obtained by simple structure tend to be invariant."

The multiple group method of factor analysis is a variation of the basic centroid method by which several factors may be removed from the matrix at one time rather than in successive steps as in the basic centriod method. This procedure involves the prior grouping of the tests, and can prove to be a great time saver if the grouping is properly done. There are certain set procedures that can be used in grouping. Both Thurstone (35) and Cattell (6) describe these procedures in detail.

The two major criteria for choosing the method of factor analysis to be used for a specific problem are, according to Cattell (6): (1) the scientific meaningfulness of the result, and (2) the ease and accuracy of computation.

When it is considered that the correlation matrix in our problem contains 2252 elements not including the forty-eight communalities which must be estimated by successive approximation, it will be realized that "ease of computation" would be an important consideration.

Scientific meaningfullness, of course, must not be neglected. There did not seem to be an absolute basis for assuming a general factor in the "liking" and disliking" of pictures. Because of this fact and the instability of the general factor which was previously discussed, it was decided not to use a method involving the extraction of a general factor as its first step. It was doubtful if the data of the present study warranted the exacting treatment required in the principle components or the maximum likelihood method. The centroid method remains. For the reason of economy the multiple group variation of the centroid method was chosen.

Source of the correlations. This study began with a correlation matrix consisting of the intercorrelations between the forty-eight pictures in the Szondi test. The matrix was obtained from an earlier study by Gordon (16). He made a film strip of the Szondi pictures. The sets appeared in their prescribed order, and the pictures within each set were randomized. The pictures were numbered from one to forty-eight in the order which they were to be

presented. These are the numbers used to represent the pictures in this study. Table I shows the correspondence between these numbers and Szondi's designations of the pictures. The film was shown to a group of students at an eastern university. The group was composed of 152 males and 85 females who were asked to indicate "like" or "dislike" for each picture as it was projected on a screen.

A contingency table for each picture with every other picture was constructed on the basis of the "likes" and "dislikes" expressed. The tetrachoric correlations for each picture with every other picture were determined from the contingency tables with aid of the Chesire, Safir and Thurstone (7) computing diagrams. Tetrachoric correlations were used because, as Wherry and Gaylord (37) have shown, the tetrachoric correlation is not influenced by item difficulty. Thus the possibility of difficulty factors confusing the factor pattern has been eliminated. The standard error for each coefficient of correlation was computed, and the significance of each from zero was tested for at the five and one per cent levels of confidence.

Method. The correlation matrix containing the intercorrelations among the forty-eight Szondi pictures is shown in Table II. In the half matrix there are 127 correlations significant at the one per cent level, and 274 significant

TABLE I

The Correspondence Between The Numbers Used to Represent the Szondi Pictures in This Study and the Szondi Designations

1 - 5h	25 - 2hy
2 - 6e	26 - 4k
3 - 3p	27 - 8h
4 - 1k	28 - 3d
5 - 4d	29 - 7e
6 - 8hy	30 - 1p
7 - 2s	31 - 5m
8 - 7m	32 - 6s
9 - 5d	33 - 5s
10 - 4h	34 - 7h
11 - 1hy	35 - 3 hy
12 - 7s	36 - 1e
13 - 3e	37 - 4p
14 - 6p	38 - 6k
15 - 8k	39 - 2d
16 - 2m	40 - 8m
17 - 6d	41 - 7d
18 - 4m	42 - 8e
19 - 5k	43 - 3k
20 - 7hy	44 - 4s
21 - 3s	45 - 1m
22 - 2e	46 - 6hy
23 - 1h	47 - 5p
24 - 8p	48 - 2h

TABLE 2

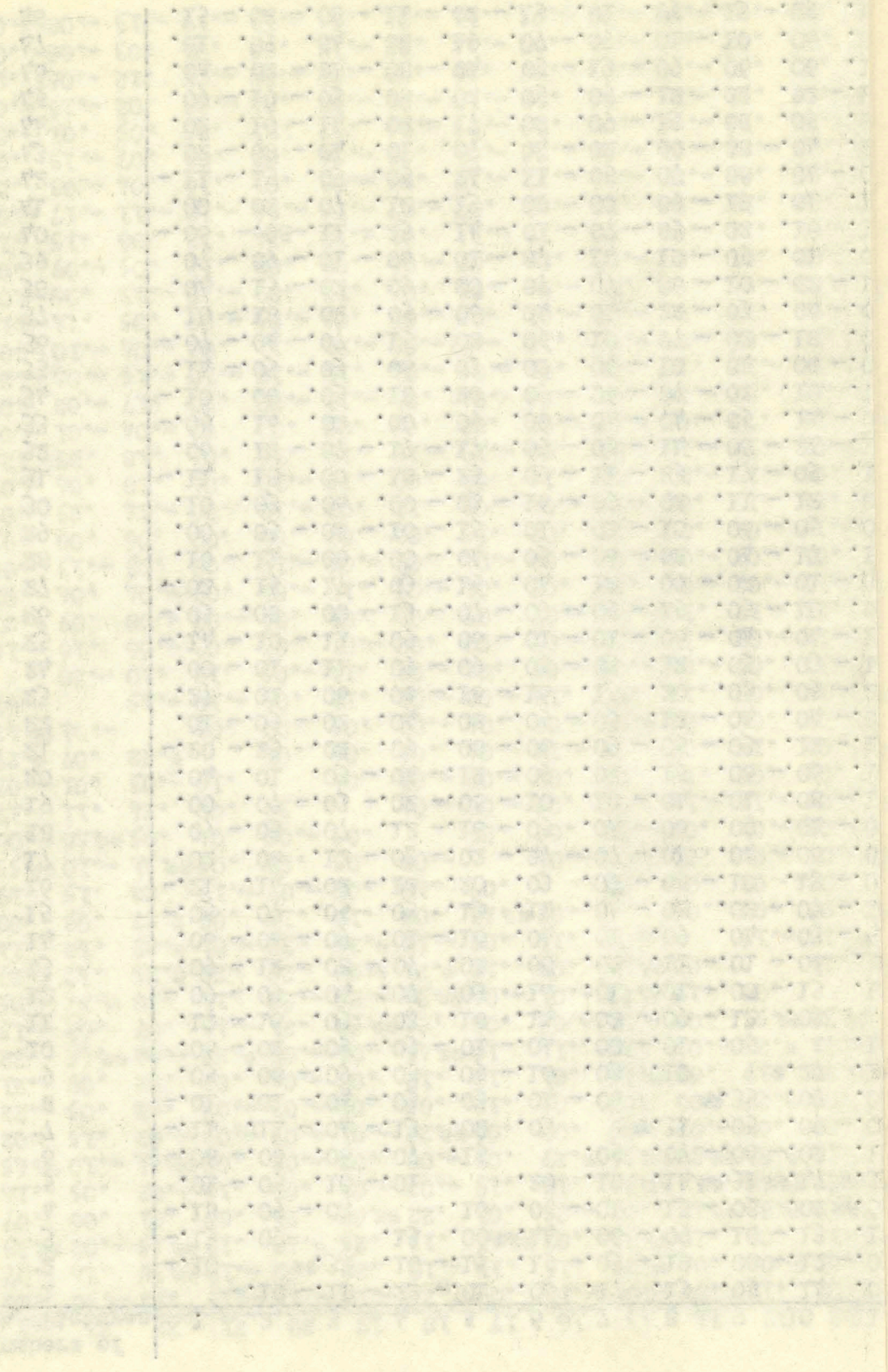
The Correspondence Between The Number Used
to Represent the Speech Figures
in This Study and the Speech Designations

TABLE II

THE INTERCORRELATIONS AMONG THE SZONDI PICTURES AND THE FINAL RESIDUAL TABLE

Numbers of the Pictures	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
1		-.10	-.11	-.22	-.01	.06	.17	.13	.05	.14	.03	.07	.11	.08	-.05	-.16	.09	.21	-.14	-.13	-.13	.12	**.36	.10	-.06	.06	.10	.09	-.01	*.29	.00	.09	.07	.08	.20	-.06	.14	.08	.10	-.01	.11	-.04	.21	.12	.10	.05	.04	*.26
2	-.10		**.32	.10	-.16	.15	-.03	-.19	.08	-.12	-.03	.01	-.04	.04	*.27	.16	.17	-.10	.22	.00	-.10	**.38	.14	.07	-.10	*.22	.15	-.03	.10	.07	.00	.03	.22	.07	-.13	.05	-.02	**.40	-.10	-.13	-.15	-.21	.14	*.29	.10	.10	**.44	-.12
3	-.13	.09		.13	.00	**.44	.06	-.09	-.10	-.13	.10	-.15	.05	.19	**.34	.07	**.41	.13	.25	*.40	.12	**.45	-.02	**.33	-.08	**.36	-.07	.21	.20	.20	.00	-.08	.12	-.10	.02	-.15	*.25	.12	.05	-.08	-.11	.02	.20	.03	**.54	.08	*.29	-.15
4	-.16	.09	-.02		.10	.05	-.01	.13	-.03	.02	**.62	.17	*.33	**.42	.00	-.23	.01	.22	**.67	.21	.00	.01	.06	.07	.06	.20	.19	.21	.25	.16	.05	.19	.16	.10	**.32	.20	.03	.17	-.01	.01	.10	*.38	.29	.11	*.32	.10	*.40	.03
5	.01	-.05	.10	-.01		.20	.10	.14	**.31	**.47	*.33	*.21	**.40	-.12	**.34	.19	.19	-.02	-.01	.00	.16	-.02	.05	.14	**.38	-.14	.14	.07	-.06	.16	.03	-.01	*.24	*.30	**.38	*.26	.03	.06	*.21	.07	.22	**.39	-.07	-.15	.12	*.21	.10	**.46
6	-.06	-.06	.06	.07	.15		.05	.07	-.06	-.02	.10	.18	*.24	**.35	**.36	*.29	.03	-.09	.00	-.08	.09	**.44	-.10	**.45	.09	.20	-.08	.23	**.30	.17	.19	.11	.19	.07	.00	-.11	**.38	.18	.08	.02	.18	.10	.17	*.29	**.53	**.32	**.41	-.13
7	-.11	.11	-.04	-.13	.08	.03		**.31	.05	.09	-.01	.20	.09	-.02	.09	.00	.06	**.28	-.01	-.03	-.03	-.02	.15	.02	.14	.10	*.29	-.17	-.08	.13	.15	.07	.18	.22	**.30	.16	-.07	.02	.20	.10	.12	.20	*.32	.13	.07	*-.22	*-.22	*.26
8	-.01	.01	-.04	-.03	.03	.04	-.06		**.35	.07	.00	.06	*.27	.06	.00	.05	.12	.05	.00	-.03	-.07	.08	.05	.22	.19	-.04	.00	-.17	-.16	.15	.00	-.04	.21	.02	.17	-.08	.17	.13	*.27	*.25	**.49	**.42	.14	*-.25	-.16	-.09	-.03	.22
9	.05	.08	-.09	.05	.05	-.16	.03	.10		*.27	.10	*.26	.19	.00	**.43	.04	.13	.12	.07	-.04	.03	.22	.09	.21	.07	.02	.07	-.10	-.07	.04	.21	.03	.07	.13	.15	.06	*.26	.18	*.25	*.22	**.44	.19	-.08	.02	.00	-.05	.01	*.29
10	.06	-.02	.05	-.03	-.01	-.04	.00	-.01	.05		.19	*.21	*.22	-.02	.10	.14	.10	**.41	.06	-.09	*.22	-.02	**.45	.22	*.28	-.12	**.48	.00	.01	.04	.09	-.05	*.24	**.35	**.32	.08	.15	.03	*.25	.02	**.40	.14	-.04	.12	.03	.21	.02	**.44
11	.12	-.16	.03	.03	.18	.14	.02	-.09	-.12	.03		**.36	**.53	.08	-.01	-.08	.05	.24	**.50	.21	-.15	.07	.00	-.15	.00	*.34	.24	*.34	.22	.01	.10	.15	.01	.02	.22	.25	-.01	-.03	*.28	*.30	.28	.25	**.37	.10	.05	.21	**.46	*.32
12	-.09	-.09	-.04	.07	.03	.14	.01	.01	-.08	-.13	.12		.02	.19	*.22	-.01	-.04	**.34	-.22	-.20	.11	.10	*.27	-.05	.17	*.23	**.37	.11	-.10	.17	.15	.23	.13	.19	.10	**.61	.16	-.07	.08	.04	*.30	.18	*.31	.19	-.12	.00	*.29	**.51
13	.09	-.12	-.08	-.07	.02	.06	.02	.11	-.01	-.06	.12	-.21		.00	**.38	.05	.15	*.21	*.28	.08	.20	*.25	.17	*.29	*.27	.10	.15	*.31	*.21	**.36	.08	.03	*.24	.03	.17	.15	*.27	*.22	.19	.21	**.32	**.32	*.21	**.31	*.24	**.27	*.28	*.29
14	.06	-.04	-.09	.01	-.10	.04	.01	.09	.04	.03	-.04	.13	-.18		.00	.11	.09	-.10	*.26	.30	-.01	*.23	.10	.14	-.12	**.40	-.14	.17	**.54	**.40	.03	.12	.14	-.16	.06	-.18	*.29	.03	-.01	.12	-.06	-.01	.03	**.38	**.36	.18	**.38	-.13
15	-.05	.07	.05	.03	.13	.11	.04	-.04	.02	-.07	-.12	.08	.05	.06		.09	**.43	.00	.19	.15	.07	*.27	.03	.20	**.37	.08	.05	.01	-.07	.11	.15	.11	.12	.12	.17	.12	.21	.14	.03	-.12	.21	.06	.07	.05	.19	.15	.09	.14
16	-.21	.14	-.08	-.12	.20	.03	.03	-.05	-.10	.13	-.04	.02	-.02	.04	.02		.07	.10	.09	-.07	-.13	.22	.15	.19	.06	.11	-.08	.17	.14	.04	.14	-.05	-.05	-.15	.11	-.11	.19	.08	.18	-.10	.19	-.12	-.01	.00	.19	.02	.10	-.11
17	.02	.06	.12	-.03	-.02	-.27	-.07	-.01	.04	.06	.07	-.02	-.09	.01	.00	-.04		-.02	.05	.03	.05	**.31	-.10	**.55	*.30	.22	-.12	.01	*.25	.22	*.23	-.17	*.24	-.02	.09	-.08	.19	.21	.12	-.14	.10	-.03	.10	-.07	.19	**.29	-.03	.22
18	.09	-.03	.07	.12	-.16	-.05	.04	.06	.05	.04	-.06	-.04	-.01	.00	-.02	.02	.06		.05	-.08	.04	.05	**.46	.00	*.21	**.32	**.35	**.54	.08	.09	.00	.03	-.08	.17	.17	*.23	.00	-.09	.12	.00	.00	.13	**.40	-.03	-.08	.00	-.05	*.22
19	.00	.07	-.03	-.02	-.06	-.10	.10	-.04	.01	.08	-.13	-.25	-.12	-.11	.09	.08	-.03	-.04		.32	.00	.24	.11	.17	.01	**.39	.11	.26	.37	.06	.20	*.39	.15	-.34	*.28	-.22	.16	*.28	.12	.10	-.20	.20	.19	.17	**.34	*.27	*.32	.04
20	.04	.01	.03	-.04	-.12	-.09	.01	.15	.06	-.06	.10	.05	.02	.13	.02	.07	-.02	-.01	.04		.15	-.03	.01	-.03	-.10	.08	-.05	-.08	.10	-.23	-.09	*.33	.08	*-.40	.02	*.28	-.03	.15	.18	.17	-.21	-.12	-.14	.01	**.60	-.04	-.02	.07
21	-.20	-.23	.02	.09	.08	-.06	-.09	-.05	-.03	.11	-.14	.02	.17	.01	-.07	-.15	-.04	.06	.06	.01		*.22	.07	*.27	.10	-.05	*.21	.02	-.02	.16	.03	.04	.19	*.28	.00	.17	.02	.13	*.27	.09	.01	.12	.09	**.31	.18	.02	.17	.00
22	.01	-.03	-.02	.04	.08	-.05	-.03	.12	-.04	.04	-.07	-.07	.06	.03	-.09	-.02	.04	-.03	.05	.00	.03		-.01	**.42	.05	*.28	-.11	.22	.20	.03	-.01	.12	.12	.17	-.18	-.03	**.43	.19	*.22	.13	-.03	.04	**.43	**.30	**.46	*.28	**.54	-.19
23	.27	.02	.06	.06	-.16	-.16	.15	.20	.06	.05	-.21	-.12	.00	.12	.00	.15	-.02	-.01	.11	.04	-.10	-.15		-.07	*.25	.17	**.58	.15	.07	**.32	.01	.20	.00	.13	.14	*.26	*.27	*.23	.12	.04	.01	-.08	.05	.20	-.08	.08	.11	*.27
24	.00	-.01	.11	.09	-.09	.05	-.03	.12	.03	.03	-.14	-.13	.06	-.05	-.06	-.03	.28	-.03	.11	-.05	.12	.10	-.20		.06	.12	.03	*.24	*.25	**.38	*.23	*.31	.13	.10	-.10	-.16	.12	.18	*.23	.14	*.26	.13	.11	.14	**.33	*.30	.22	.16
25	-.14	-.10	-.11	.09	.06	-.01	-.01	-.06	-.04	.04	-.12	.14	-.03	.17	.01	-.07	.00	.00	-.01	.05	.03	-.06	.16	-.14		.21	.05	.19	-.01	-.02	.19	.09	.00	-.17	**.41	.07	-.03	*.29	*.23	-.07	.12	*.23	.19	-.07	.10	.18	.00	.15
26	-.03	.08	.00	-.13	-.07	-.09	-.05	-.15	.05	-.10	.04	.15	-.17	.12	.02	-.07	.07	.03	.01	.06	-.07	-.08	.09	-.07	.09		-.05	.39	*.25	**.40	-.01	-.05	.03	-.09	**.31	.01	.20	*.28	.16	.09	.09	.06	**.43	.07	*.30	.12	**.34	.09
27	-.02	.15	.17	-.03	-.15	.04	.12	.00	-.02	.01	-.03	-.10	-.02	-.06	.06	.07	.01	-.05	.12	-.06	.03	-.04	.04	.01	.00	-.01		.03	.12	-.03	.09	**.42	*.22	*.33	*.28	*.22	-.11	.14	.05	-.06	**.35	.19	.12	.11	-.17	.13	.01	**.49
28	.10	-.11	.00	.00	-.04	.03	-.06	-.02	.04	-.17	.10	.01	.03	-.06	-.02	.00	-.04	.03	-.04	-.12	.08	.03	-.13	.08	.07	.04	-.03		**.35	.05	-.10	.24	-.13	-.20	.01	-.04	.21	.06	.08	.07	.01	.01	*.22	*.22	*.29	.18	.08	.05
29	.00	.05	-.02	-.10	-.15	.01	.02	-.10	.06	-.05	.08	-.12	-.04	.00	-.03	.02	.15	.02	.02	.01	.02	.06	.00	.03	.11	-.04	.18	-.04		**.35	.18	*.33	.11	-.12	.04	*-.26	**.35	.05	-.04	.17	.10	.00	-.02	**.37	**.35	*.22	.09	-.10
30	.10	.03	.06	.00	-.03	-.16	-.09	.02	.11	-.12	.09	.01	.13	.04	-.02	-.04	-.03	.11	.03	-.12	.08	-.14	.23	.09	-.09	.22	-.11	-.08	.02		*.26	.01	**.30	.04	-.01	-.02	.08	.15	.02	.08	.17	.10	.09	*.24	*.30	*.27	*.29	.13
31	-.11	.18	.00	-.18	-.25	.09	-.11	-.25	.17	-.09	.12	.05	-.13	-.21	.06	.14	.06	.00	.15	-.10	.04	.10	.04	.07	.11	-.07	.01	-.12	-.04	-.09		*.32	*.23	.03	.17	-.08	-.13	.12	.15	.12	**.40	.01	.09	.03	.16	.09	.13	**.30
32	.06	.12	-.07	-.19	-.17	.09	-.05	-.14	-.06	-.24	-.10	.04	-.17	-.19	.17	.00	-.13	-.12	.13	.16	.04	.18	.07	.24	.20	-.18	.19	.13	.08	-.16	.09		-.08	-.05	.10	.20	.11	.04	.20	.18	*.30	.09	.23	.09	.09	.08	.00	.24
33	-.05	.16	.02	.00	.09	.00	-.04	-.04	-.05	.14	-.08	.05	.06	.05	-.07	-.08	.02	.08	.05	.02	.03	-.04	-.01	-.08	-.17	-.08	.11	.00	.08	.07	.03	-.18		.02	**.30	.13	-.05	.18	*.23	-.02	*.30	.11	.10	.20	*.21	**.36	.20	.09
34	-.10	.08	.03	.18	.20	.09	-.06	-.07	-.02	.18	.12	-.15	.02	-.14	.04	-.05	-.04	.09	-.11	-.20	.20	.17	-.02	.09	-.15	.01	.05	-.05	-.01	-.14	-.13	-.13	-.08		.22	*.29	.00	-.14	.06	-.13	.19	-.08	.08	-.20	-.01	-.13	.09	.17
35	.14	-.03	.03	.08	.03	-.02	.09	-.10	.04	.00	-.06	.00	-.12	.15	.01	.09	-.05	-.04	.11	-.12	-.10	-.15	-.04	-.26	.06	.19	-.01	-.05	.05	-.10	-.01	-.05	.07	.20		.12	.10	**.32	*.28	.18	*.24	**.40	.11	-.17	*.25	.18	.03	*.27
36	-.07	-.04	-.07	.15	.08	.05	.10	.07	-.02	-.18	.01	.30	.06	.00	-.03	.10	-.01	-.06	-.24	.11	.02	-.04	-.10	-.08	.03	.09	-.26	-.04	-.09	.07	.00	.13	.10	.10	-.03		.08	.00	.10	.03	-.05	.00	.14	.04	-.07	-.08	.11	**.37
37	.10	-.18	.02	.05	-.06	.04	.01	.22	-.03	.06	-.06	.00	.11	.03	-.01	-.01	.05	-.06	.05	-.05	-.09	.05	.14	-.16	-.01	.03	-.11	.04	.13	-.09	-.17	.04	-.12	.02	.13	.11		.03	-.01	.08	.05	.10	.10	*.25	**.33	.10	*.25	-.12
38	.04	.15	-.02	.09	.00	-.07	.07	.06	-.10	-.02	-.25	-.02	.04	.09	.01	-.04	.03	.03	.10	.09	-.10	-.13	.06	-.07	-.02	.08	.03	.02	.05	.09	.22	.11	-.10	.00	.05	-.06	-.04		.15	-.08	.05	.13	.12	.08	*.30	**.33	**.35	.22
39	.07	-.09	-.01	-.06	.01	-.07	.14	.10	-.05	.01	.05	-.02	.01	.03	-.10	.03	.07	-.06	.00	.03	.11	.05	-.09	.00	.02	.02	-.16	.02	-.04	.03	.14	.10	.05	.11	-.03	.01	-.15	-.15		-.09	**.41	.02	.01	.08	*.24	**.22	.18	.12
40	-.06	-.08	-.11	-.23	.14	-.01	-.07	-.03	-.02	.16	.10	-.07	.11	.00	-.08	-.16	-.14	.01	-.10	.24	.13	.06	-.06	-.04	.14	.13	.05	.03	.04	-.15	-.15	.09	.13	.05	-.09	-.02		*.35	.07	.22	-.03	-.10	.08	.19	-.08
41	.00	.02	.07	.12	-.13	.02	.00	.09	-.19	.01	.12	.02	.11	-.08	.10	-.01	.07	-.07	-.18	-.06	-.12	-.11	-.17	-.04	-.06	.07	.12	.10	.09	.05	.19	.10	.04	.06	-.07	-.03	-.16	-.09	-.04	.11		.23	.03	.08	.05	.08	.03	**.35
42	-.11	-.15	.03	.05	.24	.11	-.05	.07	.06	.04	-.03	.07	.05	-.01	-.06	-.12	-.17	.07	-.03	.01	.16	.04	-.03	.09	-.03	-.10	.12	.02	-.01	-.01	-.18	-.03	-.09	-.13	.14	-.01	.16	.01	-.08	-.14	.05		*.22	-.05	-.06	.03	.10	.20
43	.02	-.08	-.04	.01	.07	.04	-.02	.00	-.08	-.04	.03	.03	-.01	-.01	-.02	-.05	-.01	.03	-.06	.02	.03	.07	-.13	.07	.01	.03	-.05	.03	-.04	.03	.11	.18	-.04	-.02	-.02	.05	-.09	-.07	.06	.09	-.02		.07	.15	.05	**.34	.08
44	.02	.10	-.14	-.08	-.17	.02	.09	-.13	.08	.05	.05	-.04	.16	-.04	.00	.00	-.15	-.05	.02	.01	.25	.05	.01	-.03	.10	-.11	-.03	.04	.03	-.10	-.12	-.09	.11	-.34	-.09	-.01	.03	.06	.14	-.03	.11	-.01	-.07		**.37	*.20	**.37	.11
45	.09	-.10	-.03	.08	.02	.05	.05	-.12	.02	.02	-.10	-.02	.01	-.05	-.06	.02	-.10	-.06	-.02	.04	-.03	.02	-.16	-.05	.06	-.06	-.11	.05	-.01	.06	.06	-.06	-.03	.16	.09	-.03	.03	-.05	-.02	-.12	-.01	-.04	.03	.12		**.43	**.36	*.22
46	.04	-.02	-.04	-.08	-.04	.05	-.13	-.09	.06	.06	.14	.00	.00	-.04	-.03	-.07	.06	.09	.07	-.09	-.07	.12	-.04	.03	-.01	-.03	.09	-.02	-.07	-.02	-.07	.00	.18	-.06	.02	-.04	-.04	.03	.13	.13	.01	-.05	.05	.00	.12		**.30	.00
47	.01	.03	.04	.08	.19	.07	-.09	.01	-.10	.06	.06	.10	.02	.04	-.01	.00	-.14	.07	-.13	.00	.01	.03	-.08	.00	.02	.01	-.09	-.06	-.18	.12	.20	-.11	-.03	.15	-.01	.06	-.02	-.10	.00	.05	-.09	.00	.01	.04	-.03	.03		-.14
48	.15	-.02	-.06	-.11	-.02	-.15	.01	.05	.13	-.05	.14	.24	.02	-.07	-.07	-.05	.11	-.04	.03	-.13	-.19	-.13	-.08	-.03	-.11	.10	-.02	.03	-.08	-.08	.05	.02	-.15	-.03	-.16	.05	-.15	.06	-.18	-.08	-.04	.04	.03	.06	.07	-.16	-.12	

* Significant at the .05 level of confidence. ** Significant at the .01 level of confidence.



at the five per cent level of confidence. This is well above the level of chance expectancy and indicates that there are common factors underlying the variance of the correlations.

As the multiple group method of factor analysis has seen selected for use in this problem, the first step is the grouping of the correlations. The method of highest inter-correlations described by Thurstone (35) was used. Seven groups were thus formed using all of the correlations, each being put into the group it fitted best. As an aid to computation, the matrix was redesigned so that the correlations in each group constituted a submatrix.

The communalities are the elements r_{ij} of the matrix where i = j. These quantities represent the correlation of a picture with itself in so far as this is due to the common factor variance. They are not the reliability coefficients which also include the influence of the factors specific to that picture. Thus these quantities are unknown and must be estimated. Unfortunately there is no accurate method for choosing correct communalities. Thurstone (35) discusses twelve possible methods. The method selected for use in this problem was the grouping of similar tests. This method was chosen because (1) the pictures were already grouped and (2) it usually gives a better estimation of the

communalities than methods requiring less compulational work. Thurstone's (35, p. 298) simplified formula for this method, $h^2 \doteq \frac{(s-1)(\Sigma r_1)^2}{\Sigma r_1 / 2s \Sigma r_o}$, was used to determine the first communality estimates.

The seven factors were extracted from the matrix, the usual column and row and group checks indicated by Cattell (6) being used. When the basic centroid method is used, the factors are extracted singly, and the resulting factor axes are orthogonal. The multiple group method of factor analysis produces oblique axes. In this study it was proposed to find the independent, common factors. It is then necessary to make the factor axes orthogonal and to determine the new factor loadings in relation to this system of orthogonal axes.

As the first step in the transformation of the oblique factor axes to orthogonality, the correlations between the factors were found using a procedure which is described by Cattell (6, p. 180). The Doolittle method was used to find the weights necessary to transform the oblique factor loadings into orthogonal factor loadings. This method has been developed for use in factor analysis by Brogden (3). The weights derived by this method were used to compute the orthogonal factor loadings.

The influence of the seven common factors was removed from the matrix resulting in the first residual table.

Examination of this table showed that there were significant correlations remaining in it. Three more factors were removed and their axes made orthogonal. The communalities were re-estimated three times, the factor process being repeated after each estimation. The final factorization resulted in the residual table shown in Table II. The final residual table contains more significance than was desired, but several of the communalities (pictures 9, 18, 20, and 41) were approaching unity. For this reason, it was decided to discontinue factor extraction at this point.

Rotation of the factor axes for simple structure was began. At one point in the rotation procedure, it appeared that the variance of one factor might be better accounted for by two. Therefore, this one factor was split into two making a total of eleven factors. Forty-seven rotations served to indicate the stability of the factors.

At this stage, simple structure was being approached, and it was possible to set up certain hypotheses concerning the meaning of the factors on the basis of the superficial aspects of the pictures. To aid in this process, forty men and women students were asked to judge the age, sex, mood, and general appearance of the persons shown in the pictures. A loading of .30, which is approximately twice the average standard error of the correlations, was taken as the criterion of significance, and the significant pictures in each

factor were sorted out to aid in the identification. In most cases, the identification was based on the pictures with high loadings as just significant loadings can easily be reduced to non-significance by further rotation.

RESULTS

The orthogonal factor loadings after forty-seven rotations are shown in Table XIII. Following is a list of the factors including tables showing the loadings of the significant pictures on each factor. Where it is possible, the tentative identification of the factor is given.

FACTOR I

TABLE III

The Pictures with Significant Loadings on Factor I

Pictures	29	14	30	45	6	44	31	28	46	24
Loadings	.65	.63	.54	.45	.41	.39	.38	.37	.36	.33

Pictures	26	36	9
Loadings	.30	-.33	-.36

The superficial aspect that is common to most of the pictures in Table III is "serious oldness." Both sexes are represented and several shades of expression are apparent in this group of pictures, but most of the persons shown in the pictures are judged to be over fifty. No picture with a significant loading shows a person judged to be under thirty-five, and the five pictures with the highest loadings are of serious, bearded, old men. There are two pictures with just significant negative loadings. One of these shows a round

faced, young looking man, and the other a woman of uncertain age. This factor may be considered a "serious oldness" factor.

FACTOR II

TABLE IV

The Pictures with Significant Loadings on Factor II

Pictures	27	23	48	12	36	10	34	18	5
Loadings	.81	.63	.57	.55	.55	.53	.40	.36	.32

There is a variety of expressions shown in the pictures with significant loadings on this factor, but all of these pictures are of clean looking, young men except picture 5 which is ambiguous. The judges were uncertain of the sex of the person in this picture. This factor can represent normal appearing, "clean-cut," young men.

FACTOR III

TABLE V

The Pictures with Significant Loadings on Factor III

Pictures	15	25	5	17	13
Loadings	.64	.56	.55	.48	.44

Everyone of the pictures in Table V shows a rather sad looking or expressionless woman. This factor can be called "sad or phlegmatic woman" factor.

FACTOR IV

TABLE VI

The Pictures with Significant Loadings on Factor IV

Pictures	7	43	18	26	8	1	25	42
Loadings	.69	.58	.54	.38	.37	.33	.32	.31

People with happy expressions appear in the pictures that are significant on this factor. Pictures of both men and women are present in this group. This factor can be denoted by happy expressions and might be called a "happiness" factor.

FACTOR V

TABLE VII

The Pictures with Significant Loadings on Factor V

Pictures	41	9	8	39	5	40
Loadings	.83	.79	.50	.38	.36	.36

Pleasant looking, moon faced women appear in the pictures with the largest loadings on this factor. However, picture 5, which is ambiguous, and picture 40, which shows a

smiling, moon faced, old man, seem to cling to this factor. The persons shown in the pictures with the significant loadings on this factor are either manic or depressive according to the Szondi designations. It is not possible to identify this factor by superficial aspects of the significant pictures at present.

FACTOR VI

TABLE VIII

The Pictures with Significant Loadings on Factor VI

Pictures	4	19	11	32	13	42
Loadings	.84	.73	.68	.34	.31	.30

Three pictures predominate in this factor. These pictures are of women who have been judged to be peculiar looking. This factor can be called a "wierd Women" factor.

FACTOR VII

TABLE IX

The Pictures with Significant Loadings on Factor VII

Pictures	22	47	2	6	3	45	37	43	26	44	15	9	38	19
Loadings	.79	.70	.55	.49	.48	.44	.40	.39	.36	.35	.35	.32	.31	.30

The pictures with the largest loadings on this factor show rather shaggy men with forlorn expressions. The men in these pictures contrast sharply with the clean looking men in the pictures which identify Factor II. Some of the pictures with loadings in the thirties do not conform with this description, but on the basis of the pictures with the high loadings, this factor may be labelled a "shaggy men" factor.

FACTOR VIII

TABLE X

The Pictures with Significant Loadings on Factor VIII

Pictures	20	45	3
Loadings	.89	.59	.39

There is general agreement among the judges that the persons appearing in the pictures in Table X are sad looking men. This factor can be considered a "depressed men" factor.

FACTOR IX

TABLE XI

The Pictures with Significant Loadings on Factor IX

Pictures	18	28	23	33
Loadings	.71	.59	.34	-.33

The men shown in the two pictures with the highest loadings on this factor have the same type of beards and look very much alike. They have ties on and appear well dressed. The picture with the significant negative loading is one of the nudes, a clean shaven man wearing glasses. This factor may be a doublet. In which case, it could be identified by the two bearded, "look-alike" men.

FACTOR X

TABLE XII

The Pictures with Significant Loadings on Factor X

Pictures	38	47	39	25
Loadings	.70	.32	.31	.31

This factor has one picture with a high loading on it while the loadings of the other three significant pictures are just barely significant. At this stage of rotation the meaning of this factor cannot be hypothesized.

FACTOR X

This factor does not have any significant loadings on it at this point in the rotation process. Thus there is no basis for a tentative identification at present.

TABLE XIII

The Loading of the Pictures on the Eleven Factors

After Forty-seven Rotations

Picture Numbers	FACTORS											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	h^2
1	.13	.17	-.03	.33	.08	-.18	.05	-.13	-.10	.01	-.01	.22
2	-.07	.04	.09	-.08	-.21	.01	.55	-.01	-.03	.08	.08	.38
3	.22	-.25	.14	.26	-.08	.03	.48	.39	-.03	-.11	-.10	.61
4	.27	.04	.09	.17	.08	.84	.08	-.03	-.04	.00	.11	.84
5	.08	.32	.55	-.12	.36	.04	-.18	.14	.08	-.05	.09	.63
6	.41	-.06	.16	.06	.17	-.22	.49	.10	.00	.08	-.04	.54
7	.05	.19	-.02	.69	.16	-.02	-.07	-.02	-.28	-.11	-.07	.64
8	.04	-.08	.05	.37	.50	.09	.20	-.16	-.16	.17	-.06	.53
9	-.36	.06	.05	-.08	.79	-.05	.32	.01	.14	-.21	-.10	.94
10	.08	.53	.27	.02	.28	-.02	-.17	.05	.23	.00	.08	.53
11	-.13	.17	.09	.09	.16	.68	.24	.05	.29	.13	.10	.72
12	-.07	.55	-.02	.13	.21	.04	.22	-.23	.14	-.21	.10	.55
13	.15	.14	.44	.11	.27	.31	.18	-.04	.16	.03	.12	.49
14	.63	-.04	-.10	-.11	.11	.29	.24	.02	-.08	-.22	.01	.63
15	-.20	.01	.64	.04	.23	-.10	.35	.20	-.07	-.17	.02	.71
16	.18	-.19	.05	.08	.21	-.22	.17	-.01	.23	.14	-.06	.28
17	.13	-.12	.48	.17	.14	-.10	.24	.07	-.19	.01	.02	.42
18	-.01	.36	.04	.54	-.05	.03	.00	.07	.71	-.21	.00	.98
19	.16	-.12	.14	.01	.08	.73	.30	.14	.17	.06	.08	.75
20	.07	.00	.04	-.10	-.10	.29	-.05	.89	-.16	-.10	-.15	.96
21	-.02	.24	.04	.01	.04	-.15	.16	.20	-.12	.15	-.03	.19
22	.07	-.03	.09	.16	.08	-.15	.79	.09	.08	.07	-.02	.71
23	.04	.63	.03	.01	-.06	-.05	.12	.07	.34	.09	.12	.56
24	.33	.06	.24	.04	.29	-.20	.25	.12	.05	.13	-.02	.39
25	-.13	.01	.56	.32	.16	-.13	-.02	-.02	.14	.31	.08	.60
26	.30	-.10	.04	.38	.03	.21	.36	.04	.22	.11	.00	.48
27	-.08	.81	-.03	.08	.05	.11	-.06	.04	.09	.06	.11	.71
28	.37	.02	.20	.11	-.15	.12	.15	.03	.59	-.06	.10	.61
29	.65	-.04	.07	-.11	.04	.22	.11	.00	.16	-.09	.05	.54
30	.54	.19	.22	.13	.15	-.07	.15	-.15	-.21	-.07	.07	.52
31	.38	.12	.21	.14	.29	.09	-.16	-.07	-.20	-.15	.02	.41
32	.27	.24	-.09	.04	.23	.34	-.02	.07	.02	-.12	.01	.33
33	.11	.14	.16	.15	.27	.06	.15	.06	-.33	.23	.00	.34
34	-.07	.40	-.03	.14	.11	-.15	.02	-.19	-.23	-.24	.02	.37
35	.01	.25	.28	.25	.27	.18	-.09	.19	.05	.29	.03	.44
36	-.33	.55	.07	.04	-.15	.11	.06	.17	.04	-.08	.08	.50
37	.21	.07	.06	-.11	.23	-.12	.40	.08	.13	-.10	-.03	.33
38	.03	.09	.19	.03	-.02	.01	.31	.15	-.06	.07	.06	.66
39	-.01	.18	.02	.08	.38	.00	.10	.29	.19	.31	-.07	.41
40	.01	-.09	-.17	.18	.34	.24	.10	-.10	-.06	.05	-.06	.27
41	.07	.28	-.05	-.03	.83	-.10	.01	-.01	.12	.23	-.07	.86
42	-.03	.00	.20	.31	.26	.30	.02	-.18	-.09	.14	.04	.36
43	-.04	.15	.00	.58	-.19	.20	.39	-.13	.07	.08	.06	.62
44	.39	.26	.00	-.06	-.08	.07	.35	-.07	-.09	-.17	.08	.41
45	.45	-.04	.15	.06	.08	.08	.44	.59	-.04	.14	-.10	.82
46	.36	.07	.37	-.12	-.04	.05	.13	.03	-.03	.23	.13	.38
47	.16	.12	-.04	-.11	.06	.28	.70	-.04	-.02	.32	.10	.74
48	.04	.57	.27	.14	.28	.04	-.22	.24	-.03	.09	.04	.62

DISCUSSION

Final rotation for meaning is a necessary step for better identification of the factors. This procedure would serve as a check on the hypotheses already formulated and could lead to the identification of the factors that are indeterminate at this stage of rotation. The present study was limited to the extraction of the factors and the formation of hypothesis concerning the meaning of the factor axis as simple structure was being approached. The final rotation process will constitute another study.

It would not be proper at this time to make a comprehensive comparison of the factors determined by this study and Szondi's "factors." This must await final rotation. It is evident at this point that there will be no isomorphism between the two. Although there is some variance remaining in the residual table, eleven factors have been extracted. Ten of these have significant loadings after forty-seven rotations. The configuration of these factors is such that it is evident that further rotation will not eliminate their significance while it is possible that the eleventh factor will acquire significance. In either case, more factors will be required to account for the relationships among pictures than Szondi has categories.

Five of the six pictures designated in Szondi's system as homosexuals have significant loadings on Factor II, but there are two other pictures with high loadings on this factor. According to Szondi's designations, one is a sadist, and the other an epileptic. The six pictures with significant loadings on Factor V are present in Szondi's contact vector. Three are described as depressives, and three as manics. The similarity in both these instances is rather vague. They are mentioned because they are the only evidence found in this study of similarity between the factors determined by this study and Szondi's categories.

It is a basic assumption in the present scoring method of the Szondi test that the pictures of the same category represent equivalent stimuli. With the few exceptions mentioned in the preceding paragraph, this equivalence relationship was not found in the present study. This result confirms the findings of earlier studies on this subject.

SUMMARY AND CONCLUSION

The Szondi test is being increasingly used by clinicians for personal diagnosis. The diagnosis is usually determined by the use of Szondi's scoring categories. Earlier experimental studies had shown that Szondi's categories do not satisfactorily account for the relationships found among the Szondi pictures. Gordon (16), in a study using normal subjects, had computed the tetrachoric correlations for each Szondi picture with every other Szondi picture. He found that "some relationship exists between liking patricular Szondi pictures and disliking others."

It was the purpose of the present study to factor analyze the correlation matrix formulated by Gordon in order to determine the factors underlying the correlations and to discover if these factors could be identified by superficial aspects of the pictures. The multiple group method of factor analysis was used, and eleven factors were extracted. The factor axes were carried through forty-seven rotations at which time simple structure was being approached. It was possible at this stage to tentatively identify eight of the factors by superficial aspects of the pictures.

From this study it can be concluded that:

1. The factors determined by this study do not correspond to Szondi's categories.

2. It is apparent that, at least, some of the factors found may be identified by superficial aspects of the pictures.

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