DOCUMENT RESUME

ED 097 789 88 EC 070 239

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TITLE Language Training for Trainable Mentally Retarded; Annual Project Report: Second Year; ESEA Title III.
INSTITUTION Montgomery County Intermediate Unit 23, Blue Bell, Pa.
SPONS AGENCY Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
PUB DATE Sep 74
NOTE 83p.; For related document, see ED 082 424

EDRS PRICE MF-$0.75 HC-$4.20 PLUS POSTAGE
DESCRIPTORS Childhood; *Exceptional Child Research; Intelligence Differences; *Language Instruction; *Language Programs; Mentally Handicapped; Program Effectiveness; *Program Evaluation; *Trainable Mentally Handicapped
IDENTIFIERS Distar Language I; Peabody Language Development Kit

ABSTRACT

During the 1973-74 school year, 230 trainable mentally retarded (TMR) children (ages 7 to 14 years) were exposed to one of two language training conditions: Distar or Peabody. A population of 116 continuees from the first year of the project and 174 new entries were assigned in as random a fashion as possible to either Distar or Peabody. Ss were divided into low IQ (21-43) and high IQ (44-53). Sex was built into the design, as was pretest-posttest and new entries versus continuees. Thus, a five-factor, 2 x 2 x 2 x 2 x 2 repeated-measures design was subjected to analysis of variance for each of three basic criteria: Peabody Picture Vocabulary Test, Illinois Test of Psycholinguistic Abilities, and Mecham Verbal Language Development Scale. Seven children were selected randomly from each of the 16 between-factor cells to yield a total of 112 children. Longitudinal analyses were also conducted on just the continuees with pre- and posttest data from the three basic measures from both years of the project to yield a treatments-by-IQ-by-Sex-by-Measures (2 x 2 x 2 x 4) design. While no significant differences emerged for the high-IQ children, the low-IQ children were aided more by Distar than by Peabody. In the 5-way designs, gain in the total sample was not marked. However, when one considers only the continuees (in the second set of analyses), significant gain in language functioning did occur. (DB)

LANGUAGE TRAINING FOR TRAINABLE MENTALLY RETARDED

ANNUAL PROJECT REPORT: SECOND YEAR

PROJECT NUMBER 72020H

TITLE III OF THE ELEMENTARY AND SECONDARY EDUCATION ACT OF 1965

JULY 1, 1973, TO JUNE 30, 1974 ($49,977.00)

COMPILED BY:

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SEPTEMBER, 1974

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Abstract

During the 1973-1974 school year, TMR children were exposed to one of two language training conditions: Distar or Peabody. A population of 116 continuees from the first year of the project (see Leiss and Proger, 1973; ERIC Ed-082-424) and 114 new entries were assigned in as random a fashion as possible to either Distar or Peabody. The entire sample was divided into low IQ (21-43) and high IQ (44-53). Sex was built into the design, as was pretest-posttest and new entries versus continuees. Thus, a five-factor, 2 x 2 x 2 x 2 x 2 repeated-measures design was subjected to analysis of variance for each of three basic criteria: Peabody Picture Vocabulary Test, Illinois Test of Psycholinguistic Abilities, and Mecham Verbal Language Development Scale. Seven children were selected randomly from each of the 16 between-factor cells to yield a total of 112 children. Longitudinal analyses were also conducted on just the continuees with pre- and posttest data from the three basic measures from both years of the project to yield a treatments-by-IQ-by-Sex-by-Measures (2 x 2 x 2 x 4) design. While no significant differences emerged for the high-IQ children, the low-IQ children were aided more by Distar than by Peabody. In the 5-way designs, gain in the total sample was not marked. However, when one considers only the continuees (in the second set of analyses), significant gain in language functioning did occur. Some results with the summer lag phenomenon are also discussed, as are some substudies on Myklebust's modified Picture Story Language Test.

Preface

The research project "Language Training for Trainable Mentally Retarded" has come quite some distance in yielding data on various ways in which to convey such training. In the first-year report (available from Educational Research Information Center, ERIC, as Document No. ED-082-424), the Project compared (a) groups which received no special language stimulation with (b) groups which received such stimulation four times a week and with (c) groups which received such stimulation eight times a week. The bulk of stimulation activities were patterned arount the types of activities sampled by the Illinois Test of Psycholinguistic Abilities (ITPA).

The present study (second year) discarded the ITPA exercises and turned to a different programing comparison. Specifically, two different language training programs (Distar Language 1 versus Peabody Language Development Kit, Levels P and 1) were used. Data from several sources were gathered: Peabody Picture Vocabulary Test raw score, Illinois Test of Psycholinguistic Abilities total raw score, and Mecham Verbal Language Development Scale raw score. These three criteria formed the main basis of comparisons for the 1973-1974 year of the Language Training Project. Further, longitudinal comparisons were run involving both 1972-1973 data and 1973-1974 data for only those children who were in both years of the project. These longitudinal comparisons over large blocks of time were completed not only for the three criteria mentioned just above but also for the combined scores (across three pictures) from the Myklebust Language Sample assessment technique. A total of 18 separate analyses were run on the data to shed light on the effectiveness of the programing techniques.

The Montgomery County Intermediate Unit is deeply indebted to many people and organizations who cooperated to make this program possible during its second year. Directly involved in the day-to-day activities were four speech clinicians from last year's project (John Busedu, Diane Maurer, Ralph Sholly, and Marilyn Stanford), as well as a staff member new for the second year (Debra Heisel). Two other Intermediate Unit clinicians aided greatly in project activities: Linda Bekemeier and Jean Kern. The Intermediate Unit was indeed fortunate in having the services of these people available for the first two years of this three-year project. With the exception of four of the original 21 districts whose children were involved in the first project year, the same districts continued to participate during the second year: Colonial, Hatboro-Horsham, Lower Merion, Lower Moreland, Methacton, Norristown Area, North Penn, Perkiomen Valley, Pottsgrove, Pottstown, Souderton Area, Spring-Ford Area, Upper Dublin Township, Upper Merion Area, Upper Moreland Township, Upper Perkiomen, and Wissahickon. Also, as in the first year, the Western Montgomery County Special Education Center, the Ken-Crest Center for Exceptional Persons, and St. Katherine's Day School in Overbrook participated. The continuing support of the Archdiocese of Philadelphia (Father John Neill, Assistant Superintendent of Schools) is greatly appreciated. Finally, several central office Intermediate Unit staff aided in the conduct of this project: Mrs. Martha Marcho, Secretary; and Mrs. Denise Bernardini, Secretary.

Section 1

Project Purpose and Importance

This second year of the Language Training Project for the Trainable Mentally Retarded is part of a sequential set of three investigations. The first year compared three intensities of language training based upon the widely used Illinois Test of Psycholinguistic Abilities. The topic of the first year was important because there is a frequently reported and often observable deficiency in the language skills of trainable retarded children. Thus, results of structured comparisons among different language training techniques would appear to have a direct bearing upon the caseload composition of speech and language clinicians in the public schools, have implications for the types of testing and assessment procedures used with TMR children, and may definitely influence the degree and manner in which language services are provided to these children. In this sense, the rationale for carrying out the second year's activities remains the same.

The justification for switching from the ITPA-based training of the first year to totally different programs is as follows. The first year's research report (Leiss & Proger, 1973) showed that the ITPA language training was of very minimal value to TMR children. Accordingly, it would make little sense to attempt to modify the ITPA exercises any further; instead, the second year of the project was reoriented so as to yield new and valuable feedback on the comparative effectiveness of two totally different language training techniques. After considering several language training options, it was considered important to gain feedback on the Distar Language Program (Level 1) and the Peabody Language Development Kit (Levels P and 1). Thus, the second year of the project would yield totally

new information to complement the first-year feedback.

Section 2

Identified Needs

1. The large percentage of the trainable mentally retarded children enrolled in special classes within the public schools.
2. The existence of 116 TMR children continuees from the first year into the second year, as well as 114 TMR children who are new entries for the second year of the project (chronological age range of 7 to 14 and IQ range of 21 to 53).
3. The paucity of important research with respect to the efficacy of speech and language programs with the trainable mentally retarded.
4. The estimates of the incidence of speech and language problems for the mentally retarded of ten to eighty percent.
5. The estimates of the incidence of speech and language problems among the trainable mentally retarded of about 57 percent.
6. The persistent urging by parents, educators, administrators, and others to provide speech and language services to the trainable mentally retarded.
7. The observable speech and language deficiencies of the trainable mentally retarded children.
8. The necessity for having research available to substantiate the methods utilized for the selection of the trainable mentally retarded children for therapy.

Section 3

Review of Literature

Despite the fact that a large percentage of the trainable mentally retarded children are enrolled in special classes in the schools and in spite of the research evidence which has consistently reported such children to have speech and language problems (Bangs, 1961; Brandfon, 1951; Daum, 1953; Donovan, 1957; Everhart, 1953; Gens, 1950, 1951; Goodwin, 1955; Gottsleben, 1955; Harrison, 1958; Irvin, 1942; Karlin and Kennedy, 1936; Karlin and Strazzula, 1952; Kennedy, 1930; Kolstoe, 1958; Lewald, 1932; Lubman, 1955; Lyle, 1960; Masket, 1958; Matthews, 1957; Meader, 1940; Sachs, 1955; Schiefelbusch, 1963; Schlanger, 1953b, 1953c; Schlanger and Gottsleben, 1957; Schneider and Vallon, 1954; Sheridan, 1948; Sirkin and Lyons, 1941; Tarjan, et. al., 1961; Town, 1913; Wood, 1957; Wolfensberger, et. al., 1963) there exists a paucity of important research with regards to the efficacy of speech and language programs with the trainable mentally retarded.

Among children in special classes, Matthews (1957) estimated an incidence of speech problems of 79 percent. Lubman (1955) studied subjects with IQs below 50 and noted that 95 percent had speech defects. Johnson et. al., (1960) reported an incidence of about 57 percent in a study of trainable mentally retarded children. Wood (1957) noted about 21 percent of a sample studied at a speech and hearing center to have language deficiencies associated with mental retardation. This does not, however, indicate any estimate of the number of mentally retarded who have language problems.

The estimates of the incidence of language deficiencies among the mentally retarded varies from less than 10 percent to almost 80 percent. This variance

is primarily due to the differences in the groups studied and the definitions of what constitutes a language problem.

One of the major theoretical questions is whether lack of language development among mentally retarded children is an inevitable consequence of mental retardation or whether intensive training can improve the rate of language development. The studies of language training programs for the retarded are few. Since 1955 therapy with the mentally retarded has emphasized more than articulatory proficiency; it has demonstrated the necessity for providing appropriate language development programs.

Schneider and Vallon (1954) emphasize the necessity for therapy with the severely retarded and challenge the view of West, Kennedy, and Carr (1947), who thought that therapy with the severely retarded was useless, as being too pessimistic. They state that the simple ability to express the wants or needs of oneself in a socially approved manner, along with the ability to merely express one's wants or needs, is an undeniable asset to the child intellectually, emotionally, and socially.

In 1955, Schneider and Vallon reported on a therapy program for trainable retarded children in a day school class. The children were categorized into three groups: (1) Delayed language development, (2) Insufficient language development, and (3) Disturbances of articulation. Appropriate therapy activities were presented to each group for one year. The resultant data revealed gains for all groups. These judgments were, however, subjective, and no control group had been used.

Johnson and Capobianco (1957) studied a group of severely retarded children following a year of language training; they reported no significant improvement. This study was noteworthy as one of the first experimental assessments of a

language program for the retarded in which the results were contradictory to preceding reports.

Kilstoe (1958) observed the effect of a language training program with a small group of mongoloid children. On five subtests of the Illinois Language Scale, the experimental group gained significantly over the controls during a five and one-half month's period. Rittmanic (1958) set up a pilot program in group oral language with institutionalized retardates. Despite the lack of statistical evidence, he claimed that the program was successful.

Smith (1962) conducted a language program for sixteen educable retarded children; he assessed the progress by using the ITPA. The experimental group showed a 6.75 month gain in Language Age during a three-month's period; the controls declined .4 months in Language Age. Smith did not attempt to remediate any specific disabilities. Improvement was, however, noted on all the language abilities as measured by the ITPA. Blue (1963) supervised a language program for trainable retardates similar to the previously described program by Smith. The program was conducted for an eleven-week period and utilized the ITPA for pre- and post- measurement. The experimental group showed a Language Age gain of 5.67 months as compared to the control group's 3.67 months. The difference was not statistically significant. This is considered one of the more prominent studies on the efficacy of language therapy for trainable retardates.

Blessing (1964) reported on an experimental program which was designed to improve the vocal encoding of mentally retarded children. After a period of three-month's training the ITPA was used to note progress. The results revealed only a tendency toward improvement by the experimental group.

Harvey, Yep, and Sellin (1966) reported on a two-year program for trainable mentally retarded children. Their program emphasized the areas of: (1) self-

concept development, (2) Social competence, (3) Motor coordination, and (4) Language development. Their results indicated highly significant improvements in the four areas. All scores, with the exception of social competence, declined over the summer of the first year. This was interpreted to mean: (1) that there are differences between home and school environments, and (2) it is essential to maintain minimal programs during the summer for these children. The second year revealed significant increases in all areas. They concluded that evaluation of programs should be allowed to occur over longer periods of time, particularly with individuals with low IQs.

Richardson (1967) describes a language training program for retarded children at the University of Oklahoma Child Study Center. It indicates that early sensory-motor training, beginning at the pre-verbal experience level is of utmost importance to the language development of these children. Methods used in the program are related to research evidence on the development of language and thinking which indicates that: (1) Early exposure to a variety of looking and listening experiences is important in language development, (2) Primary learning requires perceptual and pre-verbal experiences, (3) There is a close relationship between motor movements and perceptual development, (4) Language development requires the development of both motor and perceptual patterns, (5) The major source of internal mediators is the orienting response, (6) Linguistic labels serve to mediate learning processes, and (7) Language development is both a part of and a result of primary learning.

Jordan (1967) reports that speech therapy outcome studies with the mentally retarded reveal that special psycholinguistic instruction can significantly increase psycholinguistic attainment. He suggests that programmed learning and operant conditioning be utilized to teach language to the mentally retarded.

Potter and Mattson (1968) also indicate that the educable mentally retarded are capable of manifesting and sustaining improvement in speech and language performance after therapy. Ensminger and Smith (1965) state, "knowing that specific language skills can be improved and that retardates display a rather distinctive profile of their own, group language programs should be developed with this pattern of abilities and disabilities as the focal point." (p. 104).

Early attempts at therapy for language disabilities were reported with optimism, but were not objectively evaluated. Encouraging progress has been reported with the educable retarded; the trainable child, however, presents some difficulty. Since many of the children involved in these studies were institutionalized and since the size of the group was limited, it becomes difficult to generalize from these findings to the population of trainable mentally retarded children who are enrolled in special classes in the public schools.

A factor of possible significance which may serve to influence the results of research concerning the effectiveness of language stimulation for trainable mentally retarded children may be the amount of treatment which is provided. There is a lack of research information indicating, for example, how many periods of language training are necessary during the period of a year in order for such children to achieve significant improvements in language.

Section 4

Objectives of the Program

1. To determine the efficacy of providing language stimulation programs for trainable mentally retarded children who exhibit a chronological age of about 7 to 14 and an IQ between 21 and 53.
2. To determine what differences exist between the Peabody Language Development Kit program (Levels P and 1) and the Distar Language Program (Level 1).
3. To determine what differences in language performance there are between high (44 to 53) and low (21 to 43) IQ children.
4. To determine what differences in language performance there are between boys and girls.
5. To determine what differences in language performance there are between children who are continuees from the first project year and those who are new entries.
6. To determine the nature of the gains (or losses) in language performance among the various treatment groups in the study.
7. To determine the nature of longitudinal change data of continuees during pretest and posttest from both first and second project years.
8. To determine the sensitivity of selected measuring devices in assessing language functioning in TMR children: Peabody Picture Vocabulary Test (Form B), Illinois Test of Psycholinguistic Abilities (1968 edition), the Mecham Verbal Language Development Scale, and the modified Myklebust Picture Story Language Test.

Section 5

Activities of the Program

Each child received language training stimulation 4 times a week. A total of 96 different lessons were available for either the Distar Language Program (Level 1) or the Peabody Language Development Kit (Levels P and 1). A day's session in either program lasted 25 minutes. Both language training programs lasted from the beginning of November to about the middle of May. Certificated speech clinicians carried out the program.

Section 6

Involvement of Public and Nonpublic Agencies

During the first year of the project, all 21 public school districts within Montgomery County Intermediate Unit participated, as well as the Western Montgomery County Special Education Center, the Ken-Crest Center for Exceptional Persons, and St. Katherine's Day School in Overbrook. The total enrollment from these public and nonpublic sources was 24 intact classes with 157 children.

As listed in the Preface, all but 4 of the 21 public school districts participated in the second project year. From St. Katherine's Day School (Archdiocese of Philadelphia), two intact classes with a total of 26 students were involved. Because of the size of the two classes from St. Katherine's, they were broken into three smaller classes. Despite the fact that four public districts were not involved in the second year's study, the total number of public and nonpublic classes remained the same: 24 intact classes. This total represents 116 student continuees from the first year and 114 new student entries, or a grand total of 230 students, a substantial increase in the number of children being served over and above the first year's target population.

Section 7

In-Service Activities and Consultation

Dr. Harold A. Delp of the Department of Special Education, Temple University, met monthly with the Project Director to render consultation. Further, Dr. Delp held three meetings with the project speech clinicians.

Five monthly parent training sessions were held from November, 1973, through March, 1974. A psychologist spoke at one session, a neurologist at another, and Dr. Delp at a third. The other two sessions were run by clinicians from the project.

Two major in-service sessions were held for all district personnel involved in the project. Directors of pupil personnel services and their TMR teachers were invited. The first such meeting was on October 17, 1973, with about 29 in attendance, while the second meeting on March 28, 1974, had about 25 present. Finally, three small in-service sessions were held just for Norristown Area School District teachers.

Further, all project staff attended the annual Pennsylvania Speech and Hearing Association convention for training and exposure to new ideas. Two staff members of the project attended the national convention of the American Speech and Hearing Association.

Section 8

Evaluation Procedures and Design

Testing: The first year's operation of the Language Training Project yielded very limited treatment effects as gauged by the standardized tests used. The main findings involving the factor of treatments (frequency of ITPA training) showed positive effects only when qualified by IQ or by both IQ and sex; that is, the main effects of treatments across the different analyses was not statistically significant but the interactions involving treatments were. Several staff members felt that this poor showing was due, to some extent, to the fact that the tests in question (which are among the best recognized instruments currently available) do not adequately tap the language functioning of interest to the study. The specific low level of language functioning given by trainable retarded children may require instrumentation not currently available.

During the first year of project operation, one very involved form of testing was that of Myklebust's Picture Story Language Test, as modified for this study (see Leiss, 1974). Myklebust (1965) used an action-packed picture to elicit samples of a student's written language. In contrast, the present study used an adaptation to the extent that a student's language was elicited in oral rather than written form; these oral language samples were tape recorded to preserve them exactly for later scoring. The first year of the project, three pictures were used. Each picture was measured for "Productivity" by means of three criteria: total words, total sentences, and words per sentence. Further, each of the three pictures was evaluated for "Meaning/Content" by means of Myklebust's "Abstract-Concrete Scale".

Because of the meager testing results and because of the large amount of work involved in deriving the total of four different scores for each of the three pictures, the modified Myklebust Picture Story Language Test (dubbed "Language Sample" for this study) was largely omitted from the second project year design. One notable exception was to give the Language Sample to students who had continued from the first project year into the second project year. The main reason for this exception was to assess the longitudinal summer-lag forgetting phenomenon in trainable retarded children. To project staff knowledge, such data have never before been reported in the literature. Thus, no post-testing was given at the end of the 1973-1974 year in terms of the Myklebust Language Sample. It was felt the saving in time was more than justified.

With the above reduction in total individual test administration time required for each child, the second project year opted to maintain a minimal battery of pre- and posttesting. Three instruments would be given as the measurement core: Peabody Picture Vocabulary Test, Illinois Test of Psycholinguistic Ability, and the Mecham Verbal Language Development Scale.

Sample: The first year's sample consisted of 157 children located in 24 classes for the trainable mentally retarded. The children were between 7 and 14 years of age and possessed IQs between 25 and 50. From this population of 157 children, 120 were randomly selected. That is, 10 children were randomly selected from the 12 research design cell combinations formed by the factors of treatments (3 levels) by IQ (2 levels) by sex (2 levels).

The second year's population consisted of two groups: continuees (those who were in the first year of the study) and new entries (those who were brought into the study only during the second year of the project). In particular, there were 116 continuees (out of the original 157) and 114 new entries.

Design: The primary concern of this study was the treatment comparison between the Peabody program and the Distar program. Wherever administratively possible, the classes containing both continuees and new entries were randomly assigned evenly between the two treatment conditions. Because of the potency of the IQ factor as a control variable, the second factor included in the design was IQ. A median split was employed so that low IQ represented 21 to 43, while high IQ was 44 to 53. The third factor was sex (males versus females). The fourth factor was measures (pretest versus posttest). Thus, the basic design for several analyses was a four-factor, repeated-measures design. treatments by IQ by sex by measures.

Besides the four-factor design mentioned above, a fifth factor was embodied for certain analyses, namely, entry status. This factor had two levels: new entry versus continuee. Thus, the few analyses that included this fifth factor were of a five-facotr, repeated-measures design: treatments, IQ, sex, entry status, and measures.

Analyses: One series of analyses dealt with the three criteria of the PPVT, ITPA, and VLDS. The pretest and posttest data from the 1973-1974 year were placed within the four-factor design mentioned above. For each of the criteria, two separate analyses were performed: one for continuees and one for new entries. However, before any analyses were run, 7 children were randomly selected from each of the independent-factor cells (treatments by IQ by sex). Thus, each of the analyses had 56 children drawn at random from either the 116 continuees or the 114 new entries. A total of 6 such analyses were run.

A second set of analyses built in as a factor the comparison of continuee versus new entry. Each of these analyses was again done on 1973-1974 data of pretest-posttest type for the PPVT, ITPA, and VLDS. A total of 3 such analyses

were run.

A third set of analyses used only the data from the 56 continuees. These analyses represented longitudinal studies. This set of analyses involved the four pretest-posttest measures from both 1972-1973 and 1973-1974. Three of these analyses were run: PPVT, ITPA, and VLDS.

A fourth set of longitudinal studies were run on the 56 continuees with regard to the Myklebust Language Sample data. The input consisted of the pretest and posttest of 1972-1973 and the pretest of 1973-1974. Six such analyses were run: total words, total sentences, modified words per sentence, words per sentence as per Myklebust, abstractness-concreteness score, and average abstractness-concreteness score.

In all analyses, the BMD08V program of the UCLA Biomedical series was used. The analyses were run on a CDC 6400 computer at Lehigh University. A mixed design was specified, with treatments, sex, and measures as fixed factors, while IQ and replications were random factors.

Section 9

Evaluation Results

Appendix A contains a list of the analyses performed. Appendix B provides descriptive averages for each of the main effects in each analysis. Appendix C contains summary analysis of variance tables for each of the analyses. Finally, Appendix D contains the F-test ratios derived from Appendix C, with significance values attached to each ratio.

In presenting the results, the reader is cautioned to bear in mind the different designs that were in effect in certain of the 18 analyses. The designs of analyses 1 through 6 contain the factors of treatments, IQ, sex, and measures. Each analysis dealt with either 56 continuees or 56 new entries. The measures factor involved only the pretest and posttest from 1973-1974. In a similar vein, the designs of analyses 10 through 15 contain the same four factors but reflect a change in the measures factor; in particular, these analyses were of longitudinal nature and deal with the pretest and posttest of 1972-1973 and only the pretest of 1973-1974 (a total of 3 measures). Each of these analyses is derived from the longitudinal data of the 56 continuees (the posttest is missing from 1973-1974 because the Myklebust Language Sample was not given as part of the regular pretest-posttest battery of the second project year). Finally, analyses 7, 8, and 9 are of totally different design structure in that now the status of children (continuee versus new entry) is explicitly being tested in single error-estimate analyses rather than in the separate analyses reflected in 1 through 6. In specific, analyses 7, 8, and 9 contain the factors of status, treatments, IQ, sex, and measures. The three analyses each reflect 56 continuees

and 56 new entries (or 112 children) and concern only the 1973-1974 pretest-posttest data. With these basic design considerations in mind, the reader is now prepared to consider the detailed patterns of results.

Using Appendix A as a reference point for the analyses' interpretation, one sees that IQ produced highly significant ($p < .01$) control factor differences in analyses 1 through 9, 16, 17, and 18. Moderately significant ($p < .05$) differences occurred in analyses 10 and 11. It is surprising to note that no IQ control differences occurred in analyses 12 through 15; in other words, on the Myklebust Language Sample, only Total Words and Total Sentences produce IQ level differences in the expected direction. On this point alone, some questions might be raised on the overall soundness of the Myklebust technique.

With regard to the treatment factor (Peabody versus Distar), the results were consistent; no significant differences occurred.

Sex differences were found on only one analysis (13). In particular, females yielded significantly more ($p < .01$) words per sentence than males (5.69 versus 3.88).

Change over time (the factor of measures) was found only in analyses 16 and 18. In analysis 16 (ITPA), the posttest of each year (1972-1973 and 1973-1974) was significantly higher than the pretest. However, at the same time, the first year's results were significantly higher than the second year's results; the average scores (beginning with the pretest of the first year and running through to the posttest of the second year) were 113.94, 142.50, 95.50, and 118.31. Thus, there was a marked drop in going from the posttest of the first year to the pretest of the second year. The summer lag phenomenon was apparently present, and this lag was never made up even by the end of the second year's training. Turning to the other analysis (18) in which change over time occurred, one sees

that the significance in the overall measures factor was caused by a significant gain from pretest to posttest during the second year of operation, while the first year of operation yielded a more or less static level of functioning. The average scores (beginning with the pretest of the first year and running through the posttest of the second year) were 32.16, 33.84, 29.03, and 33.41. The main point to make, however, is that the overall performance of the second-year continuees was basically the same as their first year's level.

Turning from main effects to interaction effects, one again sees a very meager picture of results. First, the two-way interactions are considered. The treatment-by-IQ interaction was significant ($p < .05$) in analyses 17 and 18. In particular, in analysis 17, low-IQ children in the Peabody group were significantly hindered in comparison to their high-IQ counterparts and to their fellow students of either IQ level in the Distar groups; the difference between the latter three groups and the low-IQ Peabody group was about 15 points (about 45 versus about 30). In analysis 18, the low-IQ Peabody group (146.66) performed significantly worse than the high-IQ Peabody group (186.12), while the corresponding IQ difference in the Distar groups was in the same direction but less pronounced (167.84 versus 178.50). Further, in analysis 7 the discrepancy between high- and low-IQ children in the Peabody groups (44.05 versus 27.66) was significantly greater than in the Distar groups (49.02 versus 34.00).

The only significant two-way treatments-by-sex interaction occurred in analysis 18 ($p < .01$). In particular, in the Peabody groups, males were significantly lower than females (139.19 versus 193.59), while the reverse was true in the Distar groups (180.00 versus 166.34).

The only significant IQ-by-sex interactions occurred in analyses 7 and 8 (both $p < .05$). In analysis 7, the girls (26.26) slightly outperformed the

boys (23.93) in the low-IQ category, while almost no difference was detectable between boys (33.57) and girls (32.35) in the high-IQ category. In analysis 8, a different pattern emerged. While there was virtually no difference in the low-IQ category between boys (30.00) and girls (31.66), in the high-IQ category boys (50.12) significantly outperformed girls (42.9°).

The only significant two-way treatments-by-measures interaction occurred in analysis 17 ($p < .05$). In particular, the Distar program groups had significantly higher performance than the Peabody groups, but this difference was most pronounced for the two second-year test administrations.

The only significant two-way IQ-by-measures interactions occurred in analyses 4 ($p < .05$), 18 ($p < .01$), and 8 ($p < .05$). In analysis 4, the high-IQ students significantly gained during the second year, while the reverse was true for low-IQ students. In analysis 18, the summer lag phenomenon again evidenced itself. The interaction was caused mainly by the low-IQ students losing at a greater rate than the high-IQ students. The low-IQ students on an average lost twice as many points (from 34.25 down to 24.88) over summer as did the high-IQ students (from 36.38 down to 31.00). Another interesting observation is that while the high-IQ students finally got back up at the end of the second year where they had been at the end of the first year (but got no higher!), the low-IQ students did not even get up to the level they were at during the end of the first year. In analysis 8, for the low-IQ children the posttest (29.11) was lower than the pretest (32.55), while for the high-IQ children the posttest (49.55) was slightly higher than the pretest (43.52).

The only significant two-way sex-by-measures interaction occurred in analysis 10 ($p < .05$). During the pretest of 1973-1974, boys were significantly higher than girls (49.38 versus 31.38), while on both the pretest and posttest of

1972-1973, the reverse was true with even greater discrepancies.

While the exact patterns are too complex to be discussed here, a few triple interactions were also significant. The triple interaction of treatments by IQ by sex was significant in analysis 1 ($p < .05$), analysis 10 ($p < .05$), analysis 13 ($p < .05$), analysis 7 ($p < .05$), analysis 8 ($p < .05$), and analysis 9 ($p < .05$). The triple interaction of treatments by IQ by measures was significant in analysis 2 ($p < .01$) and analysis 18 ($p < .01$). The triple interaction of treatments by sex by measures was significant in analysis 3 ($p < .05$), analysis 11 ($p < .05$), and analysis 18 ($p < .05$). The triple interaction of IQ by sex by measures was significant in analysis 17 ($p < .05$). The triple interaction of status by treatment by sex was significant ($p < .05$) in analysis 8.

The quadruple interaction of treatments by IQ by sex by measures was not significant in any of the 18 analyses. The quadruple interaction of status by treatment by IQ by measures was significant ($p < .01$) in analysis 8.

Apart from the general pattern of findings that occurred for the four basic factors of treatments, IQ, sex, and measures, the special fifth factor of status introduced in analyses 7, 8, and 9 yielded some specific findings that should be made note of here. The interaction of status by IQ was significant in analysis 7 ($p < .01$). The difference between high- and low-IQ students for continuees (35.21 versus 30.38) was significantly less than that for new entries (30.71 versus 19.81).

The interaction of status by sex was significant ($p < .05$) in analysis 7. In particular, while there was in effect no difference between boys (32.25) and girls (31.80) in the new entries, the boys (47.88) were significantly higher than girls (42.80) in the continuee groups.

Section 10

Discussion of Results

The basic evaluative emphasis during the second year of the project was on the global pretest-posttest assessments via the PPVT, ITPA, and VLDS. Because of the many univariate analyses performed in this annual project evaluation, some words of interpretative caution should be attached to the results. Primary weight should be attached to the findings from analyses 7, 8, and 9 and from analyses 16, 17, 18. Analyses 7, 8, and 9 each embody the most all-encompassing comparisons among both continuees and new entries for the three primary criteria. Analyses 16, 17, and 18 embody the most all-encompassing comparisons among just continuees for the longitudinal (two-year) data for the three primary criteria. With these precautions as a preface, the basic findings will be discussed.

First, analyses 7, 8, and 9 show that there are no generalizable treatment effects in favor of either Peabody or Distar. This is to be expected because human language behavior is so complex that one would hardly expect one program to be effective for all levels of disability or functioning within the TMR population. Thus, one looks to the interactions with treatments to provide the qualifications on lack of general findings that say in specific levels of TMR functioning, certain programs may nonetheless be effective. In analysis 7 (VLDS), the treatment-by-IQ interaction was significant. Not only did the Distar groups surpass the Peabody groups, but the low-IQ group did not lag so far behind the high-IQ group with the Distar program as they did in the Peabody program. In analysis 8 (PPVT), no two-way interactions with treatments were significant. In analysis 9 (ITPA), again no significant two-way interactions with treatments

were found.

In terms of gain during just the second year, none of the three primary criteria showed significant movement in analyses 7, 8, and 9. Further, none of the interactions with gain were significant in analysis 7. However, in analysis 8 (PPVT), the IQ-by-gain interaction was significant. Regardless of language program, low-IQ children actually lost over time, while high-IQ children gained over time. In analysis 9 (ITPA), again no significant two-way interactions with gain occurred.

Focusing just on the continuees from the first year of the project, one can detect some interesting trends in analyses 16, 17, and 18. Here, longitudinal data was used from both project years. In analysis 16 (ITPA), the main effect for treatments was not significant, nor were any of the two-way interactions with treatments. In analysis 17 (PPVT), a different picture emerged. The treatment-by-IQ interaction ($p < .05$) showed that while no overall difference between Peabody and Distar existed, the low-IQ children in Peabody were greatly hindered in comparison to the other three treatment-by-IQ combination groups. Also in analysis 17, the treatment-by-gain interaction ($p < .05$) showed the continuees had significantly higher performance in the Distar groups than in the Peabody groups, with the greatest gain occurring during the second year. In analysis 18, no general treatment effect occurred, but two interactions with treatments are worthy of discussion. The treatment-by-IQ interaction ($p < .05$) showed that for continuees, the low-IQ Peabody group performed significantly worse than the high-IQ Peabody group, while the corresponding difference in the Distar groups was in the same direction but less pronounced. The treatment-by-sex interaction was also highly significant ($p < .01$); in the Peabody groups, males were significantly lower then females, while the reverse was true in the Distar groups.

The final reflections on analyses 16, 17, and 18 deal with the gain phenomenon. In analysis 16 (ITPA), a significant ($p < .01$) gain occurred regardless of treatment. However, strangely enough, while the posttest of each year was higher than the corresponding pretest, the overall performance of the first year was higher than the second year. No overall change occurred in analysis 17 (PPVT); however, change did occur depending upon treatment group (a finding already discussed above). In analysis 18, a highly significant ($p < .01$) change over time occurred regardless of treatment. Here, there was a notable gain during the second year of the project for the continuees, while their first year's performance was more or less static. Also in analysis 18, there was a significant ($p < .01$) IQ-by-measures interaction. The interaction was caused mainly by the low-IQ students losing at a greater rate than the high-IQ students. The low-IQ students on an average lost twice as many points over summer as did the high-IQ students. Also, while the high-IQ students finally got back up at the end of the second year where they had been at the end of the first year (but got no higher!), the low-IQ students did not even get up to the level they were at during the end of the first year.

In summary, then, the above findings are those in which perhaps the greatest degree of confidence could be placed in lieu of actually having a multivariate analysis of variance design; while Section 9 of this report presented the findings from all 18 analyses, the current section presented the findings from only the 6 most "stable" analyses. From this brief precis of key findings, it now remains to put a perspective on them.

What can one conclude from the primary set of results? With regard to treatments, while no significant differences emerged for the high-IQ children, the low-IQ children were aided moreso by Distar than by Peabody. Further, the

continuees showed greater gains during the second year of the project in Distar than in Peabody. Of course, one must remember that these continuees during the first year were in various types of ITPA-based language stimulation programs. Thus, these children who continued on into the second year of the project (at which time Peabody and Distar were introduced) had the benefit of earlier language stimulation, although the first year's project report (Leiss and Proger, 1974) indicated such ITPA-based training was of minimal value. (Children who had various degrees of ITPA-based training during the first year were, of course, randomly represented in each of the Peabody and Distar groups so that no differential pre-treatment contamination existed at the start of the second year).

In terms of change over time, two observations are possible. First, because of the poor showing in analyses 7, 8, and 9, gain in the total sample was not marked (i.e., in those analyses where both continuees and new entries were considered). However, when one considers only the continuees, significant gain in language functioning did occur. Second, the summer lag phenomenon did occur for those TMR children who were continuees; that is, in considering the posttest from the first year and the pretest of the second year, a marked decrease in performance occurred.

The final set of observations concern the measurement realm. It is clear that the battery of standardized tests used in both the first and second years of the project have not been specific enough to tap areas of language functioning of concern to this project. That is, the PPVT, ITPA, and VLDS are simply not valid enough reflections of the types of language training used with the TMR children. The sensitivity of these instruments is extremely poor for detecting subtle changes in TMR children's performance. Just what measurement devices might be substituted for the present ones is a question to which the present

investigators cannot give a legitimate answer. It would seem desirable to consider implementing a curriculum-based, criterion-referenced measurement system. For example, if one is in the Distar program, then perhaps a recording system could be developed that would reflect developmental mastery changes of the children as they move throughout the various sequential units of Distar. In its crudest form, this CRM system might use only the sequential unit numbers at the end of every week or every two weeks for each child throughout the school year. One could make the CRM system a little more precise if he not only considered developmental unit numbers (which reflect an implicit mastery of the curricular continuum) but also appended percentage mastery scores on some criterion attached to each unit.

The last set of measurement considerations concern the analyses that were considered only subordinate in importance: longitudinal language sample data on continuees. While the detailed findings from the Myklebust modified Language Sample procedure were presented in Section 9, a few general conclusions are possible. First, the procedure is time-consuming both to administer and to score. Second, when all the various scores of the Language Sample are considered, only the Total Words and Total Sentences appeared to be sensitive to the types of language functioning of TMR children.

In summary, then, the second-year results appear to be more positive (mainly in favor of Distar over Peabody) than the first-year results in which different intensities of ITPA-based language training yielded a very bleak picture. Nonetheless, even the second-year findings are relatively mild and contain no stunning revelations.

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APPENDIX A

NAMES OF ANALYSES

NAMES OF ANALYSES

Number	Name
1	ITPA Continuees (1973-1974)
2	PPVT Continuees (1973-1974)
3	VLDS Continuees (1973-1974)
4	PPVT New Entries (1973-1974)
5	ITPA New Entries (1973-1974)
6	VLDS New Entries (1973-1974)
7	VLDS Continuees and New Entries (1973-1974)
8	PPVT Continuees and New Entries (1973-1974)
9	ITPA Continuees and New Entries (1973-1974)
10	Language Sample Total Words (1972-1973, 1973-1974)
11	Language Sample Total Sentences (1972-1973, 1973-1974)
12	Language Sample Words Per Sentence as per Myklebust (1972-1973, 1973-1974)
13	Language Sample Words Per Sentence as per modified method (1972-1973, 1973-1974)
14	Language Sample Abstractness-Concreteness (1972-1973, 1973-1974)
15	Language Sample Abstractness-Concreteness Average (1972-1973, 1973-1974)
16	ITPA Continuees (1972-1973, 1973-1974)
17	PPVT Continuees (1972-1973, 1973-1974)
18	VLDS Continuees (1972-1973, 1973-1974)

Note -- Analyses 10 through 14 involve total cumulative scores across all three pictures, but not averages. Analysis 15 involves the average score for all three pictures.

APPENDIX B

DESCRIPTIVE STATISTICS FROM ANALYSES

(Note: In analyses 1 through 6 and 10 through 18, "I" denotes "treatments", "1" denotes "Peabody", and "2" denotes "Distar". "J" denotes "IQ", "1" denotes "Low IQ", and "2" denotes "High IQ". "K" denotes "sex", "1" denotes "boys", and "2" denotes "girls". In analyses 1 through 6, "M" denotes "measures", "1" denotes "posttest", and "2" denotes "pretest". In analyses 10 through 18, "M" also denotes "measures", "1" denotes "1973-1974 posttest", "2" denotes "1973-1974 pretest", "3" denotes "1972-1973 posttest", and "4" denotes "1972-1973 pretest". In analyses 7, 8, and 9, "I" denotes "entry status", "1" denotes "new entries", and "2" denotes "continuees". "J" denotes "treatments", "1" denotes "Peabody", and "2" denotes "Distar". "K" denotes "IQ", "1" denotes "Low IQ", and "2" denotes "High IQ". "L" denotes "sex", "1" denotes "boys", and "2" denotes "girls". "M" denotes "measures", "1" denotes "posttest", and "2" denotes "pretest".)

ANALYSIS 1

1973-1974 GAIN ANALYSES: MAIN CELL MEANS FOR ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES TOTAL RAW SCORE; ENTRIES CONTINUED FROM 1972-1973

FACTOR	LEVELS	
I =	1 61.30357	2 73.19643
J =	1 52.92857	2 81.57143
K =	1 68.19643	2 66.30357
M =	1 63.58929	2 70.91071

ANALYSIS 2

1973-1974 GAIN ANALYSES: MAIN CELL MEANS FOR PEABODY PICTURE VOCABULARY TEST RAW SCORE; ENTRIES CONTINUED FROM 1972-1973

FACTOR	LEVELS	
I =	1 42.71429	2 47.96429
J =	1 39.07143	2 51.60714
K =	1 47.87500	2 42.80357
M =	1 45.98214	2 44.69643

ANALYSIS 3

1973-1974 GAIN ANALYSES: MAIN CELL MEANS FOR MECHAM VERBAL LANGUAGE DEVELOPMENT SCALE RAW SCORE; ENTRIES CONTINUED FROM 1972-1973

FACTOR	LEVELS	
I =	1	2
	32.57143	33.01786
J =	1	2
	30.37500	35.21429
K =	1	2
	31.97321	33.61607
M =	1	2
	33.16964	32.41964

ANALYSIS 4

1973-1974 GAIN ANALYSES: MAIN CELL MEANS FOR PEABODY PICTURE VOCABULARY TEST RAW SCORE; NEW ENTRIES

FACTOR	LEVELS	
I =	1 29.00000	2 35.05357
J =	1 22.58929	2 41.46429
K =	1 32.25000	2 31.80357
M =	1 32.67857	2 31.37500

ANALYSIS 5

1973-1974 GAIN ANALYSES: MAIN CELL MEANS FOR
ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES
TOTAL RAW SCORE; NEW ENTRIES

FACTOR	LEVELS	
I =	J	2
	35.23214	45.41071
J =	1	2
	23.73214	56.91071
K =	1	2
	41.80357	38.83929
M =	1	2
	38.25000	42.39286

ANALYSIS 6

1973-1974 GAIN ANALYSES: MAIN CELL MEANS
FOR MECHAM VERBAL LANGUAGE DEVELOPMENT
SCALE RAW SCORE; NEW ENTRIES

FACTOR	LEVELS	
I =	1 22.93750	2 27.58036
J =	1 19.81250	2 30.70536
K =	1 25.52679	2 24.99107
M =	1 25.16071	2 25.35714

ANALYSIS 7

1973-1974 GAIN ANALYSES: MAIN CELL MEANS FOR MECHAM VERBAL LANGUAGE DEVELOPMENT SCALE RAW SCORE; BOTH NEW ENTRIES AND CONTINUED ENTRIES FROM 1972-1973

FACTOR	LEVELS	
I =	1	2
	25.25893	32.79464
J =	1	2
	27.75446	30.29911
K =	1	2
	25.09375	32.95982
L =	1	2
	28.75000	29.30357
M =	1	2
	29.16518	28.88839

ANALYSIS 8

1973-1974 GAIN ANALYSES: MAIN CELL MEANS FOR PEABODY PICTURE VOCABULARY TEST RAW SCORE; BOTH NEW ENTRIES AND CONTINUED ENTRIES FROM 1972-1973

FACTOR	LEVELS	
I =	1	2
	32.02679	45.33929
J =	1	2
	35.85714	41.50893
K =	1	2
	30.83036	46.53571
L =	1	2
	40.06250	37.30357
M =	1	2
	39.33036	38.03571

ANALYSIS 9

1973-1974 GAIN ANALYSES: MAIN CELL MEANS FOR ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES TOTAL RAW SCORE; BOTH NEW ENTRIES AND CONTINUED ENTRIES FROM 1972-1973

FACTOR	LEVELS	
I =	1 40.32143	2 67.25000
J =	1 48.26786	2 59.30357
K =	1 38.33036	2 69.24107
L =	1 55.00000	2 52.57143
M =	1 50.91964	2 56.65179

ANALYSIS 10

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): MAIN CELL MEANS FOR MYKLEBUST'S THREE LANGUAGE SAMPLE PICTURES; TOTAL WORDS FOR COMBINED PICTURES

FACTOR	LEVELS		
I =	1	2	
	46.87500	67.66667	
J =	1	2	
	46.50000	68.04167	
K =	1	2	
	45.75000	68.79167	
M =	1	2	3
	40.37500	64.56250	66.87500

ANALYSIS 11

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): MAIN CELL MEANS FOR MYKLEBUST'S THREE LANGUAGE SAMPLE PICTURES; TOTAL SENTENCES FOR COMBINED PICTURES

FACTOR	LEVELS		
I =	1	2	
	9.54167	13.87500	
J =	1	2	
	10.12500	13.29167	
K =	1	2	
	11.37500	12.04167	
M =	1	2	3
	9.37500	12.56250	13.18750

ANALYSIS 12

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): MAIN CELL MEANS FOR MYKLEBUST'S THREE LANGUAGE SAMPLE PICTURES; TOTAL WORDS PER SENTENCES FOR COMBINED PICTURES, AS PER MYKLEBUST

FACTOR	LEVELS		
I =	1	2	
	2.36500	3.13292	
J =	1	2	
	2.48000	3.01792	
K =	1	2	
	2.49500	3.00292	
M =	1	2	3
	2.12437	2.99375	3.12875

ANALYSIS 13

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): MAIN CELL MEANS FOR MYKLEBUST'S THREE LANGUAGE SAMPLE PICTURES; TOTAL WORDS PER SENTENCES FOR COMBINED PICTURES, NO MODIFICATION

FACTOR	LEVELS		
I =	1	2	
	5.07000	4.49958	
J =	1	2	
	4.64167	4.92792	
K =	1	2	
	3.87542	5.69417	
M =	1	2	3
	4.44437	5.31187	4.59812

ANALYSIS 14

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): MAIN CELL MEANS FOR MYKLEBUST'S THREE LANGUAGE SAMPLE PICTURES TOTAL ABSTRACTNESS - CONCRETENESS SCORE FOR COMBINED PICTURES

FACTOR	LEVELS		
I =	1 6.25000	2 7.91667	
J =	1 6.45833	2 7.70833	
K =	1 7.08333	2 7.08333	
M =	1 6.68750	2 6.93750	3 7.62500

ANALYSIS 15

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): MAIN CELL MEANS FOR MYKLEBUST'S THREE LANGUAGE SAMPLE PICTURES; AVERAGE ABSTRACTNESS - CONCRETENESS SCORE FOR COMBINED PICTURES

FACTOR	LEVELS		
I =	1	2	
	2.08667	2.64083	
J =	1	2	
	2.15583	2.57167	
K =	1	2	
	2.36375	2.36375	
M =	1	2	3
	2.23125	2.31500	2.54500

ANALYSIS 16

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): MAIN CELL MEANS FOR ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES TOTAL RAW SCORE

FACTOR	LEVELS			
I =	1	2		
	106.40625	128.71875		
J =	1	2		
	100.06250	135.06250		
K =	1	2		
	108.21875	126.90625		
M =	1	2	3	4
	118.31250	95.50000	142.50000	113.93750

ANALYSIS 17

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): MAIN CELL MEANS FOR PEABODY PICTURE VOCABULARY TEST RAW SCORE

FACTOR	LEVELS			
I =	1	2		
	38.03125	47.03125		
J =	1	2		
	36.93750	48.12500		
K =	1	2		
	40.18750	44.87500		
M =	1	2	3	4
	45.12500	42.06250	44.81250	38.12500

ANALYSIS 18

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): MAIN CELL MEANS FOR MECHAM VERBAL LANGUAGE DEVELOPMENT SCALE RAW SCORE

FACTOR	LEVELS			
I =	1	2		
	166.39062	173.17187		
J =	1	2		
	157.25000	182.31250		
K =	1	2		
	159.59375	179.96875		
M =	1	2	3	4
	33.40625	290.31250	33.84375	321.56250

APPENDIX C

SUMMARY ANALYSIS OF VARIANCE TABLES FOR ANALYSES

(Note: Refer to Appendix B cover sheet's "Note" for detailed explanation of factor labels and number of levels.)

1973-1974 GAIN ANALYSES: SUMMARY ANALYSIS OF VARIANCE TABLE FOR ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES TOTAL RAW SCORE; ENTRIES CONTINUED FROM 1972-1973

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARES	EXPECTED MEAN SQUARE		
1	MEAN	506527.0000	1	506527.0000	112.000 (1)	56.000 (3)	2.000 (16)
2	I	3960.3214	1	3960.3214	56.000 (2)	28.000 (6)	2.000 (16)
3	J	22971.5714	1	22971.5714	56.000 (3)	2.000 (16)	
4	K	100.3214	1	100.3214	56.000 (4)	28.000 (8)	2.000 (16)
5	M	1500.8929	1	1500.8929	56.000 (5)	28.000 (10)	1.000 (18)
6	IJ	750.8929	1	750.8929	28.000 (6)	2.000 (16)	
7	IK	464.1429	1	464.1429	28.000 (7)	14.000 (12)	2.000 (16)
8	JK	160.3214	1	160.3214	28.000 (8)	2.000 (16)	
9	IM	120.1429	1	120.1429	28.000 (9)	14.000 (13)	1.000 (18)
10	JM	12.8929	1	12.8929	28.000 (10)	1.000 (18)	
11	KM	2304.1429	1	2304.1429	28.000 (11)	14.000 (15)	1.000 (18)
12	IJK	4836.5714	1	4836.5714	14.000 (12)	2.000 (16)	
13	IJM	2377.2857	1	2377.2857	14.000 (13)	1.000 (18)	
14	IKM	670.3214	1	670.3214	14.000 (14)	7.000 (17)	1.000 (18)
15	JKM	825.1429	1	825.1429	14.000 (15)	1.000 (18)	
16	R (IJK)	50486.8571	48	1051.8095	2.000 (16)		
17	IJKM	456.0357	1	456.0357	7.000 (17)	1.000 (18)	
18	MR (IJK)	386523.1429	48	8052.5655	1.000 (18)		

ANALYSIS 2

1973-1974 GAIN ANALYSES: SUMMARY ANALYSIS OF VARIANCE TABLE FOR PEABODY PICTURE VOCABULARY TEST RAW SCORE; ENTRIES CONTINUED FROM 1972-1973

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARES	EXPECTED MEAN SQUARE		
1	MEAN	230232.8929	1	230232.8929	112.000 (1)	56.000 (3)	2.000 (16)
2	I	771.7500	1	771.7500	56.000 (2)	28.000 (6)	2.000 (16)
3	J	4400.0357	1	4400.0357	56.000 (3)	2.000 (16)	
4	K	720.1429	1	720.1429	56.000 (4)	28.000 (8)	2.000 (16)
5	M	46.2857	1	46.2857	56.000 (5)	28.000 (10)	1.000 (18)
6	IJ	364.3214	1	364.3214	28.000 (6)	2.000 (16)	
7	IK	128.5714	1	128.5714	28.000 (7)	14.000 (12)	2.000 (16)
8	JK	416.5714	1	416.5714	28.000 (8)	2.000 (16)	
9	IM	315.5714	1	315.5714	28.000 (9)	14.000 (13)	1.000 (18)
10	JM	89.2857	1	89.2857	28.000 (10)	1.000 (18)	
11	KM	424.3214	1	424.3214	28.000 (11)	14.000 (15)	1.000 (18)
12	IJK	432.1429	1	432.1429	14.000 (12)	2.000 (16)	
13	IJM	1157.1429	1	1157.1429	14.000 (13)	1.000 (18)	
14	IKM	440.0357	1	440.0357	14.000 (14)	7.000 (17)	1.000 (18)
15	JKM	85.7500	1	85.7500	14.000 (15)	1.000 (18)	
16	R (IJK)	6910.5714	48	143.9702	2.000 (16)		
17	IJKM	10.3214	1	10.3214	7.000 (17)	1.000 (18)	
18	MR (IJK)	5060.2857	48	105.4226	1.000 (18)		

ANALYSIS 3

1973-1974 GAIN ANALYSES: SUMMARY ANALYSIS OF VARIANCE TABLE FOR MECHAM VERBAL LANGUAGE DEVELOPMENT SCALE RAW SCORE; ENTRIES CONTINUED FROM 1972-1973

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE		
1	MEAN	120454.7232	1	120454.7232	112.000 (1)	56.000 (3)	2.000 (16)
2	I	5.5804	1	5.5804	56.000 (2)	28.000 (6)	2.000 (16)
3	J	655.7232	1	655.7232	56.000 (3)	2.000 (16)	
4	K	75.5714	1	75.5714	56.000 (4)	28.000 (8)	2.000 (16)
5	M	15.7500	1	15.7500	56.000 (5)	28.000 (10)	1.000 (18)
6	IJ	15.0089	1	15.0089	28.000 (6)	2.000 (16)	
7	IK	82.2857	1	82.2857	28.000 (7)	14.000 (12)	2.000 (16)
8	JK	85.7500	1	85.7500	28.000 (8)	2.000 (16)	
9	IM	264.1429	1	264.1429	28.000 (9)	14.000 (13)	1.000 (18)
10	JM	.8929	1	.8929	28.000 (10)	1.000 (18)	
11	KM	19.7232	1	19.7232	28.000 (11)	14.000 (15)	1.000 (18)
12	IJK	28.0000	1	28.0000	14.000 (12)	2.000 (16)	
13	IJM	12.8929	1	12.8929	14.000 (13)	1.000 (18)	
14	IKM	249.0089	1	249.0089	14.000 (14)	7.000 (17)	1.000 (18)
15	JKM	73.9375	1	73.9375	14.000 (15)	1.000 (18)	
16	R (IJK)	1067.6071	48	22.2418	2.000 (16)		
17	IJKM	.0804	1	.0804	7.000 (17)	1.000 (18)	
18	MR (IJK)	1927.3214	48	40.1525	1.000 (18)		

ANALYSIS 4

1973-1974 GAIN ANALYSES: SUMMARY ANALYSIS OF VARIANCE TABLE FOR PEABODY PICTURE VOCABULARY TEST RAW SCORE; NEW ENTRIES

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE		
1	MEAN	114880.0804	1	114880.0804	112.000 (1)	56.000 (3)	2.000 (16)
2	I	1026.0804	1	1026.0804	56.000 (2)	28.000 (6)	2.000 (16)
3	J	9975.4375	1	9975.4375	56.000 (3)	2.000 (16)	
4	K	5.5804	1	5.5804	56.000 (4)	28.000 (8)	2.000 (16)
5	M	47.5804	1	47.5804	56.000 (5)	28.000 (10)	1.000 (18)
6	IJ	139.5089	1	139.5089	28.000 (6)	2.000 (16)	
7	IK	198.2232	1	198.2232	28.000 (7)	14.000 (12)	2.000 (16)
8	JK	695.0089	1	695.0089	28.000 (8)	2.000 (16)	
9	IM	148.5804	1	148.5804	28.000 (9)	14.000 (13)	1.000 (18)
10	JM	1658.5804	1	1658.5804	28.000 (10)	1.000 (18)	
11	KM	31.0804	1	31.0804	28.000 (11)	14.000 (15)	1.000 (18)
12	IJK	452.0089	1	452.0089	14.000 (12)	2.000 (16)	
13	IJM	685.0804	1	685.0804	14.000 (13)	1.000 (18)	
14	IKM	231.4375	1	231.4375	14.000 (14)	7.000 (17)	1.000 (18)
15	JKM	452.0089	1	452.0089	14.000 (15)	1.000 (18)	
16	R (IJK)	12900.5714	48	268.7619	2.000 (16)		
17	IJKM	5.5804	1	5.5804	7.000 (17)	1.000 (18)	
18	MR (IJK)	16414.5714	48	341.9702	1.000 (18)		

ANALYSIS 5

1973-1974 GAIN ANALYSES: SUMMARY ANALYSIS OF VARIANCE TABLE FOR ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES TOTAL RAW SCORE; NEW ENTRIES

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE		
1	MEAN	182091.5714	1	182091.5714	112.000 (1)	56.000 (3)	2.000 (16)
2	I	2900.8929	1	2900.8929	56.000 (2)	28.000 (6)	2.000 (16)
3	J	30822.8929	1	30822.8929	56.000 (3)	2.000 (16)	
4	K	246.0357	1	246.0357	56.000 (4)	28.000 (8)	2.000 (16)
5	M	480.5714	1	480.5714	56.000 (5)	28.000 (10)	1.000 (18)
6	IJ	984.1429	1	984.1429	28.000 (6)	2.000 (16)	
7	IK	1989.1429	1	1989.1429	28.000 (7)	14.000 (12)	2.000 (16)
8	JK	2196.5714	1	2196.5714	28.000 (8)	2.000 (16)	
9	IM	612.8929	1	612.8929	28.000 (9)	14.000 (13)	1.000 (18)
10	JM	2322.3214	1	2322.3214	28.000 (10)	1.000 (18)	
11	KM	48.8929	1	48.8929	28.000 (11)	14.000 (15)	1.000 (18)
12	IJK	1442.8929	1	1442.8929	14.000 (12)	2.000 (16)	
13	IJM	3087.0000	1	3087.0000	14.000 (13)	1.000 (18)	
14	IKM	3045.1429	1	3045.1429	14.000 (14)	7.000 (17)	1.000 (18)
15	JKM	5103.0000	1	5103.0000	14.000 (15)	1.000 (18)	
16	R (IJK)	85542.8571	48	1782.1429	2.000 (16)		
17	IJKM	180.0357	1	180.0357	7.000 (17)	1.000 (18)	
18	MR (IJK)	216209.1429	48	4504.3571	1.000 (18)		

ANALYSIS 6

1973-1974 GAIN ANALYSES: SUMMARY ANALYSIS OF VARIANCE TABLE FOR MECHAM VERBAL LANGUAGE DEVELOPMENT SCALE RAW SCORE; NEW ENTRIES

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE		
1	MEAN	71457.5089	1	71457.5089	112.000 (1)	56.000 (3)	2.000 (16)
2	I	603.5714	1	603.5714	56.000 (2)	28.000 (6)	2.000 (16)
3	J	3322.3214	1	3322.3214	56.000 (3)	2.000 (16)	
4	K	8.0357	1	8.0357	56.000 (4)	28.000 (8)	2.000 (16)
5	M	1.0804	1	1.0804	56.000 (5)	28.000 (10)	1.000 (18)
6	IJ	209.0089	1	209.0089	28.000 (6)	2.000 (16)	
7	IK	7.5089	1	7.5089	28.000 (7)	14.000 (12)	2.000 (16)
8	JK	91.0804	1	91.0804	28.000 (8)	2.000 (16)	
9	IM	185.1429	1	185.1429	28.000 (9)	14.000 (13)	1.000 (18)
10	JM	343.0000	1	343.0000	28.000 (10)	1.000 (18)	
11	KM	22.3214	1	22.3214	28.000 (11)	14.000 (15)	1.000 (18)
12	IJK	150.8929	1	150.8929	14.000 (12)	2.000 (16)	
13	IJM	484.7232	1	484.7232	14.000 (13)	1.000 (18)	
14	IKM	535.9375	1	535.9375	14.000 (14)	7.000 (17)	1.000 (18)
15	JKM	153.2232	1	153.2232	14.000 (15)	1.000 (18)	
16	R (IJK)	2612.8214	48	54.4338	2.000 (16)		
17	IJKM	51.5714	1	51.5714	7.000 (17)	1.000 (18)	
18	MR (IJK)	6453.7500	48	134.4531	1.000 (18)		

1973-1974 GAIN ANALYSES: SUMMARY ANALYSIS OF VARIANCE TABLE FOR MECHAM VERBAL LANGUAGE DEVELOPMENT SCALE RAW SCORE; BOTH NEW ENTRIES AND CONTINUED ENTRIES FROM 1972-1973

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE		
1	MEAN	188732.1607	1	188732.1607	224.000 (1)	112.000 (4)	2.000 (32)
2	I	3180.0714	1	3180.0714	112.000 (2)	56.000 (8)	2.000 (32)
3	J	362.6116	1	362.6116	112.000 (3)	56.000 (9)	2.000 (32)
4	K	3465.0045	1	3465.0045	112.000 (4)	2.000 (32)	
5	L	17.1607	1	17.1607	112.000 (5)	56.000 (12)	2.000 (32)
6	M	4.2902	1	4.2902	112.000 (6)	56.000 (15)	1.000 (34)
7	IJ	246.5402	1	246.5402	56.000 (7)	28.000 (17)	2.000 (32)
8	IK	513.0402	1	513.0402	56.000 (8)	2.000 (32)	
9	JK	168.0179	1	168.0179	56.000 (9)	2.000 (32)	
10	IL	66.4464	1	66.4464	56.000 (10)	28.000 (19)	2.000 (32)
11	JL	20.0402	1	20.0402	56.000 (11)	28.000 (20)	2.000 (32)
12	KL	176.7902	1	176.7902	56.000 (12)	2.000 (32)	
13	IM	12.5402	1	12.5402	56.000 (13)	28.000 (22)	1.000 (34)
14	JM	445.7857	1	445.7857	56.000 (14)	28.000 (23)	1.000 (34)
15	KM	154.4464	1	154.4464	56.000 (15)	1.000 (34)	
16	LM	.0402	1	.0402	56.000 (16)	28.000 (26)	1.000 (34)
17	IJK	56.0000	1	56.0000	28.000 (17)	2.000 (32)	
18	IJL	69.7545	1	69.7545	28.000 (18)	14.000 (27)	2.000 (32)
19	IKL	.0402	1	.0402	28.000 (19)	2.000 (32)	
20	JKL	154.4464	1	154.4464	28.000 (20)	2.000 (32)	
21	IJM	3.5000	1	3.5000	28.000 (21)	14.000 (28)	1.000 (34)
22	IKM	189.4464	1	189.4464	28.000 (22)	1.000 (34)	
23	JKM	169.7545	1	169.7545	28.000 (23)	1.000 (34)	
24	ILM	42.0045	1	42.0045	28.000 (24)	14.000 (30)	1.000 (34)
25	JLM	757.7857	1	757.7857	28.000 (25)	14.000 (31)	1.000 (34)
26	KLM	220.0179	1	220.0179	28.000 (26)	1.000 (34)	
27	IJKL	24.4464	1	24.4464	14.000 (27)	2.000 (32)	
28	IJKM	327.8616	1	327.8616	14.000 (28)	1.000 (34)	
29	IJLM	27.1607	1	27.1607	14.000 (29)	7.000 (33)	1.000 (34)
30	IKLM	7.1429	1	7.1429	14.000 (30)	1.000 (34)	
31	JKLM	27.8616	1	27.8616	14.000 (31)	1.000 (34)	
32	R (IJKL)	3680.4286	96	38.3378	2.000 (32)		
33	IJKLM	23.7902	1	23.7902	7.000 (33)	1.000 (34)	
34	MR (IJKL)	8381.0714	96	87.3028	1.000 (34)		

1973-1974 GAIN ANALYSES: SUMMARY ANALYSIS OF VARIANCE TABLE FOR PEABODY PICTURE VOCABULARY TEST RAW SCORE; BOTH NEW ENTRIES AND CONTINUED ENTRIES FROM 1972-1973

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE		
1	MEAN	335188.5045	1	335188.5045	224.000 (1)	112.000 (4)	2.000 (32)
2	I	9924.4687	1	9924.4687	112.000 (2)	56.000 (8)	2.000 (32)
3	J	1788.7902	1	1788.7902	112.000 (3)	56.000 (9)	2.000 (32)
4	K	13812.8616	1	13812.8616	112.000 (4)	2.000 (32)	
5	L	426.2545	1	426.2545	112.000 (5)	56.000 (12)	2.000 (32)
6	M	93.8616	1	93.8616	112.000 (6)	56.000 (15)	1.000 (34)
7	IJ	9.0402	1	9.0402	56.000 (7)	28.000 (17)	2.000 (32)
8	IK	562.6116	1	562.6116	56.000 (8)	2.000 (32)	
9	JK	26.4687	1	26.4687	56.000 (9)	2.000 (32)	
10	IL	299.4687	1	299.4687	56.000 (10)	28.000 (19)	2.000 (32)
11	JL	3.7545	1	3.7545	56.000 (11)	28.000 (20)	2.000 (32)
12	KL	1093.8616	1	1093.8616	56.000 (12)	2.000 (32)	
13	IM	.0045	1	.0045	56.000 (13)	28.000 (22)	1.000 (34)
14	JM	448.6116	1	448.6116	56.000 (14)	28.000 (23)	1.000 (34)
15	KM	1258.7545	1	1258.7545	56.000 (15)	1.000 (34)	
16	LM	342.5402	1	342.5402	56.000 (16)	28.000 (26)	1.000 (34)
17	IJK	477.3616	1	477.3616	28.000 (17)	2.000 (32)	
18	IJL	323.0402	1	323.0402	28.000 (18)	14.000 (27)	2.000 (32)
19	IKL	17.7187	1	17.7187	28.000 (19)	2.000 (32)	
20	JKL	884.0402	1	884.0402	28.000 (20)	2.000 (32)	
21	IJM	15.5402	1	15.5402	28.000 (21)	14.000 (28)	1.000 (34)
22	IKM	489.1116	1	489.1116	28.000 (22)	1.000 (34)	
23	JKM	30.7545	1	30.7545	28.000 (23)	1.000 (34)	
24	ILM	112.8616	1	112.8616	28.000 (24)	14.000 (30)	1.000 (34)
25	JLM	654.8616	1	654.8616	28.000 (25)	14.000 (31)	1.000 (34)
26	KLM	465.7545	1	465.7545	28.000 (26)	1.000 (34)	
27	IJKL	.1116	1	.1116	14.000 (27)	2.000 (32)	
28	IJKM	1811.4687	1	1811.4687	14.000 (28)	1.000 (34)	
29	IJLM	16.6116	1	16.6116	14.000 (29)	7.000 (33)	1.000 (34)
30	IKLM	72.0045	1	72.0045	14.000 (30)	1.000 (34)	
31	JKLM	15.5402	1	15.5402	14.000 (31)	1.000 (34)	
32	R (IJKL)	19811.1429	96	206.3661	2.000 (32)		
33	IJKLM	.3616	1	.3616	7.000 (33)	1.000 (34)	
34	MR (IJKL)	21474.8571	96	223.6964	1.000 (34)		

1973-1974 GAIN ANALYSES: SUMMARY ANALYSIS OF VARIANCE TABLE FOR ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES TOTAL RAW SCORE; BOTH NEW ENTRIES AND CONTINUED ENTRIES FROM 1972-1973

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE		
1	MEAN	648010.2857	1	648010.2857	224.000 (1)	112.000 (4)	2.000 (32)
2	I	40608.2857	1	40608.2857	112.000 (2)	56.000 (8)	2.000 (32)
3	J	6820.0714	1	6820.0714	112.000 (3)	56.000 (9)	2.000 (32)
4	K	53506.4464	1	53506.4464	112.000 (4)	2.000 (32)	
5	L	330.2857	1	330.2857	112.000 (5)	56.000 (12)	2.000 (32)
6	M	1840.0179	1	1840.0179	112.000 (6)	56.000 (15)	1.000 (34)
7	IJ	41.1429	1	41.1429	56.000 (7)	28.000 (17)	2.000 (32)
8	IK	288.0179	1	288.0179	56.000 (8)	2.000 (32)	
9	JK	1727.1607	1	1727.1607	56.000 (9)	2.000 (32)	
10	IL	16.0714	1	16.0714	56.000 (10)	28.000 (19)	2.000 (32)
11	JL	2187.5000	1	2187.5000	56.000 (11)	28.000 (20)	2.000 (32)
12	KL	1771.8750	1	1771.8750	56.000 (12)	2.000 (32)	
13	IM	141.4464	1	141.4464	56.000 (13)	28.000 (22)	1.000 (34)
14	JM	95.1607	1	95.1607	56.000 (14)	28.000 (23)	1.000 (34)
15	KM	1340.6429	1	1340.6429	56.000 (15)	1.000 (34)	
16	LM	1512.1607	1	1512.1607	56.000 (16)	28.000 (26)	1.000 (34)
17	IJK	7.8750	1	7.8750	28.000 (17)	2.000 (32)	
18	IJL	265.7857	1	265.7857	28.000 (18)	14.000 (27)	2.000 (32)
19	IKL	585.0179	1	585.0179	28.000 (19)	2.000 (32)	
20	JKL	5781.4464	1	5781.4464	28.000 (20)	2.000 (32)	
21	IJM	637.8750	1	637.8750	28.000 (21)	14.000 (28)	1.000 (34)
22	IKM	994.5714	1	994.5714	28.000 (22)	1.000 (34)	
23	JKM	23.1429	1	23.1429	28.000 (23)	1.000 (34)	
24	ILM	840.8750	1	840.8750	28.000 (24)	14.000 (30)	1.000 (34)
25	JLM	3286.4464	1	3286.4464	28.000 (25)	14.000 (31)	1.000 (34)
26	KLM	5016.0714	1	5016.0714	28.000 (26)	1.000 (34)	
27	IJKL	498.0179	1	498.0179	14.000 (27)	2.000 (32)	
28	IJKM	5441.1429	1	5441.1429	14.000 (28)	1.000 (34)	
29	IJLM	429.0179	1	429.0179	14.000 (29)	7.000 (33)	1.000 (34)
30	IKLM	912.0714	1	912.0714	14.000 (30)	1.000 (34)	
31	JKLM	604.5714	1	604.5714	14.000 (31)	1.000 (34)	
32	R (IJKL)	136029.7143	96	1416.9762	2.000 (32)		
33	IJKLM	31.5000	1	31.5000	7.000 (33)	1.000 (34)	
34	MR (IJKL)	602732.2857	96	6278.4613	1.000 (34)		

ANALYSIS 10

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): SUMMARY ANALYSIS OF VARIANCE TABLE FOR MYKLEBUST'S THREE LANGUAGE SAMPLE PICTURES; TOTAL WORDS FOR COMBINED PICTURES

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE		
1	MEAN	157437.5208	1	157437.5208	48.000 (1)	24.000 (3)	3.000 (16)
2	I	5187.5208	1	5187.5208	24.000 (2)	12.000 (6)	3.000 (16)
3	J	5568.5208	1	5568.5208	24.000 (3)	3.000 (16)	
4	K	6371.0208	1	6371.0208	24.000 (4)	12.000 (8)	3.000 (16)
5	M	6894.0417	2	3447.0208	16.000 (5)	8.000 (10)	1.000 (18)
6	IJ	2067.1875	1	2067.1875	12.000 (6)	3.000 (16)	
7	IK	945.1875	1	945.1875	12.000 (7)	6.000 (12)	3.000 (16)
8	JK	3417.1875	1	3417.1875	12.000 (8)	3.000 (16)	
9	IM	984.5417	2	492.2708	8.000 (9)	4.000 (13)	1.000 (18)
10	JM	6417.0417	2	3208.5208	8.000 (10)	1.000 (18)	
11	KM	12469.7917	2	6234.8958	8.000 (11)	4.000 (15)	1.000 (18)
12	IJK	5963.0208	1	5963.0208	6.000 (12)	3.000 (16)	
13	IJM	760.8750	2	380.4375	4.000 (13)	1.000 (18)	
14	IKM	751.6250	2	375.8125	4.000 (14)	2.000 (17)	1.000 (18)
15	JKM	217.6250	2	108.8125	4.000 (15)	1.000 (18)	
16	R (IJK)	5174.5000	8	646.8125	3.000 (16)		
17	IJKM	776.7917	2	388.3958	2.000 (17)	1.000 (18)	
18	MR (IJK)	20227.0000	16	1264.1875	1.000 (18)		

ANALYSIS 11

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): SUMMARY ANALYSIS OF VARIANCE TABLE FOR MYKLEBUST'S THREE LANGUAGE SAMPLE PICTURES; TOTAL SENTENCES FOR COMBINED PICTURES

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE		
1	MEAN	6580.0833	1	6580.0833	48.000 (1)	24.000 (3)	3.000 (15)
2	I	225.3333	1	225.3333	24.000 (2)	12.000 (6)	3.000 (16)
3	J	120.3333	1	120.3333	24.000 (3)	3.000 (16)	
4	K	5.3333	1	5.3333	24.000 (4)	12.000 (8)	3.000 (16)
5	M	133.7917	2	66.8958	16.000 (5)	8.000 (10)	1.000 (18)
6	IJ	90.7500	1	90.7500	12.000 (6)	3.000 (16)	
7	IK	6.7500	1	6.7500	12.000 (7)	6.000 (12)	3.000 (16)
8	JK	14.0833	1	14.0833	12.000 (8)	3.000 (16)	
9	IM	62.0417	2	31.0208	8.000 (9)	4.000 (13)	1.000 (18)
10	JM	75.2917	2	37.6458	8.000 (10)	1.000 (18)	
11	KM	274.0417	2	137.0208	8.000 (11)	4.000 (15)	1.000 (18)
12	IJK	33.3333	1	33.3333	6.000 (12)	3.000 (16)	
13	IJM	3.8750	2	1.9375	4.000 (13)	1.000 (18)	
14	IKM	25.1250	2	12.5625	4.000 (14)	2.000 (17)	1.000 (18)
15	JKM	47.5417	2	23.7708	4.000 (15)	1.000 (18)	
16	R (IJK)	153.3333	8	19.1667	3.000 (16)		
17	IJKM	.2917	2	.1458	2.000 (17)	1.000 (18)	
18	MR (IJK)	268.6667	16	16.7917	1.000 (18)		

ANALYSIS 12

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): SUMMARY ANALYSIS OF VARIANCE TABLE FOR MYKLEBUST'S THREE LANGUAGE SAMPLE; TOTAL WORDS PER SENTENCES FOR COMBINED PICTURES, AS PER MYKLEBUST

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE		
1	MEAN	362.7251	1	362.7251	48.000 (1)	24.000 (3)	3.000 (16)
2	I	7.0764	1	7.0764	24.000 (2)	12.000 (6)	3.000 (16)
3	J	3.4723	1	3.4723	24.000 (3)	3.000 (16)	
4	K	3.0958	1	3.0958	24.000 (4)	12.000 (8)	3.000 (16)
5	M	9.5083	2	4.7542	16.000 (5)	8.000 (10)	1.000 (18)
6	IJ	.7081	1	.7081	12.000 (6)	3.000 (16)	
7	IK	5.0765	1	5.0765	12.000 (7)	6.000 (12)	3.000 (16)
8	JK	7.6082	1	7.6082	12.000 (8)	3.000 (16)	
9	IM	8.3559	2	4.1780	8.000 (9)	4.000 (13)	1.000 (18)
10	JM	10.7736	2	5.3868	8.000 (10)	1.000 (18)	
11	KM	27.4857	2	13.7428	8.000 (11)	4.000 (15)	1.000 (18)
12	IJK	.1716	1	.1716	6.000 (12)	3.000 (16)	
13	IJM	3.0451	2	1.5225	4.000 (13)	1.000 (18)	
14	IKM	.2672	2	.1336	4.000 (14)	2.000 (17)	1.000 (18)
15	JKM	2.8679	2	1.4339	4.000 (15)	1.000 (18)	
16	R (IJK)	16.3421	8	2.0428	3.000 (16)		
17	IJKM	4.6665	2	2.3332	2.000 (17)	1.000 (18)	
18	MR (IJK)	37.4019	16	2.3376	1.000 (18)		

ANALYSIS 13

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): SUMMARY ANALYSIS OF VARIANCE TABLE FOR MYKLEBUST'S THREE LANGUAGE SAMPLE PICTURES; TOTAL WORDS PER SENTENCES FOR COMBINED PICTURES, NO MODIFICATION

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE		
1	MEAN	1098.9231	1	1098.9231	48.000 (1)	24.000 (3)	3.000 (16)
2	I	3.9045	1	3.9045	24.000 (2)	12.000 (6)	3.000 (16)
3	J	.9833	1	.9833	24.000 (3)	3.000 (16)	
4	K	39.6942	1	39.6942	24.000 (4)	12.000 (8)	3.000 (16)
5	M	6.8567	2	3.4284	16.000 (5)	8.000 (10)	1.000 (18)
6	IJ	.0825	1	.0825	12.000 (6)	3.000 (16)	
7	IK	20.9484	1	20.9484	12.000 (7)	6.000 (12)	3.000 (16)
8	JK	.0059	1	.0059	12.000 (8)	3.000 (16)	
9	IM	4.6145	2	2.3073	8.000 (9)	4.000 (13)	1.000 (18)
10	JM	15.2474	2	7.6237	8.000 (10)	1.000 (18)	
11	KM	11.0392	2	5.5196	8.000 (11)	4.000 (15)	1.000 (18)
12	IJK	18.6128	1	18.6128	6.000 (12)	3.000 (16)	
13	IJM	.8225	2	.4112	4.000 (13)	1.000 (18)	
14	IKM	2.7200	2	1.3600	4.000 (14)	2.000 (17)	1.000 (18)
15	JKM	.9512	2	.4756	4.000 (15)	1.000 (18)	
16	R (IJK)	14.2175	8	1.7772	3.000 (16)		
17	IJKM	5.6281	2	2.8141	2.000 (17)	1.000 (18)	
18	MR (IJK)	51.0454	16	3.1903	1.000 (18)		

ANALYSIS 14

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): SUMMARY ANALYSIS OF VARIANCE TABLE FOR MYKLEBUST'S THREE LANGUAGE SAMPLE PICTURES; TOTAL ABSTRACTNESS - CONCRETENESS SCORE FOR COMBINED PICTURES

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE		
1	MEAN	2408.3333	1	2408.3333	48.000 (1)	24.000 (3)	3.000 (16)
2	I	33.3333	1	33.3333	24.000 (2)	12.000 (6)	3.000 (16)
3	J	18.7500	1	18.7500	24.000 (3)	3.000 (16)	
4	K	0.0000	1	0.0000	24.000 (4)	12.000 (8)	3.000 (16)
5	M	7.5417	2	3.7708	16.000 (5)	8.000 (10)	1.000 (18)
6	IJ	18.7500	1	18.7500	12.000 (6)	3.000 (16)	
7	IK	27.0000	1	27.0000	12.000 (7)	6.000 (12)	3.000 (16)
8	JK	6.7500	1	6.7500	12.000 (8)	3.000 (16)	
9	IM	9.2917	2	4.6458	8.000 (9)	4.000 (13)	1.000 (18)
10	JM	30.8750	2	15.4375	8.000 (10)	1.000 (18)	
11	KM	34.1250	2	17.0625	8.000 (11)	4.000 (15)	1.000 (18)
12	IJK	.7500	1	.7500	6.000 (12)	3.000 (16)	
13	IJM	12.1250	2	6.0625	4.000 (13)	1.000 (18)	
14	IKM	17.3750	2	8.6875	4.000 (14)	2.000 (17)	1.000 (18)
15	JKM	3.1250	2	1.5625	4.000 (15)	1.000 (18)	
16	R (IJK)	35.6667	8	4.4583	3.000 (16)		
17	IJKM	22.8750	2	11.4375	2.000 (17)	1.000 (18)	
18	MR (IJK)	79.3333	16	4.9583	1.000 (18)		

ANALYSIS 15

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): SUMMARY ANALYSIS OF VARIANCE TABLE FOR MYKLEBUST'S THREE LANGUAGE SAMPLE PICTURES; AVERAGE ABSTRACTNESS - CONCRETENESS SCORE FOR COMBINED PICTURES

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE		
1	MEAN	268.1911	1	268.1911	48.000 (1)	24.000 (3)	3.000 (16)
2	I	3.6852	1	3.6852	24.000 (2)	12.000 (6)	3.000 (16)
3	J	2.0750	1	2.0750	24.000 (3)	3.000 (16)	
4	K	.0000	1	.0000	24.000 (4)	12.000 (8)	3.000 (16)
5	M	.8445	2	.4223	16.000 (5)	8.000 (10)	1.000 (18)
6	IJ	2.0750	1	2.0750	12.000 (6)	3.000 (16)	
7	IK	3.0000	1	3.0000	12.000 (7)	6.000 (12)	3.000 (16)
8	JK	.7500	1	.7500	12.000 (8)	3.000 (16)	
9	IM	1.0362	2	.5181	8.000 (9)	4.000 (13)	1.000 (18)
10	JM	3.4236	2	1.7118	8.000 (10)	1.000 (18)	
11	KM	3.7783	2	1.8892	8.000 (11)	4.000 (15)	1.000 (18)
12	IJK	.0833	1	.0833	6.000 (12)	3.000 (16)	
13	IJM	1.3486	2	.6743	4.000 (13)	1.000 (18)	
14	IKM	1.9178	2	.9589	4.000 (14)	2.000 (17)	1.000 (18)
15	JKM	.3445	2	.1722	4.000 (15)	1.000 (18)	
16	R (IJK)	3.9882	8	.4985	3.000 (16)		
17	IJKM	2.5417	2	1.2708	2.000 (17)	1.000 (18)	
18	MR (IJK)	8.8309	16	.5519	1.000 (18)		

ANALYSIS 16

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): SUMMARY ANALYSIS OF VARIANCE TABLE FOR ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES TOTAL RAW SCORE

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE		
1	MEAN	884540.2500	1	884540.2500	64.000 (1)	32.000 (3)	4.000 (16)
2	I	7965.5625	1	7965.5625	32.000 (2)	16.000 (6)	4.000 (16)
3	J	19600.0000	1	19600.0000	32.000 (3)	4.000 (16)	
4	K	5587.5625	1	5587.5625	32.000 (4)	16.000 (8)	4.000 (16)
5	M	17957.3750	3	5985.7917	16.000 (5)	8.000 (10)	1.000 (18)
6	IJ	175.5625	1	175.5625	16.000 (6)	4.000 (16)	
7	IK	49506.2500	1	49506.2500	16.000 (7)	8.000 (12)	4.000 (16)
8	JK	1870.5625	1	1870.5625	16.000 (8)	4.000 (16)	
9	IM	2188.8125	3	729.6042	8.000 (9)	4.000 (13)	1.000 (18)
10	JM	195.3750	3	65.1250	8.000 (10)	1.000 (18)	
11	KM	377.5625	3	125.8542	8.000 (11)	4.000 (15)	1.000 (18)
12	IJK	961.0000	1	961.0000	8.000 (12)	4.000 (16)	
13	IJM	827.5625	3	275.8542	4.000 (13)	1.000 (18)	
14	IKM	1177.1250	3	392.3750	4.000 (14)	2.000 (17)	1.000 (18)
15	JKM	336.8125	3	112.2708	4.000 (15)	1.000 (18)	
16	R (IJK)	10416.7500	8	1302.0937	4.000 (16)		
17	IJKM	1347.6250	3	449.2083	2.000 (17)	1.000 (18)	
18	MR (IJK)	5842.2500	24	243.4271	1.000 (18)		

ANALYSIS 17

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): SUMMARY ANALYSIS OF VARIANCE TABLE FOR PEABODY PICTURE VOCABULARY TEST RAW SCORE

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE		
1	MEAN	115770.0625	1	115770.0625	64.000 (1)	32.000 (3)	4.000 (16)
2	I	1296.0000	1	1296.0000	32.000 (2)	16.000 (6)	4.000 (16)
3	J	2002.5625	1	2002.5625	32.000 (3)	4.000 (16)	
4	K	351.5625	1	351.5625	32.000 (4)	16.000 (8)	4.000 (16)
5	M	505.0625	3	168.3542	16.000 (5)	8.000 (10)	1.000 (18)
6	IJ	625.0000	1	625.0000	16.000 (6)	4.000 (16)	
7	IK	2070.2500	1	2070.2500	16.000 (7)	8.000 (12)	4.000 (16)
8	JK	33.0625	1	33.0625	16.000 (8)	4.000 (16)	
9	IM	690.8750	3	230.2917	8.000 (9)	4.000 (13)	1.000 (18)
10	JM	160.8125	3	53.6042	8.000 (10)	1.000 (18)	
11	KM	453.5625	3	151.1875	8.000 (11)	4.000 (15)	1.000 (18)
12	IJK	110.2500	1	110.2500	8.000 (12)	4.000 (16)	
13	IJM	51.1250	3	17.0417	4.000 (13)	1.000 (18)	
14	IKM	51.1250	3	17.0417	4.000 (14)	2.000 (17)	1.000 (18)
15	JKM	279.3125	3	93.1042	4.000 (15)	1.000 (18)	
16	R (IJK)	605.2500	8	75.6563	4.000 (16)		
17	IJKM	125.3750	3	41.7917	2.000 (17)	1.000 (18)	
18	MR (IJK)	506.7500	24	21.1146	1.000 (18)		

ANALYSIS 18

LONGITUDINAL GAIN ANALYSES (1972-1973 AND 1973-1974): SUMMARY ANALYSIS OF VARIANCE TABLE FOR MECHAM VERBAL LANGUAGE DEVELOPMENT SCALE RAW SCORE

	SOURCE	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	EXPECTED MEAN SQUARE		
1	MEAN	1844843.0625	1	1844843.0625	64.000 (1)	32.000 (3)	4.000 (16)
2	I	735.7656	1	735.7656	32.000 (2)	16.000 (6)	4.000 (16)
3	J	10050.0625	1	10050.0625	32.000 (3)	4.000 (16)	
4	K	6642.2500	1	6642.2500	32.000 (4)	16.000 (8)	4.000 (16)
5	M	1194279.5937	3	398093.1979	16.000 (5)	8.000 (10)	1.000 (18)
6	IJ	3320.6406	1	3320.6406	16.000 (6)	4.000 (16)	
7	IK	18530.0156	1	18530.0156	16.000 (7)	8.000 (12)	4.000 (16)
8	JK	885.0625	1	885.0625	16.000 (8)	4.000 (16)	
9	IM	1365.6406	3	455.2135	8.000 (9)	4.000 (13)	1.000 (18)
10	JM	20377.8437	3	6792.6146	8.000 (10)	1.000 (18)	
11	KM	5831.6562	3	1943.8854	8.000 (11)	4.000 (15)	1.000 (18)
12	IJK	4.5156	1	4.5156	8.000 (12)	4.000 (16)	
13	IJM	9660.5156	3	3220.1719	4.000 (13)	1.000 (18)	
14	IKM	20227.6406	3	6742.5469	4.000 (14)	2.000 (17)	1.000 (18)
15	JKM	719.4687	3	239.8229	4.000 (15)	1.000 (18)	
16	R (IJK)	4970.0000	8	621.2500	4.000 (16)		
17	IJKM	821.2656	3	273.7552	2.000 (17)	1.000 (18)	
18	MR (IJK)	7174.0000	24	298.9167	1.000 (18)		

APPENDIX D

F Ratios For Analyses

F Ratios For Gain Analyses

Source	Analysis								
	1	2	3	4	5	6	10	11	12
1 (Mean)	22.05	52.33	183.70*	11.52	5.91	21.51	28.27	54.68	104.46
2 (I, Trt.)	5.27	2.12	.37	7.35	2.95	2.89	2.51	2.48	9.99
3 (J, IQ)	21.84**	30.56**	29.48**	37.12**	17.30**	61.03**	8.61*	6.28*	1.70
4 (K, Sex)	.63	1.73	.88	.01	.11	.09	1.86	.38	.41
5 (M, Meas.)	116.41	.52	17.64	.03	.21	.00	1.07	1.78	.88
6 IJ	.71	2.53	.67	.52	.55	3.84	3.20	4.73	.35
7 IK	.10	.30	2.94	.44	1.38	.05	.16	.20	29.58
8 JK	.15	2.89	3.86	2.59	1.23	1.67	5.28	.73	3.72
9 IM	.05	.27	20.49	.22	.20	.38	1.29	6.01	2.74
10 JM	.00	.85	.02	4.85*	.52	2.55	2.54	2.24	2.30
11 KM	2.79	4.95	.27	.07	.00	.15	57.30*	5.76	9.58
12 IJK	4.60*	3.00	1.26	1.68	.81	2.77	9.22*	1.74	.08
13 IJM	.30	10.98**	.32	2.00	.69	3.61	.30	.12	.65

F Ratios For Gain Analyses (continued)

Source	Analysis								
	1	2	3	4	5	6	10	11	12
14 IKM	1.47	42.63	3097.13*	41.47	16.91	10.39	.97	86.16*	.06
15 JKM	.10	.81	1.84	1.32	1.13	1.14	.09	1.42	.61
16 R(IJK)	----	----	----	----	----	----	----	----	----
17 IJKM	.06	.10	.00	.02	.04	.38	.31	.01	1.00
18 MR(IJK)	----	----	----	----	----	----	----	----	----

* $P < .05$

** $P < .01$

F Ratios For Gain Analyses (continued)

Source	Analysis					
	13	14	15	16	17	18
1 (Mean)	1117.59*	128.44	129.25	45.13	57.81	183.57*
2 (I, Trt.)	47.33	1.78	1.78	45.37	2.07	.22
3 (J, IQ)	.55	4.21	4.16	15.05**	26.47**	16.18**
4 (K, Sex)	6727.83**	0.00	0.00	2.99	10.63	7.50
5 (M, Meas.)	.45	.24	.25	91.91**	3.14	58.61**
6 IJ	.05	4.21	4.16	.13	8.26*	5.35*
7 IK	1.13	36.00	36.01	51.52	18.78	4103.56**
8 JK	.00	1.51	1.50	1.44	.44	1.42
9 IM	5.61	.77	.77	2.64	13.51*	.14
10 JM	2.39	3.11	3.10	.27	2.54	22.72**
11 KM	11.61	10.92	10.97	1.12	1.62	8.11
12 IJK	10.47*	.17	.17	.74	1.46	.01
13 IJM	.13	1.22	1.22	1.13	.81	10.77**

F Ratios For Gain Analyses (continued)

Source	Analysis					
	13	14	15	16	17	18
14 IKM	.48	.76	.75	.87	.41	24.63*
15 JKM	.15	.32	.31	.46	4.41*	.80
16 R(IJK)	----	----	----	----	----	----
17 IJKM	.88	2.31	2.30	1.85	1.98	.92
18 MR(IJK)	----	----	----	----	----	----

* $P < .05$

** $P < .01$

F Ratios For Gain Analyses (continued)

Source	Analysis		
	7	8	9
1 (Mean)	54.47	24.27	12.11
2 (I, Status)	6.20	17.64	140.99
3 (J, Trt.)	2.16	67.58	3.95
4 (K, IQ)	90.38**	66.93**	37.76
5 (L, Sex)	.10	.39	.19
6 (M, Meas.)	.03	.07	1.37
7 IJ	4.40	.02	5.22
8 IK	13.38**	2.73	.20
9 JK	4.38*	.13	1.22
10 IL	1652.90*	16.90	.03
11 JL	.13	0.00	.38
12 KL	4.61*	5.30*	1.25
13 IM	.06	0.00	.14
14 JM	2.63	14.59	4.11
15 KM	1.77	5.63*	.21
16 LM	0.00	.74	.30
17 IJK	1.46	2.31	.01
18 IJL	2.85	2894.63*	.53
19 IKL	0.00	.09	.41
20 JKL	4.03*	4.28*	4.08

F Ratios For Gain Analyses (continued)

Source	Analysis		
	7	8	9
21 IJM	.01	.01	.12
22 IKM	2.17	2.19	.16
23 JKM	1.94	.14	0.00
24 ILM	5.88	1.57	.92
25 JLM	27.20	42.14	5.44
26 KLM	2.52	2.08	.80
27 IJKL	.64	0.00	.35
28 IJKM	3.76	8.10**	.87
29 IJLM	1.14	45.94	13.62
30 IKLM	.08	.32	.15
31 JKLM	.32	.07	.10
32 R(IJKL)	----	----	----
33 IJKLM	.27	0.00	0.00
34 MR(IJKL)	----	----	----

* $P < .05$

** $P < .01$