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DEVELOPMENT OF NORMS FOR MENTALLY RETARDED AND

BRIGHT CHILDREN ON THE HAND TEST

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DEVELOPMENT OF NORMS FOR MENTALLY RETARDED AND BRIGHT CHILDREN ON THE HAND TEST

CHAPTER I

INTRODUCTION

Methods of personality assessment which were later classified as projective techniques, have evolved gradually out of art and scientific investigations. Early artists such as Leonardo da Vinci noted the associations which were made by combining blots of paint. Toward the end of the 19th century, psychologists attempted to systematically explore the uses of inkblots, pictures, and words as stimuli which elicited responses.

Considerable research was conducted with inkblots prior to the time that Rorschach first published his test results in 1921. Preceding his studies were those of Binet and Henri, Dearborn, Sharp, Kirkpatrick, Pyle, Parsons, Whipple, Bartlett, Wells, and Rybakow (Rabin, 1968). The Rorschach test was the first major clinical and research instrument to be classified later as a projective technique.

The Thematic Apperception Test (TAT) was introduced by Morgan and Murray in 1935. According to the authors

(1935), the test "is based upon the well-recognized fact that when a person interprets an ambiguous social situation he is apt to expose his own personality. . . ." Since the initial publication of the TAT, several revisions of the pictures portraying the "ambiguous social situations" have been made.

Another test which had been devised as an early projective method was the Word Association Test. First Galton, then Wundt, Kraeplin, and Jung worked towards developing this procedure of presenting words as stimuli (Rabin, 1968). This method has been credited for the subsequent development of a number of projective techniques.

The term "projection" was originally introduced by Freud, who defined it as the tendency to externalize unacceptable inner drives to the outside world (Rabin, 1968). This idea he viewed principally in psychopathological connotations, as a defense mechanism. Rabin (1960) has pointed out that "perhaps the broader term 'externalization' is more appropriate in the case of projective techniques. It avoids the constricting misconception of projection as a mere defense mechanism. . . ." In either case, the essential feature of a projective technique has been that it evoke from the subject what is expressive of his private world.

The systematic investigations of projective methods, which were begun at the end of the 19th century, have been continued and expanded to this date. One of the newer projective tests, originated by Wagner in 1959, is the Hand

Test. The basis for creating this new test was Wagner's interest in the projection of aggression responses (Wagner, 1961) and his desire to observe and measure finer aspects of the Rorschach M (human movement) responses. He published his first study using the Hand Test in 1961, an attempt to differentiate normals from schizophrenics. Bricklin, Piotrowski, and Wagner (1962) provided the rationale and original scoring system for the Hand Test in a monograph entitled The Hand Test: a New Projective Test with Special Reference to the Prediction of Overt Aggressive Behavior. Later that year, Wagner published the first manual with a slightly modified scoring system. A revision of the 1962 Hand Test was published in 1969, by Western Psychological Services and included the manual by Wagner, one hundred scoring blanks, ten 3" x 5" cards (nine of which display india ink drawings of hands in various states of repose while the tenth is blank), and The Hand Test, a book by Bricklin, Piotrowski, and Wagner (1970) which has attempted to clarify the scoring system and discuss the predictive value of the "acting out" score. Drawings of the hands in various positions were made ambiguous so that the subject would have ample opportunity for individualized interpretations.

Because it is a relatively new projective technique, very little research has been done using the Hand Test. A pilot study was conducted by this researcher with 17 mentally retarded and 16 bright children in Norman, Oklahoma.

The results of this study seemed to indicate some marked differences in frequencies of responses on the Hand Test scoring categories. (See Table 6, Appendix.)

Background Research

A majority of the research conducted using the Hand Test has been an attempt to classify or diagnose schizophrenics on the basis of their responses on the Hand Test, specifically on the ACTive responses. Wagner (1961, 1962), Wagner and Medvedeff (1963), and Drommond (1966) have published studies attempting to differentiate schizophrenics.

Wagner has been criticized in his endeavors to prove the value of the Hand Test in predicting overt aggressive behavior. Shaw and Linden (1964) have pointed out that at one point in the manual for administration, Wagner (1962) claimed ". . . not only the probability but also the violence of acting-out can be predicted" [p. 26] and at the same time emphasized "The Hand Test seems to be optimally sensitive to the subject's immediate psychological state. It reveals the individual as he is at present--not as he was or could be" [p. 2]. Their conclusion was that "the source of this confusion seems to lie in the author's failure to discriminate between predictive and concurrent validity."

There has also been an attempt to utilize the Hand Test in an industrial setting for hiring purposes, to predict good workers. Thus far, most of the research has been done with handicapped persons in a sheltered situation.

Wagner and Copper (1963) hypothesized that the active (ACT) score would differentiate 50 subjects between satisfactory and unsatisfactory workers at Goodwill Industries, Akron, Ohio. With combined ratings by their immediate supervisors and the personnel director used as the criterion, the Hand Test correctly differentiated 45 out of 50 workers, which was statistically significant at the .001 level.

Huberman (1964) reported his attempt at crossvalidation of Wagner and Copper's findings was not successful. His study was based on 18 individuals working at a plywood mill on the Canadian West Coast. He asked the two foremen to both select the subjects and classify them into three groups as to level of activity. The third "low activity" group was nonexistent because "foremen are expected to terminate such persons during their first 30 day probationary period." Also, he stated that "The 'activity level' is a somewhat different criterion than that used by Wagner and Copper (1963)," but he does not define this "activity level." None of his results were statistically significant.

Wagner and Hawver (1965) implemented the ACT score of the Hand Test along with seven other tests, in a battery to develop one or more test predictors of success in a sheltered workshop. This study included 27 workers, already working in a performance level group, who were individually administered the eight tests at a sheltered workshop in Akron, Ohio. The results were highly significant for the predictive value of each of the eight tests.

Wagner and Capotosto (1966) further attempted to validate the ACT score of the Hand Test as predictive, by attempting to discriminate between "good" and "poor" workers at Lincoln State School, Illinois. Forty-seven retarded workers were administered the Hand Test and then rated by supervisors using an operational criterion of working behavior. The Hand Test ACT score was able to correctly differentiate 74% of the subjects, which was significant at the .01 level.

The norms established for mentally retarded persons on the Hand Test were obtained with a sample of 25 subjects from the Goodwill Industries in Akron, Ohio. The mean age was 22.9, and the mean I.Q. was 71.1 (Wagner, 1969).

One other study of norms for the mentally retarded has been completed at Lincoln State School, Illinois. Two groups of mentally retarded were included: "Imbiciles" (I.Q. 25-49) n = 25, and "Morons" (I.Q. 50-69) n = 25 (Wagner, 1969).

There seems to have been no research completed using the Hand Test with mentally retarded children from the public schools. No norms have been published including mentally retarded children from the public schools. In the original standardization of the Hand Test, no norms were established for bright children. No studies seem to have been conducted with bright children using the Hand Test. This investigation is being conducted in an effort to develop local norms for

mentally retarded and bright public school children. These norms are needed for diagnostic purposes, to further the use of the results of the instrument, to add more information about the test itself, and to determine if there are differences among specific groups.

Statement of the Problem

The problem of this study is to develop norms on the Hand Test for educable mentally retarded and bright elementary school children. The study is being undertaken because no norms have been published for these two groups of children. A comparative analysis of these norms will be made between the groups in this study, and with the established norms reported by Wagner in The Hand Test Manual (1969) for "Mental Retardates" and normal "Children."

For the purpose of this study, the following definitions will be used:

Educable Mentally Retarded Children: those children enrolled in elementary school (grades 1-6) special education classes whose I.Q. scores are within the range of 50-75 ±3, as specified by the State of Oklahoma.

Bright Children: those children enrolled in elementary school (grades 1-6) classes whose I.Q. scores are 116 or greater.

Hypotheses

The following hypotheses will be tested:

1) Are there any significant differences between the frequency of responses by categories given on the Hand Test by institutionalized mentally retarded children and public school mentally retarded children?

2) Are there any significant differences between the frequency of responses by categories given on the Hand Test by institutionalized mentally retarded children and bright children?

3) Are there any significant differences between the frequency of responses by categories given on the Hand Test by public school mentally retarded children and bright children?

CHAPTER II

METHOD

The Subjects

A sample of 60 educable mentally retarded children was obtained from Oklahoma City and Midwest City-Del City, Oklahoma, elementary schools. Four different schools were used in collecting the data because the researcher could not obtain enough mentally retarded subjects in one school setting. All four schools were located in similar socio-economic areas. Twenty-three of the subjects were enrolled in three Oklahoma City, elementary schools and 37 of the subjects were enrolled in one Midwest City-Del City school. The criterion for the selection of the subjects was that they be enrolled in public elementary schools and that their I.Q. scores fall within the range of 50-75 ±3. Each subject had previously been administered the Stanford Binet Intelligence Scale (SBIS) or the Wechsler Intelligence Scale for Children (WISC) by the respective school system. These I.Q. scores were used in the selection of subjects for this study. The sample consisted of 30 females and 30 males. Three subjects from minority races were included.

A sample of 60 bright elementary school children were obtained from the same three Oklahoma City schools as the mentally retarded sample, and from one Midwest City-Del City school different from that of the mentally retarded sample. The four different schools were used in data collection because the researcher could not obtain enough bright subjects in one school setting. All four schools were located in similar socio-economic areas. Twenty-two of the subjects were enrolled in three Oklahoma City elementary schools and 38 of the subjects were enrolled in the one Midwest City-Del City school. The criteria for the selection of the subjects were that they be enrolled in public elementary schools and that their I.Q. scores were 116 or greater. So that the children would not have to spend class time taking an I.Q. test, the school systems requested that the sampling of bright subjects include only those students who had previously been administered the California Mental Maturity Short Form (1963) and had scored at the bright level (I.Q. = 116+). All subjects included in the bright sample were enrolled in the fourth, fifth, or sixth grade because these were the levels that had been previously tested for I.Q. Twenty-seven were females and 33 were males. One subject was a member of a minority race.

A sample of 18 institutionalized mentally retarded children were selected from Hilltop School, Pauls Valley State

School, Oklahoma. All children who met the following criteria were included in the sample:

1. Each child had earned an I.Q. score within the range of 50-75 ±3 on a previously administered SBIS or WISC.
2. Each child had been in residence at Pauls Valley School continuously for a minimum of two years.
3. Each child was between the ages of 7-13, approximately the ages of the educable mentally retarded in the public school special education classes.
4. Each child visited at home or received visits from the parent(s) at the same rate as the other children in the sample (specifically during the official vacation periods of the school).

The Procedures

The identified members in each of the three groups were individually administered the Hand Test according to the published standardized procedures. No subject refused to take the test or even expressed reluctance. Two subjects from the public school sample of mentally retarded children were replaced because they had no speech.

All Hand Tests were administered by the researcher and one other doctoral candidate. Both had had considerable

training and experience in administering, scoring, and interpreting individual diagnostic instruments.

One addition was made to the instructions of the Hand Test in giving verbal directions to the mentally retarded child. On the tenth card the examiner says, "This card is blank. I would like you to imagine a hand and tell me what it might be doing." Many of the mentally retarded children seemed to show evidence of confusion at the word "imagine," in the directions. When this confusion existed, each examiner added the phrase "Pretend like there is a hand there and tell me what it might be doing" to the instructions for the child.

The Instrument

The reliability and validity of the Hand Test were ascertained by Wagner (1969), using the records compiled for his original norms (N = 1,020). The Spearman-Brown split-half method of computing reliability coefficients was used independently by each of three scorers, with the following results: scorer A, .85; scorer B, .84; scorer C, .85. Concurrent validity was established by comparing the results obtained in the normative groups to results of "known groups." Wagner (1969) stated that the meanings and interpretations of the scoring categories were "based on a logically deduced projective rationale, validated against empirical data."

Administration time for the Hand Test takes approximately five to ten minutes for each subject. Every response on the test must then be categorically scored as predominately exhibiting one of the following, as defined by Wagner (1969):

Affection (AFF): Interpersonal responses involving an interchange or bestowment of pleasure, affection, or friendly feeling, e.g. "Waving to a friend--a greeting."

Dependence (DEP): Interpersonal responses involving an expressed dependence on or need for succor from another person, e.g. "Hitch hiker thumbing a ride."

Communication (COM): Interpersonal responses involving a presentation or exchange of information, e.g. "A child holding fingers up, showing how old he is."

Exhibition (EXH): Interpersonal responses which involve displaying or exhibiting oneself in order to obtain approval from others or to stress some special noteworthy characteristic of the hand, e.g. "Making shadow pictures on the wall."

Direction (DIR): Interpersonal responses involving influencing the activities of, dominating, or directing others, e.g. "Policeman saying stop."

Aggression (AGG): Interpersonal responses involving the giving of pain, hostility, or aggression, e.g. "Trying to scare someone."

Acquisition (ACQ): Environmental responses involving an attempt to acquire or obtain a goal or object. The movement is ongoing and the goal is as yet unobtained and, to some extent, still in doubt, e.g. "Reaching for something on a high shelf."

Active (ACT): Environmental responses involving an action or attitude designed to constructively manipulate, attain, or alter an object or goal. ACT responses are distinguished from ACQ responses in that the object or goal has been, or will be, accomplished and the issue is therefore not in doubt, e.g. "Picking up a coin."

Passive (PAS): Environmental responses involving an attitude of rest and/or relaxation in relation to the force of gravity, and a deliberate and appropriate withdrawal of energy from the hand, e.g. "Just dangling over a chair arm."

Tension (TEN): Energy is being exerted but nothing or little is accomplished. A feeling of anxiety, tension or malaise is present. TEN responses also include cases where energy is exerted to support oneself against the pull of gravity accompanied

by a definite feeling of strain and effort, e.g. "Hanging on to the edge of a cliff."

Crippled (CRIP): Hand is crippled, sore, dead, disfigured, sick, injured, or incapacitated, e.g. "That hand is bleeding."

Fear (FEAR): Responses in which the hand is threatened with pain, injury, incapacitation, or death. A FEAR response is also scored if the hand is clearly perceived as meting out pain, injury, incapacitation or death to the subject or to a person with whom the subject identifies, e.g. "My father's hand . . . like he's going to hit me."

Descriptive (DES): Subject can do no more than acknowledge the presence of the hand with perhaps a few accompanying inconsequential descriptive details or feeling tones, e.g. "A plain, ordinary hand."

Bizarre (BIZ): A response predicated on hallucinatory content, delusional ideation or other peculiar, pathological thinking. The response partially or completely ignores the drawn contours of the hand and/or incorporates bizarre, idiosyncratic or morbid content. One genuine BIZ response is pathognomic of serious disturbance, e.g. "Culture, antidote, Dr. Heart, sleeping gas."

Fail (FAIL): Subject can give no scorable response whatsoever to a particular card. A FAIL is tabulated in computing summary score but is not included in the response total, R, since it is not really a response but a failure to respond.

In addition, there are four summation symbols which represent combinations of the symbols defined above. Wagner (1969) defines these as:

Interpersonal (Σ INT): AFF, DEP, COM, EXH, DIR, and AGG are combined for Σ INT responses. That is, those responses involving relations with other people . . . an absence or dearth of Σ INT always has a negative connotation.

Environmental (Σ ENV): ACQ, ACT, and PAS are combined for Σ ENV responses. They are assumed to represent generalized attitudes toward the impersonal world, i.e. a readiness to respond to or come to grips with the environment in a characteristic fashion.

Maladjustive (Σ MAL): TEN, CRIP, and FEAR are combined for Σ MAL responses. They represent difficulty, of which the individual is at least partially aware, in successfully carrying out various action tendencies, and failure to achieve need satisfactions.

Withdrawal (Σ WITH): DES, FAIL, and BIZ are combined for Σ WITH responses. They represent those who have found realistic interaction with people, objects, and ideas so traumatic, difficult, and non-reinforcing that meaningful, effective life-roles have been partially or completely abandoned.

Although the major use of the Hand Test is in personality assessment, a primary goal in developing the test has been the prediction of overt aggressive behavior. To measure this, the Acting Out Ratio (AOR) must be employed. This is expressed as the ratio of the sum of the more socialized interpersonal responses (AFF + DEP + COM) to the sum of the aggressive and domineering interpersonal responses (DIR + AGG).

Wagner (1969) also specifies symbols to be used for qualitative interpretation of the scoring categories. The symbols are used in conjunction with the standard scoring symbols in evaluating the subject's responses. These nine symbols are as follows: sexual content (SEX), immature content (IM), inanimate content (INAN), hiding content (HID), sensual content (SEN), internalization content (IN), denial content (DEN), and movement content (MOV).

The Scoring

Each subject's record blank was scored three times by the researcher (twice for the correction of any errors).

This researcher found it extremely difficult to score responses by adhering strictly to the Hand Test Manual (1969). Information from The Hand Test (Bricklin, Piotrowski, Wagner, 1970) was illustrative but sometimes contradictory. For example, the manual scores "Reaching for the rung of a ladder" as an ACQ response while The Hand Test scores "Reaching down for something" as an ACT response. Discrepancies of this nature have prompted criticism of Wagner's scoring definitions, such as the comments made by Oswald and Loftus (1967) that in making a decision whether to use the ACT or ACQ, the

> . . . distinction was largely arbitrary. They (authors) now place little confidence in the assumed significance of the ACQ scores. The authors found difficulties consistently associated with the distinction to be made between DIR or ACT or COM [p. 67].

Consequently, to insure consistency in scoring standards, this researcher evaluated each response on the basis of available guidelines. Then, those responses which were adjudged questionable, were recorded in the scoring guide under the appropriate scoring category. When the questionable response occurred again from a different subject, there was no chance of inconsistently scoring the response from an error in memory.

Wagner (1969) suggested that the subject be allowed to respond freely to each card and that every response should be recorded and scored. Although the subjects in this study were encouraged to respond freely, and each of their

responses were recorded, only the first response to each card was scored and included in the totals. The focus of this study was centered on the initial response of the subject to each card, and it was beyond the scope of this investigation to pursue differences in the numbers of subject responses for the cards.

CHAPTER III

RESULTS

This study was conducted to establish norms on the Hand Test for educable institutionalized mentally retarded, public school mentally retarded, and bright elementary public school children. The study was undertaken because there have been no norms published for these groups. Norms are needed for diagnostic purposes, to further the use of the results of the instrument, to add more information about the test itself, and to determine if there are differences among specific groups. A total of 138 subjects were administered the Hand Test in this investigation.

Thirty females and 30 males from the public school mentally retarded group (MRp) completed the test. The mean chronological age was ten years, five months; S.D., two years, three months. The mean I.Q. was 70.1; S.D., 5.6. (See Table 7, Appendix.) Twenty-seven females and 33 males in the bright group (BR) completed the Hand Test. The mean chronological age was ten years, five months; S.D., one year. The mean I.Q. was 125.7; S.D., 5.9. (See Table 8, Appendix.) Eight females and 10 males from the

institutionalized mentally retarded group (MRi) completed the Hand Test. The mean chronological age was twelve years, six months; S.D., one year, three months. The mean I.Q. was 56.9; S.D., 6.5. The subjects had been institutionalized for an average of 3.8 years; S.D., 1.4. The range for their length of stay was from two years, two months, to seven years, four months. (See Table 9, Appendix.)

An item analysis of each subject's responses was made before any statistical tests were employed. (See Tables 10, 11, 12, Appendix.) With the exception of the R, and the Σ INT, the results of the scores on the Hand Test were positively skewed. (See Table 5, Appendix.) For this reason, and in an effort to present the norms in the same statistical form as Wagner's original norms, medians and quartile points were computed. Table 1 shows the norms which were developed in the form of medians and quartile ranges ($Q_3 - Q_1$) for each scoring category and for the Acting Out Ratio (AFF + DEP + COM : DIR + AGG). By dividing $\frac{Q_3 - Q_1}{2}$, the quartile deviation (Q) is obtained. Approximately 50% of the cases fall within the range ±1 Q (Downie & Heath, 1965).

The Median Test (Guilford, 1956) was used to test for significant differences among the three groups for each scoring variable. This statistical test was chosen because the data were not normally distributed and the sample sizes were small. With df = 1, Yates' correction for continuity

was applied in the chi-square formula. This correction is usually employed when df = 1 because the distribution of chi-square is discrete, although the values resulting from the formulas are continuous (Downie & Heath, 1965).

Hypothesis 1 asks if there are any significant differences between the frequency of responses by categories given on the Hand Test by institutionalized mentally retarded children and public school mentally retarded children. There were no apparent statistically significant differences between the responses given on the Hand Test by MRi and MRp children. All chi-square values were not significant ($df = 1$, $p > .05$). This seems to indicate that the factor of institutionalization had no significant effects on the responses of the mentally retarded children in this study. The answer to the question posed in Hypothesis 1 is negative; there were no apparent significant differences between the frequency of responses given by MRi and MRp children.

Hypothesis 2 asks if there are any significant differences between the frequency of responses given on the Hand Test by institutionalized mentally retarded children and bright children. Six scoring variables showed statistically significant differences between responses given by the MRi and the BR children. MRi children offered more EXH responses on the Hand Test than did BR children (chi-square = 4.56, df = 1, $p < .05$, significant). The BR children gave more Σ ENV responses than did the MRi (chi-square = 3.98,

TABLE 1

NORMS FOR MRi, MRp, AND BR CHILDREN ON EACH SCORING CATEGORY OF THE HAND TEST

Scoring Categories	MRi (n = 18)		MRp (n = 60)		BR (n = 60)	
	Mdn	$Q_3 - Q_1$	Mdn	$Q_3 - Q_1$	Mdn	$Q_3 - Q_1$
AFF	.4	1.5	.3	1.2	.8	1.2
DEP	.1	.6	.1	.7	.2	.7
COM	1.2	1.1	1.2	1.0	1.1	1.0
EXH	.4	1.8	.2	.8	.1	.6
DIR	.4	1.3	.8	1.6	.8	1.3
AGG	1.4	1.7	1.1	1.0	1.9	1.5
INT	5.1	2.3	4.9	2.1	5.3	1.7
ACQ	.2	.7	.2	.7	.7	1.3
ACT	2.3	2.0	2.8	2.0	3.1	1.8
PAS	0.0	.5	.2	.8	.1	.5
ENV	2.5	2.5	3.3	1.9	4.1	1.8
TEN	.2	.7	.4	1.3	.1	.6
CRIP	.8	1.4	.3	1.2	.1	.5
FEAR	.1	.7	0.0	.5	.1	.6
MAL	1.5	1.8	.9	2.0	.3	1.0
DES	.1	.6	.1	.5	0.0	0.0
FAIL	.1	.5	0.0	.5	0.0	.5
BIZ	0.0	0.0	0.0	0.0	0.0	0.0
WITH	.2	.8	.1	.6	0.0	.5
AFF + COM + DEP	2.0	1.8	2.1	1.8	2.3	1.9
DIR + AGG	2.2	2.4	2.1	2.0	2.8	1.4
R	9.9	.5	10.0	.5	10.0	.5

df = 1, $p < .05$, significant). Highly significant differences were obtained between the MRi and BR children on the CRIP variable. MRi children saw a greater number of crippled hands in the test than did the BR children (chi-square = 18.33, df = 1, $p < .001$, significant). In a related variable, $\sum$ MAL, the MRi responded more often than the BR children (chi-square = 8.59, df = 1, $p < .01$, significant). As shown in Table 2, the MRi subjects displayed a tendency to give more DES responses than the BR (chi-square = 6.38, df = 1, $p < .02$, significant). Similarly, the MRi subjects gave more $\sum$ WITH responses than the BR (chi-square = 9.87, df = 1, $p < .01$, significant). The answer to the question posed in Hypothesis 2 is positive; there were significant differences between the frequency of responses of the MRi and BR on six scoring variables of the Hand Test.

Hypothesis 3 asks if there are any significant differences between the frequency of responses given on the Hand Test by public school mentally retarded children and bright children. Nine of the scoring variables showed statistically significant differences between the responses of the MRp and the BR children. The BR subjects offered more AFF responses than did the MRp (chi-square = 5.63, df = 1, $p < .02$, significant). They also gave more AGG responses than did the MRp children (chi-square = 14.85, df = 1, $p < .001$, significant). BR children responded more frequently with ACQ responses than MRp children (chi-square = 12.54, df = 1,

TABLE 2

THE MEDIAN TEST FOR RESPONSES GIVEN ON THE HAND TEST BY MRi, MRp, AND BR CHILDREN
RESULTS OF THE CHI-SQUARE
(df = 1)

Scoring Categories	MRp (n=60) - MRi (n=18)	p	BR (n=60) - MRi (n=18)	p	BR (n=60) - MRp (n=60)	p
AFF	.04	NS	.02	NS	5.63	.02
DEP	.02	NS	.08	NS	.00	NS
COM	.08	NS	.00	NS	.04	NS
EXH	1.31	NS	4.56	.05	1.23	NS
DIR	.47	NS	.08	NS	.17	NS
AGG	1.31	NS	.04	NS	14.85	.001
Σ INT	.00	NS	.04	NS	.87	NS
ACQ	.00	NS	3.54	NS	12.54	.001
ACT	.12	NS	.96	NS	.59	NS
PAS	2.49	NS	.01	NS	4.51	.05
Σ ENV	.23	NS	3.98	.05	2.43	NS
TEN	.62	NS	.50	NS	7.91	.01
CRIP	1.71	NS	18.33	.001	12.84	.001
FEAR	3.14	NS	.30	NS	1.60	NS
Σ MAL	.37	NS	8.59	.01	5.66	.02
DES	.02	NS	6.38	.02	5.46	.02
FAIL	.01	NS	1.27	NS	.84	NS
BIZ	.00	NS	.00	NS	.00	NS
ΣWITH	.50	NS	9.87	.01	6.41	.02
AFF + DEP + COM	.02	NS	.37	NS	.87	NS
DIR + AGG	.03	NS	.02	NS	.00	NS
R	.00	NS	.00	NS	.00	NS

$p < .001$, significant). MRp subjects offered more PAS responses on the test than BR (chi-square = 4.51, df = 1, $p < .05$, significant). Also, the MRp children gave a much greater number of TEN responses (chi-square = 7.91, df = 1, $p < .01$, significant) and CRIP responses (chi-square = 12.84, df = 1, $p < .001$, significant) than did the BR. Consequently, in the related scoring variable Σ MAL, the MRp responded more often than the BR (chi-square = 5.66, df = 1, $p < .02$, significant). The MRp also made more responses in the DES scoring classification than the BR (chi-square = 5.46, df = 1, $p < .02$, significant). And in the related scoring variable Σ WITH, the MRp responded more often than the BR (chi-square = 6.41, df = 1, $p < .02$, significant). The answer to the question posed in Hypothesis 3 is positive; there were significant differences between the frequency of responses of the MRp and BR on nine scoring variables of the Hand Test.

In Figure 1, the medians of the MRi, MRp, and BR groups are contrasted with those medians on mentally retarded adults and normal children obtained by Wagner in his original standardization of the Hand Test. (See Table 3.) Though in some cases large differences exist among the sizes of the medians, the pattern of responses in the summations of scoring categories appear to be somewhat similar. No statistical tests of significance were computed because frequency data on scoring categories were not included for Wagner's samples (Wagner, 1969). Therefore, a visual

TABLE 3

MEDIANS AND VARIABILITY FOR WAGNER'S MR AND NORMAL CHILDREN ON SUMMATION SCORING CATEGORIES OF THE HAND TEST

Summation Scoring Categories	MR (n = 25)		Normal Children n = 50)	
	Mdn	$Q_1 - Q_3$	Mdn	$Q_1 - Q_3$
ΣINT	4.3	1.9	5.2	2.2
ΣENV	3.4	2.6	5.2	2.2
ΣMAL	1.3	1.3	.7	1.8
ΣWITH	.5	1.3	0.0	0.0
AFF + DEP + COM	1.9	2.4	2.1	1.9
DIR + AGG	2.2	2.8	2.2	2.2

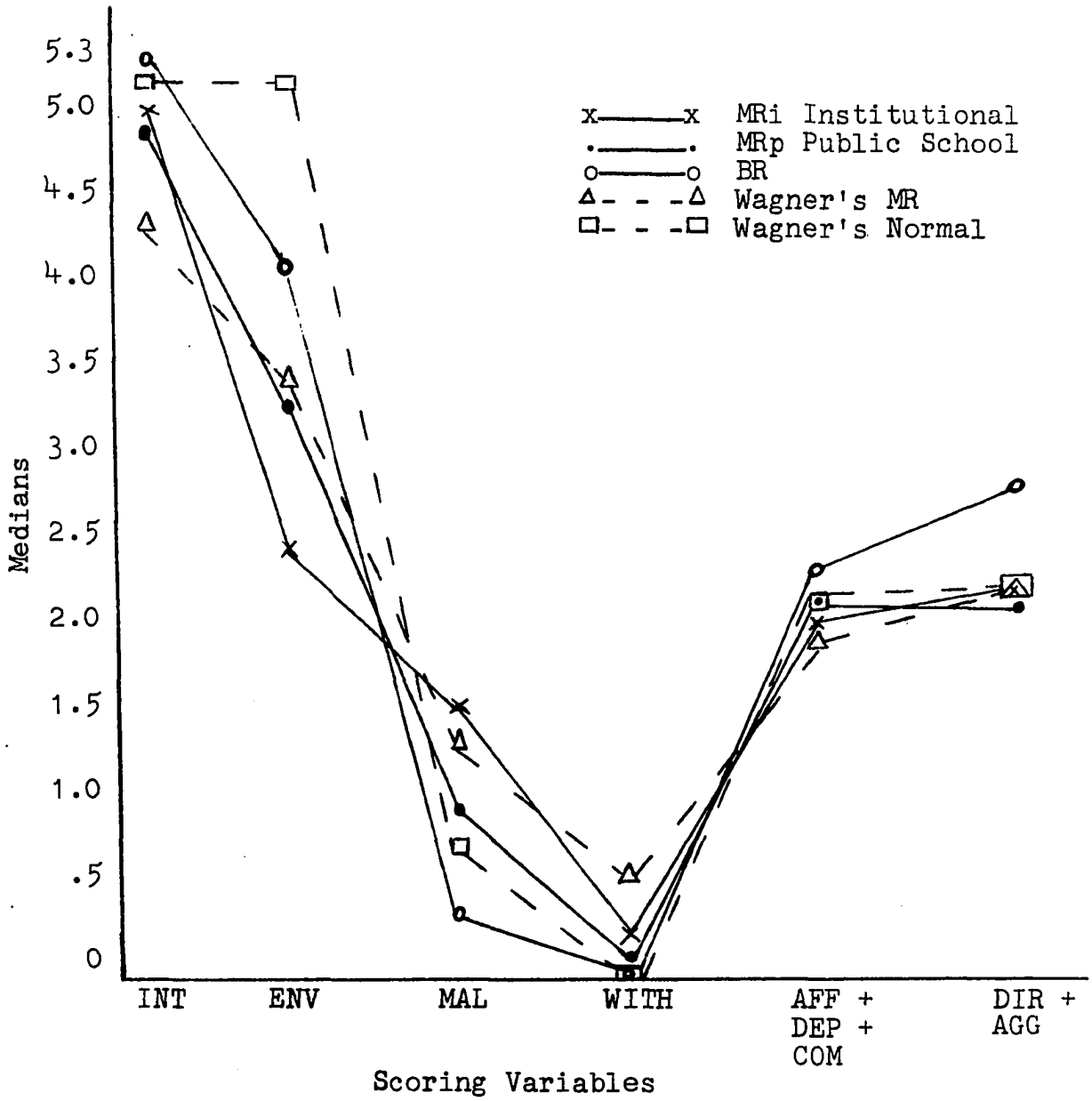

Fig. 1. Medians on the Hand Test for the MRi, MRp, BR; and for Wagner's original MR and normal children.

comparison was made simply by superimposing Wagner's data on the obtained data.

Means and standard deviations were calculated for each of the three groups in every scoring variable. The results are reported in Table 4. Tests for statistical significance between the means were not made because of sample size and because the data was not normally distributed.

An intercorrelation matrix was constructed revealing a substantial number of significant correlations. Table 4 reveals the correlations of every scoring category with every other scoring category; BIZ was deleted because no subject in any of the groups gave a response scored as BIZ, and retention of the zeros in the matrix would serve no informational purpose. In an effort to maintain consistency, Table 4 was constructed with a format similar to those matrices published by Wagner (1969).

Levels of significance for correlations within the matrix were computed as $z = .167$,* $p = .05$; and $z = .219$,** $p = .01$. Significant correlations were as follows: EXH/AFF = -.21; DIR/AFF = -.22; DIR/COM = -.26; DIR/EXH = -.19; and AGG/DIR = -.18. The Σ INT correlated positively with each of its variables (AFF, DEP, COM, EXH, DIR, AGG) except DEP. Other significant correlations were: ACT/EXH = -.19; ACT/AGG = -.21; ACT/Σ ENV = -.40; ACT/ACQ = -.34; and Σ ENV correlated positively with each of its variables (ACT, ACQ, PAS) in addition to Σ ENV/EXH = -.18; Σ ENV/AGG = -.22; and

TABLE 4

MEANS, STANDARD DEVIATIONS, AND INTERCORRELATION MATRIX ON HAND TEST SCORING CATEGORIES FOR MRi, MRp, AND BR (N = 138)

Variable	MRi $\bar{X}$	MRi SD	MRp $\bar{X}$	MRp SD	BR $\bar{X}$	BR SD	1	2	3	4	5	6	7
1. IQ	56.94	6.55	70.11	5.56	125.68	5.93	1.00						
2. AFF	.67	.84	.58	.87	.90	.93	.08	1.00					
3. DEP	.28	.67	.23	.46	.27	.52	-.14	-.08	1.00				
4. COM	1.22	.81	1.32	.77	1.20	.78	-.02	.02	-.03	1.00			
5. EXH	1.00	1.41	.38	.72	.25	.68	.06	-.21*	.03	-.05	1.00		
6. DIR	.67	.91	1.08	1.28	.88	.85	-.13	-.22**	-.14	-.26**	-.19*	1.00	
7. AGG	1.50	1.04	1.20	.90	1.87	1.00	.09	-.07	-.06	-.06	.01	-.18*	1.00
8. INT	5.33	1.24	4.80	1.61	5.37	1.28	-.01	.28**	.16	.28**	.30**	.19*	.45**
9. ACQ	.33	.59	.35	.76	.93	1.06	.10	.04	-.14	-.15	.04	-.09	.01
10. ACT	2.33	1.50	2.92	1.53	3.07	1.26	-.09	-.16	.04	-.07	-.19*	-.03	-.21*
11. PAS	.06	.24	.32	.57	.15	.52	.15	-.08	-.03	.02	-.04	-.06	-.06
12. ENV	2.72	1.56	3.58	1.65	4.15	1.15	.02	-.16	-.05	-.16	-.18*	-.10	-.22**
13. TEN	.39	.78	.67	1.02	.20	.48	.03	-.08	-.06	-.08	-.19*	-.13	-.15
14. CRIP	.83	.79	.60	.87	.10	.30	.05	-.00	-.03	-.13	-.13	.04	-.17*
15. FEAR	.28	.57	.05	.22	.15	.40	.10	-.09	-.02	.00	-.06	-.05	-.04
16. MAL	1.50	1.10	1.32	1.61	.45	.70	.08	-.08	-.06	-.12	-.21*	-.08	-.21*
17. DES	.28	.75	.22	.69	0.0	0.0	-.16	-.11	-.12	-.06	.20*	.01	-.13
18. FAIL	.17	.51	.08	.33	.03	.26	-.08	-.02	-.07	.01	-.07	-.09	-.01
19. WITH	.44	.86	.30	.83	.03	.26	-.17*	-.10	-.13	-.04	.13	-.04	-.11
20. AFF + DEP + COM	2.17	1.29	2.13	1.24	2.37	1.28	-.01	.69**	.33**	.61**	-.17*	-.37**	-.11
21. DIR + AGG	2.17	1.38	2.28	1.49	2.75	1.05	-.04	-.23**	-.16	-.26**	-.14	.69**	.59**
22. R	9.83	.51	9.92	.33	9.97	.26	.08	.02	.07	-.01	.07	.09	.01

*significant at the .05 level.

**significant at the .01 level.

TABLE 4--Continued

8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1.00														
-.14	1.00													
-.40**	.34**	1.00												
-.16	-.06	-.04	1.00											
-.54**	.26**	.76**	.28**	1.00										
-.42**	-.10	-.24**	-.02	-.31**	1.00									
-.24**	-.07	-.24**	-.13	-.32**	.28**	1.00								
-.16	.02	-.10	.02	-.08	-.02	.00	1.00							
-.45**	-.09	-.32**	-.08	-.40**	.80**	.73**	.29**	1.00						
-.11	-.02	-.18*	-.12	-.24**	.02	-.15	.04	-.05	1.00					
-.14	-.12	-.11	-.05	-.19*	.17*	-.02	-.08	.07	.09	1.00				
-.16	-.08	-.20*	-.12	-.29**	.11	-.13	-.01	-.01	.86**	.58**	1.00			
.44**	-.12	-.14	-.06	-.23**	-.13	-.09	-.07	-.16	-.16	-.03	-.15	1.00		
.49**	-.06	-.18*	-.09	-.25**	-.22**	-.10	-.07	-.21*	-.09	-.08	-.11	-.38**	1.00	
.14	.12	.11	.05	.19*	-.17*	.02	.08	-.07	-.09	-1.00**	-.58**	.03	.08	1.00

Σ ENV/Σ INT = -.54. Also, TEN/EXH = -.19; TEN/Σ INT = -.42; TEN/ACT = -.24; TEN/Σ ENV = -.31; CRIP/AGG = -.17; CRIP/Σ INT = -.24; CRIP/ACT = -.24; CRIP/Σ ENV = -.32; and CRIP/TEN = .28. The Σ MAL correlated positively with each of its variables (TEN, CRIP, FEAR) and Σ MAL/EXH = -.21; Σ MAL/AGG = -.21; Σ MAL/Σ INT = -.45; Σ MAL/ACT = -.32; and Σ MAL/Σ ENV = -.40. Also, DES/EXH = .20; DES/ACT = -.18; DES/Σ ENV = -.24; FAIL/Σ ENV = -.19; FAIL/TEN = .17; and Σ WITH correlated positively with both of its variables included in the intercorrelation matrix (DES, FAIL) and Σ WITH/I.Q. = -.17; Σ WITH/ACT = -.20; Σ WITH/Σ ENV = -.29. Besides correlating with its components, AFF + DEP + COM also correlated with AFF + DEP + COM/EXH = -.17; AFF + DEP + COM/DIR = -.37; AFF + DEP + COM/Σ INT = .44; AFF + DEP + COM/Σ ENV = -.23. DIR + AGG in addition to the correlations with its components, correlated DIR + AGG/AFF = -.23; DIR + AGG/COM = -.26; DIR + AGG/Σ INT = .49; DIR + AGG/ACT = -.18; DIR + AGG/Σ ENV = -.25; DIR + AGG/TEN = -.22; DIR + AGG/Σ MAL = -.21; and DIR + AGG/AFF + DEP + COM = -.38. R showed a perfect negative correlation with FAIL and R/Σ ENV = .19; R/TEN = -.17; and R/Σ WITH = -.58.

The strongest relationships in terms of magnitude were between the scoring categories and their summation classifications. Two exceptions to this observation were the small correlations of DEP in the Σ INT classification, and BIZ in the Σ WITH classification. The FAIL scoring category

negatively correlated perfectly with R, because to obtain R, all FAIL responses are subtracted from the total number of responses.

CHAPTER IV

DISCUSSION

As the resulting medians indicate, there were many zeros in most of the scoring categories, thus lowering some medians to fractions, while leaving others at zero. (See Table 1.) The largest median number of responses occurred in the summation scoring classifications (Σ INT, Σ ENV, Σ MAL, and the AOR) and in the ACT, AGG, and COM scoring categories. The medians in all other scoring categories were consistently small, indicating that the subjects' responses were diversified and did not tend to accumulate in only one or two scoring categories. In excluding the summation variables, only one subject gave a total as high as seven responses in a single scoring category.

The most often used scoring categories in the Hand Test, the two groups of Σ INT and Σ ENV, were placed first in order on the list by Wagner (1969). Because of their location in the scoring hierarchy, most subject responses occurred in these first nine variables creating the positively skewed appearance of the frequencies and medians. Figure 1 reveals the relationship between the medians obtained in this

study and those obtained by Wagner. Although the distribution of each sample is similar in shape, large differences appear between the BR and Wagner's MR. The large discrepancy between the MRi (Mdn. = 2.5) and Wagner's normal group (Mdn. = 5.2) on the Σ ENV variable indicated that the normal children were better able to adjust to the environment and were more inclined to exert themselves to reach environmental goals. The BR and Wagner's Normal group appear to be the most similar. Identical medians are those of the BR and Wagner's Normal groups on Σ WITH, (Mdn. = 0.0); the MRp and Normal on AFF + DEP + COM, (Mdn. = 2.1); and the MRi and Wagner's MR and Normal on DIR + AGG, (Mdn. = 2.2).

In this study, the Hand Test provided no differentiation between the MRi and MRp samples, since no significant differences were found between the medians of the scoring categories. However, while no significant differences in AFF existed between the MRi and BR, the differences between the MRp and BR were significant at the .02 level, indicating the MRp group has more difficulty entering into warm interpersonal relationships than the BR. MRi subjects showed a greater need for praise and attention than did the BR in the EXH responses. This could be directly related to the effects of their institutionalization, since time restrictions often prohibit individualized attention in this setting (MRp children who lived at home showed no such specific needs). In the AGG responses, BR subjects showed a much greater

tendency than MRp towards hostility and forcibly attaining goals, regardless of the consequences to others.

BR subjects also indicated a greater desire for accomplishment, a willingness to exert themselves to attain difficult goals, than did the MRp in ACQ responses. Conversely, the MRp gave evidence of being followers rather than leaders, of preferring a life devoid of struggle, in comparison to the BR in the PAS responses. In the Σ ENV responses, BR subjects gave more responses than did the MRi, indicating a willingness to exert effort to reach environmental goals.

MRp showed a higher degree of internal straining against difficulties in the TEN responses, than did the BR. Both MRi and MRp revealed an acute awareness of inadequacies and deficiencies in the CRIP scoring category. Also, both MRi and MRp gave more responses than BR in the Σ MAL area, indicating some difficulty resulting from the failure to achieve need satisfactions.

In the DES scoring category, which represents a safe reaction to reality, both MRi and MRp gave significantly more responses than the BR. Similarly, in the Σ WITH, the MRi and MRp gave more indication than did the BR of distress at entering into meaningful interaction with people, objects, and ideas.

The intercorrelation matrix revealed 68 significant relationships. Forty-four of these were negative relationships; as the frequency of response in one scoring variable

increased, the frequency of response in the other scoring variable decreased. These negative relationships indicated that opposing factors were being measured by the items in the test. Similar factors were being measured by the test in the 24 significant positive relationships. The fact that 21 of the 24 positive relationships were between the scoring variables and their summation classifications illustrated this similarity. The correlations of CRIP/TEN, DES/EXH, and FAIL/TEN were the only significant positive relationships between scoring variables.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This investigation was conducted to provide norms on the Hand Test (Wagner, 1969) for educable mentally retarded and bright elementary school children, since no norms seemed to have been reported for these groups. A total of 138 children were individually administered the Hand Test. A comparative analysis of the norms was made for differences between the three groups: 1) Educable mentally retarded children (MRp) enrolled in the elementary public schools of Oklahoma City or Midwest City-Del City, Oklahoma, (n = 60); 2) Bright children (BR) enrolled in the elementary public schools of Oklahoma City or Midwest City-Del City, Oklahoma, (n = 60); 3) Educable mentally retarded children (MRi) attending Hilltop School, Pauls Valley State School, Oklahoma, (n = 18). A comparison was also made between the results of this study and the norms established by Wagner for "Mental Retardates" and normal "Children" (1969).

The results of the responses on the Hand Test were positively skewed. Medians and quartile points were calculated for each scoring category in each group. The Median

Test, with a Yates correction for continuity, was used to test for significant differences between the groups. The findings which resulted from the evaluation of the data were: 1) No significant differences were apparent in the responses of the MRi and MRp. 2) Significant differences occurred between the responses of the MRi and BR in the following scoring categories: EXH ($p < .05$), Σ ENV ($p < .05$), CRIP ($p < .001$), Σ MAL ($p < .01$), DES ($p < .02$), and Σ WITH ($< .01$). 3) Significant differences were obtained between the MRp and BR in the following scoring categories: AFF ($p < .02$), AGG ($p < .001$), ACQ ($p < .001$), PAS ($p < .05$), TEN ($p < .01$), CRIP ($p < .001$), Σ MAL ($p < .02$), DES ($p < .02$), and Σ WITH ($p < .02$). Thus, there were differences in the responses of the educable mentally retarded and bright elementary school children on the Hand Test.

In a graphic contrast between Wagner's norms and the results of this study, the pattern of responses in the summation scoring categories appeared to be similar, although at times there were differences in the sizes of the medians. No statistical procedures were attempted.

Means and standard deviations were calculated for each scoring variable in each group. An intercorrelation matrix was constructed which revealed significant intercorrelations between 68 variables.

Conclusions

Since there were no significant differences in the performances of subjects in the MRi and MRp samples, in this study the Hand Test seemed to be ineffectual in making sharp distinctions between an institutionalized sample and a non-institutionalized sample of mentally retarded children. However, the Hand Test made several explicit dichotomies between mentally retarded and bright children.

The CRIP scoring category appeared to be particularly suited to showing a differentiation in the attitudes of mentally retarded and bright children towards themselves. The mentally retarded in this study seemed to be acutely aware of some deficiency, probably their disability in learning. Also the AGG and ACQ variables clearly pointed out a difference between MRp and BR in attitudes towards others, in strivings for distant goals, higher status, and more power.

The Hand Test appeared to be effective in measuring differences between the frequency of responses of mentally retarded children and bright children in this study. There were also consistent, obvious differences between the frequency of responses of Wagner's mentally retarded adults and the responses of the bright children on the Hand Test. Since there were no such large, consistent differences between the frequency of responses of the mentally retarded children and Wagner's mentally retarded adults, the assumption can be

made that the obvious differences between the frequency of responses of the mentally retarded adults and the bright children should not be attributed to age. The differences between the responses of the mentally retarded and bright indicate that the Hand Test might be successfully employed with the mentally retarded for diagnostic purposes.

Recommendations for Further Research

Very little research has been completed on the Hand Test, because it has only been in print since 1962. Consequently, there are numerous possibilities for the design of new studies.

An extremely valuable contribution could be made through research on the scoring system. As previously mentioned, the definitions and resulting examples of the scoring categories are ambiguous and at times even contradictory. Also the numerous scoring categories in combination with summation categories, ratios, and formulas are cumbersome scoring mechanisms. In a research project, the needed analysis, revision, and restructuring could be completed or a completely new scoring system could be devised.

The "initial reaction time" (IRT) it takes each subject to mobilize and offer a response should prove to be another interesting topic, which was not included in this study. A comparison of groups such as male:female or normals:retarded for IRT on each of the ten cards could be made.

Another study of a qualitative nature could be obtained from the subjects' responses on the Hand Test. During the administration and scoring of the Hand Test, substantial differences were observed in the expanse and quality of the responses. Some subjects were disposed to answer with one or two words, while others included a personal story with their answers. By defining a quality such as "creativity" and analyzing each response according to such a definition, additional uses of the Hand Test might be established.

A well-controlled, carefully designed research project on the predictive validity of the Hand Test is suggested. There are opposing views in the literature about the discriminating value of the Hand Test for predicting success in vocational placement.

As a direct contrast to the researcher's study, the Hand Test might be administered to MRi, MRp, and BR children in high school levels. This would provide a comparative set of norms in determining if the test is discriminating age differences.

Other research studies could be founded on statistical analysis of responses given on the Hand Test. Factor analysis might be employed to ascertain what types of variations the test is measuring, the interrelationships of the measures, and where applicable, what should be done to improve the test.

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APPENDIX

TABLE 5

FREQUENCY OF RESPONSES IN EACH SCORING CATEGORY BY MRi, MRp, AND BR GROUPS

Scoring Categories	Frequency of Response					
	MRi (n = 18)		MRp (n = 60)		BR (n = 60)	
AFF	12		35		54	
DEP	5		14		16	
COM	22		79		72	
EXH	18		23		15	
DIR	12		65		53	
AGG	27		72		112	
Σ INT		96		288		322
ACQ	6		21		56	
ACT	42		175		184	
PAS	1		19		9	
Σ ENV		49		215		249
TEN	7		40		12	
CRIP	15		36		6	
FEAR	5		3		9	
Σ MAL		27		79		27
DES	5		13		0	
FAIL	3		5		2	
BIZ	0		0		0	
Σ WITH		8		18		2
AFF + DEP + COM		39		128		142
DIR + AGG		39		137		165
R		177		595		598

TABLE 6

PILOT STUDY ON MR AND BR CHILDREN
USING THE HAND TEST

Scoring Categories	Frequency of Response	
	MR (n = 17)	BR (n = 16)
AFF	6	17
DEP	5	5
COM	26	15
EXH	8	14
DIR	9	5
AGG	21	25
Σ INT	75	81
ACQ	5	7
ACT	51	56
PAS	8	4
Σ ENV	64	67
TEN	7	7
CRIP	5	0
FEAR	0	1
Σ MAL	12	8
DES	4	0
BIZ	0	0
FAIL	13	3
Σ WITH	17	3

TABLE 7

DESCRIPTIVE INFORMATION FOR MRp SUBJECTS

Subject	Sex	C.A. Yr.	C.A. Mo.	I.Q.
S_1	M	9	11	75
S_2	M	9	10	74
S_3	M	9	1	65
S_4	F	12	11	78
S_5	M	10	8	75
S_6	M	12	9	72
S_7	F	11	11	70
S_8	M	8	4	76
S_9	F	12	9	67
S_{10}	F	11	3	60
S_{11}	F	12	6	63
S_{12}	M	10	6	68
S_{13}	M	9	7	78
S_{14}	M	11	8	73
S_{15}	M	6	6	66
S_{16}	M	12	4	70
S_{17}	F	8	8	70
S_{18}	M	11	3	57
S_{19}	M	12	3	70
S_{20}	F	10	3	71
S_{21}	F	8	9	67
S_{22}	F	12	1	66

TABLE 7--Continued

Subject	Sex	C.A. Yr.	C.A. Mo.	I.Q.
S_{23}	M	12	3	74
S_{24}	F	10	4	74
S_{25}	M	12	0	61
S_{26}	M	12	2	72
S_{27}	M	11	10	77
S_{28}	M	10	8	71
S_{29}	F	12	8	68
S_{30}	M	12	2	77
S_{31}	F	12	1	70
S_{32}	F	10	6	66
S_{33}	F	11	10	65
S_{34}	M	12	6	75
S_{35}	F	12	0	76
S_{36}	F	8	5	73
S_{37}	F	11	0	72
S_{38}	F	12	5	75
S_{39}	M	11	0	72
S_{40}	M	12	4	70
S_{41}	F	6	8	72
S_{42}	M	7	8	71
S_{43}	M	11	6	76
S_{44}	F	6	5	77
S_{45}	F	9	7	72

TABLE 7--Continued

Subject	Sex	C.A. Yr.	C.A. Mo.	I.Q.
S_{46}	F	8	1	78
S_{47}	F	9	2	67
S_{48}	M	11	3	56
S_{49}	F	10	2	76
S_{50}	F	10	5	59
S_{51}	F	10	2	70
S_{52}	M	10	8	62
S_{53}	M	11	9	71
S_{54}	M	11	9	64
S_{55}	F	10	7	76
S_{56}	M	10	1	74
S_{57}	F	12	8	70
S_{58}	F	12	6	58
S_{59}	F	10	2	69
S_{60}	M	12	5	70

TABLE 8

DESCRIPTIVE INFORMATION FOR BR SUBJECTS

Subjects	Sex	C.A. Mo.	C.A. Yr.	I.Q.
S_1	M	9	9	118
S_2	M	12	1	118
S_3	F	9	9	127
S_4	F	11	3	118
S_5	M	9	10	132
S_6	M	11	0	131
S_7	F	11	11	128
S_8	F	12	0	128
S_9	M	10	1	135
S_{10}	F	11	0	135
S_{11}	M	11	11	119
S_{12}	F	10	7	120
S_{13}	F	10	10	128
S_{14}	M	10	1	123
S_{15}	F	10	5	126
S_{16}	F	11	8	116
S_{17}	M	11	8	126
S_{18}	M	10	4	124
S_{19}	M	10	5	121
S_{20}	F	9	10	117
S_{21}	M	11	7	131
S_{22}	F	11	6	132

TABLE 8--Continued

Subjects	Sex	C.A. Mo.	C.A. Yr.	I.Q.
S_{23}	F	11	- 10	123
S_{24}	F	10	- 3	130
S_{25}	M	10	- 9	124
S_{26}	M	10	- 10	116
S_{27}	F	11	- 1	132
S_{28}	M	10	- 10	123
S_{29}	F	10	- 2	125
S_{30}	M	9	- 11	120
S_{31}	M	10	- 5	133
S_{32}	F	11	- 6	121
S_{33}	F	10	- 5	128
S_{34}	F	9	- 4	118
S_{35}	M	10	- 10	120
S_{36}	M	10	- 10	126
S_{37}	M	11	- 0	123
S_{38}	F	10	- 2	125
S_{39}	F	11	- 9	126
S_{40}	M	10	- 2	136
S_{41}	M	11	- 10	125
S_{42}	M	10	- 1	135
S_{43}	M	10	- 9	129
S_{44}	M	10	- 1	140
S_{45}	M	12	- 1	128

TABLE 8--Continued

Subjects	Sex	C.A. Mo.	C.A. Yr.	I.Q.
S_{46}	F	11	3	121
S_{47}	F	11	4	120
S_{48}	M	11	10	134
S_{49}	M	11	0	133
S_{50}	F	10	3	132
S_{51}	F	11	8	120
S_{52}	M	11	8	127
S_{53}	F	10	7	128
S_{54}	F	9	5	118
S_{55}	M	12	3	122
S_{56}	M	11	3	117
S_{57}	M	12	0	128
S_{58}	M	9	4	126
S_{59}	M	10	1	134
S_{60}	F	10	8	122

TABLE 9

DESCRIPTIVE INFORMATION FOR MRi SUBJECTS

Subject	Sex	C.A. Yr.	C.A. Mo.	I.Q.	Length of Time at Pauls Valley Yr.	Length of Time at Pauls Valley Mo.
S_1	F	12	7	50	2	4
S_2	F	13	0	50	3	4
S_3	M	12	3	54	3	2
S_4	M	10	3	64	7	4
S_5	M	12	6	55	4	11
S_6	M	13	7	57	2	2
S_7	F	13	10	54	5	0
S_8	F	12	1	64	3	3
S_9	F	12	9	50	3	8
S_{10}	F	11	4	61	2	2
S_{11}	F	12	8	51	5	8
S_{12}	M	11	6	53	4	8
S_{13}	M	13	11	61	6	3
S_{14}	M	13	1	51	3	4
S_{15}	M	13	6	74	3	9
S_{16}	F	13	11	57	2	11
S_{17}	M	12	9	64	2	11
S_{18}	F	10	5	55	2	5

TABLE 10

ITEM ANALYSIS OF RESPONSES ON THE HAND TEST FOR MRp

Subj.	AFF	DEP	COM	EXH	DIR	AGG	ΣINT	ACQ	ACT	PAS	ΣENV	TEN	CRIP	FEAR	ΣMAL	DES	FAIL	BIZ	ΣWITH	A+D+C	D+A	R
S_1	1	1	1	0	0	1	4	0	3	0	3	0	2	0	2	0	1	0	1	3	1	9
S_2	0	0	1	0	3	2	6	0	1	2	3	1	0	0	1	0	0	0	0	1	5	10
S_3	1	0	1	0	2	2	6	0	3	0	3	1	0	0	1	0	0	0	0	2	4	10
S_4	1	0	2	0	1	1	5	0	4	1	5	0	0	0	0	0	0	0	0	3	2	10
S_5	0	0	0	2	2	1	5	1	4	0	5	0	0	0	0	0	0	0	0	0	3	10
S_6	0	1	1	0	0	3	5	0	4	0	4	0	1	0	1	0	0	0	0	2	3	10
S_7	2	0	3	1	0	2	8	0	1	0	1	0	0	0	0	0	1	0	1	5	2	9
S_8	0	0	1	0	2	1	4	0	6	0	6	0	0	0	0	0	0	0	0	1	3	10
S_9	1	0	2	0	1	1	5	0	3	1	4	1	0	0	1	0	0	0	0	3	2	10
S_{10}	0	0	1	0	2	1	4	0	6	0	6	0	0	0	0	0	0	0	0	1	3	10
S_{11}	0	1	1	0	3	1	6	0	4	0	4	0	0	0	0	0	0	0	0	2	4	10
S_{12}	1	0	1	0	0	2	4	0	3	0	3	2	1	0	3	0	0	0	0	2	2	10
S_{13}	0	1	1	1	2	1	6	0	2	0	2	1	1	0	2	0	0	0	0	2	3	10
S_{14}	0	0	1	0	0	0	1	0	1	1	2	5	2	0	7	0	0	0	0	1	0	10

TABLE 10--Continued

Subj.	AFF	DEP	COM	EXH	DIR	AGG	ΣINT	ACQ	ACT	PAS	ΣENV	TEN	CRIP	FEAR	ΣMAL	DES	FAIL	BIZ	ΣWITH	A+D+C	D+A	R
S_{15}	0	0	1	2	0	3	6	0	4	0	4	0	0	0	0	0	0	0	0	1	3	10
S_{16}	2	1	1	0	0	1	5	1	3	1	5	0	0	0	0	0	0	0	0	4	1	10
S_{17}	0	0	2	0	0	0	2	0	7	1	8	0	0	0	0	0	0	0	0	2	0	10
S_{18}	1	0	2	0	0	1	4	0	5	0	5	0	0	0	0	1	0	0	1	3	1	10
S_{19}	0	0	1	0	4	1	6	1	2	0	3	0	1	0	1	0	0	0	0	1	5	10
S_{20}	1	0	1	0	2	0	4	0	3	1	4	2	0	0	2	0	0	0	0	2	2	10
S_{21}	0	0	0	0	5	1	6	0	0	0	0	1	3	0	4	0	0	0	0	0	6	10
S_{22}	2	0	1	0	2	3	8	0	1	0	1	0	1	0	1	0	0	0	0	3	5	10
S_{23}	1	0	1	1	1	2	6	0	3	0	3	0	1	0	1	0	0	0	0	2	3	10
S_{24}	0	0	3	0	1	3	7	0	2	1	3	0	0	0	0	0	0	0	0	3	4	10
S_{25}	0	0	3	0	1	2	6	0	4	0	4	0	0	0	0	0	0	0	0	3	3	10
S_{26}	0	0	1	0	1	0	2	1	6	0	7	1	0	0	1	0	0	0	0	1	1	10
S_{27}	1	0	2	0	1	1	5	1	2	0	3	0	1	1	2	0	0	0	0	3	2	10
S_{28}	1	0	1	0	0	0	2	0	1	0	1	4	3	0	7	0	0	0	0	2	0	10
S_{29}	0	0	1	0	1	1	3	1	2	0	3	1	1	0	2	2	0	0	2	1	2	10
S_{30}	0	1	1	1	0	1	4	0	3	0	3	1	2	0	3	0	0	0	0	2	1	10

TABLE 10--Continued

Subj.	AFF	DEP	COM	EXH	DIR	AGG	ΣINT	ACQ	ACT	PAS	ΣENV	TEN	CRIP	FEAR	ΣMAL	DES	FAIL	BIZ	ΣWITH	A+D+C	D+A	R
S_{31}	0	2	1	1	0	4	8	0	2	0	2	0	0	0	0	0	0	0	0	3	4	10
S_{32}	0	0	0	0	4	1	5	1	2	0	3	0	2	0	2	0	0	0	0	0	5	10
S_{33}	0	1	0	0	1	1	3	0	5	0	5	1	1	0	2	0	0	0	0	1	2	10
S_{34}	1	0	1	0	1	1	4	0	4	2	6	0	0	0	0	0	0	0	0	2	2	10
S_{35}	0	0	2	0	2	1	5	0	3	0	3	0	2	0	2	0	0	0	0	2	3	10
S_{36}	0	1	3	0	1	1	6	0	3	1	4	0	0	0	0	0	0	0	0	4	2	10
S_{37}	0	0	0	0	2	0	2	0	2	0	2	1	0	0	1	4	1	0	5	0	2	9
S_{38}	0	0	1	0	1	1	3	0	6	1	7	0	0	0	0	0	0	0	0	1	2	10
S_{39}	0	0	3	1	1	2	7	0	3	0	3	0	0	0	0	0	0	0	0	3	3	10
S_{40}	2	1	1	0	0	1	5	0	2	1	3	2	0	0	2	0	0	0	0	4	1	10
S_{41}	0	0	1	1	0	1	3	1	5	1	7	0	0	0	0	0	0	0	0	1	1	10
S_{42}	1	1	2	0	0	0	4	0	3	0	3	2	0	1	3	0	0	0	0	4	0	10
S_{43}	3	0	2	1	1	1	8	0	2	0	2	0	0	0	0	0	0	0	0	5	2	10
S_{44}	1	0	1	0	0	1	3	3	1	0	4	2	0	0	2	1	0	0	1	2	1	10
S_{45}	2	0	1	0	1	0	4	1	4	1	6	0	0	0	0	0	0	0	0	3	1	10
S_{46}	0	0	2	0	2	0	4	0	2	1	3	1	1	1	3	0	0	0	0	2	2	10

TABLE 10--Continued

Subj.	AFF	DEP	COM	EXH	DIR	AGG	ΣINT	ACQ	ACT	PAS	ΣENV	TEN	CRIP	FEAR	ΣMAL	DES	FAIL	BIZ	ΣWITH	A+D+C	D+A	R
S_{47}	0	0	2	2	0	0	4	0	1	0	1	2	1	0	3	2	0	0	2	2	0	10
S_{48}	0	0	0	0	5	1	6	0	3	0	3	0	0	0	0	1	0	0	1	0	6	10
S_{49}	0	0	1	0	1	0	2	0	3	0	3	2	3	0	5	0	0	0	0	1	1	10
S_{50}	0	0	2	0	0	1	3	0	2	0	2	2	1	0	3	0	2	0	2	2	1	8
S_{51}	0	0	2	1	1	1	5	1	4	0	5	0	0	0	0	0	0	0	0	2	2	10
S_{52}	2	0	2	0	0	2	6	0	2	0	2	1	1	0	2	0	0	0	0	4	2	10
S_{53}	0	0	2	2	0	1	5	2	2	0	4	0	1	0	1	0	0	0	0	2	1	10
S_{54}	1	0	2	0	0	3	6	0	2	0	2	1	1	0	2	0	0	0	0	3	3	10
S_{55}	0	1	1	0	3	1	6	0	3	0	3	1	0	0	1	0	0	0	0	2	4	10
S_{56}	0	0	1	2	1	2	6	0	4	0	4	0	0	0	0	0	0	0	0	1	3	10
S_{57}	3	0	1	0	0	1	5	0	3	0	3	0	2	0	2	0	0	0	0	4	1	10
S_{58}	0	0	1	3	0	1	5	0	3	0	3	0	0	0	0	2	0	2	1	1	1	10
S_{59}	0	1	1	1	0	2	5	3	0	2	5	0	0	0	0	0	0	0	0	2	2	10
S_{60}	3	0	1	0	0	1	5	3	1	0	4	1	0	0	1	0	0	0	0	4	1	10

TABLE 11

ITEM ANALYSIS OF RESPONSES ON THE HAND TEST FOR BR

Subj.	AFF	DEP	COM	EXH	DIR	AGG	ΣINT	ACQ	ACT	PAS	ΣENV	TEN	CRIP	FEAR	ΣMAL	DES	FAIL	BIZ	ΣWITH	A+D+C	D+A	R
S_1	0	2	2	0	0	3	7	0	3	0	3	0	0	0	0	0	0	0	0	4	3	10
S_2	0	0	1	0	3	2	6	0	4	0	4	0	0	0	0	0	0	0	0	1	5	10
S_3	0	0	2	0	0	3	5	0	3	0	3	2	0	0	2	0	0	0	0	2	3	10
S_4	1	0	1	0	1	2	5	2	3	0	5	0	0	0	0	0	0	0	0	2	3	10
S_5	0	0	1	0	0	1	2	1	4	0	5	0	1	2	3	0	0	0	0	1	1	10
S_6	0	0	0	0	2	3	5	3	2	0	5	0	0	0	0	0	0	0	0	0	5	10
S_7	1	1	2	0	2	0	6	0	4	0	4	0	0	0	0	0	0	0	0	4	2	10
S_8	1	1	1	0	1	1	5	2	3	0	5	0	0	0	0	0	0	0	0	3	2	10
S_9	2	0	1	0	0	2	5	1	4	0	5	0	0	0	0	0	0	0	0	3	2	10
S_{10}	3	0	1	0	0	2	6	0	3	1	4	0	0	0	0	0	0	0	0	4	2	10
S_{11}	1	1	1	1	0	1	5	2	3	0	5	0	0	0	0	0	0	0	0	3	1	10
S_{12}	1	1	2	0	0	0	4	0	5	0	5	1	0	0	1	0	0	0	0	4	0	10
S_{13}	0	0	2	0	2	2	6	0	3	0	3	1	0	0	1	0	0	0	0	2	4	10
S_{14}	1	0	3	0	1	1	6	0	4	0	4	0	0	0	0	0	0	0	0	4	2	10

TABLE 11--Continued

Subj.	AFF	DEP	COM	EXH	DIR	AGG	∑INT	ACQ	ACT	PAS	∑ENV	TEN	CRIP	FEAR	∑MAL	DES	FAIL	BIZ	∑WITH	A+D+C	D+A	R
S_{15}	0	0	2	0	1	2	5	0	2	2	4	0	0	1	1	0	0	0	0	2	3	10
S_{16}	0	0	1	0	1	2	4	0	4	0	4	1	1	0	2	0	0	0	0	1	3	10
S_{17}	1	0	0	0	1	2	4	1	4	0	5	1	0	0	1	0	0	0	0	1	3	10
S_{18}	1	0	2	0	1	3	7	0	3	0	3	0	0	0	0	0	0	0	0	3	4	10
S_{19}	1	0	0	2	2	1	6	0	3	0	3	0	0	1	1	0	0	0	0	1	3	10
S_{20}	0	0	1	0	2	1	4	1	4	1	6	0	0	0	0	0	0	0	0	1	3	10
S_{21}	0	0	1	0	0	3	4	1	4	0	5	0	0	1	1	0	0	0	0	1	3	10
S_{22}	0	0	1	0	1	2	4	3	1	0	4	1	0	1	2	0	0	0	0	1	3	10
S_{23}	0	0	2	0	1	2	5	2	3	0	5	0	0	0	0	0	0	0	0	2	3	10
S_{24}	1	0	1	0	1	2	5	0	5	0	5	0	0	0	0	0	0	0	0	2	3	10
S_{25}	2	0	1	0	2	2	7	1	2	0	3	0	0	0	0	0	0	0	0	3	4	10
S_{26}	1	1	1	1	0	2	6	0	3	0	3	0	0	1	1	0	0	0	0	3	2	10
S_{27}	1	0	1	0	0	3	5	0	5	0	5	0	0	0	0	0	0	0	0	2	3	10
S_{28}	3	0	1	0	0	2	6	1	3	0	4	0	0	0	0	0	0	0	0	4	2	10
S_{29}	0	1	1	0	0	3	5	0	5	0	5	0	0	0	0	0	0	0	0	2	3	10
S_{30}	0	0	1	0	2	2	5	1	2	0	3	2	0	0	2	0	0	0	0	1	4	10

TABLE 11--Continued

Subj.	AFF	DEP	COM	EXH	DIR	AGG	ΣINT	ACQ	ACT	PAS	ΣENV	TEN	CRIP	FEAR	ΣMAL	DES	FAIL	BIZ	ΣWITH	A+D+C	D+A	R
S_{31}	2	0	2	0	0	1	5	1	4	0	5	0	0	0	0	0	0	0	0	4	1	10
S_{32}	0	0	0	0	3	1	4	2	4	0	6	0	0	0	0	0	0	0	0	0	4	10
S_{33}	2	0	2	1	1	0	6	0	4	0	4	0	0	0	0	0	0	0	0	4	1	10
S_{34}	1	1	2	0	1	2	7	1	2	0	3	0	0	0	0	0	0	0	0	4	3	10
S_{35}	1	1	1	1	0	3	7	1	1	0	2	0	1	0	1	0	0	0	0	3	3	10
S_{36}	0	0	1	0	0	2	3	0	3	3	6	0	1	0	1	0	0	0	0	1	2	10
S_{37}	1	1	1	0	2	1	6	0	3	0	3	0	1	0	1	0	0	0	0	3	3	10
S_{38}	1	0	2	1	0	1	5	0	3	0	3	0	0	0	0	0	2	0	2	3	1	8
S_{39}	1	0	1	0	2	0	4	0	6	0	6	0	0	0	0	0	0	0	0	2	2	10
S_{40}	2	0	1	0	0	3	6	1	2	0	3	0	0	1	1	0	0	0	0	3	3	10
S_{41}	1	0	1	1	1	1	5	1	4	0	5	0	0	0	0	0	0	0	0	2	2	10
S_{42}	0	1	1	2	0	3	7	0	3	0	3	0	0	0	0	0	0	0	0	2	3	10
S_{43}	2	0	0	0	1	4	7	1	2	0	3	0	0	0	0	0	0	0	0	2	5	10
S_{44}	1	0	2	0	0	4	7	2	1	0	3	0	0	0	0	0	0	0	0	3	4	10
S_{45}	1	0	1	0	1	3	6	1	3	0	4	0	0	0	0	0	0	0	0	2	4	10
S_{46}	0	0	0	0	1	3	4	1	5	0	6	0	0	0	0	0	0	0	0	0	4	10

TABLE 11 --Continued

Subj.	AFF	DEP	COM	EXH	DIR	AGG	∑INT	ACQ	ACT	PAS	∑ENV	TEN	CRIP	FEAR	∑MAL	DES	FAIL	BIZ	∑WITH	A+D+C	D+A	R
S_{47}	0	1	4	0	2	1	8	1	1	0	2	0	0	0	0	0	0	0	0	5	3	10
S_{48}	1	0	1	0	0	2	4	4	1	0	5	0	0	1	1	0	0	0	0	2	2	10
S_{49}	1	0	0	0	1	3	5	0	4	0	4	1	0	0	1	0	0	0	0	1	4	10
S_{50}	2	0	1	0	1	2	6	2	2	0	4	0	0	0	0	0	0	0	0	3	3	10
S_{51}	0	0	1	0	2	0	3	3	4	0	7	0	0	0	0	0	0	0	0	1	2	10
S_{52}	0	0	2	0	1	2	5	0	4	0	4	1	0	0	1	0	0	0	0	2	3	10
S_{53}	1	0	2	0	0	3	6	3	1	0	4	0	0	0	0	0	0	0	0	3	3	10
S_{54}	4	0	1	0	2	1	8	1	1	0	2	0	0	0	0	0	0	0	0	5	3	10
S_{55}	1	0	2	0	1	1	5	0	5	0	5	0	0	0	0	0	0	0	0	3	2	10
S_{56}	1	0	1	0	0	1	3	3	3	0	6	0	1	0	1	0	0	0	0	2	1	10
S_{57}	0	0	1	1	1	2	5	1	2	1	4	1	0	0	1	0	0	0	0	1	3	10
S_{58}	2	0	1	0	0	3	6	3	1	0	4	0	0	0	0	0	0	0	0	3	3	10
S_{59}	0	1	0	4	1	1	7	1	1	1	3	0	0	0	0	0	0	0	0	1	2	10
S_{60}	3	2	0	0	1	1	7	0	3	0	3	0	0	0	0	0	0	0	0	5	2	10

TABLE 12

ITEM ANALYSIS OF RESPONSES ON THE HAND TEST FOR MRi

Subj.	AFF	DEP	COM	EXH	DIR	AGG	ΣINT	ACQ	ACT	PAS	ΣENV	TEN	CRIP	FEAR	ΣMAL	DES	FAIL	BIZ	ΣWITH	A+D+C	D+A	R
S_1	0	2	1	0	0	1	4	0	4	0	4	1	1	0	2	0	0	0	0	3	1	10
S_2	0	2	1	1	0	0	4	0	4	0	4	0	1	1	2	0	0	0	0	3	0	10
S_3	0	0	2	4	0	1	7	0	0	0	0	0	0	0	0	3	0	0	3	2	1	10
S_4	0	0	2	1	3	1	7	0	2	0	2	0	1	0	1	0	0	0	0	2	4	10
S_5	0	0	1	4	0	1	6	2	0	0	2	0	2	0	2	0	0	0	0	1	1	10
S_6	1	1	1	0	1	0	4	1	5	0	6	0	0	0	0	0	0	0	0	3	1	10
S_7	0	0	2	1	0	3	6	1	3	0	4	0	0	0	0	0	0	0	0	2	3	10
S_8	0	0	1	2	0	2	5	0	3	0	3	1	0	1	2	0	0	0	0	1	2	10
S_9	2	0	2	0	1	2	7	0	1	0	1	0	0	1	1	1	0	0	1	4	3	10
S_{10}	2	0	0	0	2	1	5	1	2	0	3	0	2	0	2	0	0	0	0	2	3	10
S_{11}	2	0	3	0	0	0	5	0	2	0	2	1	2	0	3	0	0	0	0	5	0	10
S_{12}	0	0	1	0	2	2	5	0	1	0	1	0	1	2	3	1	0	0	1	1	4	10
S_{13}	1	0	1	3	0	2	7	1	2	0	3	0	0	0	0	0	0	0	0	2	2	10
S_{14}	1	0	0	0	0	3	4	0	5	0	5	0	1	0	1	0	0	0	0	1	3	10
S_{15}	2	0	2	0	0	1	5	0	2	0	2	1	2	0	3	0	0	0	0	4	1	10
S_{16}	1	0	1	0	1	1	4	0	3	1	4	0	1	0	1	0	1	0	1	2	2	9
S_{17}	0	0	1	2	1	3	7	0	2	0	2	0	1	0	1	0	0	0	0	1	4	10
S_{18}	0	0	0	0	1	3	4	0	1	0	1	3	0	0	3	0	2	0	2	0	4	8