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A MULTIDIMENSIONAL STUDY OF THE BEHAVIOR
OF SEVERELY RETARDED BOYS

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

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* * * * *

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Approved by

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CONTENTS

Chapter	Page
I. INTRODUCTION	1
II. METHOD	9
The Sample	9
Techniques for Collecting Data	12
III. INTERPRETATION OF THE FACTORS	17
IV. SUMMARY AND CONCLUSIONS	31
APPENDIXES	
A. Observations in Carlson South	35
B. Check-list of Behaviors	39
C. Item Description	41
D. Coding Key	43
E. Intercorrelation Matrix	49
F. Factors Unrotated	50
G. Factors Rotated	52
LIST OF REFERENCES	54
AUTOBIOGRAPHY	56

LIST OF TABLES

Table	Page .
1. Age Distribution	10
2. Distribution of Social Quotients (Vineland)	10
3. Diagnostic Classification	10
4. Use of Tranquillizers and Anti-convulsants . . .	11

CHAPTER I

INTRODUCTION

One of the major problems in the treatment and training of the severely retarded child is the initial difficulty in securing a meaningful and useful description of the child's behavior characteristics. The extreme variability of observed behavior among individual members of such a group of children belies the assumption of homogeneity based on I.Q. scores alone. Although I.Q. classification signifies homogeneity in terms of responses to a particular test, its practical and theoretical significance appears limited.

Furthermore, the whole conception of intelligence as a maximally useful explanatory construct has been questioned in the recent literature. Liverant (13) makes perhaps the most forceful attack in suggesting that the construct may be not only unnecessary but even a hindrance to clear psychological theorizing. He argues from the fact that clinical studies have consistently shown that I.Q. scores do not remain stable under varying situational circumstances, and the fact that subtest scatter on an intelligence test is the rule rather than the exception. Despite these facts the notion of a general intelligence has remained with us. Eells

and Davis (6) have pointed to the cultural variability that cannot be accounted for by the present construct of intelligence, and Bayley (1) has demonstrated the inability of the construct to account for temporal variability of behavior, i.e., changes in ability with age. If these arguments obtain for the normal population, they appear even more relevant to the subnormal. An I.Q. score does not, for example, reflect variability due to differing clinical diagnoses or differing types and amounts of sensory impairment which may accompany poor performance. It gives no information about the types of tasks which the child most severely fails, nor of the effects of specific practice on his performance.

That is, within the same "homogeneous" group of severely retarded children one may find non-ambulatory, blind, deaf, or brain-damaged children, as well as those exhibiting the autistic behavior characteristic of the psychotic child. While similar in their I.Q. test performance, their daily behavior is as varied as the specific disorders which characterize them, as varied as their environmental histories, as varied as their length of stay in the institution, and so on.

The question becomes one not of the predictive validity of the construct of intelligence in terms of the criterion which has been used to define it, but rather the broader question of the construct validity of the concept. Simply asked, What is the psychological or theoretical

significance of such a construct? Posing the question in the terms of Cronbach and Meehl (4), How encompassing is the nomological net of behaviors whose variability is attributable to this dimension? That the construct has been given meaning in terms of an operational definition (meaning at level I, or verifiability, using Bergman's distinction (2)) has been adequately demonstrated. However, it has been equally forcefully demonstrated that the construct of intelligence has gained little meaning at level II. It has minor significance in terms of its ability to enter into meaningful relationships with the situational and temporal and cultural factors which also seem related to behavioral variability. Perhaps this is too much to expect of any construct (though we have traditionally expected it of intelligence--for example, the attempts to create culture-free tests). If this is, indeed, too large an order for one conceptual dimension, then perhaps the answer lies in a multi-dimensional approach--a description of intellectual behavior in terms of more than one dimension.

The need for a multi-dimensional approach to the understanding of the retarded child has been previously noted. In the early work of the Special Committee on Nomenclature of the American Association on Mental Deficiency, Sloan and Birch recognized the futility of a unidimensional system:

The term "mental retardation" refers to the overall efficiency of the functioning organism. Human

differences of the kinds which form the bases for assessing degrees of retardation are both quantitative and qualitative, and such differences are not entirely intellectual (16, p. 258).

These authors felt that the dimensions which most adequately accounted for the variability among retardates were the following: "Specifically, the maturation, the learning capacity, and the social adjustment of the subject are all considered when degree of mental retardation is being determined" (16, p. 258). The elements of such a trichotomy have the obvious shortcoming of being vague, not easily defined operationally, and surely not independent of one another.

Equally cognizant of the uni-dimensional classification problem, but less willing to offer an immediate solution, Heber (9) states in the introduction to his recent classificatory system, which has been adopted by the American Association of Mental Deficiency:

The heterogeneity of the behavioral characteristics of mentally retarded persons cannot, of course, be reflected in a uni-dimensional classification. Unfortunately, the development of a complex, multi-dimensional schema of classification is prohibited, at present, by a lack of knowledge of the parameters of behavior important for predictive purposes, and by lack of assessment techniques with adequate reliability and validity (9, p. 55).

Thus, the use of a truly multi-variate, multi-dimensional design in the psychological assessment of retarded children has not been previously attempted. Heber (9) has recently proposed a behavioral classification of retardates

based on measured intelligence and adaptive behavior, a purportedly 2-dimensional scheme, which he justifies by saying, "Though intelligence test scores and level of adaptive behavior are related there will be, nevertheless, a sufficient number of discrepancies in level of performance on the two dimensions to justify the dual classification" (9, p. 55).

Unfortunately, however, such discrepancies which would support the independence of the dimensions, would also logically betray their lack of validity, since the very measures which operationally define the two separate dimensions, have been validated against similar or identical criteria, if not against each other. For example, as measures of the dimension of intelligence, Heber suggests the Revised Stanford-Binet Test of Intelligence, the Wechsler Adult Intelligence Scale, the Wechsler Intelligence Scale for Children, and the Arthur Scale of Performance Tests. As a test of adaptive behavior, on the other hand, he proposes the Vineland in the case of the pre-school child, academic achievement (9, p. 64) at the school level, and, at the adult level, "subjective judgments of vocational and social effectiveness, and clinical evaluations of strife and discord in family and community." Since the empirical validity of the measures of one dimension depend on measures of the other dimension (e.g., Revised Stanford-Binet and academic achievement, or the Stanford-Binet and the Vineland), independence and validity of the two dimensions are mutually exclusive. Since the

Stanford-Binet has been validated against the criterion of school achievement on the basis of a significant correlation between the two measures, they cannot also be used to define two separate, independent dimensions.

It would appear that the solution to the problem of classification must begin with some knowledge of what dimensions are relevant to the behavior under study. Certainly the behavior characteristics of normal children are not described on the basis of I.Q. alone, but also in terms of such dimensions as school achievement, dependency, and acceptance of responsibility. However, the dimensions along which normal children vary may not be highly relevant to the abnormal population. As has been previously suggested, it is doubtful whether in the retarded population, intelligence (as presently defined) is the relevant, or even one of the most relevant dimensions.

Heber (9) contends that the necessary methods are lacking for both the collection and analysis of the relevant data. However, it would appear that, in some respects, the institutionalized retarded person presents a lesser methodological problem than his normal counterpart. First of all, the sum total of his behavior, the relevant dimensions which are to be determined, is confined temporally by a rigid daily schedule, locally by unchanging physical surroundings, and socially by the same constant companions, attendants, and resident workers. Thus, observational samples could be

obtained from the total universe of behaviors, occurring through all hours of the waking day, rather than being limited to specific types of behavior or specific situational contexts. In this way the criticism of selectivity of situation, often leveled against this technique (20) can be rendered less relevant.

Perhaps a factor analytic approach which could extract orthogonal factors could be employed to assure the independence of behavioral dimensions derived from the observational data. Guilford has described the approach of the dimensional model:

The most common, basic model is a multidimensional Euclidian space, each dimension of which represents a unique trait. A unique trait can be discovered as a common factor by factor analysis. To the extent that an individual's personality can be accounted for in terms of a limited number of common factors, each person can be represented as a point in n-dimensional space (7, p. 3).

The description of the dimensions under study is assured by the significance of the intercorrelations and of the factor loadings.

It is the purpose of the present study to--

1. Demonstrate the usefulness of an observational technique, namely a time-sampling of the daily behavior of institutionalized retardates, for arriving at meaningful description of the behavior dimensions of a sample of institutionalized, mentally retarded boys.

2. Demonstrate the usefulness of factorial techniques and computer aids in exploratory research of this nature.

3. Finally, to reveal, through the factor analysis of such behavioral data, the dimensions which are relevant to the description of the behavior repertoire of a group of severely retarded boys.

CHAPTER II

RESEARCH METHODS

The Sample

The subjects for this investigation were 48 boys residing in a common living unit at the Columbus State School. As the majority of subjects had reported I.Q.s of 30 or below they were classified in this institution as severely mentally retarded. The subjects ranged in chronological age from eight to eighteen (Table 1), and in Social Quotient (Table 2) from five to fifty-five. Their diagnostic classifications included undifferentiated mental deficiency, epilepsy, mongolism, chronic brain syndrome with postnatal infection, with postnatal trauma, and with developmental cranial anomaly (Table 3). Three-fourths of the group were able to feed themselves, either with spoons or by hand. Only nine of the subjects were completely toilet-trained. The primary daily medications for the group (Table 4) were tranquilizers and anti-convulsants. All but two of the subjects were ambulatory. Four were blind.

TABLE 1
AGE DISTRIBUTION

Age	N
8-0 to 8-11	8
9-0 to 9-11	4
10-0 to 10-11	4
11-0 to 11-11	5
12-0 to 12-11	4
13-0 to 13-11	10
14-0 to 14-11	6
15-0 to 15-11	2
16-0 to 16-11	3
17-0 and older	2

TABLE 2
DISTRIBUTION OF SOCIAL QUOTIENTS (VINELAND)

Score	N
4 to 8	9
9 to 13	22
14 to 18	9
19 and over	8
Total	48

TABLE 3
DIAGNOSTIC CLASSIFICATIONS

Classification	N
Epilepsy	5
Chronic Brain Syndrome - Post Infectious	4
Chronic Brain Syndrome - Post Traumatic	12
Chronic Brain Syndrome Developmental Cranial Anomaly	4
Mongolism	3
Undifferentiated Mental Deficiency	20
Total	48

TABLE 4

USE OF TRANQUILIZERS AND ANTI-CONVULSANTS

Medication*	Dosage daily**	N
Tranquilizers	None	28
	Mild	11
	Average	5
	Heavy	4
Total		48
Anti-convulsants	None	33
	Mild	4
	Average	9
	Heavy	2
Total		48

*The tranquilizers included stelazine, compazine, thorazine, and equanil. The anti-convulsants were mebaral, dilantin, serpasil, phenobarbital, triodine, and mesantoin.

**The dosage, translated into these 3 categories by the Clinical Director, took into account the type of drug, amount, body weight, effects of multiple medications, and norms for the particular group.

The boys were living in a unit of two large rooms; a day room, approximately forty by sixty feet and a dormitory, approximately fifty by eighty feet. The only items of furniture were the beds in the dormitory and several large wooden benches in the day room. The rooms were barren otherwise. The boys spent the major portion of each day in the day-room, either nude or in diapers. The few who were toilet trained wore pants.

Ordinarily three attendants cared for the group during the day; and four attendants were on duty during the night. The routine care of the attendants included feeding, bathing,

and changing of diapers. Their major goal appeared to be keeping the unit as clean and as quiet as possible. Therefore, overactive children were restrained in a seclusion room, or tied to chairs.

None of the boys used more than a few words meaningfully, and only a few were capable of routine self-help at the one year level. Their time was generally spent in running, clapping, rocking, and other such perseverative activities.

Some of the children received an occasional visitor and were permitted to leave the unit for several hours. A few were taken home over holiday periods. Twice a week five or six of the boys would go to the playground with a recreation worker, but this privilege generally fell to the more manageable boys and certainly did not include the whole group.

Techniques for Collecting Data

Two observers, the author and a research nurse, spent six eight-hour days in the living unit, observing the group in an informal manner, recording their observations in a diary-like fashion. Included in Appendix A is a sample taken from these recorded observations. These observational records were then analyzed for specific behaviors, void as much as possible of any antecedent-consequent interpretations.

The subjects exhibited approximately 109 different behaviors. Appendix B presents the list of behaviors

derived from these original observations. The items were grouped into categories for ease of recording because the list was later to be used as a check-list for a time-sampling observation of these same subjects. The grouping of items represents what seemed a logical arrangement rather than any anticipation of factorial structure or covariation among the items within any category.

A Pearson product-moment correlation yielded an inter-observer reliability coefficient of .918 for this check-list when the behavior of 15 subjects were observed independently by the two experimenters during the same 15-minute period. The average split-half reliability of the instrument, computed later, following the actual time-sampling, was .84.

On the reverse side of the check-list were then added other items of general information to be recorded during the time-sampling. These pertained to the time and date of the observation, the toilet training of the child, his state of wakefulness and dress during the observation, any visible scars or scabs, the presence of bikes or balls in the unit (as rarely occurred), occurrence of self-feeding, medication received, and illness, or restraint during the observation.

Using this check-list, a time-sampling of the boys was then conducted by the two observers. Each child was observed in the unit for a five-minute period twice a day (once by each observer) for twelve consecutive days,

excluding Saturdays and Sundays. Observations were not conducted on the week-ends since the daily schedule was often altered on these days by the presence of visitors.

Each day the hours of observation were from 7 to 9, and 10 to 12 A.M.; and from 2 to 4, and 5 to 7 P.M. The specific time at which each child was observed differed from day to day in a systematic fashion. In total, each child was observed every twenty minutes for a five minute period. This amounted, over eight hours, to a total of 24 different observations for each subject. Such a procedure was adopted to control for the obvious temporal variable which might affect the daily behavior under observation.

During the time-sampling the observers were in the unit, free to move about, but did not participate in any interactions with the subjects. After a few days the observers were generally ignored by the subjects; therefore, they did not find it necessary to isolate themselves in any way, but could play the part of the non-participating observer, a procedure typically recommended in observational research with normal children (20).

The subjects were scored for the mere presence or absence of each specific behavior on the check-list, regardless of the frequency of its occurrence during the five-minute period. Thus, after twenty-four observations for each child, the total score for any given subject on any specific variable could range from zero to 24.

During the observations one new item, which had not previously occurred during the informal observations, was added to the check-list, as it occasionally occurred during the time-sampling. No other behavior was observed during the time-sampling periods that had not been observed in the initial observations.

Following the time-sampling observations, total frequencies for each variable were computed for each child. Several of the behavioral variables occurred so infrequently during the time-sampling that they were discarded from further consideration: kneeling, creeping, falling, throwing ball, catching ball, throwing doll or other object, riding bike, pushing bike, kicking ball, sitting nude on commode, sitting clothed on commode, urinating on the floor, defecating on the floor, waving, licking, putting face up to an object, pointing to object and naming it, and the items regarding self-bathing and self-feeding, as these would be necessarily a function of the time at which the child was observed. Other items were grouped together on the basis of their obvious covariation; for example, cooperative play, parallel play and following were grouped together in the final analysis. The resulting list contained 64 behavioral variables. These are listed as items 1 through 64 in Appendix C. The remaining 16 items of Appendix C refer to the additional general information collected for each subject. The Vineland Scale of Social Maturity was administered

for each subject according to the instructions prescribed in the manual (5). The matron of the unit served as the informant for the administration of the Vineland, and also contributed the information regarding the self-feeding ability and toilet training of each of the subjects. The remaining information, gathered from existing institutional records, included data on age, diagnostic classification, age on admission, and years in the institution. The last two variables refer to the number of behaviors the child exhibited during the time-sampling, and the number of different behaviors he exhibited, i.e., the intra-individual variability of behavioral response.

These data, the eighty variables listed in Appendix C, on each subject, were then coded for processing by the IBM 704 digital computer. The coding key is included as Appendix D. Finally, the data were factor analyzed according to the principal axis method, as programmed for the IBM 704 computer.

CHAPTER III

INTERPRETATION OF THE FACTORS

Thirteen factors were extracted to explain the covariation represented by the intercorrelation matrix of the 80 items. The intercorrelation matrix is included as Appendix E. The first eight factors appeared to be group factors and together accounted for more than 50 per cent of the variance of the total behavior sampled. The present discussion deals primarily with these 8 factors.¹

The unrotated factor loadings of the items are presented in Appendix F. The factor loadings were then rotated graphically toward simple structure and adjudged psychological meaningfulness. The rotated factor loadings are presented in Appendix G.

Factor 1--Purposefulness

The available data were of a highly heterogeneous nature. Some of the items related to behavioral variables, others to diagnostic classifications, social quotient, and

¹Other specific factors extracted included a clapping dimension, a staring dimension, a rocking dimension, and other factors specific to given items, and less interpretable.

additional non-behavioral data. No general factor was expected to emerge, and indeed, this was the case. However, the factor which accounted for the largest percentage of the variance is best described by the term "purposefulness," or "goal directed behavior." The items² which define this factor are the following:

<u>Loading</u>	<u>Item</u>
.93	60 Motioning and gesture communicating
.88	59 Pointing
.82	63 Being picked up, talked to, or changed, by attendant
.80	22 Playing with, manipulating, or examining objects
.79	19 Picking things up helpfully, or helping attendants
.78	45 Responding to commands or to being called
.77	67 Social Quotient (Vineland)
.77	37 Smiling in response
.64	28 Hitting, pushing, pinching
.60	29 Fondling, patting, touching, hugging
.56	36 Other social interaction
.56	79 Number of total behaviors exhibited
.53	68 Toilet training
.52	48 Using words meaningfully
.52	5 Normal walking
.51	61 Dressing or undressing oneself
.51	80 Number of different behaviors exhibited
.45	62 Drinking from water fountain
.44	57 Appropriate laughing
.43	58 Inappropriate laughing
.43	54 Blabbering and comprehensible words, not meaningfully related
.42	30 Play (cooperative, parallel, and following another)
.40	47 Looking attentively

²An arbitrary cut-off point of a loading of .35 was used to identify those items which best define the factor. As can be seen from inspection of Table 6, Rotated Factor Loadings, these are not necessarily "pure," items, in the sense of loading on one factor only. The psychological meaningfulness does not seem to be affected seriously by this lack of perfect simple structure, however.

The only items which loaded negatively on the first factor were low in their loadings by comparison with the positive loaders, but still reflected something of the opposite pole of a "Purposefulness" dimension:

<u>Loading</u>	<u>Item</u>	
-.37	14	Meaningless hand movements
-.36	32	Kicking
-.35	39	Distorting face, frowning, blinking, wincing

From the fact that the amount of attention which the children received (item 63) loads heavily on this factor, one cannot infer either that the children are more responsive and engage in more purposeful behavior as a result of added attention, or that the attendants are more likely to favor the brighter children with their attention. A correlation study does not permit such an antecedent-consequent inference; nevertheless the fact still remains that the meaningfulness of this dimension of "purposefulness" depends to a large extent on this particular variable.

Items 79, number of total behaviors, and 80, number of different behaviors, suggest that purposefulness is significantly related not only to the general activity level, but also to the intra-individual variability of response. The goal-oriented child is one who, among other things, shows greater variability in his repertory of behavior, while his non-responsive peer is one who compulsively repeats the same meaningless responses.

Factor 2--Lack of Restraint

The items which load most heavily on this factor are the following:

<u>Loading</u>	<u>Item</u>	
.69	79	Number of total behaviors exhibited
.62	1	Standing
.57	80	Number of different behaviors
.53	9	Running poorly
.47	16	Putting fingers in mouth
.45	49	Being awake
.45	14	Meaningless hand movements
.43	58	Inappropriate laughing
.41	8	Idiosyncratic walking
.40	21	Stuffing mouth with cloth
.38	17	Hitting, kicking, rubbing own body
.38	20	Picking things off the floor indiscriminately
.36	12	jumping and climbing
.35	62	Drinking from water fountain

and the negative loaders were again only three

-.49	3	Lying down
-.40	51	Being restrained
-.35	65	Use of tranquilizers

The positive loaders on this factor are those which are most obviously precluded by restraint either physical (being tied down) or chemical (being tranquilized). Thus, the items pertaining to amount of total behaviors and to the variability of behavior are again high loaders. Although the correlational technique offers no demonstration of a cause-effect relationship, an inspection of the items does suggest that many of these behaviors often lead to the subject's being restrained or tranquilized.

It appears that the importance of this factor is in the fact that, while behavioral dimensions were expected to emerge, an institutional practices dimension was extracted

which accounted, as the second largest factor, for over 13 per cent of the total explained variance. In other words, an adequate description of the behaviors of such children is contingent on specific clinical and administrative policies as well as the behaviors of the children. For example, it may be that in some living units, or in some institutions, tranquilizers or restraints are used more freely than in others; the consequent behavior of the children will depend in large measure on such policies.

Factor 3--Self Stimulation

This factor is best defined by the following items:

<u>Loading</u>	<u>Item</u>	
.75	10	Running well
.57	17	Hitting, kicking, or rubbing one's own body
.52	65	Use of tranquilizers
.49	27	Handling genital area
.47	78	Undifferentiated Mental Deficiency
.45	5	Normal walking
.42	53	Yelling, screaming, and screeching
.41	13	Fist banging
.40	43	Spitting, or playing with spit
.39	61	Dressing or undressing self

and the following negative loaders:

-.51	34	Being kissed, hugged, or touched by the other children
-.46	73	Diagnosis of epilepsy
-.44	33	Being hit
-.41	7	Uncoordinated walking
-.38	42	Drooling
-.37	66	Use of anti-convulsants
-.37	31	Backing off
-.35	36	Other social interaction

In naming the third factor "self stimulation," the term "self" is not intended in any phenomenological sense,

or in any sense other than referring to one's own body. This dimension appears to be related to 'stimulus seeking,' particularly in items 10, 17, 27, 5, 53, and 13, which define, the dimension at one pole as active, aggressive behavior, and by the negative loaders 33, 34, and 36 which suggest passive acceptance of stimulation. The positive loading on "diagnosis of undifferentiated mental deficiency" may suggest that such "autistic" behavior is more common to those children who are not definitely diagnosed as organic cases, and may thus include "psychotic" as well as retarded subjects. Such a notion would be supported by the fact that a diagnosis of epilepsy, perhaps one of the more easily verifiable of the existing classifications, loads heavily in the negative direction on this dimension. This inference would also account for the inclusion of the negatively loading items 42 (drooling), 66 (use of anti-convulsants) and 7 (uncoordinated walking) which are positively correlated with epilepsy. In other words, this factor of bodily stimulation appears to be more a "psychotic" dimension, pertaining to those cases of mental deficiency which are undifferentiated rather than to those cases which are known to be organic in origin.

The relative stimulus poverty that exists in the daily institutional environment (described earlier in the section on methodology) may give some clues to an understanding of this dimension. The studies of early sensory

deprivation in animals (3, 14, 18, 19) have all noted the maladaptive behavior that results from early isolation from external stimuli. Characteristic features of such behavior have been a stimulus seeking and a lack of avoidance of painful stimuli.

Thompson and Melzack (19) have found that puppies reared in isolation not only fail to avoid the painful stimuli of lit matches and shock, but actually approach them. Melzack (14) points to a need to use psychological concepts, rather than a purely physiological explanation, in the understanding of pain perception. Such explanations as the direction of intense attention toward other stimuli, or the relief that comes from knowing that a pain signals the continuing life in an injured organ are some of the suggested psychological interpretations.

Levine (12,13) finds that rats who have not been handled in infancy are significantly inferior at avoidance conditioning than their litter-mates who have either been normally handled or who have been regularly shocked in infancy.

Sprague, Chambers and Stellar (17) observe that rats with mesencephalic lesions in the lateral lemniscus area respond to new physical surroundings in a way peculiarly similar to the behavior of autistic children, and these investigators also relate their findings to the sensory deprivation which results from such an operation.

Rothenberg (15) describes almost identical behavior in the case study of a child who was born prematurely, and spent the first three and a half months of life in an incubator:

And then there was his head, which would roll in a circular motion or sway from side to side. As he became stronger he began to use it against himself and others batting it against the sides of the crib, against the walls of the house, against other people's heads, and against windows.

Johnny seemed to lack sensation, seemed not to feel pain (15, p. 62).

In each of these cases we find not only a lack of avoidance of the painful stimulus, but actually an approach to painful stimulation, accompanied by an avoidance, or at least a lack of recognition of social surroundings. Other people or animals are treated as objects for one's own stimulation. Most striking is the extreme stimulus-seeking that pertains in every organism which has somehow been deprived of normal sensory input early in life, whether through cerebral lesions, or through isolation in an incubator or experimental cage.

The psychological interpretations suggested by Melzack in explaining the lack of awareness of pain do not account for approach to pain. It is suggested here that infants require sensory stimulation to produce the bodily awareness which assures them of their very existence. When this awareness is lacking, these animals approach, often in

a self-stimulating way, those intense stimuli which will reduce this deficit of bodily awareness.

The adult organism hallucinates under similar conditions of sensory deprivation (3,8). In such cases it would appear that he also is by his hallucinatory stimulation, providing external referents by which to delineate his own existence. Numerous other examples of response to boredom, e.g., the truck driver who talks or sings to himself, sees mirages on the road ahead, and so on, lend support to his view. Additional evidence concerning sensory deprivation and consequent body image distortion has been suggested by Hebb (8).

It is the present thesis that those aspects of autism which pertain to perseverative bodily stimulation and to lack of recognition of one's social surroundings as social, can be interpreted in terms of a primitive need for self (i.e., bodily) awareness-perhaps a necessary precursor of social awareness.

The fact that the use of tranquilizers loads heavily on this factor seems to support this sensory deprivation hypothesis, in that these tranquilized children probably receive even less sensory input than they otherwise would in their already stimulus-impooverished environment.

Factor 4--Age

The highest positive items defining this factor are the obviously related variables of age and years in the institution. In order of their factor loadings the items are as follows:

<u>Loading</u>	<u>Item</u>	
.74	72	Years in the institution
.70	70	Age
.50	73	Diagnosis of Epilepsy
.36	66	Use of anti-convulsants
.35	77	Diagnosis of developmental cranial anomaly'

The only significant negative loaders are:

-.50	55	Appropriate crying
-.47	2	Sitting
-.45	76	Diagnosis of Mongolism

In this interpretation of this factor less weight is put on the fact that items of diagnosis load on the dimension than on the fact that its highest loaders are those relating to age. Aside from the fact that the items relating to diagnostic classification are not the highest loaders, these classifications of dubious validity are also less considered for another reason. Often several classifications are given for a child although only the primary diagnosis is reported here. While in the first classification listed, such a classification does not always reflect the majority of presenting symptoms. Thus a child may be given a diagnosis of chronic brain syndrome associated with post-natal infection, with subsidiary diagnoses, including convulsive disorder, neurotic reaction, and others.

Factor 5--Extroversion - Introversiion

The positive items on this factor are concerned with social interaction, either actively or passively:

<u>Loading</u>	<u>Item</u>	
.61	35	Putting face next to, or kissing, another
.50	53	Yelling, screaming, screeching
.44	47	Looking attentively
.41	33	Being hit
.40	29	Fondling, patting, touching, hugging
.38	28	Hitting, pushing, pinching
.38	66	Use of anti-convulsants
.38	34	Being kissed, hugged, touched

while the negative items suggest a lack of social awareness:

-.53	38	Smiling without stimulus
-.52	46	Staring
-.48	41	Leaving the tongue out
-.39	70	Age
-.35	15	Swinging cloth in front of face, and playing with string

The negative items on this factor suggest some internal stimulus for behavior rather than any social stimulus. There is no obvious interpretation for the fact that the administration of anti-convulsants loads on this factor. It may be that those patients with convulsive disorders are the most likely in this sample to participate in social interaction as long as their seizures are under chemical control.

Factor 6--Lack of Neuro-muscular control

Factor 6 is defined by items which suggest muscular involvement. At one extreme are those behaviors which involve some lack of control or lack of normal muscular coordination.

<u>Loading</u>	<u>Item</u>	
.57	75	Diagnosis of chronic brain syndrome--post natal trauma
.53	8	Idiosyncratic walking
.46	52	Grunting, fuming, hissing, chattering and grating noises
.40	26	Rocking
.38	64	Head banging
.35	25	Shaking or rotating head

Items loading negatively on this dimension, however, pertain to behaviors which require some amount of coordination ability or muscular involvement, or at least, do not betray a lack of neuromuscular control:

-.49	78	Diagnosis of Undifferentiated Mental Deficiency
-.47	68	Toilet training ability
-.45	20	Picking things up from floor indiscriminately
-.43	69	Self-feeding ability
-.37	10	Running well
-.35	12	Jumping and climbing

This factor might be labeled "brain damage." The highest positive loader, "chronic brain syndrome" seems to provide the best clue in identifying the factor. While the dimension is concerned with motor behavior, the polarity seems to reflect normal muscular control vs. the poor coordination which is characteristic of the infant or brain-injured child.

Factor 7--Verbal (axes reversed)

The seventh factor, more specific than the others, refers, in its highest loaders, to those behaviors concerned with oral expression.

<u>Loading</u>	<u>Item</u>	
.49	54	Blabbering (incomprehensible words) and comprehensible words not meaningfully related
.42	48	Using words meaningfully

The interpretation of the dimension in terms of its opposite pole is not as clear, except that the nature of the behaviors might be expected to reduce verbal expression. Thus, children who are drooling, or actively jumping and climbing, are less likely to be involved with an attempt to express themselves with word: The high negative loaders when the axes are reversed, are:

-.44	73	Diagnosis of Epilepsy
-.41	42	Drooling
-.41	12	Jumping and climbing

Factor 8--Emotional Maladjustment
(axes reversed)

Only one pole of this dimension yielded factor loadings which were significant. These referred principally to emotional behaviors which were either inappropriate or non-integrative. The term "inappropriate" here refers to the fact that there was no observable stimulus which gave rise to the emotional behavior. It still remains that the stimulus may have been a nonobservable internal one and, therefore, the interpretation of the behaviors as inappropriate is somewhat more tenuous than the more strictly operational

definition of the other behaviors. The significant loaders on this dimension are these:

<u>Loading</u>	<u>Item</u>	
.51	71	Age on admission
.46	56	Inappropriate crying
.45	58	Inappropriate laughing
.38	55	Appropriate crying
.38	24	Bouncing, dancing, shaking

The fact that age on admission loads heavily on this factor lends itself to more than one interpretation, as there is no identifiable single reason for the time of admissions. It may be that those children who are admitted to the institution at a later age have a greater difficulty adjusting to their new surroundings and therefore appear to be more emotionally unstable. Perhaps these have already established more rigid behavioral patterns which they find difficult to change. Another possible explanation may lie in the fact that the normal home situation is more stressing to the retarded child than a less demanding institutional environment, and thus children who have remained longer at home might reasonably be expected to have developed maladjustive emotional reactions in resistance to the pressures of a more complex environment with which they are forced to cope.

CHAPTER IV

SUMMARY AND CONCLUSIONS

An investigation has been conducted to discover the independent dimensions which are relevant to the description of a group of severely retarded boys. The need for such a multi-dimensional description had been previously acknowledged in the literature (16,9), but it has been stated that adequate techniques are lacking.

The present study has attempted to demonstrate the usefulness of an observational approach and a factor analysis of behavioral data as methods appropriate to the identification of dimensions which are both relevant and independent.

A time sampling observation of the daily behavior of 48 severely retarded boys has been conducted after a series of informal observations had suggested the universe of behaviors exhibited by these subjects. A behavioral checklist of significant inter-observer and test-retest reliability was devised as the instrument to be used during the sampling by the two observers.

Each subject was observed for 24 five-minute units over a 12 day period and the behavioral data obtained from

these observations as well as other non-behavioral data on the subjects were factor analyzed. The factor analysis was the principal axis method, programmed for the IBM 704 computer.

Thirteen independent behavioral factors were thus extracted, of which eight appeared to be group factors and accounted for over 50 per cent of the total explained variance. These eight factors were then graphically rotated toward simple structure and adjudged psychological meaningfulness. The rotated factors are described here and have been named, in the order of the percentage of variance each explains; Purposefulness, Lack of Restraint, Self (Bodily) Stimulation, Age, Social Interaction, Neuromuscular Control, Verbal, and Emotional Maladjustment.

The importance of these techniques lies in the fact that they reveal dimensions which have been empirically demonstrated to be relevant to this sample and are orthogonal or independent of each other.

In addition, the results suggest further research based on a theoretical interpretation of several of these factors. The factor of lack of restraint offers evidence that much of the behavior of these children is significantly related to the amount of physical and chemical restraint present in their daily environment. An adequate description of the severely retarded child must, therefore, consider these environmental variables as well as those which pertain

to the behavior of the child, himself. Further investigation might be directed toward determining what changes in the child's daily behavior would be produced by a systematic manipulation of conditions of restraint.

The effect of sensory deprivation has been offered as a possible theoretical explanation for the occurrence of self-manipulative and asocial behavior in the subjects. Again, an experimental design which varied the amount of isolation or sensory input might yield valuable information and a more conclusive answer to the background of this autistic behavior.

The fact that age on admission loads heavily on a factor of emotional disturbance suggests the fruitfulness of more controlled research devoted to this variable. An attempt might be made to predict whether emotional maladjustment results from a late admission to the institution or rather from an inability to cope with the stress of complex living outside the institution.

Other experimental research might be centered around the variable of attention given to the child. The frequency with which the retarded child was picked up, talked to, or changed by attendants has proven to be a significant variable loading on the factor of "purposive behavior." A logical next question is whether the child responds to this

added attention, or whether he is awarded greater attention as a result of his more purposive activity.

Although the present study is an exploratory effort, it identifies a number of significant variables and offers suggestions for further investigation.

APPENDIX A

OBSERVATION ON CARLSON SOUTH

Friday, 9/29/60: 8:15 A.M.

Stench is terrible--worse than last night. Apparently the kids haven't been cleaned yet this morning. Some of them are getting medicine from one nurse. Two others are clothing the kids. Two men are washing the walls and floors. Most of the kids are clothed in clean diapers by now. A few were nude when I came in. Main impression is that there are too many children for one small room--48. Two have gone to the toilet to urinate. One small Negro boy keeps coming over to me. He doesn't appear nearly as defective as many of the others. They're mostly curious, but when I look up from my pad at them they back off, startled in a few cases. Spitting and vomiting on the floor is not at all unusual. Every few minutes one spits.

Vocalizations are limited to grunting, some screeching and occasionally a sound more like that of a human child about 10 months--i.e., a more voluntary, less throaty. One boy is talking to me now--"Mama - me (pointing) - mine (pointing to the clipboard)"--got terrible scars or scabs--red sores all over his body, as many of them do. One boy has a large sore or cut on back of his head. Shaved and a lot of dried blood around it.

All are ambulatory except one in bed. A lot of rocking and rhythmic jumping.

It seems like a continuous process of diaper changing and there's a tremendous variability in amount of self-help. Some put their own soiled clothes in the hamper, while others won't even keep diapers on.

Same boy back. "Papa." "Me."

They go to "school" (recreation in the yard) six at a time in the afternoon. Yesterday one was punished by not being allowed to go--cried, realized he was being punished.

Nurse claims very few help themselves. The one case I saw may have been an attempt to show-off (apparently some social awareness).

Spit swallowing and screaming and beating his stomach and pushing his genitals against the wall is all one boy has done for about ten minutes. Same boy--"school" (pointing outside and nurse just told him he'd go to school later) "school? me?" He's the only one I've heard a comprehensible word from so far. Articulation about that of a 20 month kid. "I go go Mommy." Eyes are filled up.

One boy chewing comes over to grunt--like a monkey only more throaty. He walks on his toes.

The boy who was screaming is louder now and also crying. One boy brought another to me pointing to him. They were hugging like. This boy has a clean T-shirt. When I commented on it, he looked at it and yelled. Returned a

smile well. Pokes me and points to show me what the nurse is doing at the table with sheets. I asked "How's that-- (Clipboard) all right?" He nodded assent.

One nurse hugs a little boy who's been turning away by himself. Another explains need for tying some up. "That's not bad punishment," implying that it is punishment.

Same boy--"Go by-by" (points outside) "by-by"--Another returns a smile.

Nurse shows me he can say 2 to 6 words of things he had for breakfast. She feels he doesn't belong here at all. He is certainly far above the rest, as well as the other boy who spoke to me.

I saw no signs of intelligent functioning in the beginning but gradually they look better and better to me. Some use a few words. Others use a smile or gesture to communicate.

David follows me and points out the window for me to look. Somehow I'm afraid he'd get worse here.

One boy doing a tremendous number of somersaults.

One boy still playing with spit.

Another is very easily frightened--my least quick movement gives him a slight start.

One continually shakes hands, arms, legs and lower jaw; rapid palsy-like movements.

For over an hour one has been shaking a little piece of cloth in front of him and looking at it.

Same boy keeps calling me "Mommy" and trying to ask me something.

<u>Position</u>	<u>Facial</u>
Standing	Smiles in response
Sitting	Smiles without known stimulus
Sitting rigidly	Distorts face or frowns
Crouching (squatting)	Licking
Lying	Chewing
Kneeling	Putting face up to object
	Sticking tongue out
	Drooling
	Spitting
	Blinking or wincing
	Keeping mouth open
	Vomits
<u>Locomotion</u>	<u>Responsiveness</u>
Walking normally	Responds to being called
Walking on toes	Responds to commands
Walking uncoordinatedly	Stares at object or into space
Walking idiosyncratically	Looks attentively at activity or person
Creeching	
Running poorly	<u>Language - Communicative vocalization</u>
Running well	Uses words comprehensibly and meaningfully
Twirling	under 5
Falling	5 to 10
Jumping	over 10
Climbing	Points to object and names it
	<u>Non-communicative vocalization</u>
<u>Use of Hands</u>	Grunting, fuming, and hissing
Pointing (non-communicative)	Yelling, screaming, or screeching
First-banging; pounding on wall, screen	Blabbering and incomprehensible words
Meaningless hand movements	Appropriate crying
Swinging cloth in front of own face	Inappropriate crying
Putting fingers in mouth	Chattering and grating noises
Hitting, kicking, rubbing own body	Appropriate laughing
Blocking ears	Comprehensible words, not meaningfully related
Picking things up, helpfully	
Picking things up inappropriately	<u>Non-vocal communication</u>
Playing with spit	Pointing (to object, person or accomplishment)
Stuffing mouth with cloth	Motions to somebody to do something
Playing, manipulating, examining objects	Otherwise gesture-communicates and is understood
Catching ball	Otherwise gesture-communicates and is not understood
Throwing ball	<u>Clothing, bathing and feeding</u>
Throwing doll or other object	Puts own clothes on
Rides bike	Takes clothes off (appropriately)
Pushes bike	Takes clothes off (inappropriately)
Kicks ball	Drinks from water fountain
	Helps bathe self
<u>Rhythmic activity</u>	Finger feeds self
Claps to music	Feeds self with silverware
Claps not to music	Drinks from cup or glass by self
Bouncing, dancing, shaking to music	
Bouncing, dancing, shaking not to music	<u>Attention given (by attendants)</u>
Shaking or rotating head	Is picked up, hugged or touched
Rocking	Is talked to, or given command
	Is changed
<u>Sexual and eliminative</u>	Is fed
Handling genital area	<u>Comment - any idiosyncratic behavior.</u>
Sitting nude on commode	e.g., cloth swatting, somersaults.
Sitting clothed on commode or on lid	T shirt over knees, etc.
Urinating on floor	
Defecating on floor	
<u>Social</u>	
Hitting or taking a pass	
Pushing an aggressor away	
Pushing a non-aggressor	
Finching or squeezing	
Fondling, patting, touching, hugging	
Waving	
Cooperative play	
Parallel play	
Following another	
Backling off from another	
Kicking or pushing with feet	
Kissing	
Is hit by another	
Is kissed, hugged, or touched	
Putting face next to another	
Other social interaction	
Helps attendant	

Reverse Side of Checklist of Behaviors

Name _____

Time _____

Date

Bowel

Bladder

Awake

Clothed

Scars, scabs, sores, or stitches

Balls

Bikes

Feeds self (how)

Ill

Medication

Restrained

APPENDIX C

ITEM DESCRIPTION

1. Standing
2. Sitting
3. Lying
4. Other positions
5. Normal walking
6. Walking on toes
7. Uncoordinated walking
8. Ideosyncratic walking
9. Running poorly
10. Running well
11. Twirling about
12. Jumping and climbing
13. Fist banging
14. Meaningless hand movements
15. Swinging cloth and playing with string
16. Putting fingers in mouth
17. Hitting, kicking, rubbing one's own body
18. Blocking ears with hands
19. Picking things up helpfully and helping attendants
20. Picking things up from floor indiscriminately
21. Stuffing mouth with cloth
22. Playing, manipulating and examining objects
23. Clapping
24. Bouncing, dancing, shaking
25. Shaking or rotating head
26. Rocking
27. Handling genital area
28. Hitting, pushing, pinching another
29. Fondling, patting, touching, hugging another
30. Play (cooperative, parallel and following)
31. Backing off
32. Kicking
33. Being hit
34. Being kissed, hugged or touched by another child
35. Putting face next to or kissing another child
36. Other social interaction
37. Smiling in response
38. Smiling without stimulus
39. Distorting face, frowning, blinking, or wincing
40. Chewing
41. Leaving tongue out
42. Drooling
43. Spitting or playing with spit

44. Keeping mouth open
45. Responding to commands and to being called
46. Staring
47. Looking attentively
48. Using words meaningfully
49. Being awake
50. Being clothed
51. Being restrained
52. Grunting, fuming, hissing, chattering and grating noises
53. Yelling, screaming, screeching
54. Blabbering (incomprehensible words) and comprehensible words not meaningfully related
55. Appropriate crying
56. Inappropriate crying
57. Appropriate laughing
58. Inappropriate laughing
59. Pointing
60. Motioning and gesture communicating
61. Dressing or undressing oneself
62. Drinking from water fountain
63. Being picked up, talked to or changed by attendants
64. Head banging
65. Use of tranquilizers
66. Use of anti-convulsants
67. Social quotient (Vineland)
68. Toilet-training
69. Self-feeding ability
70. Age
71. Age on admission
72. Years at institution
73. Diagnosis of Epilepsy
74. Diagnosis of chronic brain syndrome associated with post-natal infection
75. Diagnosis of chronic brain syndrome associated with post-natal trauma
76. Diagnosis of Mongolism
77. Diagnosis of developmental cranial anomaly
78. Diagnosis of undifferentiated mental deficiency
79. Number of total behaviors exhibited
80. Number of different behaviors exhibited.

APPENDIX D

FACTORIAL STUDY OF EMPIRICALLY OBSERVED BEHAVIOR OF SEVERELY RETARDED BOYS

CODING KEY

Three IBM cards will be used for every subject.
Columns 75 to 78 will be identical on all 3 cards and will
deal with the identification of the subject.

Card 1

Card No.	Column No.	Meaning	Code
1	1- 3	1 frequency of standing	000 never 001 once 002 twice, etc., to 024 twenty- four times code as above
1	4- 6	2 frequency of sitting	" " "
1	7- 9	3 frequency of lying	" " "
1	10-12	4 frequency of other positions	" " "
1	13-15	5 frequency of normal walking	" " "
1	16-18	6 frequency of walking on toes	" " "
1	19-21	7 frequency of uncoordinated walking	" " "
1	22-24	8 frequency of idiosyncratic walking	" " "
1	25-27	9 frequency of running poorly	" " "
1	28-30	10 frequency of running well	" " "
1	31-33	11 frequency of twirling	" " "
1	34-36	12 frequency of jumping and climbing	" " "
1	37-39	13 frequency of fist banging	" " "
1	40-42	14 frequency of meaningless hand movements	" " "
1	43-45	15 frequency of swinging cloth and playing with string	" " "
1	46-48	16 frequency of putting fingers in mouth	" " "
1	49-51	17 frequency of hitting, kicking own body	" " "

CODING KEY (CONTD.)

Card No.	Column No.	Meaning	Code
1	52-54	18 frequency of blocking ears	code as above
1	55-57	19 frequency of picking things up helpfully and helping attendants	" " "
1	58-60	20 frequency of picking things up inappropriately	" " "
1	61-63	21 frequency of stuffing mouth with cloth	" " "
1	64-66	22 frequency of playing, manipulating, examining objects	" " "
1	67-69	23 frequency of clapping	" " "
1	70-72	24 frequency of bouncing, dancing, shaking	" " "
1	73-75	Identification (identical on all cards)	001 - Allman 002 - Bennett 003 - Berard, etc., to 048 - Williams
1	76	Card number (1)	
1	77	1 = Ex 2 = Cont	

Card II

2	1- 3	25 frequency of shaking or rotating head	000 never 001 once 002 twice, etc., to 024 twenty-four times
2	4- 6	26 frequency of rocking	Code as above
2	7- 9	27 frequency of handling genital area	" " "
2	10-12	27 frequency of hitting or taking a pass, pushing an aggressor away, pushing a non-aggressor, pinching	" " "
2	13-15	29 frequency of fondling, patting, touching, hugging	" " "

CODING KEY (CONTD.)

Card No.	Column No.	Meaning	Code		
2	16-18	30 frequency of play (coop., parallel, following)	Code as above		
2	19-21	31 frequency of backing off from another	"	"	"
2	22-24	32 frequency of kicking or pushing with feet	"	"	"
2	25-27	33 frequency of being hit by another	"	"	"
2	28-30	34 frequency of being kissed, hugged or touched	"	"	"
2	31-33	35 frequency of putting face next to another or kissing	"	"	"
2	34-36	36 frequency of other social interaction	"	"	"
2	37-39	37 frequency of smiling in response	"	"	"
2	40-42	38 frequency of smiling without stimulus	"	"	"
2	43-45	39 frequency of distorting face or frowning, blinking or wincing	"	"	"
2	46-48	40 frequency of chewing	"	"	"
2	49-51	41 frequency of sticking tongue out	"	"	"
2	52-54	42 frequency of drooling	"	"	"
2	55-57	43 frequency of spitting or playing with spit	"	"	"
2	58-60	44 frequency of keeping mouth open	"	"	"
2	61-63	45 frequency of responding to being called and to commands	"	"	"
2	64-66	46 frequency of staring	"	"	"
2	67-69	47 frequency of looking attentively	"	"	"
2	70-72	48 frequency of using words meaningfully	"	"	"
2	73-75	Identification (as on card 1)			
2	76	Card number (2)			
2	77	Ex = 1			
		Cont = 2			

CODING KEY (CONTD.)

Card No.	Column No.	Meaning	Code
<u>Card III</u>			
3	1- 3	49 frequency of being awake	000 never 001 once 002 twice, etc., to 024 twenty-four times
3	4 - 6	50 frequency of being clothed	Code as above
3	7- 9	51 frequency of being restrained	" " "
3	10-12	52 frequency of grunting, fum- ing, hissing chattering and grating teeth	" " "
3	13-15	53 frequency of yelling, screaming or screeching	" " "
3	16-18	54 frequency of blabbering and incomprehensible words and comprehensible words not meaningfully related	" " "
3	19-21	55 frequency of appropriate crying	" " "
3	22-24	56 frequency of inappropriate crying	" " "
3	25-27	57 frequency of appropriate laughing	" " "
3	28-30	58 frequency of inappropriate laughing	" " "
3	31-33	59 frequency of pointing	" " "
3	34-36	60 frequency of motioning, and gesture communicating	" " "
3	37-39	61 frequency of dressing or undressing	" " "
3	40-42	62 frequency of drinking from water fountain	" " "
3	43-45	63 frequency of being picked up, talked to, or changed	" " "
3	46-48	64 frequency of head banging	" " "
3	49-51	65 Use of tranquilizers	.000 - none .001 - mild .002 - average .003 - heavy

CODING KEY (CONTD.)

Card No.	Column No.	Meaning	Code
3	52-54	66 use of anti-convulsants	.000 - none .001 - mild .002 - average .003 - heavy
3	55-57	67 Social quotient	punch actual score: 004 to 040
3	58-60	68 Extent of toilet training	000 - none 001 - partial 002 - complete
3	61-63	69 Extent of self-feeding	000 - none 001 - finger 002 - spoon
3	64-66	70 Age (in months)	(8) 000 - 8-0 to 8-11 (4) 001 - 9-0 to 9-11 (4) 002 - 10-0 to 10-11 (5) 003 - 11-0 to 11-11 (4) 004 - 12-0 to 12-11 (10) 005 - 13-0 to 13-11 (6) 006 - 14-0 to 14-11 (2) 007 - 15-0 to 15-11 (3) 008 - 16-0 to 16-11 (2) 009 - 17 and over
3	67-69	71 Age on admission	000 - 6-0 to 6-11 001 - 7-0 to 7-11 002 - 8-0 to 8-11 003 - 9-0 to 9-11 004 - 10-0 to 10-11 005 - 11-0 to 11-11 006 - 12-0 to 12-11 007 - over twelve
3	70-72	72 Years at institution	000 - 0-0 to 0-11 001 - 1-0 to 1-11 002 - 2-0 to 2-11 003 - 3-0 to 3-11 004 - 4-0 to 4-11 005 - 5-0 to 5-11 006 - 6-0 to 6-11 007 - 7-0 to 7-11 008 - over seven

CODING KEY (CONTD.)

Card No.	Column No.	Meaning	Code
3	73-75	Identification (as on cards 1 and 2)	
3	76	Card number (3)	
3	77	Ex = 1 Cont = 2	

Card IV

4	1- 3	73 Diagnosis of Epilepsy	000 - yes 001 - No
4	4- 6	74 Diagnosis of Post Infectional	Code as above
4	7- 9	75 Diagnosis of Post Traumatic	" " "
4	10-12	76 Diagnosis of Mongolism	" " "
4	13-15	77 Diagnosis of Dev. Cranial Anomaly	" " "
4	16-18	78 Diagnosis of Undifferentiated M.D.	" " "
4	19-21	79 Number of <u>total</u> behaviors	Punch actual number from 86-257
4	22-24	80 Number of different behaviors	Code as above from 25 to 58
4	73-75	Identification (as on cards 1, 2, and 3)	
4	76	Card number (4)	
4	77	Ex = 1 Cont = 2	

INTERCORRELATION MATRIX (N=48)

ITEM NUMBER

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 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

79-17-17 49 27 14 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100 102 104 106 108 110 112 114 116 118 120 122 124 126 128 130 132 134 136 138 140 142 144 146 148 150 152 154 156 158 160 162 164 166 168 170 172 174 176 178 180 182 184 186 188 190 192 194 196 198 200 202 204 206 208 210 212 214 216 218 220 222 224 226 228 230 232 234 236 238 240 242 244 246 248 250 252 254 256 258 260 262 264 266 268 270 272 274 276 278 280 282 284 286 288 290 292 294 296 298 300 302 304 306 308 310 312 314 316 318 320 322 324 326 328 330 332 334 336 338 340 342 344 346 348 350 352 354 356 358 360 362 364 366 368 370 372 374 376 378 380 382 384 386 388 390 392 394 396 398 400 402 404 406 408 410 412 414 416 418 420 422 424 426 428 430 432 434 436 438 440 442 444 446 448 450 452 454 456 458 460 462 464 466 468 470 472 474 476 478 480 482 484 486 488 490 492 494 496 498 500 502 504 506 508 510 512 514 516 518 520 522 524 526 528 530 532 534 536 538 540 542 544 546 548 550 552 554 556 558 560 562 564 566 568 570 572 574 576 578 580 582 584 586 588 590 592 594 596 598 600 602 604 606 608 610 612 614 616 618 620 622 624 626 628 630 632 634 636 638 640 642 644 646 648 650 652 654 656 658 660 662 664 666 668 670 672 674 676 678 680 682 684 686 688 690 692 694 696 698 700 702 704 706 708 710 712 714 716 718 720 722 724 726 728 730 732 734 736 738 740 742 744 746 748 750 752 754 756 758 760 762 764 766 768 770 772 774 776 778 780 782 784 786 788 790 792 794 796 798 800 802 804 806 808 810 812 814 816 818 820 822 824 826 828 830 832 834 836 838 840 842 844 846 848 850 852 854 856 858 860 862 864 866 868 870 872 874 876 878 880 882 884 886 888 890 892 894 896 898 900 902 904 906 908 910 912 914 916 918 920 922 924 926 928 930 932 934 936 938 940 942 944 946 948 950 952 954 956 958 960 962 964 966 968 970 972 974 976 978 980 982 984 986 988 990 992 994 996 998 1000 1002 1004 1006 1008 1010 1012 1014 1016 1018 1020 1022 1024 1026 1028 1030 1032 1034 1036 1038 1040 1042 1044 1046 1048 1050 1052 1054 1056 1058 1060 1062 1064 1066 1068 1070 1072 1074 1076 1078 1080 1082 1084 1086 1088 1090 1092 1094 1096 1098 1100 1102 1104 1106 1108 1110 1112 1114 1116 1118 1120 1122 1124 1126 1128 1130 1132 1134 1136 1138 1140 1142 1144 1146 1148 1150 1152 1154 1156 1158 1160 1162 1164 1166 1168 1170 1172 1174 1176 1178 1180 1182 1184 1186 1188 1190 1192 1194 1196 1198 1200 1202 1204 1206 1208 1210 1212 1214 1216 1218 1220 1222 1224 1226 1228 1230 1232 1234 1236 1238 1240 1242 1244 1246 1248 1250 1252 1254 1256 1258 1260 1262 1264 1266 1268 1270 1272 1274 1276 1278 1280 1282 1284 1286 1288 1290 1292 1294 1296 1298 1300 1302 1304 1306 1308 1310 1312 1314 1316 1318 1320 1322 1324 1326 1328 1330 1332 1334 1336 1338 1340 1342 1344 1346 1348 1350 1352 1354 1356 1358 1360 1362 1364 1366 1368 1370 1372 1374 1376 1378 1380 1382 1384 1386 1388 1390 1392 1394 1396 1398 1400 1402 1404 1406 1408 1410 1412 1414 1416 1418 1420 1422 1424 1426 1428 1430 1432 1434 1436 1438 1440 1442 1444 1446 1448 1450 1452 1454 1456 1458 1460 1462 1464 1466 1468 1470 1472 1474 1476 1478 1480 1482 1484 1486 1488 1490 1492 1494 1496 1498 1500 1502 1504 1506 1508 1510 1512 1514 1516 1518 1520 1522 1524 1526 1528 1530 1532 1534 1536 1538 1540 1542 1544 1546 1548 1550 1552 1554 1556 1558 1560 1562 1564 1566 1568 1570 1572 1574 1576 1578 1580 1582 1584 1586 1588 1590 1592 1594 1596 1598 1600 1602 1604 1606 1608 1610 1612 1614 1616 1618 1620 1622 1624 1626 1628 1630 1632 1634 1636 1638 1640 1642 1644 1646 1648 1650 1652 1654 1656 1658 1660 1662 1664 1666 1668 1670 1672 1674 1676 1678 1680 1682 1684 1686 1688 1690 1692 1694 1696 1698 1700 1702 1704 1706 1708 1710 1712 1714 1716 1718 1720 1722 1724 1726 1728 1730 1732 1734 1736 1738 1740 1742 1744 1746 1748 1750 1752 1754 1756 1758 1760 1762 1764 1766 1768 1770 1772 1

APPENDIX F

FACTORS UNROTATED (N=48)

	1	2	3	4	5	6	7	8	h^2
1	.44	.54	.17	.28	-.02	-.04	.08	-.08	.607
2	-.05	.24	-.00	-.41	.28	.11	-.07	-.09	.332
3	-.08	-.54	.26	.00	-.16	-.17	-.10	.08	.437
4	-.24	.17	.04	.10	.10	.04	.14	-.15	.152
5	.62	.07	.54	-.03	.04	.06	.27	-.05	.762
6	-.12	.32	-.23	.18	-.07	-.25	.12	.20	.324
7	-.04	.31	-.35	.20	-.01	-.13	-.31	-.15	.396
8	-.08	.19	-.09	.27	.12	.58	-.35	-.07	.602
9	-.10	.51	-.11	.28	.07	-.24	-.27	.16	.522
10	.35	.16	.70	.01	-.25	-.05	.24	-.17	.790
11	-.12	-.12	.18	-.07	-.06	-.10	-.08	-.25	.149
12	.21	.40	.29	.04	-.04	-.19	.39	-.10	.490
13	.16	-.25	.37	.10	-.26	.06	.33	.06	.419
14	-.33	.42	.22	.16	-.02	.08	-.09	.15	.397
15	-.12	.36	.02	.00	.27	-.38	-.09	-.28	.448
16	-.19	.49	.07	.09	-.19	.16	.10	.23	.414
17	-.15	.30	.62	.20	-.06	.06	.04	.19	.582
18	-.21	-.27	.15	.09	-.07	.12	.24	.16	.250
19	.67	-.20	-.24	.34	.33	.01	.27	.07	.849
20	.14	.40	.45	.03	-.11	-.27	.10	-.22	.526
21	-.07	.35	-.16	.34	-.24	-.17	.23	-.18	.440
22	.82	-.03	-.11	-.10	.24	-.10	.12	-.11	.790
23	.07	.22	.17	.03	-.14	.04	.12	.00	.119
24	-.18	.19	-.21	.18	-.11	.24	-.13	.41	.400
25	-.39	-.05	.08	-.21	.13	.23	.12	.13	.306
26	-.34	-.08	.03	-.13	.25	.31	.18	-.24	.388
27	-.00	.05	.44	.03	.09	.27	.00	-.01	.278
28	.74	-.29	.09	.06	-.14	-.08	.10	-.07	.674
29	.73	.03	-.23	.24	-.18	.01	-.06	.01	.681
30	.54	.03	.06	.11	-.09	.12	-.20	-.30	.461
31	.15	.33	-.22	.33	.00	-.17	.07	.15	.345
32	.29	-.06	.38	.26	.06	-.23	.16	-.23	.435
33	.07	.06	-.47	-.18	.38	.10	.06	-.35	.542
34	-.02	.25	-.49	.03	.42	-.13	-.32	.12	.614
35	.18	-.02	.18	.16	.58	.12	.08	.18	.480
36	.60	.13	-.39	.04	-.08	.12	-.32	-.03	.655
37	.82	-.07	-.18	.15	.06	-.09	-.12	.11	.766
38	-.24	.22	.12	.09	.44	-.32	-.10	.22	.483
39	-.36	-.06	.17	.24	.17	.39	.01	.01	.401
40	-.28	.30	-.22	.18	-.15	.14	.29	-.06	.289
41	.03	.21	.13	-.27	.50	.01	.12	.19	.435
42	.04	.28	-.34	.24	.25	-.19	.39	.29	.588
43	.08	.20	.39	.05	-.06	.25	-.01	.14	.287

[illegible]

APPENDIX G

FACTORS ROTATED (N=48)

	1	2	3	4	5	6	7	8	h ²
60	.93	-.08	-.15	.02	.00	-.22	.16	.04	.970
59	.88	-.10	-.13	.03	.02	-.18	.17	.17	.893
63	.82	.18	-.20	.04	-.13	.14	.11	-.03	.796
22	.80	.00	-.18	-.12	-.02	-.32	.12	-.10	.814
19	.79	.29	-.24	-.20	.07	-.09	.24	.10	.886
45	.78	.02	.01	.01	-.07	-.23	.17	-.14	.715
67	.77	-.01	.02	-.27	.23	-.30	.07	.00	.814
37	.77	-.02	-.22	-.08	-.20	-.28	-.13	.13	.800
28	.64	-.12	.11	.10	-.38	-.33	.09	-.10	.718
29	.60	.21	-.20	.22	-.40	-.21	-.05	-.02	.700
36	.56	.27	-.35	.02	-.29	.00	-.30	-.04	.685
79	.56	.59	.13	-.15	.02	.17	.78	.14	.956
68	.53	-.16	-.03	.10	-.06	-.47	.20	-.15	.604
48	.52	.17	.03	-.01	.20	-.02	-.42	-.03	.518
5	.52	.09	.45	-.32	-.13	-.32	.27	.00	.776
61	.51	.11	.39	.15	-.20	-.20	-.28	.10	.615
80	.51	.57	.12	-.26	-.26	.13	.10	.09	.770
62	.45	.35	.25	.06	-.33	-.04	-.25	-.15	.587
57	.43	.00	-.09	.13	-.30	-.21	.12	-.17	.387
58	.43	.43	.14	-.12	.19	.02	-.01	.45	.643
54	.42	.25	.00	.05	-.18	.05	-.49	.25	.579
30	.44	.17	.03	-.02	-.25	-.10	.17	.30	.415
47	.40	.16	-.12	-.21	-.44	-.28	.08	.17	.551
14	.37	.45	.19	-.02	.12	.08	.05	.16	.425
32	.36	.08	.32	.09	.20	-.28	.17	-.26	.461
39	.35	.27	.02	-.19	.31	-.26	.01	.05	.398
1	.32	-.62	.08	-.04	.12	-.15	.13	-.07	.554
9	.20	.53	-.22	.12	.14	-.10	.23	.13	.483
16	.25	.47	.03	-.08	-.11	.19	.13	.25	.418
49	.28	.45	-.15	-.11	.20	.20	.10	-.03	.406
8	.12	.41	.11	.20	.08	.53	.32	.04	.624
21	.23	.40	.32	-.25	.17	.10	.27	.14	.509
17	.25	.38	.25	-.04	.02	.13	.07	.20	.596
20	.09	.38	.25	-.28	-.09	.45	.13	.18	.553
12	.05	.36	.13	-.20	-.06	.35	.41	-.17	.512
3	.23	.49	.29	.15	.09	.07	.15	.05	.438
51	.10	.40	.10	-.07	.18	.09	.31	.08	.328
65	.00	.35	.52	.11	-.21	.22	.01	-.10	.508
10	.07	.24	.47	-.30	-.30	.37	.22	-.12	.767
27	.05	.16	.49	-.08	.08	.11	.01	.00	.293
78	-.26	.12	.47	.08	.32	.49	.32	.02	.755
53	.02	-.15	.42	.16	-.50	.01	-.05	.34	.593
13	.08	-.08	.41	.08	-.30	.16	.32	.04	.407
43	.08	.30	.40	-.09	-.09	.00	.00	.17	.302

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AUTOBIOGRAPHY

I, John Paul McKinney, was born in Royal Oak, Michigan, February 19, 1935. I received my secondary school education at St. Francis Seminary, Cincinnati, Ohio, and my undergraduate training at the University of Detroit, which granted me the Bachelor of Arts degree cum laude in 1956. From Fordham University, I received the Master of Arts degree under the mentorship of Professor Dorothea McCarthy in January, 1958. While in residence there I was assistant to Professor Robert T. Rock. From September, 1957 until June, 1959 I was a graduate student and teaching assistant at Syracuse University. In September, 1959 I transferred to The Ohio State University to complete the requirements for the degree of Doctor of Philosophy in the Department of Psychology under the advisorship of Professor George G. Thompson. While at The Ohio State University I held the part-time position of teaching assistant for one year and full-time position of Psychologist II for the State of Ohio for one year.