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THE USE OF INDIVIDUAL DIFFERENCE DATA IN DETERMINING THE EFFECTS OF ENVIRONMENT ON DEVELOPMENTALLY DISABLED PERSONS

A Thesis Presented

by

William H. Weitzer

Submitted to the Graduate School of the
University of Massachusetts in partial fullfillment
of the requirements for the degree of

MASTER OF SCIENCE

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Department of Psychology

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Approved as to style and content by:

C. Dalton Jones, Chairperson of Committee

Stanley M. Moss, Member

D. Geoffrey Hayward, Member

Bonnie Strickland, Chairperson
Department of Psychology

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ABSTRACT

The ELEMR Project is an investigation of the behavioral effects of renovations of the interior environment at a state school for the mentally retarded. In conjunction with the project, this study involved the collection and analysis of individual difference data to determine the relation of age, sex, years in the institution and functional level (independent variables) to the amount of social and spatial behavior of the residents (dependent variables) before and after the renovations. Correlational and multiple regression techniques were used in determining that age, sex, and years in the institution had little relation to the observed social behavior of the residents, but that functional level was related to the amount of social behavior exhibited by the residents. However, none of these variables were predictive of spatial behavior, as this set of dependent variables was independent of resident characteristics and strongly related to the style of the renovations.

TABLE OF CONTENTS

CHAPTER I INTRODUCTION..... 1

CHAPTER II COLLECTION OF THE RESIDENT CHARACTERISTIC DATA..... 4

A. The ELEMR Project--The Dependent Measures.. 4

B. The Resident Records--The Independent Measures..... 8

C. Data Reliability and Meaningfulness.....12

CHAPTER III ANALYSIS OF THE RESIDENT CHARACTERISTIC DATA.....18

A. Summary of the "Medical Record" Data.....18

B. Transformation and Reduction of the Title XIX Data.....20

C. Bivariate Correlations.....25

D. Multiple Regression Analyses.....34

CHAPTER IV INTERPRETATIONS AND CONCLUSIONS.....41

A. Problems in Interpretation for the ELEMR Project.....41

B. Areas of Interpretation for the ELEMR Project.....42

C. Conclusions.....51

BIBLIOGRAPHY.....55

APPENDIX A - Sources of Data.....57

APPENDIX B - Title XIX Rating Instructions.....62

APPENDIX C - Correlation Matrix of Title XIX Measures.....70

LIST OF TABLES

Table 1 Description of ELEMR Project Dependent Measures..... 7

2 Independent Measures from Resident Characteristic Data..11

3 Examples of Rating Scales for Title XIX Evaluations.....21

4 Listing of Clusters.....24

5 Bivariate Correlations with IQ.....27

6 Bivariate Correlations with Cluster 1 (Self-Help).....28

7 Bivariate Correlations with Cluster 2 (Communication)/
Bivariate Correlations with Cluster 3 (Training).....29

8 Bivariate Correlations with Cluster 5 (Education)/
Bivariate Correlations with Sense of Direction.....30

9 Bivariate Correlations for Spatial Variables.....32

10 Intercorrelation of Independent Measures Used in
Multiple Regression.....34

11 Results of Multiple Regression Analyses with
Social Variables.....36

12 Results of Multiple Regression Analyses with
Spatial Variables.....39

13 Population Comparisons--Open Ward to "Modular" Design...44

14 Population Comparisons--Open Ward to "Dormitory" to
"Suite" Design.....45

15 Population Comparisons--Independent Groups Using the
"Modular" Design.....46

16 Population Comparisons--Independent Groups Using the
"Dormitory" Design.....47

LIST OF FIGURES

Figure 1 Illustration of Cluster Analysis.....23

2 Comparison of "High" and "Low" IQ Residents in Repeated Observations.....50

C H A P T E R I

INTRODUCTION

Researchers in environment and behavior attempt to determine the relationship between the structure of settings and the behaviors that occur in those settings. This analysis cannot be accomplished without consideration of other factors which might affect environment-behavior interactions. Measures of individual differences constitute one set of variables which play a part in this relationship. Craik (1973, 1976; Craik and McKechnie, 1977) has reviewed efforts to use measures of individual differences in environment and behavior research. He suggests that without information concerning age, sex, cultural background, income, occupation, attitudes, and so on, the relation between environment and behavior can be obscured. However, using this data, some sources of variance can be systematically partialled out to better understand the interrelation of environment and behavior.

The ELEMR Project (Effects of the Living Environment on the Mentally Retarded) is an investigation of the behavioral effects of interior renovations at a state school for the mentally retarded. The study documents the relationship between the renovations and the behavior of residents and staff. More specifically, observations in the renovated buildings revealed an increase in the amount of resident social behavior and in the use of private spaces by residents compared to pre-renovation observations. However, the results of the study can

be more fully understood when other influences, such as IQ or skills level, are integrated into the analyses. Therefore, characteristics of the subject population were collected, analyzed, and incorporated into the ELEMR data. The integration of these factors results in a better understanding of the environment-behavior relationship and its interaction with individual differences.

This paper reports on the collection of resident characteristic data and the analysis of its relation to the ELEMR Project. The purpose of this report is to emphasize the methodological as well as the interpretive importance of the task. Therefore, the paper is organized chronologically, where each step in the collection and analysis of the data is considered as it occurred.

Chapter II reviews the initial steps which included the identification and collection of the resident characteristic data:

A) First, an overview of the ELEMR Project pointed out the need for the collection of resident characteristic data.

B) Then, resident records were examined to determine the availability of information and the feasibility of collecting it.

C) And next, the reliability and meaningfulness of the information was ascertained.

Chapter III discusses the analysis of the resident characteristic data:

A) To begin the analyses, the data were summarized.

B) Then, several of the measures were transformed and clustered in preparation for correlational and multiple regression analyses.

C) Next, bivariate correlations were obtained and used to determine which of the possible independent variables correlated with the dependent measures.

D) And finally, appropriate variables and clusters of variables were entered into multiple regression analyses in order to clarify the relation of the resident characteristic data to behavior in the renovated environments.

Chapter IV reports on the interpretation of the data:

A) The problems in interpreting the analyses for use by the ELEMR Project are discussed.

B) Despite these problems, three areas of analyses, which provided valuable interpretations for the project, are discussed.

C) Finally, the conclusions of the paper comment on the use of individual difference data in research of this type.

C H A P T E R II

COLLECTION OF THE RESIDENT CHARACTERISTIC DATA

This section presents the preliminary information necessary for an understanding of the analysis and interpretation of the resident characteristic data. The ELEMR Project is described and the dependent measures which developed from the project are listed. Data about the residents from institutional records are reviewed and the independent measures are discussed. Finally, the reliability and meaningfulness of the independent measures are addressed.

A. The ELEMR Project--The Dependent Measures

The ELEMR Project (Effects of the Living Environment on the Mentally Retarded) is a 4 year multidisciplinary research project examining the effects of interior renovations at Belchertown State School (BSS), a state school for the mentally retarded. Prior to changes in the physical environment, BSS was characterized as a traditional institution in design. Constructed in the 1920's and 1930's, the campus mainly consists of moderately-sized buildings with 40 to 55 residents per building. Before renovations, each building contained five 30' by 40' spaces, three of which slept 15 to 20 residents in an open ward arrangement; one remaining space was used as a dayhall and one as a dining room. The rooms were designed in a familiar institutional scheme, using vinyl asbestos tile floors, ceramic tile walls, and plaster ceilings. The building design offered few differentiated spaces with little opportunity for privacy.

During the first half of 1976 most of the buildings at BSS were renovated to provide more "normal", less"institutional" settings. Three designs were used:

1) Single-occupancy "modular" units defined by 4½' high partitions;

2) Units shared by three or four residents in a "suite" type arrangement with 10' high dividers;

3) And, a full-wall "dormitory" style design with single or double occupancy rooms. [1]

The ELEMR Project was funded by the Developmental Disabilities Office (DDO) of the Department of Health, Education, and Welfare (HEW) to measure the effects, if any, of the renovations on the behaviors of the residents and the direct-care staff.[2]

The ELEMR Project used an observational coding system over six observation periods, from 1974 to 1977. The first four periods were used to refine the coding system and to obtain baseline data, and the final two periods were conducted after renovations were completed. Residents were chosen at random within the buildings and each resident was observed approximately 500 times during an observation period. During each observation interval, the resident's behavior was characterized by one of 41 categories of behavior (see Appendix A, p. 58). In addition, other information was recorded, including the room, location in the room, time of day, and number of persons present.

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1 Full documentation of the renovations can be found in the reports published by the ELEMR Project (Knight, Zimring, Weitzer, and Wheeler, 1977, 1978).

2 The ELEMR Project and this thesis supported by grant number S.R.S. 5-27507 from the Developmental Disabilities Office of the U.S. Department of Health, Education and Welfare.

Two groups of dependent measures were derived from the resident observation code: social behaviors and spatial behaviors (see Table 1, p. 7). First, the behaviors were collapsed into five categories of social behavior: 1) all social behaviors, whether neutral or negative (where aggressive behavior is determined negative); 2) social behavior which is neutral or non-negative; 3) neutral or non-negative social behaviors between residents; 4) verbal behaviors; and, 5) verbal behaviors between residents.

The second group of measures concerned two measures of spatial behavior. These dependent measures were based on the proportion of time that a resident made use of his or her private space. They were determined as: 1) the proportion of time a resident made use of his or her private space whenever the resident had access to that space; and, 2) the proportion of time a resident made use of his or her private space when the resident was in any private space (whether in his or her own space, or in the space of others). These categories are more fully explained in Table 1, which lists and defines the available dependent measures (p. 7).

The results from the ELEMR Project indicated an increase in the proportion of social behaviors and the use of private spaces from the pre to the post-renovated setting. The conclusions of the ELEMR Project staff were that changes in behavior were evident, but that in certain styles of renovations, a greater amount of change was observed. More specifically, behavior in the "dormitory" style design

TABLE 1

DESCRIPTION OF ELEMR PROJECT DEPENDENT MEASURES

Category	Measure	Description	Based on Behavior Numbers*
SOCIAL BEHAVIORS:	All Social Behavior	All behaviors that constitute interaction with other residents, whether verbal, physical, or verbal-physical, and whether neutral or negative**	51 - 92
	Positive Social Behavior	All neutral or non-negative social behaviors with other residents or staff	51 - 55, 71 - 75
	Positive Social Behavior with Residents	All neutral or non-negative social behaviors between residents	51 - 55
	Verbal Behavior	All verbal behaviors (utterances and articulate gestures) with other residents or staff	53,55,61,63 64,66,73,75
	Verbal Behavior with Residents	All verbal behaviors between residents	53,55,61, 63,64,66
SPATIAL BEHAVIORS:	Use of Own Space	Proportion of behaviors in resident's own space based on the amount of time spent in access to own space	
	Use of Private Spaces	Proportion of behaviors in resident's own space based on the amount of time spent in private spaces	

*see Appendix A for a complete listing of behaviors

**negative behaviors are defined as aggressive behaviors neutral or non-negative behaviors are defined as those behaviors which are not aggressive

was improved more than behavior in the "suite" type arrangement, and both of these designs proved more effective than the "modular" design. The conclusions of the ELEMR Project staff were that the "dormitory" style design mediated improved behavior due to the increased "opportunity for control" in the renovated environment.[3]

The evidence suggests that the renovations do have an effect on resident behavior in a building, but that the style of the renovation is an important mediating influence in determining the nature of that effect. However, these conclusions are based on the average scores of all the residents observed in a building. The question remains as to whether this change in behavior is evidenced in the behavior of only one, a few, or all of the residents in each building.

This paper examines additional information which helps to tease apart the effects of the renovations on individual residents. Independent measures of age, time spent in the institution, IQ, and skills level add to the understanding of the effects of the renovations. This resident characteristic data makes it possible to specify not only if there is a change in behavior, but which residents are exhibiting this change and what characteristics of those residents appear to facilitate that change.

B. The Resident Records--The Independent Measures

The types of independent measures used in research of this kind vary greatly. Craik and McKechnie (1977) edited a volume of the

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3 Once more, for full documentation of the results, see the ELEMR reports.

journal Environment and Behavior which illustrates the breadth of the independent variables used in the study of individual differences and environment. Many researchers in the volume borrowed measures from personality psychology such as measures of an individual's perception of control (Driver and Knopf, 1977), and measures of sensation seeking (Schiff, 1977). Another author created an instrument by choosing appropriate items with an environmental emphasis from a variety of existing instruments concerning control, time orientation, political orientation, and so on (Arbuthnot, 1977). And still others in the volume created instruments of their own to measure environmental attitudes and perceptions (Kaplan, 1977; McKechnie, 1977).

For the purposes of this study, existing personality measures were too difficult to apply to the population at BSS. Creating new measures was too complex and time-consuming a task. Therefore, it was decided to use whatever measures were already available in the institutional records. Three main sources of information were located at BSS:

1) Information about behavioral incidents, visits, temporary releases, and so on, is kept in each building. There is no standard procedure followed by the building staff to assure the conformity and accuracy of this information.

2) Summary information is stored in a central filing system called "medical records". Although most of the information in these files is medical, additional types of demographic information are stored here.

3) In 1975, it was declared that residents of institutions were eligible for Federal Medicaid funds. Title XIX of this act required an evaluation

> of all residents for whom the institution was seeking funds. By 1976, BSS was prepared to administer these Title XIX evaluations to all residents on the required yearly basis.

For the purposes of this study, the information unique to each building was too inconsistent for collection, and, it was beyond the time capabilities of the ELEMR Project staff to gather these data. Interviews with record-keeping and direct-care staff led to the determination that the "medical records" were accurate enough and reasonably accessible for data collection. The 1976 Title XIX evaluations (chosen as the last fully completed year) were also chosen as a data source.

Most of the "medical records" have been summarized by BSS staff on "summary sheets" (see Appendix A, p. 60). Data were extracted from this form for the residents observed during the ELEMR Project. The ELEMR Project staff determined what information would be useful for collection from this source. The files were examined to estimate which information was consistently recorded. In some cases, answers were the same for most residents (e.g., marital history). In other instances, the information was determined irrelevant (e.g., education of parents). And other pieces of information were not totally accurate (e.g., latest IQ score could be more accurately obtained from the Title XIX records). In total, seven pieces of information were found to be consistently recorded and of potential importance for analysis: year of birth, year of admission to BSS, age at admission, sex, documentation of previous institutional placement, earliest recorded IQ and the year of that IQ test (see Table 2 for listing,p. 11).

TABLE 2

INDEPENDENT MEASURES FROM RESIDENT CHARACTERISTIC DATA

"Medical Records" Measures*

Age

Age at Admission

Previous Institutional Record

Sex

Earliest Recorded IQ

Year of Earliest IQ

Title XIX Measures**

Most Recent IQ	Attention
Year of Recent IQ	Communication (Expression)
Feeding Skills	Communication (Reception)
Dressing Skills	Destructive Towards Self
Bathing Skills	Destructive Towards Others
Oral Hygiene Skills	Destructive Towards Property
Toilet Skills	Denudative
Mobility	Hyperactive
Sense of Direction	Cooperative
Reading Skills	Perseverance
Writing Skills	Motivation
Math Skills	Receptivity to Training

*source of information provided in Appendix A
**source of information also in Appendix A,
full rating scales provided in Appendix B

The Title XIX evaluations include a comprehensive summary of the residents' current skills and these evaluations outline programs for improving skills. A summary sheet (see Appendix A, p. 61) provides an overview of the entire Title XIX evaluation. As much information as possible was gathered from this single page: the most recent measure of IQ, the year of that IQ test, and numerical evaluations of 22 behavioral characteristics. All of the independent variables are listed in Table 2, p. 11.

Data were collected for all 141 residents who were observed at BSS during the ELEMR Project's six observation periods. Initially, the sample of residents was chosen at random from within selected buildings during ELEMR's first observation period. In succeeding periods, the same residents were observed if available, and additional residents were chosen at random to fill in the gap left by residents who were no longer available for observation (having transferred to another building or out of the institution).

C. Data Reliability and Meaningfulness

The choice of measures to be recorded was based on careful consideration of the reliability of the information. Interviews with persons who supervise and execute record keeping provided insight into the records process. When information on the "summary sheets" was unclear, referrence to the original "medical records" was possible. The Title XIX records for 1976 were compiled under the supervision of a BSS administrator who saw that the forms were filled out in a

consistent manner. The measures of behavioral characteristics were arrived at by a group of three persons, all of whom had contact with the resident.

The choice of the Title XIX evaluations from 1976 presents a potential bias. Since the renovations were completed in the early part of 1976, it is possible that the staff evaluations of behavioral characteristics were based on the behavior of the residents in their new environments. Therefore, the post-renovation correlations between the Title XIX measures and the dependent variables might be enhanced. As the only complete and accurate evaluations available, the 1976 Title XIX data were used despite the possible bias. As the results indicate later in this report, high correlations between the Title XIX records and the dependent measures were found in both the pre and post-renovated settings. This finding suggests that the 1976 Title XIX were probably reliable and that there was little or no biasing effect.

While the reliability of the measures can be reasonably established, their meaningfulness cannot be as easily ascertained. The use of IQ is the most difficult measure to attach meaning to. There are persuasive arguments concerning the inaccuracy and unreliable nature of IQ measures (Jones, 1975). IQ tests have not consistently demonstrated predictive power within or outside of academic settings. The tests are not based on any theory of cognitive or intellectual functionning. And, they are based on acquired

knowledge which is not uniformly distributed throughout the population. This latter point suggests that an IQ score might be representative of an individual's performance, but will fall short in measuring that individual's capacity.

Considering a population with a low functional level serves to increase the problems with the use of IQ. Given the communication problems with developmentally disabled persons and their limited experience outside an institutional setting, it is difficult to determine the intellectual potential of the residents at BSS. Also, the residents in this study are considered "severely" or "profoundly" retarded; they are located at such an extreme end of the IQ continuum that it is difficult to distinguish a difference between individuals who, for example, have been assigned an IQ of 25 from those assigned an IQ of 20.

The American Association on Mental Deficiency (AAMD) has found that IQ is not an accurate measure for mentally retarded individuals. The AAMD now uses a combination of adaptive behaviors and intellectual functionning to classify persons (Heber, 1961; Grossman, 1973). This departure from the traditional use of IQ as a comprehensive measure is representative of the growing doubts about the use of IQ in classifying the developmentally disabled.

As a result of recent trends and criticisms, there is very little research on IQ tests and the developmentally disabled. Most research that uses IQ deals with younger populations or persons with higher IQ's than those persons observed at BSS. In an attempt to explore

these concerns with the applicability of IQ scores, Ross and Boroskin (1972) address the question "are IQ's below 30 meaningful?" in a series of studies. In a test with 137 mentally retarded individuals, Kuhlmann-Binet and Stanford-Binet IQ tests were administered 16 months apart by different psychometrists to determine the reliability of IQ test scores. They found an extremely high Pearson product-moment correlation between the two tests, .98. Ross and Boroskin note that this correlation "is higher than the test-retest correlations reported for Binet with the general population over shorter periods"(1972, p. 24). Of course, it is possible that a lack of environmental change between the time of the test and the re-test contributed to the size of this correlation.

Ross and Boroskin examined the meaningfulness of IQ by comparing IQ scores with independent measures of functional level. In a group of 260 individuals, all with IQ's less than 30, they found a correlation between IQ and Behavioral Age (using the Fairview Self-Help Scale) of .77. With another group of 169 persons, a correlation of .87 was found between IQ and Language Age (using the Fairview Language Evaluation Scale). A third group of 169 individuals was evaluated on the bases of Self-Help skills (using an average of scores for toileting, bathing, dressing, feeding, and grooming) and the correlation between IQ and these scores was .77.

Based on these data, IQ is considered a potentially useful predictor of behavior for the purposes of this research. While doubt does exist concerning the nature of the difference between an

individual measured by an IQ test at 20 and one measured at 25, it might be assumed that the test was able to measure some noticeable difference between the individuals. It cannot be specified how different the individuals might be, but the IQ data can be viewed as a ranking of individuals on an overall index of cognitive functionning. This is not to say that IQ is reflective of underlying intellectual potentials.

If this is a faulty assumption, the Title XIX data provides a safeguard. Similar to the AAMD use of intellectual functionning and adaptive behaviors, the measure of IQ and the Title XIX measures of behavioral characteristics can complement one another. If IQ does not correlate with the measures obtained from the Title XIX evaluations, doubt would exist concerning the validity of IQ. In addition, if the Title XIX measures correlate with the ELEMR Project dependent measures and IQ does not, then the utility of IQ would be strongly challenged.

Throughout the analyses it will be necessary to continually examine the meaningfulness of IQ and the Title XIX measures. Several criteria will be used to determine whether a measure should be included in further analyses or eliminated. First, it will be necessary that the independent variable have a sufficient amount of variance in order to distinguish members of the population. It will also be necessary that the independent variable correlate with the dependent variables in order to be included in further analyses. Finally, the salience of meaning of the relationship between the

independent and dependent variables will be used as a criterion for inclusion in the analyses.

The use of salience of meaning as a criterion recognizes that a resident characteristic might correlate with the social or spatial variables, but that the interpretation of this relationship might be unclear. The relation of a measure of "receptivity to training" to social and spatial behavior can be understood when considering the importance of staff training in affecting resident behavior. But, the relation of a measure of "reading skills" to the dependent variables is less easily understood given the low functional level of the residents. In the latter case, it is assumed that an observed relationship between the independent variable and the dependent variables can be accounted for by shared variance with other measures of more salient meaning. If a variable meets the first two criteria, but fails to meet the criterion of salience, it will be excluded from further analyses if an examination reveals that other, more salient, variables share variance with it.

C H A P T E R III

ANALYSIS OF THE RESIDENT CHARACTERISTIC DATA

In this section, the steps taken in the analysis and interpretation of the resident characteristic data are reviewed. Summary statistics of the information drawn from the "medical records" are reported first. Then, the Title XIX data which are more difficult to summarize are discussed in view of the data transformation and reduction (using cluster analysis) which were conducted. Next, all the "medical record" and Title XIX measures were correlated with the ELEMR Project measures using bivariate correlations. Finally, those independent measures which correlated significantly with the dependent measures were used in multiple regression analyses.

A. Summary of the "Medical Record" Data

A total of 141 residents were observed during the six observation periods conducted by the ELEMR Project. Of these, 73 were male, and 68 female. The mean, median and modal age of the observed residents were 43.2, 41.0, and 44 respectively (range: 20 to 73; standard deviation: 11.66). The mean, median, and modal age at admission were 12.5, 8.4, and 7 (range: 2 to 56; standard deviation: 9.86). The mean, median, and modal year of admission, which follows from simple calculation, were 1947, 1949, and 1949 respectively. Of those observed, 30 were previously institutionalized, 104 were not, and it was unclear in 7 cases.

This information is valuable for establishing the generality of the population when applying the findings from the ELEMR Project to another situation. In general, this is an older population of individuals who have been in an institutional setting for many years, most likely the majority of their lives.

Also for comparison with residents in others settings, the average IQ provides a useful standard. The mean, median, and modal IQ (using Stanford-Binet) for those residents observed were 20.3, 17.3, and 10[4] (range: 6 to 61; standard deviation: 11.90). It should be noted that in several cases residents were not evaluated on a conventional IQ scale. In cases where testers were unable to accurately gauge IQ, individuals were "characterized" as "severely" (an IQ of 20 to 35, in 9 cases) or "profoundly" (below 20, in 32 cases) retarded. For the purpose of estimating the IQ of the population, those labelled "severely" and "profoundly" retarded were assigned mean values of 27.5 and 10 respectively.

Regardless of the potential inaccuracies in the calculation of the mean IQ for the population, it is evident that these individuals have an extremely low level of intellectual and behavioral skills. This is further evidenced by the history of BSS in which higher functionning residents were moved to community settings over the past two decades. In 1966, 1560 persons were housed at the state school. The number of residents decreased by 304 by 1971, and by another 316

---

4 The mode of 10 includes individuals with IQ's approximated at "less than 20". Realizing that this is not a true average, 10 was assigned to these individuals as an arbitrary approximation of their IQ.

by 1976 leaving a total resident population of 960.[5] Therefore, the resident population at BSS today represents, functionally speaking, the lower half of a larger population of individuals who were in residence 10 years ago.

Before the data wereexamined further, a decision was reached concerning residents observed in the infirmary at BSS. This group of 18 residents was different from the rest of the population. They were in the infirmary due to serious handicaps and were, for the most part, non-ambulatory. Measures of social behavior and spatial behavior have different meanings for this population. Therefore, these residents have not been considered in the analyses for this report.

B. Transformation and Reduction of the Title XIX Data

Several aspects of the Title XIX behavioral measures created obstacles for tabulation and interpretation. First, the evaluative scales are ordinal in nature. The only way in which the relation between two scores on a scale can be distinguished is that one score indicates "better functional skills". How much "better" is unclear. Table 3 illustrates the problem using two examples of the rating scales (see Appendix B, p. 62 , for the full list of rating scales). The ratings for Dressing Skills and Cooperative can be rank ordered, but the size of the interval between ratings is not consistent.

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5 Population estimates are based on BSS records and indicate legal responsibility. The number of residents physically present at BSS is smaller than is reported here.

TABLE 3

EXAMPLES OF RATING SCALES FOR TITLE XIX EVALUATIONS

Dressing Skills

This question refers to the resident's ability to dress or undress himself in appropriate clothing.

01 dresses and undresses self with no assistance or supervision
02 dresses and undresses self but requires some supervision
03 dresses and undresses self but requires a little assistance
04 dresses and undresses self but requires a great deal of help
05 completely unable to dress or undress self and rquires someone else to dress client
99 unknown

Cooperative

This question refers to the client's degree of cooperation with others.

00 not applicable
01 frequently assists and cooperates with others
02 frequently cooperates with others but only on mutually beneficial activities
03 will usually cooperate with others but somewhat reluctantly
04 rarely cooperates with others
05 anti-social
99 unknown

A second problem concerns the salience of meaning of some of the Title XIX measures. As was discussed earlier, it is unclear what value some of these measures have in predicting social behavior or the use of private space. For example, items such as Toilet Skills, Reading Skills, and Denudative do not suggest interpretable relationships with the dependent measures.

A final consideration in interpreting the Title XIX variables is the high intercorrelation among the measures. The interrelatedness

of these measures is illustrated by the correlation matrix provided in Appendix C, p.70).

The ordinal nature of these scales created an imposing problem. Not only is it difficult to include ordinal ratings in regression analyses, but it is impossible to combine several ordinal ratings into a meaningful sum or average. Therefore, the data were transformed to serve as percentile rankings. Each resident was assigned a score indicating what percent of the residents in the sample scored below and what percent scored above him or her on that measure.

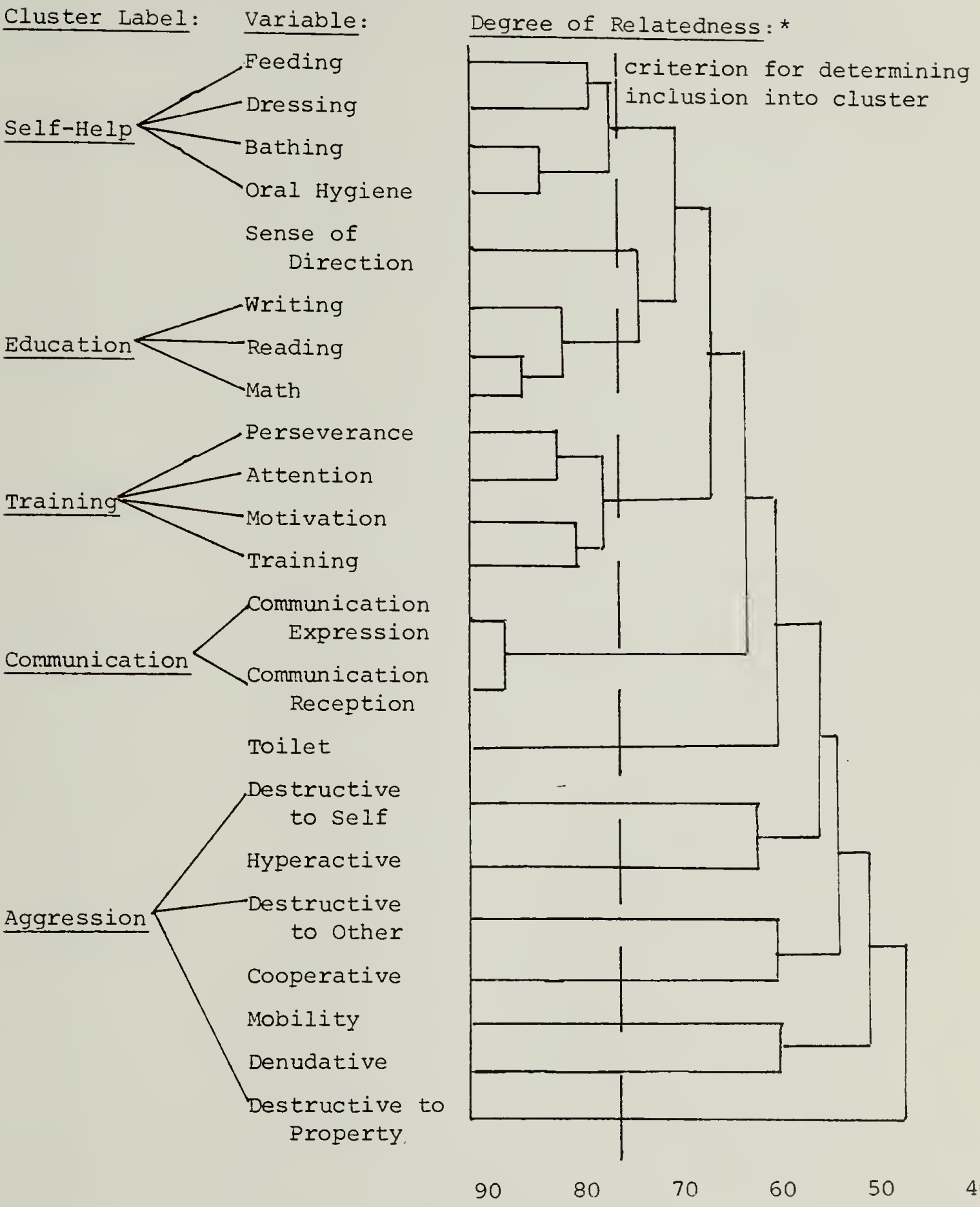
The transformed percentile data was treated differently from the ordinal ratings. The distance between the points on the scale were meaningful in that they represented relative ability amongst the population of residents. Scores could be summed and averaged to compute scores for groups of variables (averages for each resident).

A data reduction technique was used to solve the problem of the high intercorrelation among the measures. The BioMed Cluster Analysis program was used to combine the variables into relatively independent groupings of variables which share variance. Reducing the number of variables also helped to increase the power of the multiple regression analyses.

The cluster analyses were also used to solve the problem with salience of meaning. Clusters were examined for clarity of meaning as well as degree of relatedness. An example of the clearest cluster analysis is provided in Figure 1, p. 23. The higher the value where the variables are joined, the more closely related are the variables.

FIGURE 1

ILLUSTRATION OF CLUSTER ANALYSIS



*The higher the score where the variables are joined, the stronger the degree of relatedness between the variables.

The results of this cluster analysis were used to form meaningful and related groupings of variables. Five clusters were formed and are listed in Table 4. All but Cluster 4 (Aggression) are clearly illustrated in Figure 1. This additional cluster was formed due to the obvious conceptual relation of the three items (Destructive Towards Self, Destructive Towards Others, Destructive Towards Property), despite their lack of relation in the cluster analysis.

TABLE 4

LISTING OF CLUSTERS

Cluster	Label	Measures Included
Cluster 1	Self-Help	Feeding, Dressing, Bathing, Oral Hygiene
Cluster 2	Communication	Communication Expression, Communication Reception
Cluster 3	Training	Attention, Motivation, Receptivity to Training, Perseverance
Cluster 4	Aggression	Destructive Towards Self, Destructive Towards Others, Destructive Towards Property
Cluster 5	Education	Reading, Writing, Math

The remaining variables were not clustered into meaningful or related groups. These measures, Toilet Skills, Sense of Direction, Mobility, Denudative, and Hyperactive, were not eliminated from possible use in future analyses. However, they were used individually in analyses and not as averages in cluster scores.

With these clusters of independent variables determined, the data were ready for integration with the ELEMR Project dependent measures of social and spatial behavior.

C. Bivariate Correlations

Despite the care taken in collecting the resident characteristic data and recording the ELEMR observations, there were limitations with regard to the size of the bivariate and multivariate correlations. The distribution of the ELEMR data is skewed at the low end of the scale, as many residents exhibited no or few behaviors that were either social or that were located in private spaces. With "no behavior" as a "floor" to the distribution, it was unlikely that the full distribution would approach normality. This placed severe limits on the size of the correlations since these statistics are based on the assumption of normality.

However, the use of correlational and multiple regression analyses is not unreasonable. Though the amount of variance accounted for is limited by the nature of the distribution, the correlational statistics can provide an estimate of the degree of relatedness between the independent and dependent measures. Since the magnitude of the correlations is limited, the reported r and multiple R values and their tests of significance can be viewed as conservative measures of this relation.

The bivariate correlations were used to examine the independent variables' relation to the dependent variables. Those independent measures which correlated with the measures of social and spatial behavior were included in the multiple regression analyses. But, as was discussed earlier, high correlations were not the only criteria. The salience of meaning of the independent variables was examined as

an additional criterion for inclusion in the multiple regression analyses. These criteria are applied so that high predictive power is not the only goal, rather it is equally important to predict with variables whose relation to the dependent variables is understood. The application of these criteria to the bivariate correlations will be described first for the social variables, then for the spatial variables.

Social variables.

Bivariate correlations were calculated between each independent variable (e.g., IQ, age, Cluster 1, and so on) with each dependent variable (e.g., positive social behavior, use of own space, and so on). For each pair of variables to be correlated (e.g., IQ with positive social behavior), there were nine different correlation coefficients. These nine values represent scores from each of six observation periods and three combinations of the observations. Before the renovations were observations 2, 3, and 4. After the renovations, observations 5A, 5B, and 6 were conducted[6]. Combined scores were computed averaging all pre-renovation, all post-renovation, and all scores whether pre or post-renovation. All nine correlations are not reported; instead the pre, post, and total correlations are presented. The correlations within individual observation periods were examined, however, to insure that no significant departures from the combined score correlations existed.

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6 Period 5 was split into two sections because the weather changed from late winter to spring. Therefore, 5A and 5B are treated as separate observations to guard against differences due to weather.

TABLE 5

BIVARIATE CORRELATIONS WITH IQ

	N	All Social Behavior	Positive Social Behavior	Resident-Resident Positive Social	Verbal Behavior	Resident-Resident Verbal Behavior
Pre-Renovation	79	.3489**	.3608**	.3907**	.4425**	.4628**
Post-Renovation	75	.2374*	.3073**	.3705**	.3566**	.3764**
Total	112	.4008**	.4328**	.4164**	.5033**	.4861**

*p < .05
**p < .01

The Pearson product-moment correlation coefficients for IQ with the social variables are reported in Table 5. The significant positive correlations, while small, suggest that persons scoring high on the IQ test also tended to participate in more social behavior. It was concluded that IQ should be used in the multiple regression analyses.

An examination of the correlations using age, age at admission, and year of admission resulted in no significant correlations. Since most of the residents are older and have been in the institution a large number of years, it is difficult to distinguish differences among them for these measures. Therefore, it is possible that these variables would correlate with the social measures if the population of residents were more diverse. The bivariate correlations for sex were also not significant. Thus sex, like age at admission, age, and year of admission was not used in the multiple regression analyses.

TABLE 6

BIVARIATE CORRELATIONS WITH CLUSTER 1 (SELF-HELP)

	N	All Social Behavior	Positive Social Behavior	Resident-Resident Positive Social	Verbal Behavior	Resident-Resident Verbal Behavior
Pre-Renovation	75	.2409*	.2195	.2726*	.3059**	.3352**
Post-Renovation	70	.1834	.2368*	.2560*	.2878*	.3331**
Total	105	.3375**	.3465**	.3574**	.4037**	.4155**

*p <.05
**p <.01

Cluster 1 (Self-Help) was also found to correlate slightly with the measures of social behavior as indicated in Table 6. The positive correlations indicate that the higher percentile ranking for the Self-Help items, the more likely an individual was to have participated in social behaviors. A comparison was conducted between the correlations reported for Cluster 1 and the correlations for each item which was used to form the cluster. The comparison revealed that Cluster 1 scores contained as much or more variance as any of the individual items accounted for.

Cluster 2 (Communication) and Cluster 3 (Training) also correlated with the dependent social measures. Table 7 reports on the correlations for these two clusters. Again, correlations of the individual items which formed the cluster were examined and assurance was obtained that no information was lost by grouping the items into clusters.

TABLE 7

BIVARIATE CORRELATIONS WITH CLUSTER 2 (COMMUNICATION)

	N	All Social Behavior	Positive Social Behavior	Resident-Resident Positive Social	Verbal Behavior	Resident-Resident Verbal Behavior
Pre-Renovation	75	.3417**	.3091**	.3116**	.4064**	.3911**
Post-Renovation	72	.2699*	.2107	.1645	.2669*	.2229
Total	108	.3581**	.3156**	.2719**	.3887**	.3328**

*p < .05
**p < .01

BIVARIATE CORRELATIONS WITH CLUSTER 3 (TRAINING)

	N	All Social Behavior	Positive Social Behavior	Resident-Resident Positive Social	Verbal Behavior	Resident-Resident Verbal Behavior
Pre-Renovation	74	.2643*	.2953*	.2909*	.3327**	.3279**
Post-Renovation	69	.1253	.1754	.2244*	.2403*	.2935*
Total	103	.3082**	.3382**	.3309**	.3761**	.3767**

*p < .05
**p < .01

For each of the first three clusters, the bivariate correlations were significant and the relation between these items and the dependent measures had interpretive meaning. Therefore, Clusters 1, 2, and 3 were included in the multiple regression analyses. Cluster 4 (Aggression) did not correlate with the dependent variables and was dropped from further analysis. Cluster 5 (Education) did show some relation to the dependent measures. However, the meaning of these ratings (Reading, Writing, and Math Skills) for this population is

questionable.

A review of the individual items which were not formed into clusters revealed only one item that correlated with the dependent measures--Sense of Direction. As in the case of Cluster 5, it was unclear how to interpret the relation between Sense of Direction and measures of social behavior.

Table 8 reports the correlations for Cluster 5 and Sense of Direction. Although these correlations are significant, these measures

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TABLE 8

BIVARIATE CORRELATIONS WITH CLUSTER 5 (EDUCATION)

	N	All Social Behavior	Positive Social Behavior	Resident-Resident Positive Social	Verbal Behavior	Resident-Resident Verbal Behavior
Pre-Renovation	78	.2943**	.3024**	.2968**	.3458**	.3350**
Post-Renovation	73	.0425	.0267	.0468	.0994	.1031
Total	109	.2425*	.2386*	.2092*	.2918**	.2559**

*p <.05
**p <.01

BIVARIATE CORRELATIONS WITH SENSE OF DIRECTION

	N	All Social Behavior	Positive Social Behavior	Resident-Resident Positive Social	Verbal Behavior	Resident-Resident Verbal Behavior
Pre-Renovation	71	.4645**	.4215**	.4051**	.4797**	.4757**
Post-Renovation	73	.2577*	.2574*	.3171**	.3145**	.3831**
Total	103	.4221**	.4099**	.4010**	.4500**	.4517**

*p <.05
**p <.01

were dropped from further consideration in the analyses due to their lack of interpretability. In dropping these variables, it is assumed that much of the variance which they accounted for would be accounted for by variables already included in the multiple regression analyses. As will be reported later, this assumption was proven accurate.

Spatial variables.

The results of the bivariate correlations for the spatial variables were much more difficult to interpret than those reported for the social variables. The meaning of the pre-renovation measures of the use of private spaces was in doubt for two reasons: the definition of the private spaces in the pre-renovation design was very difficult to operationalize; and, as a result, for only a small proportion of the residents were private spaces identified. The resulting sample of pre-renovation measures was too small to determine patterns of spatial behavior.

What remained for interpretation was the data from the post-renovation settings. The correlations between the independent measures and spatial behavior were still difficult to interpret. In general, the correlations from observations 5A and 5B were not significant. In observation 6, many significant correlations were found, but they were negative correlations while the correlations from 5A and 5B were positive. The combined post-renovation scores fall inbetween the scores from 5A/5B and 6, and therefore do not add any significant information.

Those variables which did correlate significantly with the

TABLE 9

BIVARIATE CORRELATIONS FOR SPATIAL VARIABLES

Observation Period:	5A	5B	6	Post
IQ (N)	(31)	(41)	(50)	(64)
Use of Own Space	.3104	.2327	-.5428**	-.2502*
Use of Private Spaces	.2260	.1795	-.4624**	-.3185**
Cluster 1 (Self-Help) (N)	(28)	(38)	(48)	(60)
Use of Own Space	.1785	.1528	-.4767**	-.2229
Use of Private Spaces	.1814	.0280	-.3541*	-.3468**
Cluster 2 (Communication) (N)	(31)	(40)	(49)	(62)
Use of Own Space	-.0248	.1111	-.4090**	-.2387
Use of Private Spaces	.1019	.0862	-.1915	-.3318**
Cluster 3 (Training) (N)	(29)	(38)	(46)	(60)
Use of Own Space	-.1004	.0612	-.3378*	-.2585*
Use of Private Spaces	-.1799	-.0038	-.3362*	-.3175*
Cluster 5 (Education) (N)	(31)	(41)	(49)	(63)
Use of Own Space	.0891	.2755	-.4985**	-.2359
Use of Private Spaces	.0214	.0695	-.3929**	-.2163
Sense of Direction (N)	(30)	(40)	(49)	(63)
Use of Own Space	.1773	.3720*	-.5854**	-.2518*
Use of Private Spaces	-.0473	.0612	-.5365**	-.3005*

*p <.05
**p <.01

spatial variables are listed in Table 9, p. 32. These are IQ, Cluster 1 (Self-Help), Cluster 2 (Communication), Cluster 3 (Training), Cluster 5 (Education), and Sense of Direction. It should be noted that negative correlations are the significant values in the table. This indicates that persons of higher functional levels tend to spend less time in their own space and more time in the spaces of others. This would make sense given the earlier finding that higher functionning residents were more social, and, in order to be involved in social activity, would spend less time in their private spaces. This finding is also related to the type of private spaces available to the residents. This will be further investigated in the multiple regression analyses.

The bivariate correlations reveal a significant relationship between several of the independent variables (IQ, Self-Help, Communication, and Training) and the social behavior of the residents. The size of many of the correlations decreases from the pre to the post-renovated settings. This change will be discussed in the section on interpretations for the ELEMR Project (p. 47).

The nature of the relationship between the independent variables and spatial behavior is uncertain. In particular, the only significant correlations were found in observation 6 and they were opposite in sign from the correlations with the social variables. This difference will be explored through the use of multiple regression analyses in the next section. These analyses will demonstrate the influence of the renovation style on spatial behavior.

D. Multiple Regression Analyses

The goal of the multiple regression analyses was to determine how much of the variance of the dependent measures (social and spatial variables) could be accounted for by the independent variables (IQ and the clusters). Goals were established to use variables with highly salient meanings to produce as high a multiple R as possible using as few variables as possible. The idea behind these goals was to produce equations which were meaningful and useful for further interpretation by the ELEMR Project.

As a result of the examination of the bivariate correlations, Clusters 1 (Self-Help), 2 (Communication), and 3 (Training), and IQ were chosen as the most meaningful and significantly predictive variables. Also examined to determine their predictive significance were Cluster 5 (Education) and Sense of Direction, although these variables lacked interpretive power. Table 10 presents the inter-correlation among these six variables. The significant relationship

TABLE 10

INTERCORRELATION OF INDEPENDENT MEASURES USED IN MULTIPLE REGRESSION**

	Cluster1	Cluster2	Cluster3	Cluster5	Sense of Direction
IQ	.5153	.6075	.4698	.5383	.5710
Cluster1 (Self-Help)		.4570	.6612	.5718	.6206
Cluster2 (Communicate)			.3660	.5172	.5186
Cluster3 (Training)				.4392	.6312
Cluster5 (Education)					.6426

**all correlations, $p < .01$

between these variables points to the care needed when choosing the order in which variables were entered into the multiple regression equations. It was likely that the first variable entered would account for much of the variance that could be accounted for by the others.

A procedure was developed that began with the inclusion of Clusters 1, 2, and/or 3 in a stepwise matter if they met minimum criteria.[7] Following the inclusion or rejection of these three clusters, IQ was entered if the same minimum criteria were met. Cluster 5 and Sense of Direction were held out of the equation but their partial correlations were examined to insure that the variance which they could account for was subsumed by the other variables in the equation. This procedure was designed for maximum prediction, making use of the variables which were most easily interpretable. The results will be described first for the social variables, then the spatial variables.

Social variables.

Results of the multiple regression analyses for all five social variables are presented in Table 11. The computer program selected the clusters which accounted for the most variance and entered them first, followed by IQ (if the minimum criteria were met). The numerical ranking from 1st to 4th is used to indicate the order of entrance into the equation.

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7 The criteria were F greater than 1.0, tolerance greater than .5. These criteria were set to exclude variables which would not add a minimal amount of information.

TABLE 11

RESULTS OF MULTIPLE REGRESSION ANALYSES WITH SOCIAL VARIABLES
This table presents the final results of the multiple regression analyses. Clusters 1, 2, and 3 were offered first, then IQ was offered for entry in the equation. All of the variables had to meet minimum criteria for entrance into the equation.

	Inclusion Level for..... Cluster 1	Cluster 2	Cluster 3	IQ	Multiple R	F Ratio	(N)
Pre-Renovation:							
All Social Behavior	2nd	1st		3rd	.412	4.55**	(71)
Positive Social		1st	2nd	3rd	.401	4.28**	
Resident-Resident Positive Social		1st	2nd	3rd	.407	4.42**	
Verbal Behavior		1st	2nd	3rd	.508	7.78**	
Resident-Resident Verbal Behavior	2nd	1st		3rd	.512	7.92**	
Post-Renovation:							
All Social Behavior		1st			.278	5.10*	(63)
Positive Social	1st	2nd		3rd	.317	2.20	
Resident-Resident Positive Social	1st			2nd	.333	3.74*	
Verbal Behavior	1st	2nd		3rd	.380	3.32*	
Resident-Resident Verbal Behavior	1st			2nd	.411	6.09**	
Total:							
All Social Behavior	1st	2nd		3rd	.469	8.74**	(97)
Positive Social	1st	2nd	3rd	4th	.473	6.62**	
Resident-Resident Positive Social	1st	2nd	3rd	4th	.459	6.12**	
Verbal Behavior	1st	2nd	3rd	4th	.553	10.15**	
Resident-Resident Verbal Behavior	1st	2nd	3rd	4th	.533	9.14**	

*p < .05
**p < .01

The analyses produced multiple R values ranging from .278 to .553. These values represent highly significant proportions of variance accounted for (especially considering the limits to the multiple R due to the nature of the distributions). The inclusion level of the variables followed no strong pattern, but Clusters 1 (Self-Help) and 2 (Communication) were more consistently included in the equations. In addition, IQ was consistently entered into the equations because this variable still accounted for additional variance after the entry of the clusters. The other noteworthy finding was the decrease in the multiple R for the post-renovated observations. It was difficult to assess this finding, however, the lower correlation does suggest a lessening of the relation between functional level and social behavior in the post-renovated environments. Further discussion of this finding is included in the interpretation section (p.47).

Spatial variables.

For the spatial variables, the results from the bivariate correlations had cast doubt on the predictive power of the resident characteristic data chosen for this study. Therefore, other explanations were explored. One argument suggests that since the higher functionning residents were more social, they might have spent less time in their private spaces and more time in locations where they could socialize. A second argument concerns the differences between the three renovated environments: it is possible that regardless of the resident characteristics, it was the nature of the environments that had a significant effect on the use of private spaces.

The latter argument could be tested by entering "location" as a variable in the multiple regression analyses to determine how much variance could be accounted for by the style of the design.[8] Table 12 reports the findings of the multiple regression analyses where "location" was introduced into the equation,before the resident characteristic data,using the spatial variables as the dependent measures. It is apparent that by first entering the location, i.e. the style of the renovation, an extremely significant amount of variance was accounted for, the multiple R ranging from .470 to .860. After partialling out the variance accounted for by location, there were indications that the resident characteristic data adds slightly to the significance of the multiple regression equations. The lowest multiple R (Use of Private Spaces - 5A) changed from .470 to .535 with the entry of Cluster 3, and the highest multiple R (Use of Own Space - 6) went from .860 to .900 with the entry of Clusters 2 and 3.

In contrast to the earlier analyses with social behavior, Cluster 3 (Training) now appears to have some relation to spatial behavior as it was entered in five out of the six equations. The variables from this cluster (Attention, Motivation, Perseverance, and Receptivity to Training) do relate to a resident's ability to learn about and use private spaces. Still, the relationship between Cluster 3 and the spatial variables is not strong, as it is based on an equation with "location" already entered.

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8 The use of "location" as a predictor was explored for the social variables as well, but the findings were not reported since they were not significant.

TABLE 12

RESULTS OF MULTIPLE REGRESSION ANALYSES WITH SPATIAL VARIABLES
This table presents the results from the first step of the multiple regression analyses, then the final results. First, "location" was entered into the equation, and the multiple R and F ratio for this step are reported. Then, Clusters 1, 2, and 3 were offered for inclusion, followed by IQ. The final multiple R and F ratio are then reported.

	Inclusion of "Location"...		Inclusion Level for.....						
	Multiple R	F Ratio	Cluster 1	Cluster 2	Cluster 3	IQ	Multiple R	F Ratio	(N)
Use of Own Space:									
5A	.616	7.04**			1st		.642	3.68*	(26)
5B	.746	19.48**			1st		.777	15.27**	(34)
6	.860	52.75		1st	2nd		.900	37.23**	(40)
Use of Private Spaces:									
5A	.470	3.25			1st		.535	2.93	(26)
5B	.597	8.59**	1st				.640	6.93**	(34)
6	.600	10.38**		2nd	1st	3rd	.666	5.41**	(40)

*p < .05
**p < .01

The multiple regression analyses demonstrate the predictive power of the resident characteristic data. In the case of the social variables, the functional level of the resident is strongly related to the amount of social behavior of the resident. The spatial variables are less influenced by the resident's functional level and more

significantly related to the nature of the renovation design. If these findings were further interpreted, they would prove to be of more use to the ELEMR Project. The last section of the paper discusses ways in which the resident characteristic data can be interpreted for use by the ELEMR Project.

C H A P T E R IV

INTERPRETATIONS AND CONCLUSIONS

A. Problems in Interpretation for the ELEMR Project

The multiple regression analyses point out the relationship between the social behavior and functional level of the residents observed by the ELEMR Project. But, in order to be useful for the ELEMR Project's conclusions, the data are in need of further interpretation. This final step was made difficult by the nature of the research design of the ELEMR Project. As a result of these problems, the use of the resident characteristic data falls short of its potential.

One problem with the ELEMR data concerned the use of percentages when reporting resident behaviors. Since the residents were not observed an equal number of times, the only possible way to compare their scores was to translate them into percentages. Once in percentile form, change scores are difficult to interpret. If a resident increased his or her social behavior from 5 to 10 percent, how does this compare to a resident who went from 20 to 25 percent? There is no answer to this question which does not involve potentially misleading assumptions.

Another problem developed around the fairly random assignment of residents to buildings at BSS. Because of the seemingly chaotic assignment of residents to buildings it was impossible to observe the same sample of residents in each succeeding observation period. Only

a small number of residents were observed in all of the ELEMR Project observation periods, and many were observed in only pre or only post-renovated settings. This situation tends to obscure the interpretation of the data.

B. Areas of Interpretation for the ELEMR Project

Regardless of the difficulties in interpretation, several ways were discovered to make use of the resident characteristic data: 1) The summary of resident characteristics by building provided invaluable information for the ELEMR Project analyses and comparisons. 2) The interpretation of the multiple regression analyses offered input into the conclusions of the project. 3) And finally, although not statistically testable, an examination within buildings provided insight into the nature of the changes that occured as a result of the renovations.

Summary characteristics by building.

A summary of the resident characteristic data by building provided valuable data for the ELEMR Project. Most of the data analyses conducted by the project were based on repeated observations of two groups of residents. One group was observed in the open ward, pre-renovation design for three observation periods, and in a "modular" style building for two more observation periods. Another group was observed in an open ward, then the "dormitory" design, and finally in the "suite" style renovation.

Due to the transfer of residents around the grounds, those residents observed in each succeeding setting were not the exact same group as those observed before. Yet it was important to the ELEMR analyses that these groups be considered representatively equal. A statistical test was devised for comparing those residents in the group who were continually observed ("repeaters") with those who were in the larger group but not observed previously. This test examined the strength of each observed trend by comparing the pattern of behavior of the "repeaters" with the patterns exhibited by the entire group.

A second means for testing the comparability of the populations was through the use of the resident characteristic data. Using IQ, age, age at admission, and sex, the characteristics of the populations were compared. Table 13 illustrates this procedure for the group observed in the open ward then in the "modular" design. The table (p. 44) indicates a similar trend of resident characteristics across the settings for these variables.

The same type of analysis is shown in Table 14 for the population moving from the open ward to the "dormitory" to the "suite" style design. This table (p. 45) demonstrates how the addition of new individuals caused a rise in the mean IQ's for the groups observed in the "dormitory" and in the "suite" designs in comparison to the open ward, pre-renovation group. These results provided greater assurance that the populations in the "dormitory" and "suite" styles were comparable, but also indicated that conclusions drawn from the open ward,

TABLE 13

POPULATION COMPARISONS--OPEN WARD TO "MODULAR" DESIGN

	Mean	Standard Deviation	Range	N	Male/Female
Observation 2 Open Ward:					
Age	47.63	8.22	37 - 62	16	5/11
Age at Admission	13.31	9.76	6 - 44		
IQ	24.69	10.60	10 - 47		
Observation 3 Open Ward:					
Age	47.06	8.71	36 - 66	16	5/11
Age at Admission	12.87	9.76	6 - 44		
IQ	22.94	8.84	10 - 44		
Observation 4 Open Ward:					
Age	47.73	10.92	31 - 68	22	8/14
Age at Admission	13.95	9.77	5 - 44		
IQ	21.91	10.30	10 - 47		
Observation 5A/5B Modular Design:					
Age	48.17	10.99	27 - 68	23	9/14
Age at Admission	14.00	9.50	6 - 44		
IQ	23.13	9.42	10 - 47		
Observation 6 Modular Design:					
Age	49.06	10.23	34 - 68	16	4/12
Age at Admission	13.44	9.85	6 - 44		
IQ	21.31	7.05	10 - 35		

TABLE 14

POPULATION COMPARISONS--OPEN WARD
TO "DORMITORY" TO "SUITE" DESIGN

	Mean	Standard Deviation	Range	N	Male/Female
Observation 3 Open Ward:					
Age	41.25	7.64	31 - 53	16	0/16
Age at Admission	11.19	6.61	4 - 26		
IQ	17.06	8.85	10 - 35		
Observation 5A/5B Dormitory Design:					
Age	43.06	12.42	20 - 64	18	6/12
Age at Admission	14.17	10.92	3 - 40		
IQ	28.18	11.87	10 - 47		
Observation 6 Suite Design:					
Age	45.37	8.40	28 - 62	19	7/12
Age at Admission	13.79	9.45	4 - 34		
IQ	26.47	11.35	10 - 42		

pre-renovation condition must be examined carefully due to the differences in population characteristics.

Summary data by building was also useful when comparing two independent populations. In observation period 5, two identical settings were observed where the "modular" design was employed. The data analyses indicated different levels of social and spatial behavior in the two buildings. In searching for a reason for this discrepancy, an examination of the resident characteristics provided

TABLE 15

POPULATION COMPARISONS--INDEPENDENT GROUPS
USING THE "MODULAR" DESIGN

	Mean	Standard Deviation	Range	N	Male/Female
Observation 5A/5B Modular Design:					
Age	33.79	8.62	26 - 54	14	8/6
Age at Admission	7.21	3.89	2 - 14		
IQ	13.43	6.33	10 - 27		
Observation 5A/5B Modular Design:					
Age	48.17	10.99	27 - 68	23	9/14
Age at Admission	14.00	9.50	6 - 44		
IQ	23.13	9.42	10 - 27		

useful information. As Table 15 indicates, the population in one of the buildings was on the average younger, was admitted at an earlier age to the institution, and had a mean IQ ten points lower than the population in the other building. Earlier analyses indicated that higher functionning populations were more likely to exhibit more social behavior. Thus, the differing amounts of social behavior observed in these two "physically" identical settings can be explained, in part, by the higher functional level evident in one of the settings.

Two other distinct populations used identical settings, this time in the "dormitory" design. The data in Table 16 indicate contrasting IQ levels and ages at admission for the two groups. These figures would suggest a greater amount of social behavior would be found when the higher functionning group occupied the "dormitory" style design.

TABLE 16

POPULATION COMPARISONS--INDEPENDENT GROUPS
USING THE "DORMITORY" DESIGN

	Mean	Standard Deviation	Range	N	Male/Female
Observation 5A/5B Dormitory Design:					
Age	43.06	12.42	20 - 64	18	6/12
Age at Admission	14.17	10.92	3 - 40		
IQ	28.18	11.87	10 - 47		
Observation 6 Dormitory Design:					
Age	43.29	9.80	31 - 61	21	11/10
Age at Admission	9.95	6.77	5 - 35		
IQ	15.10	6.51	10 - 27		

However, the analyses indicated high levels of social behavior for both the lower functionning group and the higher functionning group of residents. This style renovation also increased the use of private spaces for both groups. This analysis makes it clear that the difference between populations was less influential than the style of the renovation.

Multiple regression analyses.

The multiple regression analyses reported in the previous section offer some relevant information for the ELEMR Project. The relation of functional level to social behavior was demonstrated using either IQ or clusters of the Title XIX measures. Therefore, during the analyses of the ELEMR data, the functional level of each group was

taken into account when trying to determine whether the behavior of that group was affected by the renovations.

The multiple regression analyses with the spatial measures indicated that the style of the renovation was a prime influence on the spatial behavior of the residents. There was a mild relationship between spatial behavior and functional level as significant variance was accounted for most often by one particular cluster (Cluster 3 - Training). This finding supported the ELEMR Project's conclusions that the environment plays an important role in mediating the amount of behavior that takes place in private spaces, regardless of the functional level of the resident.

Why is it that the renovation style has more of a relation to spatial behavior and that functional level has a relation to social behavior? These results would be expected when considering how the renovated environments might affect behavior. It should be noted that the measures of spatial behavior are more general categories than the measures of social behavior. The initial effects of an environmental change would have to be demonstrated by the residents actual use of the environments. The general measures of spatial behavior would provide evidence of the use of the renovated environments. If the residents made use of the renovated environments, then a secondary effect might be a change in social behavior. But social behavior must be viewed as a secondary effect which might also be influenced by other factors, and in this case was influenced by functional level.

The bivariate and multivariate correlations fluctuated from the pre-renovation to the post-renovation observations. The general direction was that the correlations decreased in the renovated environments. In order for this to occur the renovations would have affected various functional levels differently. If all functional levels had been similarly affected, the correlations would not have changed.

The exact nature of the differential effects that would result in decreasing correlations is unclear. It was reported that it was impossible to use the same group of residents in calculating the correlations. Since the populations were not identical for the pre-renovation, post-renovation, and total correlations, differences in the distribution of the scores could have affected these scores. Higher correlations can result from larger sample sizes, increased variability, and greater normality of the distribution.

Beyond the statistical considerations, if the differences are to be considered valid, it can be speculated that the renovations had differential effects on the population of residents. Perhaps (as will be discussed briefly in the next section) the higher functionning residents were capable of responding to the renovations, while the lower functionning residents maintained the low level of social behavior evident before the renovations.

Within building analyses.

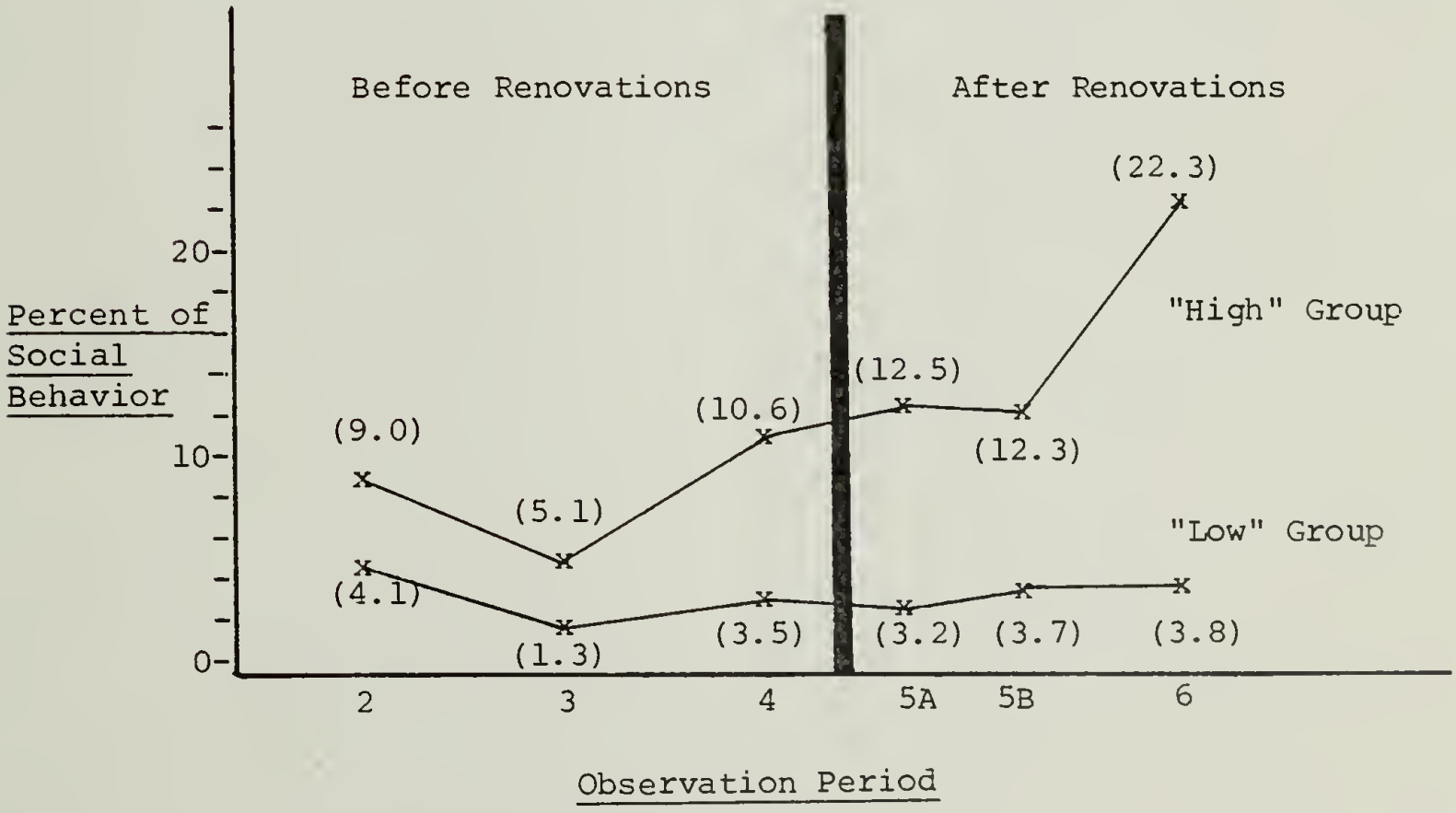
The final area of interpretation for the ELEMR Project investigates the nature of the decreasing correlations from the pre-renovation to the

post-renovation observations. This can be accomplished by examining the scores for those residents who were observed repeatedly throughout the project. However, as was pointed out earlier, the ELEMR Project was only able to observe small groups of "repeaters".

An example of this procedure is provided in Figure 2 which illustrates the proportion of all social behavior for the eight individuals who "repeated" in the analysis moving from the open ward to the "modular" style design. Four residents in this group had "high" IQ scores (over 20, mean 30.0), and the other four had "low" IQ scores (20 and under, mean 16.8). The figure reports the mean percentages separately for the "high" and the "low" IQ group.

FIGURE 2

COMPARISON OF "HIGH" AND "LOW" IQ
RESIDENTS IN REPEATED OBSERVATIONS



The figure shows an initial difference between the two groups in observation periods 2, 3,and 4. After the renovations, particularly in observation period 6, the "low" IQ group remained at the same level of social behavior while the "high" IQ group increased their level of social behavior. This example serves to demonstrate how it was possible that the post-renovation correlations were lower than the pre-renovation correlations. A differential change such as the one illustrated in Figure 2 could account for the corresponding change in the correlations between IQ and social behavior. However, with so small a number of subjects, it is difficult to draw conclusions.

C. Conclusions

Characteristics of the research design made it difficult to more fully utilize the resident characteristic data. Despite these difficulties, the data were useful in providing the ELEMR Project analyses with an understanding of how functional level might interact with the renovations. The resident characteristic data were shown to have a significant relation to the social variables from the ELEMR Project. Averages of ratings of functional level and IQ were predictive of the amount of social behavior exhibited by the residents to a moderate degree. However, there was much less of a relation between the spatial behavior of the residents and their individual characteristics. The relation of spatial behavior to the design style of the renovation supports the conclusions of the ELEMR Project that the renovation of the environments at BSS do have observable effects on the residents.

This study suggests general conclusions for research of this kind. In environment and behavior research, the individual differences among subjects are important mediating factors in the subjects' interactions with the environment. Using personality measures and individual histories is of value, but does present many problems. Solutions to these problems are critical to the success of the research.

The first critical problem concerns the choice of individual difference measures. As was discussed earlier, there is a broad range of measures available for use in this type of research. Should existing measures be used, new ones created, or are there existing records which could be utilized without administering additional tests? These and other questions must be addressed early in the research, often before it is possible to speculate which measures will be of value. In this study, as if often the case in applied research, all existing measures which were potentially useful were collected in the hope that some of them would successfully fulfill the goals of the research.

Whether one uses established measures of personality, newly created instruments, or existing records, there is no assurance of the reliability and meaning of the measures chosen. In this study, there was a concern for the accuracy and consistency of the professional evaluations of individual skills and habits. Only through a thorough investigation of the measures can their reliability and meaningfulness be established. Criteria, such as those outlined in this study, need to be established to judge whether a measure is sufficiently reliable and meaningful.

Another problem involves the design of the experiment. Beyond the considerations of random assignment and control groups, the size of the sample is especially relevant. A researcher might designate an appropriate sample size which would detect differences of a certain magnitude between groups. But often the researcher will want to disect the sample in order to determine the effectswithinindividual difference categories and sub-categories. Individual difference research requires a well-designed experiment with a sample size sufficient for these kinds of sub-sample analyses.

The manipulation of individual difference data is a final area of difficulty. When, as was the case in this research, measures are recorded from existing tests, there is no control over the form which the data takes. Problems arise in the interpretation of the ordinal scales, percentile scores, change scores, and so on. While no handy solutions are available, each decision has to be carefully weighed for advantages and disadvantages. When a course of action is chosen, more than one solution might be temporarily pursued to insure that an appropriate decision was made.

The importance of individual differences in providing a perspective for environment and behavior research was demonstrated by this study. In addition, the difficulties which one will encounter in research of this type were made evident. The choice of instruments, the reliability and meaning of the measures, the

design of the experiment (choice of sample size), and the manipulation of the data are all problems which must be dealt with. If handled carefully, the result will be useful research in environment and behavior which takes individual difference data into account.

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A P P E N D I X A

SOURCES OF DATA

ELEMR Observation Categories.....p. 58

"Summary Sheet" from "Medical Records".....p. 60

Title XIX Summary Sheet.....p. 61

ELEMR OBSERVATION CATEGORIES

Individual Actions

A. Self-Directed

21 neutral stereotype

22 self care

23 aggression - self

24 sleeping

B. Solitary

31 stationary intent

32 purposeful movement (walking, locomotion)

33 undirected movement

C. Solitary with Object

41 appropriate use of object

42 inappropriate use of object

43 destructive use of object

44 ward care

45 own space care

Interactions*

A. Resident-Resident Interactions

51 cooperative use of object

52 other use of object

53 interaction without object - verbal

*Interactions require two persons, for example, a communication must be delivered and then received by another.

54 interaction without object - physical

55 interaction without object - physical/verbal

61 directed aggression with/over object - verbal

62 directed aggression with/over object - physical

63 directed aggression with/over object - physical/verbal

64 directed aggression without object - verbal

65 directed aggression without object - physical

66 directed aggression without object - physical/verbal

67 undirected aggression

B. Resident-Attendant Interactions

71 cooperative use of object

72 other use of object

73 interaction without object - verbal

74 interaction without object - physical

75 interaction without object - physical/verbal

81 directed aggression with/over object - verbal

82 directed aggression with/over object - physical

83 directed aggression with/over object - physical/verbal

84 directed aggression without object - verbal

85 directed aggression without object - physical

86 directed aggression without object - physical/verbal

C. Resident-Other Interactions

91 interactions with other

92 interactions with observer

"SUMMARY SHEET" FROM "MEDICAL RECORDS"

CASE ABSTRACT | BELCHERTOWN STATE SCHOOL | DATE | 1. PATIENT'S NUMBER 1a.SOCIAL SECURITY #

2. BIRTHDATE | 3. BIRTHPLACE | 4. SEX | 5. ORIGIN White___ Black___ Asiatic___ Mixed___ Other___

6. HOME ADDRESS | 7. RELIGION Prot.___ R.Catholic___ Jewish___ Other___

7a. LEGAL CUSTODY | 8. TYPE OF COMMITMENT

9. PREVIOUS MENTAL HOSPITAL OR INSTITUTIONAL PLACEMENT Yes___ No___

10. ADMISSION DATE | 11. FIRST ADM.___ NO. OF OTHER ADM.___ | 12. MARITAL HISTORY Single___ Married once or more___ Unknown___

13. NUMBER OF CHILDREN BORN TO INDIVIDUAL OR SPOUSE Unknown___ Total Number___ Retarded___ Normal___ | 14. MARITAL STATUS OF PARENTS Parents living together___ Parents separated or divorced___ Parent(s) deceased___ Other___

15. EDUCATION OF FATHER AND AGE AT TIME OF PATIENT'S BIRTH Age___ Education___ | 17. NUMBER OF Brothers___ Total___ Sisters___

16. EDUCATION OF MOTHER AND AGE AT TIME OF PATIENT'S BIRTH Age___ Education___ | 18. OTHER MEMBERS OF FAMILY RESIDENTS OF B.S.S.

19. NUMBER OF RETARDED (living or dead) Brothers___ Sisters___ | 20. RELATIONSHIP OF NATURAL PARENTS Cousins___ Not Related___ Other___

21. IF MULTIPLE BIRTH is twin retarded___ deceased___ | 22. OBSTETRICAL HISTORY Length of gestation___mos. Complications___Prenatal___Delivery Method of delivery Birthweight Apgar Score Childhood Conv.(up to 2 yrs.)___

23. INTELLIGENCE SCORES First I.Q. Date Latest I.Q. Date | 24. PLACEMENT RECORD Family Care___ Home or Foster Home___ Halfway or BoardingHouse___ Nursing or Rest Home___

25. PHYSICAL CHARACTERISTICS Impairment of Vision___ Speech___ Hearing___ Motor Dysfunction___ Convulsions___ Spasticity___ | 26. DISCHARGE INFORMATION Date DISPOSITION Home or Foster Home___ Halfway or Boarding House___ Nursing or Rest Home___ Other___ CAUSE OF DEATH (from Death Certificate)

MEDICAL DATA using A.P.A. (DSM II) and ICDA, Eighth Revision

27. DATE	28. DISEASE OR OPERATION	29.Class.No.	30.OutsideFac.

TITLE XIX SUMMARY SHEET

1 NAME	2 IDENTIFICATION CODE	3 DATE OF BIRTH	4 DATE PREPARED

5 IQ	TEST	DATE	CHARACTERIZATION	PROB	6 IQ	TEST	DATE	7 IQ	TEST	DATE

MENTAL/EMOTIONAL DISABILITY PROFILE

8 DIAGNOSIS	PROG	S.S.I.	12 MOS	TREAT	MED	CONS
9						
10						

11 SIGNATURE

12 INTERVIEW ENTRY

CAPABILITIES

13 FEED	PROG	CAUSE
14 DRESS		
15 BATH		
16 ORAL		
17 TOIL		
18 MOBIL		
19 DIR		

BEHAVIOR

20 O. SELF	MED	TREAT	CONS
21 O. OTH.			
22 O. PROP			
23 DENUD			
24 HYPER			
25 COOP			

BEHAVIOR (cont.)

26 PERS	MED	TREAT	CONS
27 MOTIV			
28 TRAIN			
29 ATTEN			

35 BEHAVIOR INCIDENTS

FREQ PROB

36

FREQ PROB

30 NAME - SOURCE

33 NAME - REVIEWER

31 TITLE

32 DATE

34 DATE

EDUCATIONAL

1 C. EX.	PROG	CAUSE
2 C. REC		
3 WRIT		
4 READ		
5 MATH		

6 SIGNATURE

7 TITLE

8 DATE

A P P E N D I X B

TITLE XIX RATING INSTRUCTIONS

Feeding Skills

This question refers to the client's usual method of feeding himself.

01 no difficulties feeding self
02 feeds self properly but physically unable to eat solids
03 usually feeds self with correct utensils but with some difficulty (i.e., spills, or makes mess)
04 usually feeds self with spoon and fork without difficulty
05 usually feeds self with spoon and fork but with difficulty
06 usually feeds self with spoon without difficulty
07 usually feeds self with spoon but with difficulty
08 usually feeds self with fingers
09 cannot feed self and requires unskilled aid (i.e., other residents or untrained persons)
10 unable to eat solids and requires assistance
11 cannot feed self and requires skilled aid (i.e., a person trained in special techniques for feeding clients with eating problems)
99 unknown

Dressing Skills

This question refers to the resident's usual ability to dress or undress himself in appropriate clothing.

01 dresses and undresses self with no assistance or supervision
02 dresses and undresses self but requires some supervision
03 dresses and undresses self but requires a little assistance
04 dresses and undresses self but requires a great deal of help
05 completely unable to dress or undress self and requires someone else to dress client
99 unknown

Bathing Skills

This question refers to the client's usual ability to bathe himself and includes baths or showers.

01 able to bathe self properly with no problem
02 able to bathe self but requires being told to do so
03 able to bathe self but requires supervision and close attention
04 able to bathe self but requires some help
05 completely unable to bathe self
99 unknown

Oral Hygiene

This question refers to the individual's ability to properly care for his teeth or dentures.

00 not applicable, client has neither dentures nor teeth
01 able to care for teeth or dentures properly
02 able to care for teeth or dentures but must be prompted to do so
03 able to care for teeth or dentures but requires supervision and/or some assistance
04 unable to care for teeth or dentures and requires someone else to do so
99 unknown

Toilet Training

This question refers to the client's ability to control his bodily functions and avoid incidents of inappropriate urinating or defecating as well as the client's ability to care for himself at toilet.

01 rarely has incidents and cares for self
02 rarely has incidents but requires assistance
03 has occasional incidents at night only and usually cares for self otherwise
04 has occasional incidents at night only and usually requires assistance
05 has occasional incidents and usually cares for self otherwise
06 has occasional incidents and usually requires assistance
07 has frequent incidents at night and usually cares for self otherwise
08 has frequent incidents at night only and usually requires assistance
10 completely incontinent

Mobility

This question refers to the client's ability to use the normal means of public transportation including a taxi, subway or bus but does not include long distance transportation such as trains or planes.

01 can travel independently by means of public transportation
02 can travel independently by means of public transportation but only on familiar routes
03 can travel by means of public transportation but with assistance (i.e., is met at proper destination or is helped by someone to pay fares to to get off at proper destination)
04 can travel by means of public transportation but only if accompanied by someone else

Mobility (continued)

05 cannot travel by means of public transportation even if accompanied by someone else
99 unknown

Sense of Direction

This question refers to the client's ability to walk around his environment without becoming lost and can be based on either the client's familiarity with his surroundings or his ability to retrace his movements.

00 client is non-ambulatory
01 able to walk several blocks (1/3 mile or more) from grounds or school/house without becoming lost
02 able to walk around the grounds of the school or a few blocks from home without becoming lost
03 able to walk to familiar places only (i.e., regularly used buildings) without becoming lost
04 able to walk around only immediate place of residence without becoming lost
05 becomes lost whenever he or she leaves the immediate living area
99 unknown

Reading Skills

This question refers to the ability of the client to read or otherwise comprehend graphically presented material.

01 no problem; the client is able to read and usually comprehend complex materials such as a newspaper or novel
02 some reading skills; the client is able to read very simple material such as grammar school texts
03 minimal reading skills; the client is able to read very simple material such as first or second grade primers
04 the client recognizes a few simple words or signs such as "stop", "go", or his name
05 the client has no reading ability at all
99 unknown

Writing Skills

This question refers to the ability of the client to express himself graphically.

01 no problem; the client is able to write complex sentences, with good grammar and spelling and an adequate vocabulary

Writing Skills (continued)

02 the client is usually able to write simple sentences without difficulty and is reasonably able to express himself
03 the client usually is able to write simple sentences but has a limited vocabulary and/or has considerable difficulty with grammar or spelling
04 the client is usually able to write only a few words or phrases
05 the client is unable to write, but is able to copy and recognize some words
06 the client has minimal ability to do any graphic expression
99 unknown

Math Skills

This question refers to the degree of the client's ability to perform mathematical functions and understand mathematical concepts.

01 no problems; the client is usually able to perform all of the basic mathematical functions
02 the client is able to perform addition and subtraction sufficiently well to handle his financial affairs
03 the client has some rudimentary math skills and understands values of coins and money, but could not handle his financial affairs completely independently
04 the client has extremely limited math skills, but does not understand money values
05 the client has no understanding of numbers of mathematics
99 unknown

Attention

This question refers to the client's degree of attention towards others or activities, as distinct from the issue of training.

00 not applicable
01 is attentive and/or responsive for more than 15 minutes
02 is attentive and/or responsive for up to 15 minutes
03 is attentive and/or responsive up to 5 minutes
04 is only occasionally attentive and/or responsive
05 is usually completely non-attentive and/or non-responsive
99 unknown

Communication Expression

This question refers to the degree of capability of the client to express himself orally, by gestures, or by signals.

01 no problem with communication; the client is usually able to articulate needs and ideas in complex, precise, and grammatically correct sentences
02 the client is usually able to express ideas in simple sentences, occasional errors in grammar or has difficulty choosing the correct word or words
03 the client has difficulty expressing himself with even simple sentences, has a limited vocabulary and/or has considerable difficulty with grammar and syntax
04 the client has great difficulty expressing himself and has an extremely limited vocabulary
05 the client usually jabbers or makes mostly unintelligible sounds or gestures
06 the client makes little or no effort to communicate to others
99 unknown

Communication Reception

This question refers to the degree of capability of the client to receive and understand communication from others whether the communication is oral or by signals or gestures.

01 no problems; the client usually understands complex sentences and has a normal vocabulary
02 the client usually understands simple sentences and has a fair vocabulary though occasionally does not understand fairly common words or concepts
03 the client understands only the simplest sentences and has a limited vocabulary
04 the client understands only a few concepts and has a very limited vocabulary
05 the client appears to not understand communication
99 unknown

Destructive Towards Self

This question refers to the frequency and degree of violence by the client toward himself within the past year.

01 never
02 occasional minor incidents
03 frequent minor incidents
04 occasional incidents which pose serious danger to health
05 frequent incidents which pose serious danger to health

Destructive Toward Others

This question refers to the frequency and degree of violence by the client, toward others within the past year. A major incident refers to an incident which posed a serious danger to others.

01 never
02 occasional minor incidents, but only when provoked
03 occasional minor incidents, unprovoked
04 frequent minor incidents, but only when provoked
05 frequent minor incidents, unprovoked
06 occasional major incidents, but only when provoked
07 occasional major incidents, unprovoked
08 frequent major incidents, but only when provoked
09 frequent major incidents, unprovoked

Destructive Toward Property

This question refers to the frequency and degree of destruction of property by the client (excluding clothes) within the past year.

00 not applicable
01 never
02 occasional minor incidents
03 frequent minor incidents
04 occasional major incidents
05 frequent major incidents
99 unknown

Denudative

This question refers to the frequency (i.e., number of "incidents") with which the client undresses or exposes himself inappropriately.

00 not applicable
01 no incidents within past six months
02 occasional incidents, i.e., once or twice a month, but responds when told to dress or cease exposing self
03 occasional incidents, but does not respond when told to dress or cease exposing self
04 frequent incidents, i.e., weekly episodes, but responds when told to dress or cease exposing self
05 frequent incidents, but does not respond when told to dress or cease exposing self
99 unknown

Hyperactive

This question refers to whether the client is hyperactive without medication.

01 not hyperactive
02 somewhat hyperactive
03 extremely hyperactive
99 unknown

Cooperative

This question refers to the client's degree of cooperation with others.

00 not applicable
01 frequently assists and cooperates with others
02 frequently cooperates with others but only on mutually beneficial activities
03 will usually cooperate with others but somewhat reluctantly
04 rarely cooperates with others
05 anti-social
99 unknown

Perseverance

This question refers to the client's ability to perform a task to completion.

01 will perform a task which is monotonous for over an hour or will complete a task requiring over an hour for intangible or abstract reward, i.e., money
02 will perform a task which is monotonous for over an hour or will complete a task requiring over an hour but only for a very tangible reward, i.e., candy
03 will persevere at a task for periods less than an hour, regardless of the reward
04 will only infrequently persevere at a task for up to an hour, regardless of the reward
05 will persevere at a task for only 5 to 10 minutes
06 refuses any activity
99 unknown

Motivation

This question refers to degree to which the client can be motivated to perform a task.

00 not applicable
01 easily motivated or responds to abstract concepts, i.e.,money
02 easily motivated but only by tangible rewards, i.e., candy

Motivation (continued)

03 easily motivated but only for tasks which are inherently pleasurable
04 hard to motivate
99 unknown

Receptivity to Training

This question refers to the client's receptivity and inclination toward training.

01 very receptive to training
02 very receptive to training but only for short and simple lessons, i.e., easily acquired skills
03 occasionally rejects or is frustrated by short and simple training
04 frequently rejects or is frustrated by short and simple training
05 completely rejects effort to train
99 unknown

APPENDIX C

CORRELATION MATRIX OF TITLE XIX MEASURES

	Feeding	Dressing	Bathing	Oral Hygiene	Toilet	Mobility	Direction	Comm. Exp.	Comm. Rec.	Writing	Reading	Math
IQ	.4766	.4453	.4639	.4186	.2629	.0532	.5710	.6227	.5340	.5017	.4699	.4681
Feeding		.6907	.5812	.6084	.3010	.1159	.5108	.4253	.4549	.5345	.4254	.3665
Dressing			.6812	.6373	.5095	.1296	.5683	.3209	.3228	.4978	.3935	.4482
Bathing				.7420	.4678	.0865	.6098	.3958	.3268	.4671	.4724	.4264
Oral Hygiene					.3617	.0656	.4399	.3445	.3814	.4579	.4290	.4095
Toilet						-.1118	.2707	.2731	.2780	.2580	.1531	.1565
Mobility							.1488	.0159	-.0648	.1946	.1785	.2611
Direction								.5143	.4737	.6108	.5055	.5954
Comm. Exp.									.8264	.5089	.3857	.4045
Comm. Rec.										.5145	.4311	.3937
Writing											.6576	.6574
Reading												.7475
Math												
Dest. Self												
Dest. Other												
Dest. Prop.												
Denudative												
Hyperactive												
Cooperative												
Perseverance												
Motivation												
Training												

CORRELATION MATRIX (CONTINUED)

Dest. Self	Dest. Other	Dest. Prop.	Denudative	Hyperactive	Cooperative	Perseverance	Motivation	Training	Attention	
.2620	.1010	-.0709	.2200	.0873	.1071	.4540	.3247	.3499	.4098	IQ
.2208	.0449	-.0047	.2068	.0760	.1569	.4570	.2836	.3760	.4452	Feeding
.2410	.0814	.0378	.1879	.0310	.1425	.5241	.4101	.5322	.5062	Dressing
.2042	.1860	-.0161	.3123	.0036	.1798	.5920	.3836	.4671	.4951	Bathing
.3258	.2213	.0816	.2172	.1454	.2470	.5906	.3107	.5095	.4709	Oral Hygiene
.2055	.1344	.1601	.3219	-.0176	.2317	.4015	.2792	.3876	.4235	Toilet
.0590	.1000	.0019	.0714	.0013	.0965	.0361	.0956	.1207	.0463	Mobility
.3072	.0557	-.1446	.2742	.1064	.1191	.6225	.4541	.5255	.6066	Direction
.2293	-.0878	-.0696	.2277	.0896	.1733	.3809	.2046	.2741	.3725	Comm. Exp.
.2475	-.0723	-.1082	.2951	.0932	.2352	.3795	.1003	.2827	.3778	Comm. Rec.
.2728	.2105	.0278	.2618	.0757	.0625	.3772	.2382	.4455	.4478	Writing
.2571	.2387	-.1086	.1755	.0564	-.0404	.4210	.2113	.3388	.3929	Reading
.2493	.2280	.0280	.1707	.1074	-.0764	.3612	.1798	.3416	.3093	Math
	.3235	.0453	.2448	.3265	.1448	.2508	.1348	.2470	.2185	Dest. Self
		.2324	.2429	.0683	.2493	.1763	.1629	.2553	.1252	Dest. Other
			.2658	.0210	.0653	-.0405	-.0996	.0359	.0815	Dest. Prop.
				.0329	.2949	.3894	.2569	.2990	.3167	Denudative
					-.0540	.1455	.0806	.0971	.1198	Hyperactive
						.2950	.4279	.4899	.3518	Cooperative
							.4968	.7002	.7299	Perseverance
								.7041	.5809	Motivation
									.6935	Training