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THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

AN EXPERIMENTAL INVESTIGATION OF THE RELATIVE EFFECTIVENESS OF GROUP AND INDIVIDUAL VOICE INSTRUCTION AT THE BEGINNING LEVEL TO HIGH SCHOOL STUDENTS

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Thesis

AN EXPERIMENTAL INVESTIGATION OF THE RELATIVE EFFECTIVENESS OF GROUP AND INDIVIDUAL VOICE INSTRUCTION AT THE BEGINNING LEVEL TO HIGH SCHOOL STUDENTS

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ABSTRACT

This dissertation was a study of the relative effectiveness of group and individual voice instruction at the beginning level to high school students. The null hypothesis was established that there is no significant difference in performance achievement between students taught in classes and students taught by private instruction. Among other major hypotheses were: (1) there is no significant difference between the evaluations of the three adjudicators; and (2) there is no significant difference in performance achievement between the group of boys, the group of girls, and the mixed group. Investigation revealed a very limited amount of research in the area.

The twenty-one students, thirteen girls and eight boys, participating in the study were assigned to the three classes or private study on the basis of the scores on the Musical Aptitude Test by Whistler and Thorpe. The investigator did all of the teaching. The same three adjudicators heard and evaluated all the students at the beginning of the study, after the students had had fourteen lessons, and at the close of the eight-month study period. At these three evaluations the adjudicators marked the errors on new copies of the music

as they occurred in performance. They also judged the students on eight aspects of vocal technique by giving a number rating to each item. This chapter revealed the statistical technique of analysis of variance as it was applied to the data collected in order to determine which items, if any, in the study showed enough variability to be statistically significant.

In Chapter II the discussion focused upon the method of procedure preliminary to and during the study, along with the discussion of the statistical procedures used.

Chapter III included all of the analysis of variance tables for the two-way, three-way, and four-way classifications of variables which were necessary in the analysis of the data and tested the five established null hypotheses of no difference in means.

Chapter IV included both conclusions and recommendations. The major conclusions were as follows:

1. class-taught students were not lower achievers than were private-taught students; thus, they must have been equal to or better than the private-taught students;
2. adjudicators are likely to disagree on subjective evaluation, but to be consistent with themselves in the evaluation scores they give;
3. the class of both boys and girls created an atmosphere which was more conducive to learning voice

than either the class of boys or girls.

Major recommendations were as follows:

1. more voice teaching should be done in classes by studio voice teachers, and by public school music teachers;
2. voice classes should be encouraged which include both boys and girls.

ACKNOWLEDGEMENTS

I am particularly grateful to the twenty-one high school young people who made this experimental study possible by participating as voice students.

I am indebted to Mrs. Elizabeth Parham, Mr. E. J. Schultz, and Dr. Orcenith S. Smith, the adjudicators for the three evaluations, who also gave professional guidance during the planning of the study. For their professional services, their sincere interest, cooperation, and encouragement throughout the study, I am most appreciative.

Dr. Gail Shannon and Dr. Glenn R. Snider each served as chairman of my committee. Dr. Shannon guided the planning of the study and the actual investigation. Dr. Snider accepted the chairmanship before the writing of the dissertation began and continued through its completion. The valued judgments of both these men contributed greatly to the successful completion of this study.

To Dr. Leonard S. Laws who patiently led me through the statistical procedures and guided my treatment of the data, I am deeply grateful.

It is impossible to verbalize a realistic picture of the stress and strain, the sacrifice, and the general lack

of normal home life that my dedicated and loving wife, Ruth, and our four children have endured these past seven years--Ronda Jo, age 12; Vicki Lyn, age 10; Terry Lee, age 8; and Darryl Joe, age 6. All have gone far beyond any normal "call of duty" to home and family life in order that everything could be secondary to the demand of "Daddy and the Doctoral program." It is with deep emotion that I say thank you to each member of my family.

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AN EXPERIMENTAL INVESTIGATION OF THE RELATIVE EFFECTIVENESS OF GROUP AND INDIVIDUAL VOICE INSTRUCTION AT THE BEGINNING LEVEL TO HIGH SCHOOL STUDENTS

INTRODUCTION AND STATEMENT OF PROBLEM

Within the community in which the author lives, there had been more high school students desiring to study voice with a college voice instructor than the time of the instructor allowed. Most of the time this demand for voice instruction exceeded the supply of private voice teachers in the community.

Each year as requests for instruction in voice from high school students were made and had to be denied there was some thought of providing voice instruction for them in regular classes. Since the method of teaching voice in regular classes is rarely done in the United States, and since the fee for such instruction would necessarily be less than for private instruction, a practice which might be frowned upon by private teachers, the idea was not implemented. There is a general belief among music educators that private instruction is superior to class instruction in the area of voice. This belief has contributed to the present general practice

of not having class voice instruction offered through the college. Teaching voice through regular classes, however, was not new since the practice started in the United States shortly after the turn of this century.[1] As a substitute for private voice instruction, however, this method had not made much progress; but it continued to be used to some degree and very gradually was accepted by an increasing number of music educators. The teaching of voice to classes as a method was accepted and encouraged by those who designed song collections and instructional books for use in voice classes. In 1917 the book Universal Song by Fred Haywood opened the way for those which followed with class voice material. The latest ones were the volumes Guide for Young Singers by Millard H. Gates, published in 1959, and Functional Lessons In Singing by Ivan Trusler and Walter Ehret, published in 1960.

It was obvious that voice taught in classes would accomplish three things: (1) economize the time of the instructor, (2) make voice instruction available to more pupils, and (3) be of financial benefit to the pupils and the teacher. Why then did not the method of teaching voice in classes replace private voice instruction, at least in areas and communities where the pupil demand exceeded the teacher supply? The answer to this question, in part at least, was the

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[1]Cleo Resler, "A Comparative Study of the Relative Values of Voice Class Procedures" (unpublished Master's thesis, Ohio State University, 1940), p. 3.

belief that voice instruction by the class method would not produce results equal to private voice instruction.

Among the many different instruments used for musical expression the vocal instrument is unique. It is a natural instrument, man's universal instrument, the only instrument which combines music and words, and an instrument which is a part of the performer. Because of these unique characteristics, many have believed that vocal training should be pursued through private instruction. On the other hand, perhaps it is because of these unique characteristics that voice study could be as effective when done in a class setting.

In the study of voice culture, the uniqueness of the instrument presents problems to pupil and teacher alike that are also unique as compared to other areas of applied music study. The voice is not heard by the performer as it is by others, thus the pupil must learn to listen and develop an ability to discriminate between good and bad tone quality and pure and impure vowels. By keen listening he must develop a sensitivity to intonation and articulation. In a class each pupil will have more opportunity to hear others, and to hear them as the teacher does, which might help him to understand his vocal problems more readily and more clearly. To realize that every pupil in the class has problems may be very reassuring to each class member and is certainly related to motivation, a basic requirement for effective learning. The element of competition, although not stimulated

by the teacher, may well play an important role in motivation in a class situation.

If either in spite of or because of the unique characteristics of the vocal instrument and voice study, voice instruction in classes could prove to be equal to private instruction in voice, then the method of class voice instruction should result in more pupils being taught by fewer teachers providing financial and educational benefits to both.

By the same logic, all vocal music teachers should strive to teach voice techniques on a higher level through the regular school class room vocal music time. If voice can be taught effectively in classes of six or eight, then perhaps a glee club or chorus of thirty-five to sixty could be taught much of the same things. Since, as a rule, a glee club, chorus, or singing time for a class will occur more than once a week; it may be that the larger groups can accomplish as much as a small group meeting once a week.

Statement of the Problem

The problem of this study was to investigate the relative effectiveness of group and individual voice instruction at the beginning level to high school students. The null hypothesis was established that there is no significant difference in performance achievement between beginning high school students taught in classes and those taught by private instruction.

More specifically this study was concerned with the

following hypotheses:

1. There is no significant difference between the scores made by the students on the first, second, and third evaluations.
2. There is no significant difference between the evaluations of the three adjudicators.
3. There is no significant difference in performance achievement between the group of boys, the group of girls, and the mixed group.
4. There is no significant difference between the scores of the eight objective components or those of the eight subjective components.
5. There is no significant difference between the various possible interactions of these variables.

Assumptions

It was assumed that the students used in this study were a normal sampling of the students in the community who over a period of years would desire instruction in voice.

The evaluation instrument, it was assumed, was constructed in a manner that permitted the adjudicators to discriminate as to the effectiveness of performance and thus show the relative effectiveness of the voice instruction to groups and individuals.

The third assumption was that the selected adjudicators, who were professionally trained, were competent to use the evaluation guide.

Sampling

No attempt was made to screen or select particular students. The study was open to all students in the Winfield High School, grades nine through twelve, who wanted to participate in the study unless they had more than six months private voice study. Screening might have eliminated the loss of the six students who started and did not finish.

Limitations

This study was limited to the small percentage of Winfield High School students who desired to receive voice instruction from the investigator and were willing to participate in this study.

The same instructional materials and basic repertoire were used for all students in classes and those who took private lessons.

The study was done over an eight month period from the last week in September through the second week in May with each participating student taking a total of thirty lessons. Class lessons were sixty minutes and private lessons were thirty minutes long.

Definitions

Adjudicator meant a judge or evaluator. Beginning level was defined for this study as any high school student who had not had more than six months private voice instruction. Class was used in contrast to private as a means of

teaching voice. Component was the designation given to the eight different items in the objective and subjective halves of the evaluation guide. Evaluation was based on the three times the adjudicators heard the students sing. Evaluation guide was the name given to the form designed by the investigator for the purpose of accurately measuring the vocal performances. Group meant the class and private students who sang the same selections respectively for the evaluations. These were divided into classes; one for girls, one for boys, and one for a mixed group of boys and girls. Investigator was the person doing the study. Objective evaluation meant that certain evaluations were made on the basis of correct or incorrect performance. Private meant those students individually, or referred to as a group, who took private lessons. Subjective evaluation meant that certain evaluations were made on the basis of the judgment of the adjudicators as to the degree of proficiency in vocal techniques displayed by the performers. Type referred to the two methods of voice instruction, class and private, used in this study.

Method of Study

Twenty-seven students, sixteen girls and eleven boys, started this study; but three girls and three boys dropped out at different times leaving twenty-one who finished. These students were designated to be in one of the three classes or to study privately. The investigator did all of the teaching and followed the same procedures and methods

for all. All students were heard and evaluated by three adjudicators at the beginning of the study, after the students had had fourteen lessons, and at the close of the study period. At these three evaluations the adjudicators marked the errors, as they occurred in performance on new copies of the music. They also judged the students on eight aspects of vocal technique by giving a number rating to each item. The statistical technique of analysis of variance was applied to the data collected in order to determine which items, if any, in the study showed enough variability to be statistically significant and to determine the relative effectiveness of voice teaching to classes and to individual students.

Related Research

In reviewing the four Master's theses which dealt with the study of voice taught by classes, it was discovered that none of them investigated the relative effectiveness of voice taught in a class as compared to private voice instruction.

In 1937 Quist[1] did a Master's thesis in which she analyzed and compared techniques used in class voice instruction. A major part of this thesis was devoted to concepts of breathing. Other elements included were: tone quality, diction, and interpretation. Her main conclusion was that class voice could be taught satisfactorily by the different

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[1]Margaret A. Quist, "Comparative Analysis of Class Voice Techniques" (unpublished Master's thesis, University of Idaho, 1937).

techniques analyzed.

The study done by Resler[1] in 1940 was a thorough coverage of class voice for high school students. Based upon his list of values of class voice and his historical survey of teaching voice in classes in the United States, Resler developed a sound defense for the concept that voice study for high school students was significantly important.

From a survey of available material for voice classes, Resler selected "Class Lessons in Singing" by Pierce and Liebling and "Pathways of Song" by LaForge and Earhart, Vol. I, which he used with two mixed classes of twelve students in an experiment of teaching voice to classes.

From this study came the recommendation that a combination of voice class procedures would be more effective than limiting to one procedure. For example, the use of a method book along with a repertoire of songs, rather than putting the emphasis on one or the other; and having some solo singing within each lesson, but not using the entire lesson period for individual work, were more profitable procedures.

A study was completed by Strom[2] in which twenty-seven voice method publications were evaluated. An evaluation instrument was designed and used for this purpose with the results of the evaluation shown on a special chart. The bulk

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[1]Cleo Resler, "A Comparative Study of the Relative Values of Voice Class Procedures" (unpublished Master's thesis, Ohio State University, 1940).

[2]Charles W. Strom, "An Evaluation of Voice Class Methods" (unpublished Master's thesis, University of Idaho, 1942).

of this study consisted of a brief review of each class method. The fact that twenty-seven volumes had been written to aid in class voice teaching was indicative of a belief on the part of many that class voice was a sound means of teaching voice.

Utterback[1] conducted a study in which a major consideration was class voice instruction as opposed to individual voice instruction. The pros and cons were well-outlined and discussed in this study but no attempt was made to prove that the two methods were equal or that either was better than the other. She concluded that class voice instruction should be given to senior high school students.

More closely related to this study in form than these four Master's theses was the Hutcherson[2] Doctoral study. This study included a review of related material, ten study units outlining a music education program of keyboard experience for the whole classroom at the third grade level, and the procedures and results of two experimental projects involving matched groups of children and of college students at the beginning level of piano for a period of fifteen weeks.

With the children the difference in test results and

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[1]Madge Winifred Utterback, "A Treatise On Class Voice Instruction in Senior High School" (unpublished Master's thesis, The University of Arizona, 1945).

[2]Rita Johnson Hutcherson, Ph. D., "Group Instruction In Piano: An Investigation of the Relative Effectiveness of Group and Individual Piano Instruction at Beginning Level" (State University of Iowa, 1955).

questionnaire findings lacked statistical significance so the only conclusion was that economy of teacher-time resulted.

Test results with the college students with regard to rhythm proficiency in sight performance showed the difference in the mean error made by the two groups to be statistically significant at the 5 per cent level in favor of the group-taught pupils.

Since the research in the area of class teaching in an applied field has been thin and the findings limited, it was appropriate to do this study. It was hoped that this additional research would make some contribution and open the way for further research in this area.

The major conclusions arrived at on the basis of this study were as follows: adjudicators tend to be consistent with themselves in the evaluation scores they give; class-taught students achieved as much as did the private-taught students; and the demands of a musical composition will affect the evaluation scores on the objective items.

The recommendations, in light of the conclusions, were: voice should be taught to students in classes; for solo performance, one adjudicator is sufficient; and there are several ways to arrange students for voice study--sex, ability, voice range, or voice classification. This last item indicates that additional investigation would be appropriate.

CHAPTER II

METHOD OF PROCEDURE AND STATISTICAL PROCEDURES USED

Many preliminary details had to be worked out before this study actually began. Although many procedures of the study were predetermined, there were some that developed as the study progressed. Analysis of variance was identified as the appropriate statistical technique for this study.

Preliminary Procedures

Before the teaching was begun, it was necessary to have the study structured and well-organized. Basic requirements were: (1) the development of an evaluation guide which would be comprehensive, discriminatory, and yet efficient with regard to time; (2) securing the services of three well-qualified adjudicators who understood the study and were interested in such an investigation; (3) the motivation and organization of the students who were to participate; (4) the selection of appropriate standardized tests used to determine the musical aptitude and achievement of each student; and (5) the evaluation of materials and the selecting of appropriate repertoire.

Evaluation Form

The first step taken in the procedure was to develop an evaluation form. This form had to be one which would be standard for the performers and adjudicators alike. The form had to force specific and discriminative evaluation. From the study of several adjudication forms, talking with voice instructors, and from experience, the division into two categories resulted. Certain criteria used in evaluation can be recognized as correct or incorrect, and other criteria used will always be subject to the opinion of the evaluator. In light of this the evaluation guide[1] had an objective half, including those items which can be determined as correct or incorrect; and a subjective half, including those items which will vary according to the opinion of the evaluator. After collecting a large number of possible evaluative criteria, sixteen were selected. In the objective half the following were used: intonation, rhythm, dynamics, phrasing, vowels, consonants, phrase endings, and intervals. In order to make this half of the evaluation form scientifically sound, provision was made for each adjudicator to have a new copy of the musical selection for each performer. On this music the adjudicator marked all errors.

In the subjective half the following were used: breath support, breath control, tone quality, attitude, artistry

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[1]See appendix B.

and interpretation, posture, tempo, and memory. In order to force the adjudicators to be discriminative on these items, the guide provides for a rating scale from zero to ten, divided into levels of poor (0, 1, or 2); good (4, 5, or 6); and excellent (8, 9, or 10). The omission of the numbers 3 and 7 was done intentionally to bring about more discriminative judgment from the adjudicators.

Adjudicators

The second step in the procedure was to find three capable professors of music who would be interested enough in this study to give the necessary time to be the adjudicators. In order to test the possible variability of adjudicators, it was necessary to use three. Three professors of the Music School of The University of Oklahoma took a sincere interest in the study and agreed to be the adjudicators. They agreed to travel to Winfield, Kansas, for the three evaluations. These three persons, Mrs. Elizabeth Parham, Dr. Orcenith S. Smith, and Mr. E. J. Schultz made an excellent team for this specific job.

Mrs. Parham has had years of experience teaching high school and college voice students. She teaches vocal pedagogy and also adjudicates many times each year. The two men have entirely different backgrounds. Dr. Smith is a very skilled vocalist and specializes in the teaching of voice. He is in demand as an adjudicator and does as much as his schedule will allow. Mr. Schultz is a specialist in music

education and has had several years experience teaching in public schools. Although he is not now teaching voice, he does much adjudicating and is very well-qualified to do this work.

Students in the Sample

The third procedural step was to determine who would participate in the study as voice students. Interest was created through the high school music department during the spring before the study was to start in the fall of 1959. After school had started in 1959 the investigator was permitted to go before the high school choral groups to explain the purpose and procedures of the study. At this time everyone was invited to participate, but the importance of the study was stressed and no one was to enter into it unless he intended to stay through the entire study. Twenty-seven students, sixteen girls and eleven boys (two seniors, ten juniors, ten sophomores, and five freshmen) volunteered to be a part of the study.

Each one of these students agreed to study as a private student or in a class as the investigator would designate and pay the required fee of $2.00 for a private lesson and $1.00 for a class lesson respectively. They also agreed to provide their own transportation from the high school to Southwestern College for their lessons.

Formation of Groups

With these twenty-seven students it was possible to have one group of nine girls, a group of nine boys, and a mixed group of seven girls and two boys. Out of each group three students were selected to study privately and the other six made up a class. Thus, there were three classes of six students each--a class of girls, one of boys, and the mixed class including four girls and two boys. There were nine students, six girls and three boys, who studied privately.

Standardized Tests

The investigator needed to have some knowledge of the musical aptitude and the musical achievement of this heterogeneous group before starting the actual voice instruction. Also, the students had to be assigned to a class or as a private student by some systematic procedure. Two standardized music tests, the "Musical Aptitude Test, (Series A)," by Harvey S. Whistler and Louis P. Thorpe and the "Diagnostic Tests of Achievement in Music," by M. Lela Kotick and T. L. Torgerson were selected. The A form of the Kotick-Torgerson test was used at the beginning and the B form was given at the completion of the study.

The computation to establish the reliabilities for both of these tests was done by using the Kuder-Richardson formula. In the "Musical Aptitude Test," the test data for 500 pupils--100 each for grades five through nine, inclusive--

was used in the computation. In the "Diagnostic Tests of Achievement in Music," the data was based on grades four through ten with 179 or more cases used for each of the ten quotients. Based on the total-test scores, the reliabilities were for single grade group ranges. This test has no statement as to validity. The test by Whistler and Thorpe, however, states that the statistical validity of the instrument was investigated using 100 pupils, ages 140-159 months with a range of I.Q.'s from 70-134. This validity was correlated with teachers' judgments on two factors and pupil status on three other factors against the total score on the test and against each of the three parts of the test.

Teaching Material Used

The next procedural step was to select the musical material to be used. A major factor was economy since the investigator supplied a new copy of music for each of the three adjudicators for each performer at each of the three evaluations. Research was undertaken to find a collection of suitable music which would include nine selections that could be used for the evaluations. Such a collection had to consist of good musical literature, with a variety of songs that would appeal to high school girls and boys, with ranges that were not too demanding, and that was not technically too difficult. The collection that met these requirements was Something To Sing, First-Year Songs for Study and Recreation, compiled by W. J. Baltzell and W. A. F., and published

by the Oliver Ditson Company.

As a companion to this collection of songs each student was required to have a voice method book. This book needed to include a good number of progressively difficult exercises, clear explanations of voice terminology and vocal concepts, and some songs of recognized worth. The Class Method of Voice Culture by D. A. Clippinger was selected as the companion book from other similar books available.

Procedures of the Study

To get the study underway, it was necessary to orientate the students to the project and to administer the two standardized tests. After the tests were given and before any lessons were given, the investigator scored the tests and determined which students were to study in classes and which ones were to study privately. The cooperation of the high school music teachers and administration was secured and each student was permitted to leave a music class once a week for his lesson.

Before the first evaluation of the students by the three adjudicators, the investigator spent three hours in preparing the adjudicators for the evaluation. Other miscellaneous details had to be worked out and organized before the first evaluation took place.

In spite of the effort made to retain all of the students to the end of the study, it was impossible to accomplish this objective.

The three evaluations were conducted in the same manner with the same adjudicators in October, February, and May. Although the classes were grouped heterogeneously and the entire study was composed of a heterogeneous group, the teaching procedures, methods, and basic material were the same.

Orientation of Students And Administration of Tests

The study was begun in the last week of September, 1959, when the twenty-seven students met together in the Music Hall Auditorium at Southwestern College, Winfield, Kansas. This meeting was used for orientation and to administer the "Musical Aptitude Test." In the orientation, the purpose and procedures of the study were explained and discussed. The students were made aware of their importance to the study, the seriousness of the study as a controlled experiment, and of their responsibility to give complete cooperation to the investigator and to complete the study. They were asked not to enter into the program unless they expected to finish it. The difference in the amount of the fee, $2.00 for one-half hour private lesson and $1.00 for a one hour class lesson, was explained as was the procedure by which they would be designated as a private student or as a part of a specific class.

The next week another evening meeting of the group was held and the "Diagnostic Test of Achievement in Music" was administered to them by the investigator.

Determining Class And Private Assignment

The scores from the "Musical Aptitude Test, (Series A)" were arranged in ascending order for the girls and for the boys (see Table 1). In the boys group, the second score was two points below the top score. There was a score two points above the lowest score so those two were designated as private students. There was a middle score so it was designated as the third private student. In the girls group, this same pattern did not exist. The second and sixth scores from the top and the second and sixth scores from the bottom were designated as private students. Since there were sixteen scores, either the seventh (57) or eighth (58) score would have been used as the middle score. Because the score of 58 had already been designated, the score of 57 was chosen.

The girls' scores were divided into two groups--the girls class and the mixed class. The top two scores were put into the girls class in order to more nearly match the boys class. Then, alternatingly, the scores were designated for class three and one. The last two scores were put into class three because class one had its quota of nine members. Two boys were needed to make class three complete and a mixed group. There were eleven in the boys group so the transfer of two balanced the three classes. The scores directly above and below the middle score in the boys group were also the fourth scores from the top and the bottom; so, they were transferred. One more private student designation

TABLE 1

APTITUDE TEST SCORES ARRANGED IN DESCENDING ORDER BY SEX

Girls	Score	Group	Boys	Score	Group
Judy Wood	66	I	Woody Joe Hodges	67	II
Carol Biby	65	I*	Alvin Lowrey	65	II*
Sandra Flick	64	III	Cary Sandstrum	63	II
Shirley Holman	62	I	Jim Bailey	63	II
Melanie Thompson	62	I	Don Hodges	62	III
Linda Hill	61	I*			
Sue Nichols	60	III			
Elizabeth Dick	58	I	Roger Holman	58	II*
Trudy Kittelson	57	III*			
Diana Dicken	56	I			
Lin Miller	56	III*			
Mary Swoyer	52	I*	Mike Rayl	53	III
Marcia Young	51	III	Preston Price	51	II
Janice Campbell	50	I	Raymond Shelburn	48	II*
Ilene Fox	43	III*	Allen Lipperd	47	II
Peggy Porter	40	III	Stanley Galbreath	46	II

*Students selected to study privately.

needed to be made for the mixed class. By listing the eight scores already designated for private study, it was discovered that the score of 52 filled in the spot to give a more equal distribution of scores. The score of 53 could have been used; except, it represented one of the two boys in the class. To have five girls and one boy in a class seemed psychologically inappropriate.

Cooperation

Through the excellent cooperation of the high school music instructors and the administration, the students were excused from their one o'clock music class one day each week to participate in the study as a member of a voice class. The participants who were taking private lessons were excused from a music class or a homeroom period once a week for that purpose. All lessons and evaluations were conducted at the college music hall.

On Friday, October 9, 1959, the students were notified of their class or private designation and the time of their first lesson. The date for the first evaluation was set for Saturday, October 24, 1959, allowing only two weeks for the students to prepare two selections. The first two lessons were devoted entirely to helping the students prepare the selections for the first evaluation. On Thursday night, October 22, 1959, each student was given seven minutes to sing his selections with his accompanist from the stage for the investigator. This was done in an attempt to insure

that each student would be able to perform his selections adequately for the first evaluation. The two weeks allowed for preparation was held at a minimum so that the first evaluation would show little or no influence from the investigator.

Orientation of Adjudicators

The three adjudicators came to Winfield on Friday evening, October 23, and met with the investigator for an orientation session. The evaluation instrument was explained by the investigator and discussed by the group. Through some experimenting, it was decided that the eight objective components should be divided among the three adjudicators for scoring, but that all three should score the eight components of the subjective half of the evaluation guide. The objective components were divided by assigning intonation, dynamics, and intervals to one; rhythm, phrasing and phrase endings to one; and vowels and consonants to one. The adjudicators were assigned letters by which they would be represented throughout the study. They evaluated the same objective components each time. The letter "K" was assigned to the judge who evaluated the component parts--phrasing, phrase endings, and rhythm. To the judge who evaluated intonation, dynamics, and intervals was assigned the letter "M". Letter "O" designated the judge who evaluated vowels and consonants.

In an experimental trial run with the investigator singing a selection, purposely making errors, the adjudicators

marked the errors according to their respective assignments of the eight objective components. Out of this trial experience came the need for a marking system. The marks needed to be distinctive and such that they could be quickly applied. The following were agreed upon and used throughout the study: "P" for phrasing; "e" for phrase endings; "√" for rhythm, over the note or rest; "√" for intonation, over the note; "D" for dynamics; "X" for intervals, between the notes; "/" for vowels and consonants, through the vowel or consonant. Using the "√" for rhythm and intonation errors was not confusing because the marks were on different copies of music.

Other Considerations

In preparation for the first evaluation, the students were scheduled, as nearly as possible, to prevent the same selection from being sung consecutively. This order of appearance determined the number designation for each student. Three copies of Something to Sing by Baltzell and W. A. F. were designated for each student by number only. Throughout the three evaluations the identity of the students, as to the type of instruction they were receiving, was not revealed to the adjudicators. Neither were the adjudicators identified to the students as to which components they were marking or by which letter. For this reason one of the three copies for each student was marked "K," "M," and "O" respectively. Each adjudicator used the same set of books for the three evaluations in which they marked the

errors for each student in his assigned copy.

Before the evaluation took place, the investigator counted and tabulated on each evaluation guide the possible points for each of the evaluative criteria. After the evaluation, the investigator tabulated the errors as marked, and subtracted them from the possible points for the scores.

Accompanists for the lessons and the evaluations were three college music majors. Each of these three girls was assigned to accompany one of the voice classes, some of the private students for lessons, and for the evaluations throughout the study.

A tape recording was made of each student singing his selection at each evaluation. These tapes are on file in the investigator's studio. Little use was made of these recordings. Since the first evaluation took place after only two lessons the students were not psychologically ready to be exposed to a recording of their voice. A recording is so revealing that it can be discouraging and even shocking, especially to the beginning student. After the second evaluation one lesson time for each class and each private lesson was given to listening to the recording they made during the second evaluation. By this time the students had developed enough in their ability to produce tone and use some vocal techniques so that they could profit by hearing the recording of themselves and others. This proved to be a very enlightening experience because the students became

more aware of faulty intonation, impure vowels, inarticulate consonants, rhythmic inaccuracy, and a weakness in the development of breath support and breath control.

Drop-outs

One boy, a private student, quit during the week of the first evaluation because of a car accident which took all of his money. He was paying for his voice lessons. One girl became ill and was out of school eight weeks and since she was a class participant there was no way to make up her lessons. A brother and sister quit because the parents were having too much difficulty making them practice; and thus, refused to pay for their lessons. A personal visit with the father by the investigator did not save the students for the study. One boy took a job, would not make a time for practice, and refused to continue in the study. One girl continued several weeks after the second evaluation but quit in spite of much effort to keep her. This accounted for the loss of six students, leaving the twenty-one who finished.

Evaluations by Adjudicators

The three evaluations were conducted in the same manner on Saturdays with the same three adjudicators marking errors on the same components. Seven minutes were allowed for each student to perform two selections.

First Evaluation.--At the first evaluation, October 24, 1959, each student sang a warm-up number chosen from the songs

introduced in the first two lessons or from the collection of songs being used in the study. Memorization of this number was not required and the adjudicators were not evaluating the performance. Since vocal solo performance was a new experience for this group of adolescents, it was deemed necessary to have them sing one number in which to adjust before singing for evaluation. Each of the three selections for evaluation were assigned to a different class and to the private students who had been grouped with each class respectively. By musical selection the adjudicators could identify the classes but they never were informed during the study as to which students were studying privately.

Second Evaluation.--The second evaluation was held February 13, 1960. As the warm-up that time, the students used the selection they had sung for evaluation the first time. The adjudicators were given red pencils to use in marking errors on the warm-up selection; thus, they could readily see a comparison to the marks given before. This was not done for purposes of tabulation but to help the adjudicators get a better concept of each student. For the new selection, the adjudicators used a black pencil to mark errors. As before the first evaluation, again the students were all given a time, on Thursday evening before the second evaluation, to sing their selections on stage for the investigator.

Third Evaluation.--The third and last evaluation was

held on May 14, 1960. Everything was conducted in the same manner as had been done the other two times, with one exception. This time the adjudicators were asked by the investigator to indicate, by writing class or private at the bottom of the evaluation guide, the type of instruction they believed the student had received. After the evaluation was completed, the investigator revealed the type of study which each student had received as they reviewed each evaluation guide from this last evaluation. The adjudicators had unanimously agreed on thirteen students. Of these thirteen, they were correct on six of them. They were correct on two private out of six and four class students out of fifteen. They were unanimously incorrect on seven, four of which were private and the other three were class students. Of the eight remaining students, five were listed as private by two adjudicators and three were listed as class by two adjudicators.

These resultant designations could not be considered as statistically significant; however, they did show that the adjudicators expected the students who had received private instruction to be the best in performance. They selected those students they considered to be the best performers and marked them as private students. This fact was made known in the discussion following the third evaluation.

Conducting of Lessons

The private lessons were conducted in the investigator's

studio but the class lessons were conducted in the recital hall because more room was needed. In the larger space, the students were directed to leave about ten feet between themselves and any other student. With this arrangement, the investigator moved from one to the other and was able to hear each individual more distinctly. After the first few lessons, the students became accustomed to having the teacher stop to listen to them, as the whole class was singing, and they would sing more naturally. Everyone in the class needed to be kept busy singing as much as possible throughout the class period.

All lessons, class and private, followed a general plan: (a) a warm-up time through vocalises with emphasis upon techniques of correct tone production, (b) sight-reading using exercises and/or a song from one of two student-owned books, and (c) a study of songs where vocal techniques and the techniques of correct tone production were applied. In each class lesson some time was given to individual singing which varied from one student singing an exercise to each student singing an entire selection. While one student was singing all of the other class members were directed to listen for specific things such as purity of vowels, clarity of consonants, intonation, and tone quality. This kind of listening developed a sensitivity to these aspects of singing and provided more opportunity for directed listening.

As the students were ready, a new lesson in the Clippenger book was introduced at the lesson, to be worked on by the students on their own, in preparation for the next lesson. All of the lessons were used during the year and the review of earlier assigned lessons was a part of the warm-up time. Students were directed to do some review of lesson material from previous lessons each time they practiced.

There was some difficulty experienced in keeping a class motivated to a high level of concentration for an hour. Although much repetition was necessary in order to develop correct habits for singing, there also had to be variety in each lesson with everything moving at a quick pace. The investigator observed that in the girls class, there were times of giggling and a general waste of time. In the boys class, this same sort of thing occurred; but, in the class of boys and girls, there was none of this waste of time for giggling or adolescent frivolity.

As the study was being planned, there was some reservation about having a class which included boys and girls. Throughout the study, the class of both boys and girls was the most alert, easiest to motivate, and the most mature in conduct. The class of boys was a close second and the class of girls trailed in third place.

Statistical Procedures

The null hypotheses tested with analysis of variance

were that the samples were from populations with the same mean. That is, it was hypothesized that the scores made on the three different evaluations were not significantly different. Another hypothesis tested was that the three adjudicators did not give evaluation scores that were significantly different. It was further hypothesized that there was no significant difference in the means of performance achievement (a) between the group of boys, the group of girls, or the mixed group; and (b) between class-taught students and students who received private instruction. There were two types of evaluation components and it was hypothesized that there was no significant difference between the scores of the eight objective components or the scores of the eight subjective components. The final hypothesis was that between the various possible interactions of these variables there was no significant difference. All of these hypotheses were tested with the analyzed data and as the results indicated were then accepted or rejected.

CHAPTER III

ANALYSIS OF THE DATA

All of the statistical data collected in this study was analyzed by the statistical technique of analysis of variance. The tests of significance for each observation resulted from a random sampling taken from a normal population with homogeneous variance. This statement was based upon the Bartlett's Test of Homogeneity of Variances. This test was applied to the nonsignificant interactions in the four-way classification which included 120 degrees of freedom. The hypothesis of homogeneous variance was accepted. In this study the number of degrees of freedom was so large that the effects of adding the pooled nonsignificant interactions into the residual, or random error, figure was so minute that it should not be considered. Assuming that all of the observations will result in no difference of means of sums of squares, it may be concluded that if there is a significant difference, there must be some effect which causes this difference.

The Subjective Evaluation

The subjective evaluation part required two four-way

classifications for analysis of variance since it involved:

A. Types
   1. the three evaluations
   2. the three adjudicators
   3. the two types--class and private
   4. the eight components

B. Groups
   1. the three evaluations
   2. the three adjudicators
   3. the three groups--girls, boys, mixed
   4. the eight components

A restatement of the null hypotheses for the purpose of applying them to the data in TABLE 2, the four-way classification of the subjective evaluation by types, was now appropriate.

Hypothesis 1: There is no significant difference between the scores made by the students on the first, second, and third evaluations.

Hypothesis rejected. The effect, evaluation, was highly significant.

Hypothesis 2: There is no significant difference between the evaluations of the three adjudicators.

Hypothesis rejected. The effect, adjudicator, was highly significant.

Hypothesis 3: There is no significant difference in performance achievement between students taught in classes and those taught by private instruction.

Hypothesis rejected. The effect, type, was significant.

Hypothesis 4: There is no significant difference

between the scores of the eight subjective components.

Hypothesis rejected. The effect, component, was significant.

Hypothesis 5: There is no significant difference between the various possible interactions of these variables.

This hypothesis was rejected for the interaction of evaluation cross adjudicator.

TABLE 2

ANALYSIS OF VARIANCE OF SUBJECTIVE COMPONENTS BY TYPES

SOURCE	S. S.	d.f.	M. S.	F ratio
Evaluation	864.02	2	432.01	79.85[a]
Adjudicator	958.90	2	479.45	88.62[a]
Type	65.20	1	65.20	12.05[a]
Component	1,000.69	7	142.96	26.42[a]
Eval. X Adj.	124.85	4	31.21	5.77[a]
Residual	8,082.61	1495	5.41	
Total	11,096.27	1511		

[a]Significant at the $\alpha = .01$ level.

The companion four-way classification which included groups in place of types is shown in TABLE 3.

Hypothesis 1: There is no significant difference between the scores made by the students on the first, second, and third evaluations.

Hypothesis rejected.

Hypothesis 2: There is no significant difference between the evaluations of the three adjudicators.

Hypothesis rejected.

Hypothesis 3: There is no significant difference in performance achievement between the group of boys, the group of girls, and the mixed group.

Hypothesis rejected.

Hypothesis 4: There is no significant difference between the scores of the eight subjective components.

Hypothesis rejected.

Hypothesis 5: There is no significant difference between the various possible interactions of these variables.

Hypothesis rejected with regard to four interactions.

TABLE 3

ANALYSIS OF VARIANCE OF SUBJECTIVE COMPONENTS BY GROUPS

SOURCE	S. S.	d.f.	M. S.	F ratio
Evaluation	864.02	2	432.01	83.56[a]
Adjudicator	958.90	2	479.45	92.54[a]
Group	131.68	2	65.84	12.73[a]
Component	1,000.69	7	142.96	27.61[a]
Eval. X Adj.	124.85	4	31.21	6.04[a]
Eval. X Group	135.71	4	33.93	6.56[a]
Adj. X Group	122.21	4	30.55	5.91[a]
Adj. X Comp.	150.74	14	10.76	2.08[a]
Residual	7,607.47	1472	5.17	
Total	11,096.27	1511		

[a]Significant at the $\alpha = .01$ level.

Objective Evaluation

The eight components making up the objective half of the evaluation guide were divided among the three adjudicators; thus, each component received one score rather than

three as was true for the components in the subjective half. Consequently, the objective evaluation is only a three-way classification for analysis of variance. Two classification tables were necessary to identify the effects by types and by groups as was true in the four-way classification.

The objective evaluation three-way classification by types is set up in the Analysis of Variance TABLE 4. Shown as significant factors were the three single sources--evaluation, component, and type; and the one effect caused by the interaction of evaluation and component.

TABLE 4

ANALYSIS OF VARIANCE OF OBJECTIVE COMPONENTS BY TYPES

SOURCE	S. S.	d.f.	M. S.	F ratio
Evaluation	4,150.67	2	2,075.33	102.94[a]
Component	21,594.41	7	3,084.92	153.02[a]
Type	162.15	1	162.15	8.04[a]
Eval. X Comp.	9,590.02	14	685.00	33.97[a]
Eval. X Type	3.37	2	1.68	.08
Comp. X Type	176.08	7	25.15	1.24
Residual	282.21	14	20.16	
Total	35,958.90	47		

[a]Significant at the $\alpha = .01$ level.

TABLE 5 is the analysis of variance of the objective evaluation three-way classification by groups. Although the evaluation and component showed significance, the group effect, in contrast to type effect, was not significant. Again the evaluation interaction with component caused

enough variance to be significant.

TABLE 5

ANALYSIS OF VARIANCE OF OBJECTIVE COMPONENTS BY GROUPS

SOURCE	S. S.	d.f.	M. S.	F ratio
Evaluation	4,150.67	2	2,075.33	14.67[a]
Component	21,594.41	7	3,084.91	21.81[a]
Group	184.60	2	92.30	.66
Eval. X Comp.	9,590.02	14	685.00	4.84[a]
Eval. X Group	358.38	4	89.59	.63
Comp. X Group	1,526.76	14	108.32	.76
Residual	3,960.91	28	141.46	
Total	41,365.74	71		

[a]Significant at the $\alpha = .01$ level.

Subjective Component Evaluation

By extracting the raw data relative to each of the eight components in the subjective half, an analysis of variance was applied through a three-way classification. This was done for types and also for groups.

Types

First consideration was given to the eight components for effects by types. The first component was Breath Support and the Analysis of Variance TABLE 6 shows the results.

Significant variability was affected by the three main sources--type, evaluation, and adjudicator--and by all the cross effects.

TABLE 6

ANALYSIS OF VARIANCE FOR BREATH SUPPORT

SOURCE	S. S.	d.f.	M. S.	F ratio
Type	28.48	1	28.48	67.81[a]
Evaluation	65.43	2	32.71	77.88[a]
Adjudicator	288.03	2	144.01	342.88[a]
Type X Eval.	3.28	2	1.64	3.90[b]
Type X Adj.	3.67	2	1.83	4.36[b]
Eval. X Adj.	25.97	4	6.49	15.45[a]
Residual	1.69	4	.42	
Total	416.55	17		

[a]Significant at the $\alpha = .01$ level.

[b]Significant at the $\alpha = .05$ level.

Component number two, Breath Control, is recorded in TABLE 7.

TABLE 7

ANALYSIS OF VARIANCE FOR BREATH CONTROL

SOURCE	S. S.	d.f.	M. S.	F ratio
Type	45.73	1	45.73	51.96[a]
Evaluation	68.11	2	34.05	38.69[a]
Adjudicator	226.07	2	113.03	128.44[a]
Eval. X Adj.	40.08	4	10.02	11.38[a]
Type X Eval.	7.15	2	3.57	4.05[b]
Type X Adj.	6.07	2	3.03	3.44
Residual	3.52	4	.88	
Total	396.74	17		

[a]Significant at the $\alpha = .01$ level.

[b]Significant at the $\alpha = .05$ level.

Type, evaluation, adjudicator, the evaluation cross adjudicator, and the type cross evaluation were the factors which showed a significant amount of variance.

The same was not true of Tone Quality, the third component, in TABLE 8, since the interaction type cross evaluation was not significant and evaluation cross adjudicator was significant.

TABLE 8

ANALYSIS OF VARIANCE FOR TONE QUALITY

SOURCE	S. S.	d.f.	M. S.	F ratio
Type	9.49	1	9.49	28.75[a]
Evaluation	154.05	2	77.02	233.39[a]
Adjudicator	13.41	2	6.70	20.30[a]
Type X Eval.	.83	2	.41	1.24
Type X Adj.	2.77	2	1.38	4.18[b]
Eval. X Adj.	48.33	4	12.08	36.60[a]
Residual	1.35	4	.33	
Total	230.23	17		

[a]Significant at the $\alpha = .01$ level.

[b]Significant at the $\alpha = .05$ level.

In TABLE 9, the Analysis of Variance for Attitude showed that the type effect was not significant; but that there was significance for evaluation, adjudicator, and the interactions between type and adjudicator, and evaluation and adjudicator.

TABLE 9

ANALYSIS OF VARIANCE FOR ATTITUDE

SOURCE	S. S.	d.f.	M. S.	F ratio
Type	1.12	1	1.12	1.38
Evaluation	142.68	2	71.34	88.07[a]
Adjudicator	98.30	2	49.15	60.67[a]
Type X Eval.	5.62	2	2.81	3.46
Type X Adj.	8.47	2	4.23	5.22[b]
Eval. X Adj.	38.18	4	9.54	11.77[a]
Residual	3.24	4	.81	
Total	297.61	17		

[a]Significant at the $\alpha = .01$ level.

[b]Significant at the $\alpha = .05$ level.

It would be redundant to discuss the last four components separately since they all had the same two sources showing significance. The four components--Artistry And Interpretation, Posture, Tempo, and Memory--all show that evaluation and adjudicator have significant effects. These are represented by TABLES 10, 11, 12, and 13, respectively.

TABLE 10

ANALYSIS OF VARIANCE FOR ARTISTRY AND INTERPRETATION

SOURCE	S. S.	d.f.	M. S.	F ratio
Type	3.37	1	3.37	.80
Evaluation	153.85	2	76.92	18.27[a]
Adjudicator	94.29	2	47.14	11.19[a]
Type X Eval.	6.45	2	3.22	.76
Type X Adj.	2.70	2	1.35	.32
Eval. X Adj.	14.56	4	3.64	.86
Residual	16.87	4	4.21	
Total	292.08	17		

[a]Significant at the $\alpha = .01$ level.

TABLE 11

ANALYSIS OF VARIANCE FOR POSTURE

SOURCE	S. S.	d.f.	M. S.	F ratio
Type	4.37	1	4.37	3.09
Evaluation	112.45	2	56.22	39.87[a]
Adjudicator	103.88	2	51.94	36.83[a]
Type X Eval.	7.94	2	3.97	2.81
Type X Adj.	4.34	2	2.17	1.53
Eval. X Adj.	8.37	4	2.09	1.48
Residual	5.67	4	1.41	
Total	247.01	17		

[a]Significant at the $\alpha = .01$ level.

TABLE 12

ANALYSIS OF VARIANCE FOR TEMPO

SOURCE	S. S.	d.f.	M. S.	F ratio
Type	8.52	1	8.52	3.94
Evaluation	171.76	2	85.88	39.75[a]
Adjudicator	104.96	2	52.48	24.29[a]
Type X Eval.	7.13	2	3.56	1.64
Type X Adj.	3.78	2	1.89	.87
Eval. X Adj.	16.37	4	4.09	1.89
Residual	8.65	4	2.16	
Total	321.17	17		

[a]Significant at the $\alpha = .01$ level.

TABLE 13

ANALYSIS OF VARIANCE FOR MEMORY

SOURCE	S. S.	d.f.	M. S.	F ratio
Type	.05	1	.05	.01
Evaluation	72.61	2	36.30	9.65[a]
Adjudicator	180.70	2	90.35	24.02[a]
Type X Eval.	9.67	2	4.83	1.28
Type X Adj.	1.30	2	.65	.17
Eval. X Adj.	8.88	4	2.22	.59
Residual	15.06	4	3.76	
Total	288.27	17		

[a]Significant at the $\alpha = .01$ level.

Groups

Looking at the group effect on the eight components instead of the type effect, there was some contrast. The different critical F values were brought about by the change

in degrees of freedom; there are three groups replacing the two types. TABLE 14 is the Analysis of Variance for Breath Support by groups.

TABLE 14

ANALYSIS OF VARIANCE FOR BREATH SUPPORT

SOURCE	S. S.	d.f.	M. S.	F ratio
Group	17.15	2	8.52	10.92[a]
Evaluation	65.43	2	32.71	41.93[a]
Adjudicator	288.02	2	144.01	184.62[a]
Group X Eval.	14.18	4	3.55	4.55[a]
Group X Adj.	20.08	4	7.52	9.64[a]
Eval. X Adj.	25.97	4	6.49	8.32[a]
Residual	6.29	8	.78	
Total	437.12	26		

[a]Significant at the $\alpha = .01$ level.

There are the three main effects--group, evaluation, and adjudicator; and the three interactions--group cross evaluation, group cross adjudicator, and evaluation cross adjudicator--all of which revealed a variability that exceeded the critical F value. The six effects of group--evaluation, adjudicator, group cross evaluation, group cross adjudicator, and evaluation cross adjudicator--were all greater than could be explained by chance or random effects; and thus, were considered to be significant effects. The very same results appeared as shown in TABLE 15, the Analysis of Variance for Breath Control, with the exception of the difference in the level of significance for the interaction

of group cross adjudicator.

TABLE 15

ANALYSIS OF VARIANCE FOR BREATH CONTROL

SOURCE	S. S.	d.f.	M. S.	F ratio
Group	17.67	2	8.84	9.60[a]
Evaluation	68.11	2	34.05	37.01[a]
Adjudicator	226.07	2	113.03	122.85[a]
Group X Eval.	16.33	4	4.08	4.43[a]
Group X Adj.	13.62	4	3.40	3.69[b]
Eval. X Adj.	40.08	4	10.02	10.89[a]
Residual	7.38	8	.92	
Total	389.26	26		

[a]Significant at the $\alpha = .01$ level.

[b]Significant at the $\alpha = .05$ level.

For Tone Quality, TABLE 16, the sources which caused significant effects in variance were group, evaluation, and the interactions of evaluation cross adjudicator, and group cross adjudicator.

TABLE 16

ANALYSIS OF VARIANCE FOR TONE QUALITY

SOURCE	S. S.	d.f.	M. S.	F ratio
Group	21.52	2	10.76	4.80[b]
Evaluation	154.05	2	77.02	34.38[a]
Adjudicator	13.41	2	6.70	2.99
Group X Eval.	9.68	4	2.42	1.08
Group X Adj.	28.91	4	7.23	3.22[b]
Eval. X Adj.	48.33	4	12.08	5.39[a]
Residual	17.97	8	2.24	
Total	293.87	26		

[a]Significant at the $\alpha = .01$ level.

[b]Significant at the $\alpha = .05$ level.

Everything except the interaction of group cross adjudicator showed significance for Attitude, TABLE 17.

TABLE 17

ANALYSIS OF VARIANCE FOR ATTITUDE

SOURCE	S. S.	d.f.	M. S.	F ratio
Group	23.19	2	11.59	4.69[b]
Evaluation	142.68	2	71.34	28.88[a]
Adjudicator	98.30	2	49.15	19.89[a]
Group X Eval.	30.41	4	7.60	3.07[b]
Group X Adj.	27.12	4	6.78	2.74
Eval. X Adj.	38.18	4	9.54	3.86[b]
Residual	19.79	8	2.47	
Total	379.67	26		

[a]Significant at the $\alpha = .01$ level.

[b]Significant at the $\alpha = .05$ level.

The component of Artistry And Interpretation is shown in TABLE 18.

TABLE 18

ANALYSIS OF VARIANCE FOR ARTISTRY AND INTERPRETATION

SOURCE	S. S.	d.f.	M. S.	F ratio
Group	61.27	2	30.63	13.67[a]
Evaluation	153.85	2	76.92	34.33[a]
Adjudicator	94.29	2	47.14	21.04[a]
Group X Eval.	36.61	4	9.15	4.08[a]
Group X Adj.	20.73	4	5.15	2.29
Eval. X Adj.	14.56	4	3.64	1.62
Residual	17.98	8	2.24	
Total	399.29	26		

[a]Significant at the $\alpha = .01$ level.

The group, evaluation, adjudicator, and the interaction of group cross evaluation caused this component to vary significantly.

The only two significant effects upon the component Posture were evaluation and adjudicator as shown in TABLE 19.

TABLE 19

ANALYSIS OF VARIANCE FOR POSTURE

SOURCE	S. S.	d.f.	M. S.	F ratio
Group	8.26	2	4.13	1.21
Evaluation	112.45	2	54.22	15.94[a]
Adjudicator	103.88	2	51.94	15.27[a]
Group X Eval.	26.28	4	6.57	1.93
Group X Adj.	16.69	4	4.17	1.22
Eval. X Adj.	8.37	4	1.09	.32
Residual	27.20	8	3.40	
Total	303.13	26		

[a]Significant at the $\alpha = .01$ level.

Tempo was affected to a significant degree by evaluation, adjudicator, the interaction of group cross evaluation, and group cross adjudicator as shown in TABLE 20.

TABLE 20

ANALYSIS OF VARIANCE FOR TEMPO

SOURCE	S. S.	d.f.	M. S.	F ratio
Group	11.74	2	5.87	3.17
Evaluation	171.76	2	85.88	46.42[a]
Adjudicator	104.96	2	52.48	28.36[a]
Group X Eval.	47.01	4	11.75	6.35[a]
Group X Adj.	46.08	4	11.52	6.22[a]
Eval. X Adj.	16.37	4	4.09	2.21
Residual	14.84	8	1.85	
Total	412.76	26		

[a]Significant at the $\alpha = .01$ level.

The eighth component is Memory, TABLE 21, and the

analysis of variance indicated significance for group, evaluation, and adjudicator effects.

TABLE 21

ANALYSIS OF VARIANCE FOR MEMORY

SOURCE	S. S.	d.f.	M. S.	F ratio
Group	31.94	2	15.97	6.23[a]
Evaluation	72.61	2	36.30	14.17[a]
Adjudicator	180.70	2	90.34	35.28[a]
Group X Eval.	2.00	4	.50	.19
Group X Adj.	11.83	4	2.98	1.16
Eval. X Adj.	8.88	4	2.22	.86
Residual	20.51	8	2.56	
Total	328.47	26		

[a]Significant at the $\alpha = .01$ level.

Objective Component Evaluation

As in the subjective half of the evaluation guide, there were eight component areas to be evaluated in the objective half. The criteria included here were considered objective because they were not as subject to the individual differences of opinion. For example, an objective component--intonation--was compared to a subjective component--tone quality. Each vocalist in a group of singers normally has a different tone quality. To evaluate this aspect of singing requires a judgment as to the degree to which tone quality is good--or not as good. This judgment appears to be chiefly based upon the likes and dislikes of the person making such judgment. If, however, each person in this group is asked

to sing a specific tone, they will either be correct--on pitch--or they will be incorrect--above or below the correct pitch.

The concentrated effort of the three adjudicators was required to mark the errors of these eight components as they occurred in performance. Explanation was made in Chapter II as to how these components were divided among the adjudicators. Because this half represents the evaluations of the three adjudicators on separate components, there was no way to test for effects of adjudicators. Thus, as significant effects on each of the eight components, by types and by groups, were tested the analysis of variance involved only a two-way classification.

The test of significance was made by using the mean square figure, for the interaction between type and evaluation or group and evaluation, as the denominator in the ratio to each of these sources of effects. If the mean square of type or group is 18.51 times larger than the interaction mean square, it was concluded that the type or group effect was significant. The mean square for evaluation must be 19.00 times greater than the interaction mean square to show significant effects. That is, if the effects for type, group, or evaluation do not show a mean square sufficiently large--that the F ratio is equal to or larger than the critical F value--then it must be assumed that the effects could be caused by interaction and/or random effects and/or chance effects.

Types

The two types refer to the fifteen students who were taught in three classes and the six students who were taught privately. Looking at the analysis of variance for each of the eight components, the following results were noted. Intonation, TABLE 22, and Rhythm, TABLE 23, did not show that type of teaching or different evaluations had significant effects.

TABLE 22

ANALYSIS OF VARIANCE FOR INTONATION

SOURCE	S. S.	d.f.	M. S.	F ratio
Type	62.86	1	62.86	4.3
Evaluation	71.84	2	35.92	2.4
Type X Eval.	29.20	2	14.60	
Total	163.90	5		

TABLE 23

ANALYSIS OF VARIANCE FOR RHYTHM

SOURCE	S. S.	d.f.	M. S.	F ratio
Type	8.00	1	8.00	1.86
Evaluation	15.27	2	7.63	1.78
Type X Eval.	8.58	2	4.29	
Total	31.85	5		

Dynamics, TABLE 24, indicates a highly significant effect for evaluation. For the same component, however, the

type showed no variance at all.

TABLE 24

ANALYSIS OF VARIANCE FOR DYNAMICS

SOURCE	S. S.	d.f.	M. S.	F ratio
Type	.01	1	.01	--
Evaluation	9,505.41	2	4,752.70	302.72[a]
Type X Eval.	31.41	2	15.70	
Total	9,536.83	5		

[a]Significant at the $\alpha = .01$ level.

Phrasing was not a component to be affected to a significant degree by type or evaluation, TABLE 25.

TABLE 25

ANALYSIS OF VARIANCE FOR PHRASING

SOURCE	S. S.	d.f.	M. S.	F ratio
Type	10.93	1	10.93	.52
Evaluation	87.53	2	43.76	2.11
Type X Eval.	41.49	2	20.74	
Total	139.95	5		

There was enough variance in the pronounciation of Vowels to result in a significant effect for evaluation as seen in TABLE 26.

TABLE 26

ANALYSIS OF VARIANCE FOR VOWELS

SOURCE	S. S.	d.f.	M. S.	F ratio
Type	50.85	1	50.85	3.55
Evaluation	1,832.79	2	916.39	63.99[a]
Type X Eval.	28.65	2	14.32	
Total	1,912.29	5		

[a]Significant at the $\alpha = .01$ level.

Of the eight components, Consonants--TABLE 27--was the only one to show significant effects for both type and evaluation.

TABLE 27

ANALYSIS OF VARIANCE FOR CONSONANTS

SOURCE	S. S.	d.f.	M. S.	F ratio
Type	160.50	1	160.50	42.02[a]
Evaluation	1,558.65	2	779.32	204.01[a]
Type X Eval.	7.64	2	3.82	
Total	1,726.79	5		

[a]Significant at the $\alpha = .01$ level.

Phrase endings, TABLE 28, and Intervals, TABLE 29, neither one were affected by type or evaluation enough to be significant in their variability.

TABLE 28

ANALYSIS OF VARIANCE FOR PHRASE ENDINGS

SOURCE	S. S.	d.f.	M. S.	F ratio
Type	13.14	1	13.14	.33
Evaluation	610.89	2	305.44	8.38[b]
Type X Eval.	72.95	2	36.47	
Total	696.98	5		

[b]Significant at the $\alpha = .05$ level.

TABLE 29

ANALYSIS OF VARIANCE FOR INTERVALS

SOURCE	S. S.	d.f.	M. S.	F ratio
Type	32.01	1	32.01	1.41
Evaluation	78.32	2	39.16	1.72
Type X Eval.	45.52	2	22.76	
Total	155.85	5		

Groups

Considering the same eight components in the objective part of the evaluation guide by groups rather than types, we find less significance. Since there were three groups--in contrast to two types; there were now two degrees of freedom for group; and thus, four degrees of freedom for the interaction or residual. This change in degrees of freedom provided a different number for the critical F value.

Intonation, TABLE 30, does not show variance at a

significant level. The hypothesis of no difference in means was accepted.

TABLE 30

ANALYSIS OF VARIANCE FOR INTONATION

SOURCE	S. S.	d.f.	M. S.	F ratio
Group	31.75	2	15.87	.53
Evaluation	71.84	2	35.92	1.19
Group X Eval.	120.34	4	30.08	
Total	223.93	8		

Rhythm, TABLE 31, was not affected by group or by evaluation effects, as was evidenced by the F ratio.

TABLE 31

ANALYSIS OF VARIANCE FOR RHYTHM

SOURCE	S. S.	d.f.	M. S.	F ratio
Group	11.20	2	5.60	.37
Evaluation	15.27	2	7.63	.51
Group X Eval.	59.48	4	14.87	
Total	85.95	8		

The first component by groups to show a significant effect for evaluation was Dynamics, TABLE 32. The hypothesis of no difference in means was rejected.

TABLE 32

ANALYSIS OF VARIANCE FOR DYNAMICS

SOURCE	S. S.	d.f.	M. S.	F ratio
Group	898.33	2	449.16	.80
Evaluation	9,505.41	2	4,752.70	8.47[b]
Group X Eval.	2,243.38	4	560.84	
Total	12,657.12	8		

[b]Significant at the $\alpha = .05$ level.

Phrasing, TABLE 33 was the one component of significant variance for the group effect.

TABLE 33

ANALYSIS OF VARIANCE FOR PHRASING

SOURCE	S. S.	d.f.	M. S.	F ratio
Group	240.80	2	120.40	14.80[a]
Evaluation	87.53	2	43.76	5.38[b]
Group X Eval.	32.53	4	8.13	
Total	360.86	8		

[a]Significant at the $\alpha = .01$ level.

[b]Significant at the $\alpha = .05$ level.

For the last four components the null hypothesis, as stated above and consistent throughout this study, was accepted.

In TABLE 34 for Vowels the evaluation effect is enough to be significant.

TABLE 34

ANALYSIS OF VARIANCE FOR VOWELS

SOURCE	S. S.	d.f.	M. S.	F ratio
Group	194.92	2	97.46	.56
Evaluation	1,832.79	2	916.39	5.17[b]
Group X Eval.	709.43	4	177.36	
Total	2,737.14	8		

[b]Significant at the $\alpha = .05$ level.

The component Consonants, TABLE 35, was significant by groups.

TABLE 35

ANALYSIS OF VARIANCE FOR CONSONANTS

SOURCE	S. S.	d.f.	M. S.	F ratio
Group	243.70	2	121.85	.79
Evaluation	1,558.65	2	779.32	5.06[b]
Group X Eval.	615.93	4	153.98	
Total	2,408.28	8		

[b]Significant at the $\alpha = .05$ level.

Component number seven, Phrase Endings, TABLE 36, did not have enough difference in means to be significant.

TABLE 36

ANALYSIS OF VARIANCE FOR PHRASE ENDINGS

SOURCE	S. S.	d.f.	M. S.	F ratio
Group	11.64	2	5.82	.04
Evaluation	610.89	2	305.44	2.26
Group X Eval.	540.03	4	135.00	
Total	1,162.56	8		

The last component, Intervals, TABLE 37, was not affected by group but it was by evaluation to the extent that there was a significant difference in the means.

TABLE 37

ANALYSIS OF VARIANCE FOR INTERVALS

SOURCE	S. S.	d.f.	M. S.	F ratio
Group	12.59	2	6.29	.75
Evaluation	78.32	2	39.16	4.65[b]
Group X Eval.	33.61	4	8.40	
Total	124.52	8		

[b]Significant at the $\alpha = .05$ level.

TABLE 38

SUMMARY OF SIGNIFICANT VARIABLE EFFECTS

Items Affected	Sources of Effect				
	Evaluation	Adjudicator	Type	Group	Component
Subjective Half	a	a	a	a	a
Objective Half	a		a		a
Breath Support	a	a	a	a	
Breath Control	a	a	a	a	
Tone Quality	a	a	a	b	
Attitude	a	a	a	b	
Artistry and Interpretation	a	a		a	
Posture	a	a			
Tempo	a	a			
Memory	a	a		a	
Dynamics	a				
Vowels	a				
Consonants	a		a		
Phrase Endings	b				
Phrasing	b			a	
Intervals	b				

	Interactions of above effects[c]									
	E.X A.		E.X T.		E.X G.		A.X T.		A.X G.	A.X C.
Subjective Half	a			a				a		a
Breath Support	a		b			b		a		
Breath Control	a		b					b		
Tone Quality	a					b		b		
Attitude	a			b		b				
Artistry and Interpretation				a						
Tempo				a				a		
Objective Half	(only item significant for Eval. X Comp.) a									

[a]Significant at the $\alpha = .01$ level.

[b]Significant at the $\alpha = .05$ level.

[c]Letters represent the words above.

Discussion of Analyzed Data

The primary objective of this study was to determine the relative effectiveness of teaching voice to beginning high school students by the class method and by the private teaching method.

There were only four main effects to be considered from the adjudicator evaluations. These were (1) evaluations, (2) components, (3) types, and (4) groups which were also used in the subjective components analysis.

There was a significant variance in the effects of the evaluations, the components, and the types. The variability within the groups was sufficiently high to be significant for the subjective components, but was not significant for the objective components. In this one test of significance then, the hypothesis of equal means for the three groups was accepted.

Even though there was not enough difference in the means of the groups in the objective components to be significant, there was a substantial increase for all three groups from the first evaluation to the second evaluation, and still a greater increase from the second to the third evaluation for the girls and the boys but a decrease for the mixed group. The boys, as a group, made on the average the larger increase on the second and on the third evaluations. Concerning these groups in the subjective component half, there was a significant difference among the means. It was

the boys again who gained the greatest amount of total increase in scores. In contrast to the pattern observed in the objective area, all three groups here showed less growth from the second to the third evaluation than from the first to the second evaluation. It may be that this is characteristic of the subjective element.

In contrast to groups was the analysis of the types. Since there was a significant difference between the class and private groups, it was a valid conclusion that one must be better than the other. In practice, it has been understood that a larger numerical value indicates a higher level of achievement. Appendix L shows that the average rate of increase in the subjective area was greater for the class group than it was for the private group. In fact, the private group showed a decrease from the second to the third evaluation.

Appendix C showed that in the objective area both the class and private groups scored higher on the average at each successive evaluation. The private group averaged one point better on the second evaluation and the class group averaged four points better on the third evaluation.

Combining the total objective and subjective component average increase in scores by types, we see that the class group scored sixteen points higher on the average than did the private group. Doing the same by groups, we see that the boys increased their scores on the average forty points

more than did the girls and forty-one points more than did the mixed group.

It was observed that the boys had a greater rate of increase in achievement.

Although the statistics indicated that the mean for the class-taught students was significantly different from the mean for the privately-taught students, it was more advisable to conclude that since the class-taught students were not lower in achievement scores than the privately-taught students; then, they must be equal to or better than the privately-taught students. Based upon the sampling for and the results of this study, it resulted that class voice was as effective a way to teach the first year of voice as that of private lessons.

In any learning experience, it is generally assumed that the level of achievement will increase with continued effort being applied in a specific area of learning. It is possible, however, that especially in the study of an applied art, there could be a personality conflict between teacher and student, a change of attitude within the student, a psychological block, or some other circumstance which would result in little or no increase or even a regression in achievement.

Although the over-all totals showed an increase in achievement scores for successive evaluations, there were some inconsistencies. As mentioned before for the subjective components, the private group of students failed by four

points to achieve as well in the last half of the study as they did in the first half. The mixed group, for the same items in the same period, only increased three points.

What all of the reasons were for regression or non-improvement in the level of achievement, this study was not designed to reveal. However, the analysis did indicate that the effect of the adjudicators resulted in a significant difference in means. Also, the demands of the musical selections may have increased in different degrees of difficulty and more rapidly than did the abilities of the students. These may have been the most important reasons.

In TABLES 2 and 3, the largest F ratio number for significant difference in means resulted from the effects of adjudicators, both for the objective and subjective components. Checking Appendix O and Appendix L, note that for each of the three groups--girls, boys, and mixed--the two types--class and private--and for all twenty-one students by the eight subjective components, the adjudicators were absolutely consistent. That is, Adjudicator K rated each of the twenty-one students at each of the three evaluations on the average of eight points higher than did Adjudicator O. Adjudicators K and O were then on the average of fifteen points apart on each student at each of the three evaluations. Since there were eight different components evaluated by each adjudicator for each student at each time of evaluation, the average was approximately one point difference per component between Adjudicators K and M and between

Adjudicators M and O, and approximately two points difference per component between Adjudicators K and O.

Although the totals were consistently higher for Adjudicators K over M, and M over O, there were inconsistencies revealed when the data was broken down to the single components at each evaluation. This will be discussed in the section on separate components.

From the evidence of this study based upon the performance of three experienced and well-qualified musicians, it was observed that adjudicators do not agree upon subjective evaluations. In fact, they will probably disagree at a highly significant level. The interesting aspect of this was that the characteristic which caused the significant difference in the mean adjudicator scores was at the same time a profound strength in each adjudicator; namely, the consistency of each adjudicators' evaluation with himself throughout a day and at different times of adjudicating.

In light of this, it is probable that the practice of using a single adjudicator for solo events is satisfactory even though one may tend to give higher ratings and another lower ratings. This study indicated that each adjudicator will discriminate equally well as to the relative level of performance among the performers. Since, however, the mean of any sample--taken at random from a normal population--will most nearly represent the mean of the population, it is logical that the mean evaluation--or rating--from three adjudicators will be more nearly a true evaluation than if only

one adjudicator is used. It is, of course, possible to have a sample of adjudicators all of which would tend to rate high or low. The probability of such a sample is not very likely.

The other of the four main classifications used in the statistical analysis of this study was the eight objective and the eight subjective components. In all four analysis of variance tables where component was a source of variability, the hypothesis of equal means was rejected.

Referring to the appropriate Appendixes G and O, it may be seen that the total score for the objective and subjective components was larger for each successive evaluation. Looking at each component, however, there were two exceptions to this in the subjective components. That is, the components tone quality and memory showed a smaller score on the third evaluation than they did on the second evaluation.

In the objective components, there were more exceptions. There were two components, intonation and dynamics, which had scores on the third evaluation smaller than on the second evaluation. In fact, the score for intonation on the third evaluation was even smaller than on the first evaluation. Possible explanation of this isolated case may have been the fact that the music for each successive evaluation was more demanding. There were four other components, rhythm, phrasing, consonants, and intervals, which received lower scores on the second evaluation than they did on the first evaluation. The amount of increase in the other three

components was large enough to compensate for the five which regressed, resulting in a total increase for all eight components.

In Appendixes G, I, L, and O, the components varied between groups by sex and types of teaching method. In support of the observation made before, that the class group achieved more than did the private group, there was only one component--phrase endings--which showed a larger score on the average for the private students. Two components, dynamics and memory, average the same for class-taught and privately-taught students. The other thirteen components showed that the larger scores on the average were for the class-taught students. Turning to the sex groupings, the mixed group showed on the average the largest scores for the greatest number of components. In the subjective half, only the component of tone quality was the exception to this pattern where the girls scored higher. In the objective half, however, the girls scored the highest for phrase endings; the boys scored the highest for intonation, vowels, and intervals; the mixed group scored highest for rhythm, dynamics, phrasing, and consonants.

In the light of the statistical analysis of data, it was obvious that in this study voice taught to a class of both boys and girls resulted in greater achievement for each student on the average than voice taught to a class of boys or to a class of girls.

The boys made on the average the largest amount of actual increase per evaluation, and the mixed group made the highest scores indicating the most achievement. A pertinent fact to be noted is that in the comparison between the class- and privately-taught students, the class students scored higher in both the amount of increase and the amount of actual achievement on the average per evaluation.

Between the various main classifications, there was the possibility of many interaction effects--any or all of which could have caused enough variability to result in a significant difference in means.

In the four-way classifications for the subjective components, there were no significant three-way interactions. With regard to the two-way interactions, there were two which were significant in the analysis by both groups and by types. Both of these involve the adjudicator; namely, the interaction between evaluation and adjudicator, and between adjudicator and component. In the analysis by groups, there were two more significant interactions. These were the interactions between evaluation and group, and between adjudicator and group. Having studied the significant variance of these main effects separately, it was understandable that there were significant effects brought about by some of the interactions. Any attempt to explain a significant interaction would be based upon the same data that has been presented through the single main effects.

To look more minutely into the analysis of the data, attention was focused upon each of the sixteen components which was analyzed by groups and by types for significant differences in means. The results for groups and for types were considered for each component as significance was compared and explained. Since the subjective components required the three-way classification--evaluation, group or type, and adjudicator--for the analysis of variance, they were presented before the objective components.

As the components were looked at separately, it was obvious that most of them showed results which followed the above mentioned patterns. For this reason, then, it was the exceptions to these patterns that were then to be considered.

Breath support was the first subjective component. This data analyzed--TABLES 6 and 14--showed that the private students and the group of mixed students, there was some overlapping, both failed to improve their scores of the second evaluation on the final evaluation. The mixed group was not rated higher than the boys group by Adjudicator O; and on the final evaluation, Adjudicator M rated all the students on the average lower than he did at the second evaluation.

The analysis, TABLES 7 and 15, revealed that the component breath control was indeed very similar to breath support. The only fractional difference between breath support and breath control was that Adjudicator O was consistent

with the over-all pattern for breath control; but, as was pointed out above, was not for breath support.

Tone quality was certainly subject to personal opinion because no two voices are exactly alike. In this study, the analysis--TABLES 8 and 16--showed that this component was the only one in which variance within the adjudicators was enough to cause both the class group and the private group to show on the average a decrease in scores from the second to the final evaluation. Since Adjudicator O rated the class students higher than did Adjudicator M--who rated all the students on the average lower the third time of evaluation; and since Adjudicator O averaged the same score for each student on the last two evaluations; and Adjudicator K showed only a slight increase for the third over the second evaluation, we may conclude that Adjudicator M was most responsible for the slight decrease on the average in the third evaluation scores which resulted for all the class and private students.

One of the more abstract subjective components was that of attitude--TABLES 9 and 17. This was the first component to fail to show significance by type.

The means were not enough different between the class students and the private students because Adjudicator K rated the private students enough higher on the second evaluation to show that on the average for the three evaluations, the private students were higher than the class students. On the

first evaluation, Adjudicator M gave higher ratings than did Adjudicator K--which was not the usual--and in like manner, Adjudicator O gave higher than did Adjudicator M on the third evaluation. Compared to the other components which showed significance by groups, this one--attitude--was so close that there was a question as to its effectiveness in evaluation.

Another component which was significant for groups--TABLE 18--but failed to show significance for types--TABLE 10--was artistry and interpretation. Three exceptions to the general pattern for this component were (1) Adjudicator M rated the boys group higher and particularly at the first evaluation when he was higher than was Adjudicator K; (2) the private students on the average rated lower on the third evaluation than they did the second time; and (3) the mixed group was lower in rating scores on the third evaluation than it had been on the second evaluation.

Apparently a rather unimportant component was that of posture--TABLE 11 and 19. Significance for it was only by evaluation and by adjudicator and yet the improvement pattern per student on the average was normal--with minor exceptions. Adjudicator O rated the boys group higher than the mixed group, and Adjudicator K rated the private students higher than the class students on the second evaluation.

Also following the normal pattern of score increases was the component tempo--TABLES 12 and 20--but without enough variance in means to show significance by group or type. In the analysis by groups, there were no exceptions to the

pattern of total component scores; and by types, the two exceptions were too slight to be pertinent.

The last subjective component, memory--TABLES 13 and 21--was unique in that on the third evaluation, all three adjudicators rated the students on the average lower than they did on the second evaluation. Only the class group averaged any increase in scores from the second to the third evaluation time. Even so, the analysis did show a significant difference in the group means for evaluation and adjudicator. Obviously in this study, the students had more memory difficulties on the final evaluation. No explanation was revealed.

The other eight components made up the objective half of the evaluation guide. Only one adjudicator evaluated each of these eight components which were divided among the three adjudicators. The analysis of the data for each of these components required only one two-way classification by types and one by groups. By comparing the analysis of these two classifications, the most significant components were discovered.

The first component in the objective half was intonation and the difference in the means was not significant--even for the three evaluations. In fact, all of the different groupings of the students showed a decrease in scores on the second evaluation which was so great that, although the scores increased on the third evaluation, the girls group did

not equal their score of the first evaluation. The degree to which the girls did not measure up was enough to cause the group of private students on the third evaluation to fail to equal even their first evaluation score. This discrepancy was also enough to cause the total score for all twenty-one students on the third evaluation to be three points less than the first evaluation score. Intonation was the only component showing a decrease.

The logical explanation for this decrease in total evaluation scores was the demands of the music. Each group--girls, boys, and mixed--sang a different number respectively for each evaluation. The selections for the first evaluation were very simple and the melodic line was not independent; thus, making it easier for the students to be guided and supported in pitch. The limited range of the first evaluation selections would also contribute to better intonation than in the later selections demanding a wider range. Having sighted the scores made by the girls group, it is interesting to note that the mixed group had the highest score at first; dropped the most in total score on the second evaluation; and made the largest gain on the final score.

This study indicates that intonation as a component in evaluation will vary according to the relationship between student singing proficiency and the musical demands of the selection sung.

The second objective component was rhythm. The

variance within the groups and among the evaluations was not great enough to be significant. For this component, the private students and the mixed group both failed to score as high on the final evaluation as they did on the first. The boys group improved enough each time to pull the total for all students, on the third score, up above the original score.

The first objective component to show significance was dynamics. The difference in means among the evaluations was highly significant both by groups and by types. Even so, the most increase was made on the second evaluation with only the girls group showing any improvement over the second evaluation on the third evaluation.

The musical selections probably account for the variance in dynamics. Some musical selections provide greater opportunity for dynamic contrasts and shading than do others.

The only other component showing significance by groups was phrasing. The significant difference in means for phrasing was within the groups. The girls group improved its score on each successive evaluation. The boys lost two points on the second evaluation and gained them back on the third. The mixed group lost four points, then gained those four back plus eighteen additional points.

Since there was no significance in phrasing by types, it is difficult to explain any cause for the group significance. Again, the demands of the different selections would

probably account for the difference in scores.

The next objective component was vowels. It was significant with regard to evaluation by types only. The class group on the average scored higher on each evaluation than did the private group. Both, however, did show an increase on each successive evaluation.

Consonants, the sixth objective component, was the only one to show significance for two effects. By types and in evaluations, the means were significantly different. By groups, the consonants were not significantly different within groups or among the evaluations. As has been true consistently, the class students showed on the average higher scores than did the private students. By groups and by types, all students had lower scores on the second evaluation; but they were able to exceed the original scores on the final evaluation.

With regard to the component, phrase endings, there was no significance and the increase in scores was normal with the exception of the boys group which failed to equal their first score on the second evaluation.

The last component, intervals, did not prove to discriminate very well as an evaluation item. There was no significance shown and very little variance in scores. It appeared, from this study, that the component, intervals, could just as well be left out of the evaluation guide.

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

This study was designed to determine the relative effectiveness of teaching voice to beginning high school students in classes and privately.

Conclusions

The following conclusions were reached:

1. Boys will probably have lower scores in the beginning of voice study but be able to show a greater rate of improvement on subsequent evaluations than will girls.
2. The class of both boys and girls created an atmosphere which was more conducive to learning voice than either the class of boys or girls.
3. Adjudicators are likely to disagree on subjective evaluations, but to be consistent with themselves in the evaluation scores they give; thus, a single adjudicator will be able to discriminate among a group of solo performers in a satisfactory manner.
4. Class-taught students were not lower achievers than were private-taught students; thus, they must

have been equal to or better than the private-taught students. Since by total evaluation scores and by the majority of individual component scores the class-taught showed larger scores on the average than did the private-taught students, it was a safe conclusion that the class method of teaching voice was as effective a way to teach the first year of voice as was the method of teaching the students privately.

5. Since this study with its limited sample showed class voice teaching to be as effective as was private voice teaching, it was concluded that another similar study should be done using a larger sample.
6. Attitude, as an evaluation item, appeared to be too indefinite to be effective. It was concluded that an evaluation guide would be just as effective without considering attitude.
7. It was concluded that the scores for the following five objective components--(a) intonation, (b) rhythm, (c) dynamics, (d) phrasing, and (e) phrase endings--were determined to some extent by the demands of the musical selection. This well may have been a more important factor than was the ability of the students or the effectiveness of the instruction.

8. The component, intervals, was of no real value as a separate evaluation item. The evaluation of intonation will account for any discrepancy in intervals.
9. It was concluded that the subjective components were not affected by the demands of the musical selections as were the objective components and thus provided a more realistic picture of the progress the students made between the successive evaluation times.
10. It was concluded that an evaluation guide must have both objective and subjective components, as defined and used in this study. Everyone must recognize that there are two major variables which are very strong in their effects upon vocal solo adjudication. These are (a) the demands of a musical selection will greatly determine the level of performance as evaluated by the objective components, (b) the personal standards of the adjudicator will greatly determine the score which indicates the level of performance as evaluated by the subjective components.

Recommendations

The following recommendations are based upon the conclusions of this study:

1. Voice teachers particularly should recognize the

advantages of teaching voice to class groups. As was stated before in this paper, there are the obvious advantages of economy of the teacher's time and the lesson fee. Now that this study has shown that class teaching of voice is at least equal to and possibly even more effective than private teaching of voice, there is no reason why more students should not have the opportunity to study voice. In one hour of teaching, a teacher can instruct at least six students in a class but only two if taken privately. If the class lesson fee is half as much as the private lesson fee and assuming the class size is six, the student will save 50 per cent; and the instructor receives 50 per cent more than if he taught two students privately. If it is believed that the study of voice is a valuable endeavor, then it is time that teachers open up the voice studios for class instruction and reach more students.

2. By the same logic all choral directors should strive to include in each rehearsal period some elements of teaching voice as is practiced in the voice studio. In proportion to vocal maturity, the teaching of voice in the studio will probably result in a much higher degree of vocal proficiency for the minority who may study with the studio

teacher. To assume, however, that what is taught in a voice studio cannot also be taught to some degree in the classroom or choral rehearsal is a fallacy. It is recommended that the lives of many more students be enhanced by an increasing amount of voice culture as taught by public school music teachers.

3. No attempt was made in this study to classify voices and put sopranos, altos, tenors, or basses into separate classes. No distinction was made as to high or low voices for class assignments. It is possible that homogeneous classes by voice range or by sex and voice range would prove to be more effective than classes grouped heterogeneously by voice classification either by sex or in classes of boys and girls both. Another study designed to test the relative effectiveness of these different types of classes is recommended.

4. Ability grouping for voice classes may be of more importance than voice classification or sex. It is recommended that when musical aptitude is similar for a group of students they may be effectively taught as a class of boys, a class of girls, or a mixed class of both boys and girls. In light of this study, a class of both boys and girls should not be discouraged, but rather encouraged as

possibly the most satisfactory.

5. Although the use of more than one adjudicator will provide more criticism for the performer and the score will be the average of all of the adjudicator evaluations, it is recommended that only one adjudicator be used for solo performance. The findings of this study revealed that each adjudicator was consistent with his own standards of performance.

APPENDIX A

STUDENT PERSONNEL DATA

Name	Designated Number	Aptitude Test Score	Diagnostic Test Scores First	Final	Group*
Carol Biby	3	65	110	142	I - Private
Jim Bailey	27	63			II
Janice Campbell	5	50	91	131	I
Elizabeth Ann Dick	22	58	171	177	I
Diana Dicken	1	56	114	156	I
Sandra Flick	4	64	125	173	III
Ilene Fox	6	43	50		III-Private
Stanley Galbreath	2	46	58	98	II
Linda Hill	10	61	116	158	I - Private
Don Hodges	9	62	170	183	III
Woody Joe Hodges	7	67	167	186	II
Roger Holman	13	58	47		II - Private
Shirley Holman	12	62	71		I
Trudy Kittelson	17	57	87	131	III-Private
Allen Lipperd	11	47	55	96	II
Alvin Lowrey	19	65	169	187	II - Private
Lin Miller	23	56	89	120	III-Private
Sue Nichols	25	60	86	112	III
Peggy Porter	18	40	116		III
Preston Price	15	51	119	163	II
Mike Rayl	14	53	127	167	III
Gary Sandstrum	16	63	155	167	II
Raymond Shelburn	24	48	80		II - Private
Mary Swoyer	8	52	87	116	I - Private
Melanie Thompson	20	62	132	142	I
Judy Wood	26	66	125	165	I
Marcia Young	21	51	47	62	III

*The students included in each group, a class and some private students, all sang the same selections for each evaluation.

APPENDIX B

SIMS STUDY VOCAL SOLO EVALUATION GUIDE

Name_____ Appearance No.____

Selection Title_____

		Errors	Points Possible	Score
Intonation	For these items check the errors on the music provided.			
Rhythm				
Dynamics				
Phrasing				
Vowels				
Consonants				
Phrase Endings				
Intervals				
Objective Evaluation Totals				

	Poor 0 - 2	Good 4 - 6	Excellent 8 - 10
Breath Support			
Breath Control			
Tone Quality			
Attitude			
Artistry and Interpretation			
Posture			
Tempo			
Memory			

Subjective Evaluation Total Score _____

Evaluation Final Score _____

Signature of Adjudicator_____

APPENDIX C

COMPLETE EVALUATION SCORES: BY PERCENTAGE

	Identification	PERCENTAGE OBJECTIVE			Difference 1 & 3	PERCENTAGE SUBJECTIVE			Difference 1 & 3	Total Difference
		1st	2nd	3rd		1st	2nd	3rd		
3	IP	.949	.886	.948	0	.662	.762	.700	4	4
8	IP	.882	.881	.939	6	.387	.400	.450	6	12
10	IP	.898	.928	.939	4	.537	.662	.762	22	26
17	IIIP	.898	.855	.977	8	.387	.700	.662	27	35
19	IIP	.898	.911	.964	6	.362	.600	.600	24	30
23	IIIP	.865	.800	.909	5	.275	.525	.462	18	23
1	III	.940	.931	.977	4	.562	.837	.825	26	30
2	II	.858	.872	.976	12	.312	.425	.512	20	32
4	III	.933	.943	.973	4	.475	.812	.825	34	38
5	I	.902	.847	.923	2	.375	.362	.437	6	8
7	II	.945	.901	.985	4	.525	.787	.737	22	26
9	III	.918	.963	.944	2	.600	.612	.787	19	21
11	II	.873	.879	.973	10	.387	.362	.737	35	45
14	III	.912	.908	.931	2	.312	.525	.550	24	26
15	II	.859	.879	.972	11	.525	.650	.637	12	23
16	II	.903	.884	.978	8	.487	.500	.762	27	35
20	I	.867	.807	.948	8	.337	.362	.450	11	19
21	III	.904	.931	.974	7	.550	.575	.525	-3	4
22	I	.925	.925	.955	3	.600	.712	.662	6	9
25	III	.921	.945	.969	5	.725	.775	.862	14	19
26	I	.908	.936	.981	7	.700	.787	.887	19	26

APPENDIX D

ORIGINAL DATA

OBJECTIVE EVALUATION: BY TYPES

COMPONENTS

		Intonation				Rhythm			
		First	Second	Third		First	Second	Third	
Class	1	99	94	97		100	100	100	
	2	100	100	99		95	98	100	
	4	99	98	99		100	97	99	
	5	84	91	88		99	95	99	
	7	98	95	99		100	98	100	
	9	99	96	95		100	100	100	
	11	96	96	98		96	100	99	
	14	99	98	97		99	99	99	
	15	99	93	97		96	98	99	
	16	97	99	100		95	100	99	
	20	96	77	89		98	96	100	
	21	96	99	99		100	98	99	
	22	100	97	99		100	100	99	
	25	92	99	97		100	100	98	
	26	98	100	100		100	96	100	
Totals ...		1452	1432	1453		1478	1475	1490	
Class total ...				4337					4443
Private	3	99	93	90		99	98	99	
	8	92	98	94		98	91	99	
	10	100	95	95		100	97	100	
	17	95	89	99		100	100	98	
	19	98	96	97		96	98	99	
	23	92	76	97		100	96	95	
Totals ...		576	547	572		593	580	590	
Private total ..				1695					1763
Evaluation Totals		2028	1979	2025		2071	2055	2080	
TOTAL				6032					6206

APPENDIX D

ORIGINAL DATA

OBJECTIVE EVALUATION: BY TYPES

COMPONENTS

		Dynamics			Phrasing		
		First	Second	Third	First	Second	Third
Class	1	70	92	96	100	100	100
	2	51	76	82	96	90	100
	4	100	98	75	88	100	100
	5	68	90	100	88	76	100
	7	64	100	88	100	100	100
	9	90	92	100	100	96	100
	11	33	85	88	100	100	100
	14	55	86	79	94	100	100
	15	60	94	91	96	100	100
	16	49	82	82	100	100	100
	20	42	82	100	100	92	94
	21	60	80	71	100	100	100
	22	55	98	90	100	85	94
	25	83	88	88	100	100	100
	26	74	92	100	96	100	94
Totals ...		954	1335	1330	1458	1439	1482
Class total			3619				4379
Private	3	53	90	100	100	100	99
	8	71	82	100	88	100	100
	10	55	94	100	75	99	100
	17	75	99	83	100	89	100
	19	51	82	82	100	100	92
	23	65	98	67	100	93	100
Totals ...		370	545	532	563	581	591
Private total ..			1447				1735
Evaluation Totals		1324	1880	1862	2021	2020	2073
TOTAL			5066				6114

APPENDIX D

ORIGINAL DATA

OBJECTIVE EVALUATION: BY TYPES

COMPONENTS

		Vowels			Consonants			
		First	Second	Third	First	Second	Third	
Class	1	89	83	94	91	90	99	
	2	77	78	98	75	71	94	
	4	76	89	95	91	89	99	
	5	80	57	86	93	86	81	
	7	94	94	98	92	70	97	
	9	71	92	93	89	96	86	
	11	75	93	98	85	63	94	
	14	83	91	96	89	75	82	
	15	67	86	95	80	69	96	
	16	84	77	98	88	75	96	
	20	84	82	95	74	65	87	
	21	85	89	96	86	86	98	
	22	92	76	89	82	89	88	
	25	76	83	97	93	94	95	
	26	86	84	91	81	88	97	
Totals ..		1219	1254	1419	1289	1206	1389	
Class total				3892				3884
Private	3	95	70	89	92	84	90	
	8	74	80	87	87	82	83	
	10	86	89	88	80	87	79	
	17	70	85	96	88	62	98	
	19	88	90	99	81	80	91	
	23	69	82	84	79	61	86	
Totals ...		482	496	543	507	456	527	
Private total ..				1521				1490
Evaluation Totals		1701	1750	1962	1796	1662	1916	
TOTAL				5413				5374

APPENDIX D

ORIGINAL DATA

OBJECTIVE EVALUATION: BY TYPES

COMPONENTS

		Phrase endings			Intervals			
		First	Second	Third	First	Second	Third	
Class	1	80	100	94	98	99	100	
	2	75	83	100	100	100	100	
	4	100	100	88	96	98	100	
	5	100	100	100	98	97	100	
	7	92	100	100	98	97	100	
	9	80	93	100	100	100	100	
	11	100	83	100	99	99	100	
	14	87	93	94	98	100	99	
	15	100	83	100	96	99	100	
	16	100	92	100	99	98	100	
	20	75	67	100	99	92	100	
	21	73	96	94	96	100	100	
	22	100	100	100	100	98	100	
	25	100	85	100	99	99	100	
	26	100	100	100	100	100	100	
Totals ..		1362	1375	1470	1476	1476	1499	
Class total				4207				4451
Private	3	92	100	100	99	93	100	
	8	75	100	99	98	91	100	
	10	71	100	100	99	98	100	
	17	100	100	100	96	97	99	
	19	100	83	100	100	100	100	
	23	100	93	88	96	86	100	
Totals ...		538	576	587	588	565	599	
Private total ..				1701				1752
Evaluation Totals		1900	1951	2057	2064	2041	2098	
TOTAL				5908				6203

APPENDIX E

OBJECTIVE EVALUATION

COMPONENT: BY TYPES

1. INTONATION

Evaluation

	First	Second	Third	Total
Class	1452	1432	1453	4337
Private	576	547	572	1695
Totals	2028	1979	2025	6032

Computation:

Total S. S.:

$$\frac{(1452)^2}{15} + \frac{(1432)^2}{15} + \ldots + \frac{(572)^2}{6} - \frac{(6032)^2}{63} =$$

$$577{,}703.96 - 577{,}540.06 = 163.90$$

Type:

$$\frac{(4337)^2}{45} + \frac{(1695)^2}{18} - \frac{(6032)^2}{63} =$$

$$577{,}602.92 - 577{,}540.06 = 62.86$$

Evaluation:

$$\frac{(2028)^2}{21} + \frac{(1979)^2}{21} + \frac{(2025)^2}{21} - \frac{(6032)^2}{63} =$$

$$577{,}611.90 - 577{,}540.06 = 71.84$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.	F ratio	F .95
Type	62.86	1	62.86	4.3	18.51
Evaluation	71.84	2	35.92	2.4	19.00
Type X Eval.	29.20	2	14.60		
Total	163.90	5			

APPENDIX E

OBJECTIVE EVALUATION

COMPONENT: BY TYPES

2. RHYTHM

Evaluation

	First	Second	Third	Total
Class	1478	1475	1490	4443
Private	593	580	590	1763
Totals	2071	2055	2080	6206

Computation:

Total S. S.:

$$\frac{(1478)^2}{15} + \frac{(1475)^2}{15} + \ldots + \frac{(590)^2}{6} - \frac{(6206)^2}{63} =$$

$$611{,}372.10 - 611{,}340.25 = 31.85$$

Type:

$$\frac{(4443)^2}{45} + \frac{(1763)^2}{18} - \frac{(6206)^2}{63} =$$

$$611{,}348.25 - 611{,}340.25 = 8.00$$

Evaluation:

$$\frac{(2071)^2}{21} + \frac{(2055)^2}{21} + \frac{(2080)^2}{21} - \frac{(6206)^2}{63} =$$

$$611{,}355.52 - 611{,}340.25 = 15.27$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.	F ratio	F .95
Type	8.00	1	8.00	1.86	18.51
Evaluation	15.27	2	7.63	1.78	19.00
Type X Eval.	8.58	2	4.29		
Total	31.85	5			

APPENDIX E

OBJECTIVE EVALUATION

COMPONENT: BY TYPES

3. DYNAMICS

Evaluation

	First	Second	Third	Total
Class	954	1335	1330	3619
Private	370	545	532	1447
Totals	1324	1880	1862	5066

Computation:

Total S. S.:

$$\frac{(954)^2}{15} + \frac{(1335)^2}{15} + \ldots + \frac{(532)^2}{6} - \frac{(5066)^2}{63} =$$

$$416{,}907.56 - 407{,}370.73 = 9{,}536.83$$

Type:

$$\frac{(3619)^2}{45} + \frac{(1447)^2}{18} - \frac{(5066)^2}{63} =$$

$$407{,}370.74 - 407{,}370.73 = .01$$

Evaluation:

$$\frac{(1324)^2}{21} + \frac{(1880)^2}{21} + \frac{(1862)^2}{21} - \frac{(5066)^2}{63} =$$

$$416{,}877.14 - 407{,}370.73 = 9{,}505.41$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.	F ratio	F .95
Type	.01	1	.01	--	18.51
Evaluation	9,505.41	2	4,752.70	302.72	19.00
Type X Eval.	31.41	2	15.70		
Total	9,536.83	5			

APPENDIX E

OBJECTIVE EVALUATION

COMPONENT: BY TYPES

4. PHRASING

Evaluation

	First	Second	Third	Total
Class	1458	1439	1482	4379
Private	563	581	591	1735
Totals	2021	2020	2073	6114

Computation:

Total S. S.:

$$\frac{(1458)^2}{15} + \frac{(1439)^2}{15} + \ldots + \frac{(591)^2}{6} - \frac{(6114)^2}{63} =$$

$$593{,}489.09 - 593{,}349.14 = 139.15$$

Type:

$$\frac{(4379)^2}{45} + \frac{(1735)^2}{18} - \frac{(6114)^2}{63} =$$

$$593{,}360.07 - 593{,}349.14 = 10.93$$

Evaluation:

$$\frac{(2021)^2}{21} + \frac{(2020)^2}{21} + \frac{(2073)^2}{21} - \frac{(6114)^2}{63} =$$

$$593{,}436.67 - 593{,}349.14 = 87.53$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.	F ratio	F .95
Type	10.93	1	10.93	.52	18.51
Evaluation	87.53	2	43.76	2.11	19.00
Type X Eval.	41.49	2	20.74		
Total	139.95	5			

APPENDIX E

OBJECTIVE EVALUATION

COMPONENT: BY TYPES

5. VOWELS

Evaluation

	First	Second	Third	Total
Class	1219	1254	1419	3892
Private	482	496	543	1521
Totals	1701	1750	1962	5413

Computation:

Total S. S.:

$$\frac{(1219)^2}{15} + \frac{(1254)^2}{15} + \ldots + \frac{(543)^2}{6} - \frac{(5413)^2}{63} =$$

$$467{,}000.69 - 465{,}088.40 = 1{,}912.29$$

Type:

$$\frac{(3892)^2}{45} + \frac{(1521)^2}{18} - \frac{(5413)^2}{63} =$$

$$465{,}139.25 - 465{,}088.40 = 50.85$$

Evaluation:

$$\frac{(1701)^2}{21} + \frac{(1750)^2}{21} + \frac{(1962)^2}{21} - \frac{(5413)^2}{63} =$$

$$466{,}921.19 - 465{,}088.40 = 1{,}832.79$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.	F ratio	F .95
Type	50.85	1	50.85	3.55	18.51
Evaluation	1,832.79	2	916.39	63.99	19.00
Type X Eval.	28.65	2	14.32		
Total	1,912.29	5			

APPENDIX E

OBJECTIVE EVALUATION

COMPONENT: BY TYPES

6. CONSONANTS

Evaluation

	First	Second	Third	Total
Class	1289	1206	1389	3884
Private	507	456	527	1490
Totals	1796	1662	1916	5374

Computation:

Total S. S.:

$$\frac{(1289)^2}{15} + \frac{(1206)^2}{15} + \ldots + \frac{(527)^2}{6} - \frac{(5374)^2}{63} =$$

$$460{,}137.52 - 458{,}410.73 = 1{,}726.79$$

Type:

$$\frac{(3884)^2}{45} + \frac{(1490)^2}{18} - \frac{(5374)^2}{63} =$$

$$458{,}571.23 - 458{,}410.73 = 160.50$$

Evaluation:

$$\frac{(1796)^2}{21} + \frac{(1662)^2}{21} + \frac{(1916)^2}{21} - \frac{(5374)^2}{63} =$$

$$459{,}948.38 - 458{,}410.73 = 1{,}558.65$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.	F ratio	F .95
Type	160.50	1	160.50	42.02	18.51
Evaluation	1,558.65	2	779.32	204.01	19.00
Type X Eval.	7.64	2	3.82		
Total	1,726.79	5			

APPENDIX E

OBJECTIVE EVALUATION

COMPONENT: BY TYPES

7. PHRASE ENDINGS

Evaluation

	First	Second	Third	Total
Class	1362	1375	1470	42
Private	538	576	587	17
Totals	1900	1951	2057	59

Computation:

Total S. S.:

$$\frac{(1362)^2}{15} + \frac{(1375)^2}{15} + \ldots + \frac{(587)^2}{6} - \frac{(5908)^2}{63} =$$

$$554{,}736.09 - 554{,}039.11 = 696.$$

Type:

$$\frac{(4207)^2}{45} + \frac{(1701)^2}{18} - \frac{(5908)^2}{63} =$$

$$554{,}052.25 - 554{,}039.11 = 13.$$

Evaluation:

$$\frac{(1900)^2}{21} + \frac{(1951)^2}{21} + \frac{(2057)^2}{21} - \frac{(5908)^2}{63} =$$

$$554{,}650.00 - 554{,}039.11 = 610.$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.	F ratio	F .
Type	13.14	1	13.14	.33	18.
Evaluation	610.89	2	305.44	8.38	19.
Type X Eval.	72.95	2	36.47		
Total	696.98	5			

APPENDIX E

OBJECTIVE EVALUATION

COMPONENT: BY TYPES

7. PHRASE ENDINGS

Evaluation

	First	Second	Third	Total
Class	1362	1375	1470	4207
Private	538	576	587	1701
Totals	1900	1951	2057	5908

Computation:

Total S. S.:

$$\frac{(1362)^2}{15} + \frac{(1375)^2}{15} + \ldots + \frac{(587)^2}{6} - \frac{(5908)^2}{63} =$$

$$554{,}736.09 - 554{,}039.11 = 696.98$$

Type:

$$\frac{(4207)^2}{45} + \frac{(1701)^2}{18} - \frac{(5908)^2}{63} =$$

$$554{,}052.25 - 554{,}039.11 = 13.14$$

Evaluation:

$$\frac{(1900)^2}{21} + \frac{(1951)^2}{21} + \frac{(2057)^2}{21} - \frac{(5908)^2}{63} =$$

$$554{,}650.00 - 554{,}039.11 = 610.89$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.	F ratio	F .95
Type	13.14	1	13.14	.33	18.51
Evaluation	610.89	2	305.44	8.38	19.00
Type X Eval.	72.95	2	36.47		
Total	696.98	5			

APPENDIX E

OBJECTIVE EVALUATION

COMPONENT: BY TYPES

8. INTERVALS

Evaluation

	First	Second	Third	Total
Class	1476	1476	1499	4451
Private	588	565	599	1752
Total	2064	2041	2098	6203

Computation:

Total S. S.:

$$\frac{(1476)^2}{15} + \frac{(1476)^2}{15} + \ldots + \frac{(599)^2}{6} - \frac{(6203)^2}{63} =$$

$$610,905.19 - 610,749.34 = 155.85$$

Type:

$$\frac{(4451)^2}{45} + \frac{(1752)^2}{18} - \frac{(6203)^2}{63} =$$

$$610,781.35 - 610,749.34 = 32.01$$

Evaluation:

$$\frac{(2064)^2}{21} + \frac{(2041)^2}{21} + \frac{(2098)^2}{21} - \frac{(6203)^2}{63} =$$

$$610,827.66 - 610,749.34 = 78.32$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.	F ratio	F .95
Type	32.01	1	32.01	1.41	18.51
Evaluation	78.32	2	39.16	1.72	19.00
Type X Eval.	45.52	2	22.76		
Total	155.85	5			

APPENDIX F

OBJECTIVE EVALUATION

COMPONENTS: BY TYPES

	Evaluation			
	First	Second	Third	Total
Class	10688	10992	11532	33212
Private	4217	4346	4541	13104
Totals	14905	15338	16073	46316

Computation:

Total S. S.:

$$\frac{(10688)^2}{120} + \frac{(4217)^2}{48} + \ldots + \frac{(4541)^2}{48} - \frac{(46316)^2}{504} =$$

$$4,260,609.55 - 4,256,293.36 = 4,316.19$$

Type:

$$\frac{(33212)^2}{360} + \frac{(13104)^2}{144} - \frac{(46316)^2}{504} =$$

$$4,256,455.51 - 4,256,293.36 = 162.15$$

Evaluation:

$$\frac{(14905)^2}{168} + \frac{(15338)^2}{168} + \frac{(16073)^2}{168} - \frac{(46316)^2}{504} =$$

$$4,260,444.03 - 4,256,293.36 = 4,150.67$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	162.15	1	162.15
Evaluation	4,150.67	2	2,075.33
Type X Eval.	3.37	2	1.68
Total	4,316.19	5	

APPENDIX F

OBJECTIVE EVALUATION

COMPONENTS: BY TYPES

		Evaluation			
		First	Second	Third	Totals
COMPONENTS	1	2028	1979	2025	6032
	2	2071	2055	2080	6206
	3	1324	1880	1862	5066
	4	2021	2020	2073	6114
	5	1701	1750	1962	5413
	6	1796	1662	1916	5374
	7	1900	1951	2057	5908
	8	2064	2041	2098	6203
	Totals	14905	15338	16073	46316

Computation:

Total S. S.:

$$\frac{(2028)^2}{21} + \frac{(1979)^2}{21} + \ldots + \frac{(2098)^2}{21} - \frac{(46316)^2}{504} =$$

$$4,291,628.46 - 4,256,293.36 = 35,335.10$$

Component:

$$\frac{(6032)^2}{63} + \frac{(6206)^2}{63} + \ldots + \frac{(6203)^2}{63} - \frac{(46316)^2}{504} =$$

$$4,277,887.77 - 4,256,293.36 = 21,594.41$$

Evaluation:

$$\frac{(14905)^2}{168} + \frac{(15338)^2}{168} + \frac{(16073)^2}{168} - \frac{(46316)^2}{504} =$$

$$4,260,444.03 - 4,256,293.36 = 4,150.67$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Component	21,594.41	7	3,084.92
Evaluation	4,150.67	2	2,075.33
Comp. X Eval.	9,590.02	14	685.00
Total	35,335.10	23	

APPENDIX F

OBJECTIVE EVALUATION

COMPONENTS: BY TYPES

		Types		
		Class	Private	Totals
COMPONENTS	1	4337	1695	6032
	2	4443	1763	6206
	3	3619	1447	5066
	4	4379	1735	6114
	5	3892	1521	5413
	6	3884	1490	5374
	7	4207	1701	5908
	8	4451	1752	6203
	Totals	33212	13104	46316

Computation:

Total S. S.:

$$\frac{(4337)^2}{45} + \frac{(1695)^2}{18} + \ldots + \frac{(1752)^2}{18} - \frac{(46316)^2}{504} =$$

$$4,278,226.10 - 4,256,293.36 = 21,932.64$$

Component:

$$\frac{(6032)^2}{63} + \frac{(6206)^2}{63} + \ldots + \frac{(6203)^2}{63} - \frac{(46316)^2}{504} =$$

$$4,277,887.77 - 4,256,293.36 = 21,594.41$$

Type:

$$\frac{(33212)^2}{360} + \frac{(13104)^2}{144} - \frac{(46316)^2}{504} =$$

$$4,256,455.51 - 4,256,293.36 = 162.15$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Component	21,594.41	7	3,084.92
Type	162.15	1	162.15
Comp. X Type	176.08	7	25.15
Total	21,932.64	15	

APPENDIX F

OBJECTIVE EVALUATION

COMPONENTS: BY TYPES

Evaluation

		First		Second		Third		Totals
Types		Class	Private	Class	Private	Class	Private	
COMPONENTS	1	1452	576	1432	547	1453	572	6032
	2	1478	593	1475	580	1490	590	6206
	3	954	370	1335	545	1330	532	5066
	4	1458	563	1439	581	1482	591	6114
	5	1219	482	1254	496	1419	543	5413
	6	1289	507	1206	456	1389	527	5374
	7	1362	538	1375	576	1470	587	5908
	8	1476	588	1476	565	1499	599	6203
Totals		10688	4217	10992	4346	11532	4541	
Evaluation Totals		14905		15338		16073		46316

Computation:

Total S. S.:

$$\frac{(1452)^2}{15} + \frac{(576)^2}{6} + \ldots + \frac{(599)^2}{6} - \frac{(46316)^2}{504} =$$

$$4,292,252.26 - 4,256,293.36 = 35,958.90$$

APPENDIX F

SUBJECTIVE EVALUATION

COMPONENTS: BY ADJUDICATOR

Evaluation

		First			Second			Third			Totals
Adjudicator		K	M	O	K	M	O	K	M	O	
COMPONENTS	1	101	85	56	135	103	70	156	97	76	879
	2	115	100	51	137	110	83	154	98	104	952
	3	85	104	75	137	123	128	146	107	128	1033
	4	121	130	78	151	140	109	170	145	148	1192
	5	94	103	68	141	123	98	153	131	116	1027
	6	128	113	86	149	126	114	172	138	136	1162
	7	121	111	84	158	142	110	174	143	144	1187
	8	172	132	108	192	160	151	186	152	145	1398
Totals		937	878	606	1200	1027	863	1311	1011	997	
Evaluation Totals			2421			3090			3319		8830

Computation:

Total S. S.:

$$\frac{(101)^2}{21} + \frac{(85)^2}{21} + \ldots + \frac{(145)^2}{21} - \frac{(8830)^2}{1512} =$$

$$54,818.71 - 51,566.73 = 3,251.98$$

APPENDIX G

ORIGINAL DATA

OBJECTIVE EVALUATION: BY GROUPS

COMPONENTS

		Intonation			Rhythm			
		First	Second	Third	First	Second	Third	
Girls	3	99	93	90	99	98	99	
	5	84	91	88	99	95	99	
	8	92	98	94	98	91	99	
	10	100	95	95	100	97	100	
	20	96	77	89	98	96	100	
	22	100	97	99	100	100	99	
	26	98	100	100	100	96	100	
Totals ...		669	651	655	694	673	696	
Girls' total		1975						2063
Boys	2	100	100	99	95	98	100	
	7	98	95	99	100	98	100	
	11	96	96	98	96	100	99	
	15	99	93	97	96	98	99	
	16	97	99	100	95	100	99	
	19	98	96	97	96	98	99	
Totals ...		588	579	590	578	592	596	
Boys' total		1757						1766
Mixed	1	99	94	97	100	100	100	
	4	99	98	99	100	97	99	
	9	99	96	95	100	100	100	
	14	99	98	97	99	99	99	
	17	95	89	99	100	100	98	
	21	96	99	99	100	98	99	
	23	92	76	97	100	96	95	
	25	92	99	97	100	100	98	
Totals ...		771	749	780	799	790	788	
Mixed total		2300						2377
Evaluation Totals		2028	1979	2025	2071	2055	2080	
TOTAL		6032						6206

APPENDIX G

ORIGINAL DATA

OBJECTIVE EVALUATION: BY GROUPS

COMPONENTS

		Dynamics			Phrasing		
		First	Second	Third	First	Second	Third
Girls	3	53	90	100	100	100	99
	5	68	90	100	88	76	100
	8	71	82	100	88	100	100
	10	55	94	100	75	99	100
	20	42	82	100	100	92	94
	22	55	98	90	100	85	94
	26	74	92	100	96	100	94
Totals ...		418	628	690	647	652	681
Girls' total		1736					1980
Boys	2	51	76	82	96	90	100
	7	64	100	88	100	100	100
	11	33	85	88	100	100	100
	15	60	94	91	96	100	100
	16	49	82	82	100	100	100
	19	51	82	82	100	100	92
Totals ...		308	519	513	592	590	592
Boys' total		1340					1774
Mixed	1	70	92	96	100	100	100
	4	100	98	75	88	100	100
	9	90	92	100	100	96	100
	14	55	86	79	94	100	100
	17	75	99	83	100	89	100
	21	60	80	71	100	100	100
	23	65	98	67	100	93	100
	25	83	88	88	100	100	100
Totals ...		598	733	659	782	778	800
Mixed total		1990					2360
Evaluation Total		1324	1880	1862	2021	2020	2073
TOTAL		5066					6114

APPENDIX G

ORIGINAL DATA

OBJECTIVE EVALUATION: BY GROUPS

COMPONENTS

		Vowels			Consonants			
		First	Second	Third	First	Second	Third	
Girls	3	95	70	89	92	84	90	
	5	80	57	86	93	86	81	
	8	74	80	87	87	82	83	
	10	86	89	88	80	87	79	
	20	84	82	95	74	65	87	
	22	92	76	89	82	89	88	
	26	86	84	91	81	88	97	
Totals ...		597	538	--625	589	581	605	
Girls' total				1760				1775
Boys	2	77	78	98	75	71	94	
	7	94	94	98	92	70	97	
	11	75	93	98	85	63	94	
	15	67	86	95	80	69	96	
	16	84	77	98	88	75	96	
	19	88	90	99	81	80	91	
Totals ...		485	518	586	501	428	568	
Boys' total				1589				1497
Mixed	1	89	83	94	91	90	99	
	4	76	89	95	91	89	99	
	9	71	92	93	89	96	86	
	14	83	91	96	89	75	82	
	17	70	85	96	88	62	98	
	21	85	89	96	86	86	98	
	23	69	82	84	79	61	86	
	25	76	83	97	93	94	95	
Totals ...		619	694	751	706	653	743	
Mixed total				2064				2102
Evaluation Total		1701	1750	1962	1796	1662	1916	
TOTAL				5413				5374

APPENDIX G

ORIGINAL DATA

OBJECTIVE EVALUATION: BY GROUPS

COMPONENTS

		Phrase Endings			Intervals			
		First	Second	Third	First	Second	Third	
Girls	3	92	100	100	99	93	100	
	5	100	100	100	98	97	100	
	8	75	100	99	98	91	100	
	10	71	100	100	99	98	100	
	20	75	67	100	99	92	100	
	22	100	100	100	100	98	100	
	26	100	100	100	100	100	100	
Totals ...		613	667	699	693	669	700	
Girls' total		1979						2062
Boys	2	75	83	100	100	100	100	
	7	92	100	100	98	97	100	
	11	100	83	100	99	99	100	
	15	100	83	100	96	99	100	
	16	100	92	100	99	98	100	
	19	100	83	100	100	100	100	
Totals ...		567	524	600	592	593	600	
Boys' total		1691						1785
Mixed	1	80	100	94	98	99	100	
	4	100	100	88	96	98	100	
	9	80	93	100	100	100	100	
	14	87	93	94	98	100	99	
	17	100	100	100	96	97	99	
	21	73	96	94	96	100	100	
	23	100	93	88	96	86	100	
	25	100	85	100	99	99	100	
Totals ...		720	760	758	779	779	798	
Mixed total		2238						2356
Evaluation Totals		1900	1951	2057	2064	2041	2098	
TOTAL		5908						6203

APPENDIX H

OBJECTIVE EVALUATION

COMPONENT: BY GROUPS

1. INTONATION

Evaluation

	First	Second	Third	Total
Girls	669	651	655	1975
Boys	588	579	590	1757
Mixed	771	749	780	2300
Totals	2028	1979	2025	6032

Computation:

Total S. S.:

$$\frac{(669)^2}{7} + \frac{(651)^2}{7} + \ldots + \frac{(780)^2}{8} - \frac{(6032)^2}{63} =$$

$$577{,}763.99 - 577{,}540.06 = 223.93$$

Group:

$$\frac{(1975)^2}{21} + \frac{(1757)^2}{18} + \frac{(2300)^2}{24} - \frac{(6032)^2}{63} =$$

$$577{,}571.81 - 577{,}540.06 = 31.75$$

Evaluation:

$$\frac{(2028)^2}{21} + \frac{(1979)^2}{21} + \frac{(2025)^2}{21} - \frac{(6032)^2}{63} =$$

$$577{,}611.90 - 577{,}540.06 = 71.84$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.	F ratio	F .95
Group	31.75	2	15.87	.53	6.94
Evaluation	71.84	2	35.92	1.19	6.94
Group X Eval.	120.34	4	30.08		
Total	223.93	8			

APPENDIX H

OBJECTIVE EVALUATION

COMPONENT: BY GROUPS

2. RHYTHM

Evaluation

	First	Second	Third	Total
Girls	694	673	696	2063
Boys	578	592	596	1766
Mixed	799	790	788	2377
Totals	2071	2055	2080	6206

Computation:

Total S. S.:

$$\frac{(694)^2}{7} + \frac{(673)^2}{7} + \ldots + \frac{(788)^2}{8} - \frac{(6206)^2}{63} =$$

$$611{,}436.20 - 611{,}340.25 = 85.95$$

Group:

$$\frac{(2063)^2}{21} + \frac{(1766)^2}{18} + \frac{(2377)^2}{24} - \frac{(6206)^2}{63} =$$

$$611{,}351.45 - 611{,}340.25 = 11.20$$

Evaluation:

$$\frac{(2071)^2}{21} + \frac{(2055)^2}{21} + \frac{(2080)^2}{21} - \frac{(6206)^2}{63} =$$

$$611{,}355.52 - 611{,}340.25 = 15.27$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.	F ratio	F .95
Group	11.20	2	5.60	.38	6.94
Evaluation	15.27	2	7.63	.51	6.94
Group X Eval.	59.48	4	14.87		
Total	85.95	8			

APPENDIX H

OBJECTIVE EVALUATION

COMPONENT: BY GROUPS

3. DYNAMICS

Evaluation

	First	Second	Third	Total
Girls	418	628	690	1736
Boys	308	519	513	1340
Mixed	598	733	659	1990
Totals	1324	1880	1862	5066

Computation:

Total S. S.:

$$\frac{(418)^2}{7} + \frac{(628)^2}{7} + \ldots + \frac{(659)^2}{8} - \frac{(5066)^2}{63} =$$

$$420{,}027.85 - 407{,}370.73 = 12{,}657.12$$

Group:

$$\frac{(1736)^2}{21} + \frac{(1340)^2}{18} + \frac{(1990)^2}{24} - \frac{(5066)^2}{63} =$$

$$408{,}269.06 - 407{,}370.73 = 898.33$$

Evaluation:

$$\frac{(1324)^2}{21} + \frac{(1880)^2}{21} + \frac{(1862)^2}{21} - \frac{(5066)^2}{63} =$$

$$416{,}877.14 - 407{,}370.73 = 9{,}505.41$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.	F ratio	F .95
Group	898.33	2	449.16	.80	6.94
Evaluation	9,505.41	2	4,752.70	8.47	6.94
Group X Eval.	2,243.38	4	560.84		
Total	12,657.12	8			

APPENDIX H

OBJECTIVE EVALUATION

COMPONENT: BY GROUPS

4. PHRASING

Evaluation

	First	Second	Third	Total
Girls	647	652	681	1980
Boys	592	590	592	1774
Mixed	782	778	800	2360
Totals	2021	2020	2073	6114

Computation:

Total S. S.:

$$\frac{(647)^2}{7} + \frac{(652)^2}{7} + \ldots + \frac{(800)^2}{8} - \frac{(6114)^2}{63} =$$

$$593{,}721.00 - 593{,}349.14 = 360.86$$

Group:

$$\frac{(1980)^2}{21} + \frac{(1774)^2}{18} + \frac{(2360)^2}{24} - \frac{(6114)^2}{63} =$$

$$593{,}589.94 - 593{,}349.14 = 240.80$$

Evaluation:

$$\frac{(2021)^2}{21} + \frac{(2020)^2}{21} + \frac{(2073)^2}{21} - \frac{(6114)^2}{63} =$$

$$593{,}436.67 - 593{,}349.14 = 87.53$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.	F ratio	F .95
Group	240.80	2	120.40	14.80	6.94
Evaluation	87.53	2	43.76	5.38	6.94
Group X Eval.	32.53	4	8.13		
Total	360.86	8			

APPENDIX H

OBJECTIVE EVALUATION

COMPONENT: BY GROUPS

5. VOWELS

Evaluation

	First	Second	Third	Total
Girls	597	538	625	1760
Boys	485	518	586	1589
Mixed	619	694	751	2064
Totals	1701	1750	1962	5413

Computation:

Total S. S.:

$$\frac{(597)^2}{7} + \frac{(538)^2}{7} + \ldots + \frac{(751)^2}{8} - \frac{(5413)^2}{63} =$$

$$467{,}825.54 - 465{,}088.40 = 2{,}737.14$$

Group:

$$\frac{(1760)^2}{21} + \frac{(1589)^2}{18} + \frac{(2064)^2}{24} - \frac{(5413)^2}{63} =$$

$$465{,}283.32 - 465{,}088.40 = 194.92$$

Evaluation:

$$\frac{(1701)^2}{21} + \frac{(1750)^2}{21} + \frac{(1962)^2}{21} - \frac{(5413)^2}{63} =$$

$$466{,}921.19 - 465{,}088.40 = 1{,}832.79$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.	F ratio	F .95
Group	194.92	2	97.46	.55	6.94
Evaluation	1,832.79	2	916.39	5.17	6.94
Group X Eval.	709.43	4	177.36		
Total	2,737.14	8			

APPENDIX H

OBJECTIVE EVALUATION

COMPONENT: BY GROUPS

6. CONSONANTS

Evaluation

	First	Second	Third	Total
Girls	589	581	605	1775
Boys	501	428	568	1497
Mixed	706	653	743	2102
Totals	1796	1662	1916	5374

Computation:

Total S. S.:

$$\frac{(589)^2}{7} + \frac{(581)^2}{7} + \ldots + \frac{(743)^2}{8} - \frac{(5374)^2}{63} =$$

$$460{,}819.01 - 458{,}410.73 = 2{,}408.28$$

Group:

$$\frac{(1775)^2}{21} + \frac{(1497)^2}{18} + \frac{(2102)^2}{24} - \frac{(5374)^2}{63} =$$

$$458{,}654.43 - 458{,}410.73 = 243.70$$

Evaluation:

$$\frac{(1796)^2}{21} + \frac{(1662)^2}{21} + \frac{(1916)^2}{21} - \frac{(5374)^2}{63} =$$

$$459{,}948.38 - 458{,}410.73 = 1{,}558.65$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.	F ratio	F .95
Group	243.70	2	121.85	.79	6.94
Evaluation	1,558.65	2	779.32	5.06	6.94
Group X Eval.	615.93	4	153.98		
Total	2,408.28	8			

APPENDIX H

OBJECTIVE EVALUATION

COMPONENT: BY GROUPS

7. PHRASE ENDINGS

Evaluation

	First	Second	Third	Total
Girls	613	667	699	1979
Boys	567	524	600	1691
Mixed	720	760	758	2238
Totals	1900	1951	2057	5908

Computation:

Total S. S.:

$$\frac{(613)^2}{7} + \frac{(667)^2}{7} + \ldots + \frac{(758)^2}{8} - \frac{(5908)^2}{63} =$$

$$555{,}201.67 - 554{,}039.11 = 1{,}162.56$$

Group:

$$\frac{(1979)^2}{21} + \frac{(1691)^2}{18} + \frac{(2238)^2}{24} - \frac{(5908)^2}{63} =$$

$$554{,}050.75 - 554{,}039.11 = 11.64$$

Evaluation:

$$\frac{(1900)^2}{21} + \frac{(1951)^2}{21} + \frac{(2057)^2}{21} - \frac{(5908)^2}{63} =$$

$$554{,}650.00 - 554{,}039.11 = 610.89$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.	F ratio	F .95
Group	11.64	2	5.82	.04	6.94
Evaluation	610.89	2	305.44	2.26	6.94
Group X Eval.	540.03	4	135.00		
Total	1,162.56	8			

APPENDIX H

OBJECTIVE EVALUATION

COMPONENT: BY GROUPS

8. INTERVALS

Evaluation

	First	Second	Third	Total
Girls	693	669	700	2062
Boys	592	593	600	1785
Mixed	779	779	798	2356
Totals	2064	2041	2098	6203

Computation:

Total S. S.:

$$\frac{(693)^2}{7} + \frac{(669)^2}{7} + \ldots + \frac{(798)^2}{8} - \frac{(6203)^2}{63} =$$

$$610,873.86 - 610,749.34 = 124.52$$

Group:

$$\frac{(2062)^2}{21} + \frac{(1785)^2}{18} + \frac{(2356)^2}{24} - \frac{(6203)^2}{63} =$$

$$610,761.93 - 610,749.34 = 12.59$$

Evaluation:

$$\frac{(2064)^2}{21} + \frac{(2041)^2}{21} + \frac{(2098)^2}{21} - \frac{(6203)^2}{63} =$$

$$610,827.66 - 610,749.34 = 78.32$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.	F ratio	F .95
Group	12.59	2	6.29	.75	6.94
Evaluation	78.32	2	39.16	4.66	6.94
Group X Eval.	33.61	4	8.40		
Total	124.52	8			

APPENDIX I

OBJECTIVE EVALUATION

COMPONENTS: BY GROUPS

	Evaluation			
	First	Second	Third	Totals
Girls	4920	5059	5351	15330
Boys	4211	4343	4645	13199
Mixed	5774	5936	6077	17787
Totals	14905	15338	16073	46316

Computation:

Total S. S.:

$$\frac{(4920)^2}{56} + \frac{(4211)^2}{48} + \frac{(5774)^2}{64} + \ldots + \frac{(6077)^2}{64} - \frac{(46316)^2}{504} =$$

$$4{,}260{,}987.01 - 4{,}256{,}293.36 = 4{,}693.65$$

Group:

$$\frac{(15330)^2}{168} + \frac{(13199)^2}{144} + \frac{(17787)^2}{192} - \frac{(46316)^2}{504} =$$

$$4{,}256{,}477.96 - 4{,}256{,}293.36 = 184.60$$

Evaluation:

$$\frac{(14905)^2}{168} + \frac{(15338)^2}{168} + \frac{(16073)^2}{168} - \frac{(46316)^2}{504} =$$

$$4{,}260{,}444.03 - 4{,}256{,}293.36 = 4{,}150.67$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	184.60	2	92.30
Evaluation	4,150.67	2	2,075.33
Group X Eval.	358.38	4	89.59
Total	4,693.65	8	

APPENDIX I

OBJECTIVE EVALUATION

COMPONENTS: BY GROUPS

		Groups			
		Girls	Boys	Mixed	Totals
COMPONENTS	1	1975	1757	2300	6032
	2	2063	1766	2377	6206
	3	1736	1340	1990	5066
	4	1980	1774	2360	6114
	5	1760	1589	2064	5413
	6	1775	1497	2102	5374
	7	1979	1691	2238	5908
	8	2062	1785	2356	6203
	Totals	15330	13199	17787	46316

Computation:

Total S. S.

$$\frac{(1975)^2}{21} + \frac{(1757)^2}{18} + \ldots + \frac{(2356)^2}{24} - \frac{(46316)^2}{504} =$$

$$4,279,599.12 - 4,256,293.36 = 23,305.77$$

Component:

$$\frac{(6032)^2}{63} + \frac{(6206)^2}{63} + \ldots + \frac{(6203)^2}{63} - \frac{(46316)^2}{504} =$$

$$4,277,887.77 - 4,256,293.36 = 21,594.41$$

Group:

$$\frac{(15330)^2}{168} + \frac{(13199)^2}{144} + \frac{(17787)^2}{192} - \frac{(46316)^2}{504} =$$

$$4,256,477.96 - 4,256,293.36 = 184.60$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Components	21,594.41	7	3,084.91
Groups	184.60	2	92.30
Comp. X Groups	1,526.76	14	108.32
Total	23,305.77	23	

APPENDIX I

OBJECTIVE EVALUATION

COMPONENTS: BY GROUPS

Evaluation

COMPONENTS	First			Second			Third			Totals
	Girls	Boys	Mixed	Girls	Boys	Mixed	Girls	Boys	Mixed	
1	669	588	771	651	579	749	655	590	780	6032
2	694	578	799	673	592	790	696	596	788	6206
3	418	308	598	628	519	733	690	513	659	5066
4	647	592	782	652	590	778	681	592	800	6114
5	597	485	619	538	518	694	625	586	751	5413
6	589	501	706	581	428	653	605	568	743	5374
7	613	567	720	667	524	760	699	600	758	5908
8	693	592	779	669	593	779	700	600	598	6203
Totals	4920	4211	5774	5059	4343	5936	5351	4645	6077	
Evaluation Totals		14905			15338			16073		46316

Computation:

Total S. S.:

$$\frac{(669)^2}{7} + \frac{(588)^2}{6} + \frac{(771)^2}{8} + \cdots + \frac{(798)^2}{8} - \frac{(46316)^2}{504} =$$

$$4,297,669.10 - 4,256,293.36 = 41,365.74$$

APPENDIX J

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY TYPES

FIRST EVALUATION

Adjudicator K

		Components 1	2	3	4	5	6	7	8	
Class	1	4	5	4	8	5	8	6	10	
	2	1	2	1	4	1	6	5	8	
	4	6	4	5	4	6	8	5	6	
	5	6	6	4	4	4	4	6	9	
	7	5	6	4	4	4	6	4	8	
	9	8	8	5	6	5	5	6	9	
	11	2	4	1	2	2	6	5	10	
	14	2	4	2	2	2	2	1	9	
	15	8	8	1	9	2	9	6	5	
	16	5	6	4	5	4	5	4	9	
	20	2	4	4	5	4	5	4	9	
	21	5	6	6	8	6	8	8	10	
	22	6	8	6	8	6	6	8	5	
	25	8	9	6	9	8	9	9	10	
	26	8	9	8	9	8	9	9	10	
	Totals	76	89	61	87	67	96	86	127	
						Class total ...				689
Private	3	6	6	5	8	6	8	9	10	
	8	5	4	5	6	5	6	6	5	
	10	6	6	6	6	6	5	8	9	
	17	6	6	5	8	6	6	6	8	
	19	1	2	2	4	2	5	2	8	
	23	1	2	1	2	2	2	4	5	
	Totals	25	26	24	34	27	32	35	45	
						Private total ..				248
Component Totals		101	115	85	121	94	128	121	172	
						TOTAL				937

APPENDIX J

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY TYPES

FIRST EVALUATION

Adjudicator M

	Components	1	2	3	4	5	6	7	8	
	1	4	6	2	6	6	5	6	10	
	2	2	2	4	2	2	2	6	4	
	4	4	6	8	6	8	6	2	0	
	5	2	4	2	4	4	2	5	4	
	7	6	8	4	8	6	5	4	4	
	9	8	8	6	8	6	8	8	6	
	11	2	2	2	6	4	6	6	8	
Class	14	2	4	4	5	4	6	0	4	
	15	4	5	6	8	8	6	5	4	
	16	4	6	8	6	2	6	6	8	
	20	2	2	2	4	2	2	2	6	
	21	2	4	6	6	4	5	6	8	
	22	9	8	8	8	6	8	6	6	
	25	8	8	6	8	9	8	9	10	
	26	6	8	9	10	6	8	6	10	
	Totals	65	81	77	95	77	83	77	92	
							Class total ...			647
	3	8	9	10	8	8	10	8	10	
	8	2	2	4	5	6	4	6	2	
	10	6	4	8	10	6	8	6	6	
Private	17	2	2	1	4	2	4	2	4	
	19	1	1	2	4	2	2	6	10	
	23	1	1	2	4	2	2	6	8	
	Totals	20	19	27	35	26	30	34	40	
							Private total ..			231
	Component Totals	85	100	104	130	103	113	111	132	
							TOTAL			878

APPENDIX J

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY TYPES

FIRST EVALUATION

Adjudicator O

Components		1	2	3	4	5	6	7	8
	1	4	5	5	5	4	4	4	10
	2	2	2	4	4	2	4	4	2
	4	2	2	5	5	4	5	2	4
	5	2	2	2	0	1	4	5	4
	7	4	4	4	6	4	6	6	6
	9	4	2	2	4	2	4	6	10
	11	2	2	2	4	2	4	4	4
Class	14	2	2	4	4	2	2	2	4
	15	4	4	4	4	4	4	6	2
	16	2	2	4	4	4	4	2	6
	20	2	2	4	2	2	2	2	6
	21	2	2	6	6	5	5	2	6
	22	4	4	5	0	6	6	6	2
	25	4	2	4	5	5	6	4	9
	26	4	2	4	5	5	6	6	2
Totals		44	39	59	58	52	66	61	77

Class total 456

	3	2	2	2	4	4	4	5	8
	8	2	2	2	4	2	4	2	2
	10	2	2	4	4	2	2	2	6
Private	17	2	2	2	4	4	4	2	2
	19	2	2	4	2	2	4	8	9
	23	2	2	2	2	2	2	4	4
Totals		12	12	16	20	16	20	23	31

Private total .. 150

Component Totals	56	51	75	78	68	86	84	108

TOTAL 606

APPENDIX J

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY TYPES

SECOND EVALUATION

Adjudicator K

Components		1	2	3	4	5	6	7	8	
Class	1	10	10	10	10	10	10	10	10	
	2	5	4	5	5	5	4	8	10	
	4	9	9	9	10	9	10	10	8	
	5	4	5	4	4	5	6	8	6	
	7	8	9	8	9	8	8	9	10	
	9	6	6	5	4	5	5	8	10	
	11	4	4	2	4	4	4	4	8	
	14	4	6	5	5	5	5	6	10	
	15	8	8	8	9	8	8	6	10	
	16	4	2	4	5	4	2	6	10	
	20	2	4	4	5	5	6	6	4	
	21	8	8	9	9	8	8	9	10	
	22	6	8	8	6	8	6	6	10	
	25	10	9	10	10	9	10	10	10	
	26	8	8	8	8	9	9	9	10	
Totals		96	100	99	103	102	101	115	136	
							Class total			852
Private	3	9	8	9	10	9	9	8	10	
	8	6	6	8	8	5	8	6	6	
	10	8	6	5	8	6	8	8	10	
	17	8	9	8	9	9	9	10	10	
	19	4	4	4	5	4	6	5	10	
	23	4	4	4	8	6	8	6	10	
Totals		39	37	38	48	39	48	43	56	
							Private total ..			348
Component Totals		135	137	137	151	141	149	158	192	
							TOTAL			1200

APPENDIX J

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY TYPES

SECOND EVALUATION

Adjudicator M

Components		1	2	3	4	5	6	7	8	
Class	1	8	8	4	6	8	6	9	10	
	2	2	2	4	2	2	4	4	6	
	4	8	8	10	9	9	9	9	6	
	5	2	2	2	4	2	4	4	4	
	7	8	8	9	9	9	9	8	10	
	9	6	6	4	8	6	8	9	6	
	11	2	4	2	6	2	4	4	4	
	14	4	4	6	4	6	6	8	8	
	15	4	4	4	6	4	4	6	8	
	16	6	6	8	8	6	6	8	8	
	20	2	2	2	4	2	4	2	6	
	21	2	4	6	8	6	4	8	8	
	22	6	6	10	8	6	6	8	10	
	25	10	10	9	9	10	8	10	10	
	26	8	8	9	10	9	10	10	10	
Totals		78	82	89	101	87	92	107	114	
							Class total			750
Private	3	8	6	8	8	8	8	6	10	
	8	2	2	4	2	2	2	2	2	
	10	4	4	8	8	6	6	5	10	
	17	4	6	4	9	8	8	8	6	
	19	5	8	8	8	6	8	8	10	
	23	2	2	2	4	6	2	6	8	
Totals		25	28	34	39	36	34	35	46	
							Private total ...			277
Component Totals		103	110	123	140	123	126	142	160	
							TOTAL			1027

APPENDIX J

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY TYPES

SECOND EVALUATION

Adjudicator O

		Components 1	2	3	4	5	6	7	8	
Class	1	5	8	6	8	9	8	8	10	
	2	2	4	8	4	2	5	4	0	
	4	4	4	9	9	8	8	8	4	
	5	2	2	2	2	2	4	4	4	
	7	4	5	8	5	5	6	6	10	
	9	4	4	8	5	4	8	2	10	
	11	2	2	2	4	2	4	6	4	
	14	2	4	4	4	2	4	4	10	
	15	6	6	8	5	4	6	6	10	
	16	2	2	4	4	2	4	5	4	
	20	2	2	6	4	4	2	4	2	
	21	2	2	4	4	4	4	2	2	
	22	5	5	8	5	5	6	8	10	
	25	6	6	8	8	8	8	8	10	
	26	4	4	8	6	5	5	5	10	
Totals		52	60	93	77	66	82	80	100	
							Class total			610
Private	3	2	5	9	6	6	8	4	10	
	8	2	2	4	4	4	4	4	2	
	10	4	4	8	6	6	6	5	10	
	17	2	4	4	6	6	5	6	10	
	19	4	4	6	4	5	4	5	10	
	23	4	4	4	6	5	5	6	9	
Totals		18	23	35	32	32	32	30	51	
							Private total ..			253
Component Totals		70	83	128	109	98	114	110	151	
							TOTAL			863

APPENDIX J

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY TYPES

THIRD EVALUATION

Adjudicator K

Components		1	2	3	4	5	6	7	8	
Class	1	10	10	10	10	10	10	10	10	
	2	5	5	6	6	5	6	6	6	
	4	10	10	10	10	9	10	10	8	
	5	6	5	4	5	4	6	6	9	
	7	9	9	8	9	9	9	8	10	
	9	9	9	8	10	9	9	9	10	
	11	6	8	6	9	6	8	8	10	
	14	6	4	5	6	6	8	8	10	
	15	8	6	5	8	6	8	9	6	
	16	6	8	8	8	6	8	8	10	
	20	6	6	6	8	6	6	8	8	
	21	6	5	5	6	6	6	6	5	
	22	8	8	6	6	8	8	8	10	
	25	10	10	9	10	10	10	10	10	
	26	10	10	9	9	9	10	9	10	
Totals ...		115	113	105	120	109	122	123	132	
							Class total			939
Private	3	10	10	9	10	9	10	9	8	
	8	4	4	6	8	6	6	6	8	
	10	10	9	9	10	9	10	10	10	
	17	8	9	6	10	9	10	10	10	
	19	5	5	6	6	6	8	8	10	
	23	4	4	5	6	5	6	8	8	
Totals		41	41	41	50	44	50	51	54	
							Private total ..			372
Component Totals		156	154	146	170	153	172	174	186	
							TOTAL			1311

APPENDIX J

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY TYPES

THIRD EVALUATION

Adjudicator M

Components		1	2	3	4	5	6	7	8	
	1	4	4	6	8	8	8	8	9	
	2	2	2	4	8	4	4	6	2	
	4	6	6	8	9	9	9	9	8	
	5	2	2	4	4	4	4	6	6	
	7	6	6	5	8	6	6	4	9	
	9	8	8	6	9	9	9	8	8	
	11	4	5	4	8	6	8	8	8	
Class	14	4	4	4	6	2	6	6	6	
	15	5	5	4	6	6	8	8	6	
	16	6	6	4	8	9	8	8	10	
	20	2	2	2	4	2	4	4	4	
	21	5	5	6	4	4	5	6	5	
	22	6	6	8	6	6	6	8	10	
	25	8	8	6	8	8	8	9	10	
	26	9	9	8	9	10	8	9	10	
Totals		77	78	79	105	93	101	107	111	
							Class total			751
	3	4	4	6	8	8	8	6	6	
	8	2	2	4	4	4	4	4	4	
	10	6	6	6	6	8	8	8	6	
Private	17	4	4	2	8	6	6	8	8	
	19	2	2	6	6	6	5	4	8	
	23	2	2	4	8	6	6	6	9	
Totals		20	20	28	40	38	37	36	41	
							Private total ..			260
Component Totals		97	98	107	145	131	138	143	152	
							TOTAL			1011

APPENDIX J

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY TYPES

THIRD EVALUATION

Adjudicator O

Components		1	2	3	4	5	6	7	8	
	1	6	6	6	10	10	6	10	10	
	2	4	4	6	9	5	6	8	4	
	4	4	6	8	8	8	8	8	6	
	5	2	2	2	4	2	4	6	6	
	7	4	6	8	9	6	8	4	10	
	9	4	6	6	8	5	6	6	10	
	11	5	6	6	9	9	9	10	10	
Class	14	2	4	5	5	4	5	8	8	
	15	4	5	6	10	8	8	8	0	
	16	5	6	8	8	5	10	10	10	
	20	2	4	4	4	4	4	4	4	
	21	2	4	6	6	6	6	6	4	
	22	4	5	6	5	4	6	4	6	
	25	5	8	9	8	8	6	10	10	
	26	5	8	9	9	8	8	8	10	
Totals		58	80	95	112	92	100	110	108	
						Class total				755
	3	4	4	6	8	4	6	8	4	
	8	2	2	6	4	2	6	6	4	
	10	4	8	8	6	6	8	6	5	
Private	17	2	4	4	8	4	6	4	10	
	19	4	4	5	6	6	8	8	10	
	23	2	2	4	4	2	2	2	4	
Totals		18	24	33	36	24	36	34	37	
						Private total ..				242
Component Totals		76	104	128	148	116	136	144	145	
						TOTAL				997

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES

1. BREATH SUPPORT

	Evaluation			
	First	Second	Third	Total
Class	185	226	250	661
Private	57	82	79	218
Totals	242	308	329	879

Computation:

Total S. S.:

$$\frac{(185)^2}{45} + \frac{(226)^2}{45} + \ldots + \frac{(79)^2}{18} - \frac{(879)^2}{189} =$$

$$4{,}185.23 - 4{,}088.04 = 97.19$$

Type:

$$\frac{(661)^2}{135} + \frac{(218)^2}{54} - \frac{(879)^2}{189} =$$

$$4{,}116.52 - 4{,}088.04 = 28.48$$

Evaluation:

$$\frac{(242)^2}{63} + \frac{(308)^2}{63} + \frac{(329)^2}{63} - \frac{(879)^2}{189} =$$

$$4{,}153.47 - 4{,}088.04 = 65.43$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	28.48	1	28.48
Evaluation	65.43	2	32.71
Type X Eval.	3.28	2	1.64
Total	97.19	5	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES

1. BREATH SUPPORT

Adjudicator

	K	M	O	Total
Class	287	220	154	661
Privats	105	65	48	218
Totals	392	285	202	879

Computation:

Total S. S.:

$$\frac{(287)^2}{45} + \frac{(220)^2}{45} + \ldots + \frac{(48)^2}{18} - \frac{(879)^2}{189} =$$

$$4{,}408.22 - 4{,}088.04 = 320.18$$

Type:

$$\frac{(661)^2}{135} + \frac{(218)^2}{54} - \frac{(879)^2}{189} =$$

$$4{,}116.52 - 4{,}088.04 = 28.48$$

Adjudicator:

$$\frac{(392)^2}{63} + \frac{(285)^2}{63} + \frac{(202)^2}{63} - \frac{(879)^2}{189} =$$

$$4{,}376.07 - 4{,}088.04 = 288.03$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	28.48	1	28.48
Adjudicator	288.03	2	144.01
Type X Adj.	3.67	2	1.83
Total	320.18	5	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES AND BY GROUPS

1. BREATH SUPPORT

Evaluation

	First	Second	Third	Total
K	101	135	156	392
M	85	103	97	285
O	56	70	76	202
Totals	242	308	329	879

Computation:

Total S. S.:

$$\frac{(101)^2}{21} + \frac{(135)^2}{21} + \frac{(76)^2}{21} - \frac{(879)^2}{189} =$$

$$4,467.47 - 4,088.04 = 379.43$$

Adjudicator:

$$\frac{(392)^2}{63} + \frac{(285)^2}{63} + \frac{(202)^2}{63} - \frac{(879)^2}{189} =$$

$$4,376.07 - 4,088.04 = 288.03$$

Evaluation:

$$\frac{(242)^2}{63} + \frac{(308)^2}{63} + \frac{(329)^2}{63} - \frac{(879)^2}{189} =$$

$$4,153.47 - 4,088.04 = 65.43$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Adjudicator	288.03	2	144.01
Evaluation	65.43	2	32.71
Adj. X Eval.	25.97	4	6.49
Total	379.43	8	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES

2. BREATH CONTROL

Evaluation

	First	Second	Third	Total
Class	209	242	271	722
Private	57	88	85	230
Totals	266	330	357	952

Computation:

Total S. S.:

$$\frac{(209)^2}{45} + \frac{(242)^2}{45} + \ldots + \frac{(85)^2}{18} - \frac{(952)^2}{189} =$$

$$4{,}916.24 - 4{,}795.25 = 120.99$$

Type:

$$\frac{(722)^2}{135} + \frac{(230)^2}{54} - \frac{(952)^2}{189} =$$

$$4{,}840.98 - 4{,}795.25 = 45.73$$

Evaluation:

$$\frac{(266)^2}{63} + \frac{(330)^2}{63} + \frac{(357)^2}{63} - \frac{(952)^2}{189} =$$

$$4{,}863.36 - 4{,}795.25 = 68.11$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	45.73	1	45.73
Evaluation	68.11	2	34.05
Type X Eval.	7.15	2	3.57
Total	120.99	5	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES

2. BREATH CONTROL

Adjudicator

	K	M	O	Total
Class	302	241	179	722
Private	104	67	59	230
Totals	406	308	238	952

Computation:

Total S. S.:

$$\frac{(302)^2}{45} + \frac{(241)^2}{45} + \ldots + \frac{(59)^2}{18} - \frac{(952)^2}{189} =$$

$$5{,}073.12 - 4{,}795.25 = 277.87$$

Type:

$$\frac{(722)^2}{135} + \frac{(230)^2}{54} - \frac{(952)^2}{189} =$$

$$4{,}840.98 - 4{,}795.25 = 45.73$$

Adjudicator:

$$\frac{(406)^2}{63} + \frac{(308)^2}{63} + \frac{(238)^2}{63} - \frac{(952)^2}{189} =$$

$$5{,}021.32 - 4{,}795.25 = 226.07$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	45.73	1	45.73
Adjudicator	226.07	2	113.03
Type X Adj.	6.07	2	3.03
Total	277.87	5	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES AND BY GROUPS

2. BREATH CONTROL

Evaluation

	First	Second	Third	Total
K	115	137	154	406
M	100	110	98	308
O	51	83	104	238
Totals	266	330	356	952

Computation:

Total S. S.:

$$\frac{(115)^2}{21} + \frac{(137)^2}{21} + \ldots + \frac{(104)^2}{21} - \frac{(952)^2}{189} =$$

$$5{,}129.52 - 4{,}795.25 = 334.27$$

Adjudicator:

$$\frac{(406)^2}{63} + \frac{(308)^2}{63} + \frac{(238)^2}{63} - \frac{(952)^2}{189} =$$

$$5{,}021.32 - 4{,}795.25 = 226.07$$

Evaluation:

$$\frac{(266)^2}{63} + \frac{(330)^2}{63} + \frac{(356)^2}{63} - \frac{(952)^2}{189} =$$

$$4{,}863.36 - 4{,}795.25 = 68.11$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Adjudicator	226.07	2	113.03
Evaluation	68.11	2	34.05
Adj. X Eval.	40.09	4	10.02
Total	334.27	8	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES

3. TONE QUALITY

Adjudicator

	K	M	O	Total
Class	265	245	247	757
Private	103	89	84	276
Totals	368	334	331	1033

Computation:

Total S. S.:

$$\frac{(265)^2}{45} + \frac{(245)^2}{45} + \ldots + \frac{(84)^2}{18} - \frac{(1033)^2}{189} =$$

$$5,671.64 - 5,645.97 = 25.67$$

Type:

$$\frac{(757)^2}{135} + \frac{(276)^2}{54} - \frac{(1033)^2}{189} =$$

$$5,655.46 - 5,645.97 = 9.49$$

Adjudicator:

$$\frac{(368)^2}{63} + \frac{(334)^2}{63} + \frac{(331)^2}{63} - \frac{(1033)^2}{189} =$$

$$5,659.38 - 5,645.97 = 13.41$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	9.49	1	9.49
Adjudicator	13.41	2	6.70
Type X Adj.	2.77	2	1.38
Total	25.67	5	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES

3. TONE QUALITY

Evaluation

	First	Second	Third	Total
Class	197	281	279	757
Private	67	107	102	276
Totals	264	388	381	1033

Computation:

Total S. S.:

$$\frac{(197)^2}{45} + \frac{(281)^2}{45} + \ldots + \frac{(102)^2}{18} - \frac{(1033)^2}{189} =$$

$$5{,}810.35 - 5{,}645.97 = 164.38$$

Type:

$$\frac{(757)^2}{135} + \frac{(276)^2}{54} - \frac{(1033)^2}{189} =$$

$$5{,}655.46 - 5{,}645.97 = 9.49$$

Evaluation:

$$\frac{(264)^2}{63} + \frac{(388)^2}{63} + \frac{(381)^2}{63} - \frac{(1033)^2}{189} =$$

$$5{,}800.02 - 5{,}645.97 = 154.05$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	9.49	1	9.49
Evaluation	154.05	2	77.02
Type X Eval.	.83	2	.41
Total	164.38	5	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES AND BY GROUPS

3. TONE QUALITY

Evaluation

	First	Second	Third	Total
K	85	137	146	368
M	104	123	107	334
O	75	128	128	331
Totals	264	388	381	1033

Computation:

Total S. S.:

$$\frac{(85)^2}{21} + \frac{(104)^2}{21} + \frac{(75)^2}{21} + \ldots + \frac{(128)^2}{21} - \frac{(1033)^2}{189} =$$

$$5,861.76 - 5,645.97 = 215.69$$

Adjudicator:

$$\frac{(368)^2}{63} + \frac{(334)^2}{63} + \frac{(331)^2}{63} - \frac{(1033)^2}{189} =$$

$$5,659.38 - 5,645.97 = 13.41$$

Evaluation:

$$\frac{(264)^2}{63} + \frac{(388)^2}{63} + \frac{(381)^2}{63} - \frac{(1033)^2}{189} =$$

$$5,800.02 - 5,645.97 = 154.05$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Adjudicator	13.41	2	6.70
Evaluation	154.05	2	77.02
Adj. X Eval.	48.23	4	12.06
Total	215.69	8	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES

4. ATTITUDE

Evaluation

	First	Second	Third	Total
Class	240	281	337	858
Private	89	119	126	334
Totals	329	400	463	1192

Computation:

Total S. S.:

$$\frac{(240)^2}{45} + \frac{(281)^2}{45} + \ldots + \frac{(126)^2}{18} - \frac{(1192)^2}{189} =$$

$$7{,}667.21 - 7{,}517.79 = 149.42$$

Type:

$$\frac{(858)^2}{135} + \frac{(334)^2}{54} - \frac{(1192)^2}{189} =$$

$$7{,}518.91 - 7{,}517.79 = 1.12$$

Evaluation:

$$\frac{(329)^2}{63} + \frac{(400)^2}{63} + \frac{(463)^2}{63} - \frac{(1192)^2}{189} =$$

$$7{,}660.47 - 7{,}517.79 = 142.68$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	1.12	1	1.12
Evaluation	142.68	2	71.34
Type X Eval.	5.62	2	2.81
Total	149.42	5	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES

4. ATTITUDE

Adjudicator

	K	M	O	Total
Class	310	301	247	858
Private	132	114	88	334
Totals	442	415	335	1192

Computation:

Total S. S.:

$$\frac{(310)^2}{45} + \frac{(301)^2}{45} + \ldots + \frac{(88)^2}{18} - \frac{(1192)^2}{189} =$$

$$7{,}624.88 - 7{,}517.79 = 107.09$$

Type:

$$\frac{(858)^2}{135} + \frac{(334)^2}{54} - \frac{(1192)^2}{189} =$$

$$7{,}518.91 - 7{,}517.79 = 1.12$$

Adjudicator:

$$\frac{(442)^2}{63} + \frac{(415)^2}{63} + \frac{(335)^2}{63} - \frac{(1192)^2}{189} =$$

$$7{,}616.09 - 7{,}517.79 = 98.30$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	1.12	1	1.12
Adjudicator	98.30	2	49.15
Type X Adj.	8.47	2	4.23
Total	107.09	5	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES AND BY GROUPS

4. ATTITUDE

Evaluation

	First	Second	Third	Total
K	121	151	170	442
M	130	140	145	415
O	78	109	148	335
Totals	329	400	463	1192

Computation:

Total S. S.:

$$\frac{(121)^2}{21} + \frac{(151)^2}{21} + \ldots + \frac{(148)^2}{21} - \frac{(1192)^2}{189} =$$

$$7{,}796.95 - 7{,}517.79 = 279.16$$

Adjudicator:

$$\frac{(442)^2}{63} + \frac{(415)^2}{63} + \frac{(335)^2}{63} - \frac{(1192)^2}{189} =$$

$$7{,}616.09 - 7{,}517.79 = 98.30$$

Evaluation:

$$\frac{(329)^2}{63} + \frac{(400)^2}{63} + \frac{(463)^2}{63} - \frac{(1192)^2}{189} =$$

$$7{,}660.47 - 7{,}517.79 = 142.68$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Adjudicator	98.30	2	49.15
Evaluation	142.68	2	71.34
Adj. X Eval.	38.18	4	9.54
Total	279.16	8	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES

5. ARTISTRY AND INTERPRETATION

Evaluation

	First	Second	Third	Total
Class	196	255	294	745
Private	69	107	106	282
Totals	265	362	400	1027

Computation:

Total S. S.:

$$\frac{(196)^2}{45} + \frac{(255)^2}{45} + \ldots + \frac{(106)^2}{18} - \frac{(1027)^2}{189} =$$

$$5,744.25 - 5,580.58 = 163.67$$

Type:

$$\frac{(745)^2}{135} + \frac{(282)^2}{54} - \frac{(1027)^2}{189} =$$

$$5,583.95 - 5,580.58 = 3.37$$

Evaluation:

$$\frac{(265)^2}{63} + \frac{(362)^2}{63} + \frac{(400)^2}{63} - \frac{(1027)^2}{189} =$$

$$5,734.43 - 5,580.58 = 153.85$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	3.37	1	3.37
Evaluation	153.85	2	76.92
Type X Eval.	6.45	2	3.22
Total	163.67	5	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES

5. ARTISTRY AND INTERPRETATION

	Adjudicator			
	K	M	O	Total
Class	278	257	210	745
Private	110	100	72	282
Totals	388	357	282	1027

Computation:

Total S. S.:

$$\frac{(278)^2}{45} + \frac{(257)^2}{45} + \ldots + \frac{(72)^2}{18} - \frac{(1027)^2}{189} =$$

$$5{,}680.94 - 5{,}580.58 = 100.36$$

Type:

$$\frac{(745)^2}{135} + \frac{(282)^2}{54} - \frac{(1027)^2}{189} =$$

$$5{,}583.95 - 5{,}580.58 = 3.37$$

Adjudicator:

$$\frac{(388)^2}{63} + \frac{(357)^2}{63} + \frac{(282)^2}{63} - \frac{(1027)^2}{189} =$$

$$5{,}674.87 - 5{,}580.58 = 94.29$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	3.37	1	3.37
Adjudicator	94.29	2	47.14
Type X Adj.	2.70	2	1.35
Total	100.36	5	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES AND BY GROUPS

5. ARTISTRY AND INTERPRETATION

Evaluation

	First	Second	Third	Total
K	94	141	153	388
M	103	123	131	357
O	68	98	116	282
Totals	265	362	400	1027

Computation:

Total S. S.:

$$\frac{(94)^2}{21} + \frac{(141)^2}{21} + \ldots + \frac{(116)^2}{21} - \frac{(1027)^2}{189} =$$

$$5,843.28 - 5,580.58 = 262.70$$

Adjudicator:

$$\frac{(388)^2}{63} + \frac{(357)^2}{63} + \frac{(282)^2}{63} - \frac{(1027)^2}{189} =$$

$$5,674.87 - 5,580.58 = 94.29$$

Evaluation:

$$\frac{(265)^2}{63} + \frac{(362)^2}{63} + \frac{(400)^2}{63} - \frac{(1027)^2}{189} =$$

$$5,734.43 - 5,580.58 = 153.85$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Adjudicator	94.29	2	47.14
Evaluation	153.85	2	76.92
Adj. X Eval.	14.56	4	3.64
Total	262.70	8	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES

6. POSTURE

Evaluation

	First	Second	Third	Total
Class	245	275	323	843
Private	82	114	123	319
Totals	327	389	446	1162

Computation:

Total S. S.:

$$\frac{(245)^2}{45} + \frac{(275)^2}{45} + \ldots + \frac{(123)^2}{18} - \frac{(1162)^2}{189} =$$

$$7{,}268.91 - 7{,}144.15 = 124.76$$

Type:

$$\frac{(843)^2}{135} + \frac{(319)^2}{54} - \frac{(1162)^2}{189} =$$

$$7{,}148.52 - 7{,}144.15 = 4.37$$

Evaluation:

$$\frac{(327)^2}{63} + \frac{(389)^2}{63} + \frac{(446)^2}{63} - \frac{(1162)^2}{189} =$$

$$7{,}256.60 - 7{,}144.15 = 112.45$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	4.37	1	4.37
Evaluation	112.45	2	56.22
Type X Eval.	7.94	2	3.97
Total	124.76	5	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES

6. POSTURE

Adjudicator

	K	M	O	Total
Class	319	276	248	843
Private	130	101	88	319
Totals	449	377	336	1162

Computation:

Total S. S.:

$$\frac{(319)^2}{45} + \frac{(276)^2}{45} + \ldots + \frac{(88)^2}{18} - \frac{(1162)^2}{189} =$$

$$7{,}256.74 - 7{,}144.15 = 112.59$$

Type:

$$\frac{(843)^2}{135} + \frac{(319)^2}{54} - \frac{(1162)^2}{189} =$$

$$7{,}148.52 - 7{,}144.15 = 4.37$$

Adjudicator:

$$\frac{(449)^2}{63} + \frac{(377)^2}{63} + \frac{(336)^2}{63} - \frac{(1162)^2}{189} =$$

$$7{,}248.03 - 7{,}144.15 = 103.88$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	4.37	1	4.37
Adjudicator	103.88	2	51.94
Type X Adj.	4.34	2	2.17
Total	112.59	5	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES AND BY GROUPS

6. POSTURE

Evaluation

	First	Second	Third	Total
K	128	149	172	449
M	113	126	138	377
O	86	114	136	336
Totals	327	389	446	1162

Computation:

Total S. S.:

$$\frac{(128)^2}{21} + \frac{(149)^2}{21} + \ldots + \frac{(136)^2}{21} + \frac{(1162)^2}{189} =$$

$$7,368.85 - 7,144.15 = 224.70$$

Adjudicator:

$$\frac{(449)^2}{63} + \frac{(377)^2}{63} + \frac{(336)^2}{63} - \frac{(1162)^2}{189} =$$

$$7,248.03 - 7,144.15 = 103.88$$

Evaluation:

$$\frac{(327)^2}{63} + \frac{(389)^2}{63} + \frac{(446)^2}{63} - \frac{(1162)^2}{189} =$$

$$7,256.60 - 7,144.15 = 112.45$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Adjudicator	103.88	2	51.94
Evaluation	112.45	2	56.22
Adj. X Eval.	8.37	4	2.09
Total	224.70	8	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES

7. TEMPO

Evaluation

	First	Second	Third	Total
Class	224	302	340	866
Private	92	108	121	321
Totals	316	410	461	1187

Computation:

Total S. S.:

$$\frac{(224)^2}{45} + \frac{(302)^2}{45} + \ldots + \frac{(121)^2}{18} - \frac{(1187)^2}{189} =$$

$$7{,}642.27 - 7{,}454.86 = 187.41$$

Type:

$$\frac{(866)^2}{135} + \frac{(321)^2}{54} - \frac{(1187)^2}{189} =$$

$$7{,}463.38 - 7{,}454.86 = 8.52$$

Evaluation:

$$\frac{(316)^2}{63} + \frac{(410)^2}{63} + \frac{(461)^2}{63} - \frac{(1187)^2}{189} =$$

$$7{,}626.62 - 7{,}454.86 = 171.76$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	8.52	1	8.52
Evaluation	171.76	2	85.88
Type X Eval.	7.13	2	3.56
Total	187.41	5	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES

7. TEMPO

Adjudicator

	K	M	O	Total
Class	324	291	251	866
Private	129	105	87	321
Totals	453	396	338	1187

Computation:

Total S. S.:

$$\frac{(324)^2}{45} + \frac{(291)^2}{45} + \ldots + \frac{(87)^2}{18} - \frac{(1187)^2}{189} =$$

$$7{,}572.12 - 7{,}454.86 = 117.26$$

Type:

$$\frac{(866)^2}{135} + \frac{(321)^2}{54} - \frac{(1187)^2}{189} =$$

$$7{,}463.38 - 7{,}454.86 = 8.52$$

Adjudicator:

$$\frac{(453)^2}{63} + \frac{(396)^2}{63} + \frac{(338)^2}{63} - \frac{(1187)^2}{189} =$$

$$7{,}559.82 - 7{,}454.86 = 104.96$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	8.52	1	8.52
Adjudicator	104.96	2	52.48
Type X Adj.	3.78	2	1.89
Total	117.26	5	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES AND BY GROUPS

7. TEMPO

Evaluation

	First	Second	Third	Total
K	121	158	174	453
M	111	142	143	396
O	84	110	144	338
Totals	316	410	461	1187

Computation:

Total S. S.:

$$\frac{(121)^2}{21} + \frac{(158)^2}{21} + \ldots + \frac{(144)^2}{21} - \frac{(1187)^2}{189} =$$

$$7{,}747.95 - 7{,}454.86 = 293.09$$

Adjudicator:

$$\frac{(453)^2}{63} + \frac{(396)^2}{63} + \frac{(338)^2}{63} - \frac{(1187)^2}{189} =$$

$$7{,}559.82 - 7{,}454.86 = 104.96$$

Evaluation:

$$\frac{(316)^2}{63} + \frac{(410)^2}{63} + \frac{(461)^2}{63} - \frac{(1187)^2}{189} =$$

$$7{,}626.62 - 7{,}454.86 = 171.76$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Adjudicator	104.96	2	52.48
Evaluation	171.76	2	85.88
Adj. X Eval.	16.37	4	4.09
Total	293.09	8	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES

8. MEMORY

Evaluation

	First	Second	Third	Total
Class	296	350	351	997
Private	116	153	132	401
Totals	412	503	483	1398

Computation:

Total S. S.:

$$\frac{(296)^2}{45} + \frac{(350)^2}{45} + \ldots + \frac{(132)^2}{18} - \frac{(1398)^2}{189} =$$

$$10,423.09 - 10,340.76 = 82.33$$

Type:

$$\frac{(997)^2}{135} + \frac{(401)^2}{54} - \frac{(1398)^2}{189} =$$

$$10,340.81 - 10,340.76 = 00.05$$

Evaluation:

$$\frac{(412)^2}{63} + \frac{(503)^2}{63} + \frac{(483)^2}{63} - \frac{(1398)^2}{189} =$$

$$10,413.37 - 10,340.76 = 72.61$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	.05	1	.05
Evaluation	72.61	2	36.30
Type X Eval.	9.67	2	4.83
Total	82.33	5	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES

8. MEMORY

Adjudicator

	K	M	O	Total
Class	395	317	285	997
Private	155	127	119	401
Totals	550	444	404	1398

Computation:

Total S. S.:

$$\frac{(395)^2}{45} + \frac{(317)^2}{45} + \ldots + \frac{(119)^2}{18} - \frac{(1398)^2}{189} =$$

$$10,522.81 - 10,340.76 = 182.05$$

Type:

$$\frac{(997)^2}{135} + \frac{(401)^2}{54} - \frac{(1398)^2}{189} =$$

$$10,340.81 - 10,340.76 = 00.05$$

Adjudicator:

$$\frac{(550)^2}{63} + \frac{(444)^2}{63} + \frac{(404)^2}{63} - \frac{(1398)^2}{189} =$$

$$10,521.46 - 10,340.76 = 180.70$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	.05	1	.05
Adjudicator	180.70	2	90.35
Type X Adj.	1.30	2	.65
Total	182.05	5	

APPENDIX K

SUBJECTIVE EVALUATION

COMPONENT: BY TYPES AND BY GROUPS

8. MEMORY

Evaluation

	First	Second	Third	Total
K	172	192	186	550
M	132	160	152	444
O	108	151	145	404
Totals	412	503	483	1398

Computation:

Total S. S.:

$$\frac{(172)^2}{21} + \frac{(192)^2}{21} + \ldots + \frac{(145)^2}{21} - \frac{(1398)^2}{189} =$$

$$10{,}602.95 - 10{,}340.76 = 262.19$$

Adjudicator:

$$\frac{(550)^2}{63} + \frac{(444)^2}{63} + \frac{(404)^2}{63} - \frac{(1398)^2}{189} =$$

$$10{,}521.46 - 10{,}340.76 = 180.70$$

Evaluation:

$$\frac{(412)^2}{63} + \frac{(503)^2}{63} + \frac{(483)^2}{63} - \frac{(1398)^2}{189} =$$

$$10{,}413.37 - 10{,}340.76 = 72.61$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Adjudicator	180.70	2	90.35
Evaluation	72.61	2	36.30
Adj. X Eval.	8.88	4	2.22
Total	262.19	8	

APPENDIX L

SUBJECTIVE EVALUATION

COMPONENTS: BY TYPES

Adjudicator

	K	M	O	Totals
Class	2480	2148	1821	6449
Private	968	768	645	2381
Totals	3448	2916	2466	8830

Computation:

Total S. S.:

$$\frac{(2480)^2}{360} + \frac{(2148)^2}{360} + \ldots + \frac{(645)^2}{144} - \frac{(8830)^2}{1512} =$$

$$52{,}604.23 - 51{,}566.73 = 1{,}037.50$$

Type:

$$\frac{(6449)^2}{1080} + \frac{(2381)^2}{432} - \frac{(8830)^2}{1512} =$$

$$51{,}631.93 - 51{,}566.73 = 65.20$$

Adjudicator:

$$\frac{(3448)^2}{504} + \frac{(2916)^2}{504} + \frac{(2466)^2}{504} - \frac{(8830)^2}{1512} =$$

$$52{,}525.62 - 51{,}566.73 = 958.89$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	65.20	1	65.20
Adjudicator	958.90	2	479.45
Type X Adj.	13.10	2	6.55
Total	1,037.20	5	

APPENDIX L

SUBJECTIVE EVALUATION

COMPONENTS: BY TYPES

COMPONENTS	Types: Class	Private	Totals
1	661	218	879
2	722	230	952
3	757	276	1033
4	858	334	1192
5	745	282	1027
6	843	319	1162
7	866	321	1187
8	997	401	1398
Totals	6449	2381	8830

Computation:

Total S. S.:

$$\frac{(661)^2}{135} + \frac{(218)^2}{54} + \ldots + \frac{(401)^2}{54} - \frac{(8830)^2}{1512} =$$

$$52{,}688.62 - 51{,}566.73 = 1{,}101.89$$

Component:

$$\frac{(879)^2}{189} + \frac{(952)^2}{189} + \ldots + \frac{(1398)^2}{189} - \frac{(8830)^2}{1512} =$$

$$52{,}567.42 - 51{,}566.73 = 1{,}000.69$$

Type:

$$\frac{(6449)^2}{1080} + \frac{(2381)^2}{432} - \frac{(8830)^2}{1512} =$$

$$51{,}631.93 - 51{,}566.73 = 65.20$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Component	1,000.69	7	142.95
Type	65.20	1	65.20
Comp. X Type	36.00	7	5.14
Total	1,101.89	15	

APPENDIX L

SUBJECTIVE EVALUATION

COMPONENTS: BY TYPES

		Adjudicator K	M	O	Totals
COMPONENTS	1	392	285	202	879
	2	406	308	238	952
	3	368	334	331	1033
	4	442	415	335	1192
	5	388	357	282	1027
	6	449	377	336	1162
	7	453	396	338	1187
	8	550	444	404	1398
	Totals	3448	2916	2466	8830

Computation:

Total S. S.:

$$\frac{(392)^2}{63} + \frac{(285)^2}{63} + \ldots + \frac{(404)^2}{63} - \frac{(8830)^2}{1512} =$$

$$53,677.06 - 51,566.73 = 2,110.33$$

Adjudicator:

$$\frac{(3448)^2}{504} + \frac{(2916)^2}{504} + \frac{(2466)^2}{504} - \frac{(8830)^2}{1512} =$$

$$52,525.62 - 51,566.73 = 958.89$$

Component:

$$\frac{(879)^2}{189} + \frac{(952)^2}{189} + \ldots + \frac{(1398)^2}{189} - \frac{(8830)^2}{1512} =$$

$$52,567.42 - 51,566.73 = 1,000.69$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Adjudicator	958.90	2	479.45
Component	1,000.69	7	142.96
Adj. X Comp.	150.74	14	10.76
Total	2,110.33	23	

APPENDIX L

SUBJECTIVE EVALUATION

COMPONENTS: BY TYPES

		Adjudicator K		Adjudicator M		Adjudicator O		
Types		Class	Private	Class	Private	Class	Private	Totals
COMPONENTS	1	287	105	220	65	154	48	879
	2	302	104	241	67	179	59	952
	3	265	103	245	89	247	84	1033
	4	310	132	301	114	247	88	1192
	5	278	110	257	100	210	72	1027
	6	319	130	276	101	248	88	1162
	7	324	129	291	105	251	87	1187
	8	395	155	317	127	285	119	1398
Totals		2480	968	2148	768	1821	645	8830
Evaluation Totals		3448		2916		2466		

Computation:

Total S. S.:

$$\frac{(287)^2}{45} + \frac{(105)^2}{18} + \ldots + \frac{(119)^2}{18} - \frac{(8830)^2}{1512} =$$

$$53,810.51 - 51,566.73 = 2,243.78$$

APPENDIX L

SUBJECTIVE EVALUATION

COMPONENTS: BY TYPES

	Evaluation			
	First	Second	Third	Totals
Class	1792	2212	2445	6449
Private	692	878	874	2381
Totals	2421	3090	3319	8830

Computation:

Total S. S.:

$$\frac{(1792)^2}{360} + \frac{(2212)^2}{360} + \ldots + \frac{(874)^2}{144} - \frac{(8830)^2}{1512} =$$

$$52{,}522.87 - 51{,}566.73 = 956.14$$

Type:

$$\frac{(6449)^2}{1080} + \frac{(2381)^2}{432} - \frac{(8830)^2}{1512} =$$

$$51{,}631.93 - 51{,}566.73 = 65.20$$

Evaluation:

$$\frac{(2421)^2}{504} + \frac{(3090)^2}{504} + \frac{(3319)^2}{504} - \frac{(8830)^2}{1512} =$$

$$52{,}430.75 - 51{,}566.73 = 864.02$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Type	65.20	1	65.20
Evaluation	864.02	2	432.01
Type X Eval.	26.92	2	13.46
Total	956.14	5	

APPENDIX L

SUBJECTIVE EVALUATION

COMPONENTS: BY TYPES

		Evaluation						
		First		Second		Third		Totals
Types		Class	Private	Class	Private	Class	Private	
COMPONENTS	1	185	57	226	82	250	79	879
	2	209	57	242	88	271	85	952
	3	197	67	281	107	279	102	1033
	4	240	89	281	119	337	126	1192
	5	196	69	255	107	294	106	1027
	6	245	82	275	114	323	123	1162
	7	224	92	302	108	340	121	1187
	8	296	116	350	153	351	132	1398
Totals		1792	629	2212	878	2445	874	
Evaluation Totals		2421		3090		3319		8830

Computation:

Total S. S.:

$$\frac{(185)^2}{45} + \frac{(57)^2}{18} + \ldots + \frac{(132)^2}{18} - \frac{(8830)^2}{1521} =$$

$$53{,}657.63 - 51{,}566.73 = 2{,}090.90$$

APPENDIX M

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY GROUPS

FIRST EVALUATION

Adjudicator K

		1	2	3	4	5	6	7	8	
Components										
	3	6	6	5	8	6	8	9	10	
	5	6	6	4	4	4	4	6	9	
	8	5	4	5	6	5	6	6	5	
Girls	10	6	6	6	6	6	5	8	9	
	20	2	4	4	5	4	5	4	9	
	22	6	8	6	8	6	6	8	5	
	26	8	9	8	9	8	9	9	10	
Totals		39	43	38	46	39	43	50	57	
										Girls' total ... 355
	2	1	2	1	4	1	6	5	8	
	7	5	6	4	4	4	6	4	8	
	11	2	4	1	2	2	6	5	10	
Boys	15	8	8	1	9	2	9	6	5	
	16	5	6	4	5	4	5	4	9	
	19	1	2	2	4	2	5	2	8	
Totals		22	28	13	28	15	37	26	48	
										Boys' total 217
	1	4	5	4	8	5	8	6	10	
	4	6	4	5	4	6	8	5	6	
	9	8	8	5	6	5	5	6	9	
	14	2	4	2	2	2	2	1	9	
Mixed	17	6	6	5	8	6	6	6	8	
	21	5	6	6	8	6	8	8	10	
	23	1	2	1	2	2	2	4	5	
	25	8	9	6	9	8	9	9	10	
Totals		40	44	34	47	40	48	45	67	
										Mixed total 365
Component Totals		101	115	85	121	94	128	121	172	
										TOTAL 937

APPENDIX M

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY GROUPS

FIRST EVALUATION

Adjudicator M

		Components	1	2	3	4	5	6	7	8	
	3		8	9	10	8	8	10	8	10	
	5		2	4	2	4	4	2	5	4	
	8		2	2	4	5	6	4	6	2	
Girls	10		6	4	8	10	6	8	6	6	
	20		2	2	2	4	2	2	2	6	
	22		9	8	8	8	6	8	6	6	
	26		6	8	9	10	6	8	6	10	
		Totals	35	37	43	49	38	42	39	44	
									Girls' total ...		327
	2		2	2	4	2	2	2	6	4	
	7		6	8	4	8	6	5	4	4	
	11		2	2	2	6	4	6	6	8	
Boys	15		4	5	6	8	8	6	5	4	
	16		4	6	8	6	2	6	6	8	
	19		1	1	2	4	2	2	6	10	
		Totals	19	24	26	34	24	27	33	38	
									Boys' total		225
	1		4	6	2	6	6	5	6	10	
	4		4	6	8	6	8	6	2	0	
	9		8	8	6	8	6	8	8	6	
	14		2	4	4	5	4	6	0	4	
Mixed	17		2	2	1	4	2	4	2	4	
	21		2	4	6	6	4	5	6	8	
	23		1	1	2	4	2	2	6	8	
	25		8	8	6	8	9	8	9	10	
		Totals	31	39	35	47	41	44	39	50	
									Mixed total		326
		Component Totals	85	100	104	130	103	113	111	132	
									TOTAL		878

APPENDIX M

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY GROUPS

FIRST EVALUATION

Adjudicator O

		1	2	3	4	5	6	7	8	
Components										
Girls	3	2	2	2	4	4	4	5	8	
	5	2	2	2	0	1	4	5	4	
	8	2	2	2	4	2	4	2	2	
	10	2	2	4	4	2	2	2	6	
	20	2	2	4	2	2	2	2	6	
	22	4	4	5	0	6	6	6	2	
	26	4	2	4	5	5	6	6	2	
Totals		18	16	23	19	22	28	28	30	
								Girls' total ...		184
Boys	2	2	2	4	4	2	4	4	2	
	7	4	4	4	6	4	6	6	6	
	11	2	2	2	4	2	4	4	4	
	15	4	4	4	4	4	4	6	2	
	16	2	2	4	4	4	4	2	6	
	19	2	2	4	2	2	4	8	9	
Totals		16	16	22	24	18	26	30	29	
								Boys, total		181
Mixed	1	4	5	5	5	4	4	4	10	
	4	2	2	5	5	4	5	2	4	
	9	4	2	2	4	2	4	6	10	
	14	2	2	4	4	2	2	2	4	
	17	2	2	2	4	4	4	2	2	
	21	2	2	6	6	5	5	2	6	
	23	2	2	2	2	2	2	4	4	
	25	4	2	4	5	5	6	4	9	
Totals		22	19	30	35	28	32	26	49	
								Mixed total		241
Component Totals		56	51	75	78	68	86	84	108	
								TOTAL		606

APPENDIX M

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY GROUPS

SECOND EVALUATION

Adjudicator K

Components		1	2	3	4	5	6	7	8	
	3	9	8	9	10	9	9	8	10	
	5	4	5	4	4	5	6	8	6	
	8	6	6	8	8	5	8	6	6	
Girls	10	8	6	5	8	6	8	8	10	
	20	2	4	4	5	5	6	6	4	
	22	6	8	8	6	8	6	6	10	
	26	8	8	8	8	9	9	9	10	
Totals		43	45	46	49	47	52	51	56	
								Girls' total ...		389
	2	5	4	5	5	5	4	8	10	
	7	8	9	8	9	8	8	9	10	
	11	4	4	2	4	4	4	4	8	
Boys	15	8	8	8	9	8	8	6	10	
	16	4	2	4	5	4	2	6	10	
	19	4	4	4	5	4	6	5	10	
Totals		33	31	31	37	33	32	38	58	
								Boys' total		293
	1	10	10	10	10	10	10	10	10	
	4	9	9	9	10	9	10	10	8	
	9	6	6	5	4	5	5	8	10	
	14	4	6	5	5	5	5	6	10	
Mixed	17	8	9	8	9	9	9	10	10	
	21	8	8	9	9	8	8	9	10	
	23	4	4	4	8	6	8	6	10	
	25	10	9	10	10	9	10	10	10	
Totals		59	61	60	65	61	65	69	78	
								Mixed total		518
Component Totals		135	137	137	151	141	149	158	192	
								TOTAL		1200

APPENDIX M

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY GROUPS

SECOND EVALUATION

Adjudicator M

		1	2	3	4	5	6	7	8	
Components										
	3	8	6	8	8	8	8	6	10	
	5	2	2	2	4	2	4	4	4	
	8	2	2	4	2	2	2	2	2	
Girls	10	4	4	8	8	6	6	5	10	
	20	2	2	2	4	2	4	2	6	
	22	6	6	10	8	6	6	8	10	
	26	8	8	9	10	9	10	10	10	
Totals		32	30	43	44	35	40	37	52	
								Girls' total ...		313
	2	2	2	4	2	2	4	4	6	
	7	8	8	9	9	9	9	8	10	
	11	2	4	2	6	2	4	4	4	
Boys	15	4	4	4	6	4	4	6	8	
	16	6	6	8	8	6	6	8	8	
	19	5	8	8	8	6	8	8	10	
Totals		27	32	35	39	29	35	38	46	
								Boys' total		281
	1	8	8	4	6	8	6	9	10	
	4	8	8	10	9	9	9	9	6	
	9	6	6	4	8	6	8	9	6	
	14	4	4	6	4	6	6	8	8	
Mixed	17	4	6	4	9	8	8	8	6	
	21	2	4	6	8	6	4	8	8	
	23	2	2	2	4	6	2	6	8	
	25	10	10	9	9	10	8	10	10	
Totals		44	48	45	57	59	51	67	62	
								Mixed total		433
Component Totals		103	110	123	140	123	126	142	160	
								TOTAL		1027

APPENDIX M

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY GROUPS

SECOND EVALUATION

Adjudicator O

		Components	1	2	3	4	5	6	7	8	
Girls	3		2	5	9	6	6	8	4	10	
	5		2	2	2	2	2	4	4	4	
	8		2	2	4	4	4	4	4	2	
	10		4	4	8	6	6	6	5	10	
	20		2	2	6	4	4	2	4	2	
	22		5	5	8	5	5	6	8	10	
	26		4	4	8	6	5	5	5	10	
		Totals	21	24	45	33	32	35	34	48	
								Girls' total ...			272
Boys	2		2	4	8	4	2	5	4	0	
	7		4	5	8	5	5	6	6	10	
	11		2	2	2	4	2	4	6	4	
	15		6	6	8	5	4	6	6	10	
	16		2	2	4	4	2	4	5	4	
	19		4	4	6	4	5	4	5	10	
		Totals	20	23	36	26	20	29	32	38	
								Boys' total			224
Mixed	1		5	8	6	8	9	8	8	10	
	4		4	4	9	9	8	8	8	4	
	9		4	4	8	5	4	8	2	10	
	14		2	4	4	4	2	4	4	10	
	17		2	4	4	6	6	5	6	10	
	21		2	2	4	4	4	4	2	2	
	23		4	4	4	6	5	5	6	9	
	25		6	6	8	8	8	8	8	10	
		Totals	29	36	47	50	46	50	44	65	
								Mixed total			367
		Component Totals	70	83	128	109	98	114	110	151	
								TOTAL			863

APPENDIX M

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY GROUPS

THIRD EVALUATION

Adjudicator K

Components	1	2	3	4	5	6	7	8	
	3	10	10	9	10	9	10	9	8
	5	6	5	4	5	4	6	6	9
	8	4	4	6	8	6	6	6	8
Girls	10	10	9	9	10	9	10	10	10
	20	6	6	6	8	6	6	8	8
	22	8	8	6	6	8	8	8	10
	26	10	10	9	9	9	10	9	10
Totals	54	52	49	56	51	56	56	63	
							Girls' total ...		437
	2	5	5	6	6	5	6	6	6
	7	9	9	8	9	9	9	8	10
	11	6	8	6	9	6	8	8	10
Boys	15	8	6	5	8	6	8	9	6
	16	6	8	8	8	6	8	8	10
	19	5	5	6	6	6	8	8	10
Totals	39	41	39	46	38	47	47	72	
							Boys' total		349
	1	10	10	10	10	10	10	10	10
	4	10	10	10	10	9	10	10	8
	9	9	9	8	10	9	9	9	10
	14	6	4	5	6	6	8	8	10
Mixed	17	8	9	6	10	9	10	10	10
	21	6	5	5	6	6	6	6	5
	23	4	4	5	6	5	6	8	8
	25	10	10	9	10	10	10	10	10
Totals	63	61	58	68	64	69	71	71	
							Mixed total		525
Component Totals	156	154	146	170	153	172	174	186	
							TOTAL		1311

APPENDIX M

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY GROUPS

THIRD EVALUATION

Adjudicator M

		1	2	3	4	5	6	7	8	
Components										
	3	4	4	6	8	8	8	6	6	
	5	2	2	4	4	4	4	6	6	
	8	2	2	4	4	4	4	4	4	
Girls	10	6	6	6	6	8	8	8	6	
	20	2	2	2	4	2	4	4	4	
	22	6	6	8	6	6	6	8	10	
	26	9	9	8	9	10	8	9	10	
Totals		31	31	38	41	42	42	45	46	
							Girls' total ...			316
	2	2	2	4	8	4	4	6	2	
	7	6	6	5	8	6	6	4	9	
	11	4	5	4	8	6	8	8	8	
Boys	15	5	5	4	6	6	8	8	6	
	16	6	6	4	8	9	8	8	10	
	19	2	2	6	6	6	5	4	8	
Totals		25	26	27	44	37	39	38	43	
							Boys' total			279
	1	4	4	6	8	8	8	8	9	
	4	6	6	8	9	9	9	9	8	
	9	8	8	6	9	9	9	8	8	
	14	4	4	4	6	2	6	6	6	
Mixed	17	4	4	2	8	6	6	8	8	
	21	5	5	6	4	4	5	6	5	
	23	2	2	4	8	6	6	6	9	
	25	8	8	6	8	8	8	9	10	
Totals		41	41	42	60	52	57	60	63	
							Mixed total			416
Component Totals		97	98	107	145	131	138	143	152	
							TOTAL			1011

APPENDIX M

ORIGINAL DATA

SUBJECTIVE EVALUATION: BY GROUPS

THIRD EVALUATION

Adjudicator O

Components		1	2	3	4	5	6	7	8	
	3	4	4	6	8	4	6	8	4	
	5	2	2	2	4	2	4	6	6	
	8	2	2	6	4	2	6	6	4	
Girls	10	4	8	8	6	6	8	6	5	
	20	2	4	4	4	4	4	4	4	
	22	4	5	6	5	4	6	4	6	
	26	5	8	9	9	8	8	8	10	
Totals		23	33	41	40	30	42	42	39	
							Girls' total ...			290
	2	4	4	6	9	5	6	8	4	
	7	4	6	8	9	6	8	4	10	
	11	5	6	6	9	9	9	10	10	
Boys	15	4	5	6	10	8	8	8	0	
	16	5	6	8	8	5	10	10	10	
	19	4	4	5	6	6	8	8	10	
Totals		26	31	39	51	39	49	48	44	
							Boys' total			327
	1	6	6	6	10	10	6	10	10	
	4	4	6	8	8	8	8	8	6	
	9	4	6	6	8	5	6	6	10	
	14	2	4	5	5	4	5	8	8	
Mixed	17	2	4	4	8	4	6	4	10	
	21	2	4	6	6	6	6	6	4	
	23	2	2	4	4	2	2	2	4	
	25	5	8	9	8	8	6	10	10	
Totals		27	40	48	57	47	45	54	62	
							Mixed total			380
Component Totals		76	104	128	148	116	136	144	145	
							TOTAL			997

APPENDIX N

SUBJECTIVE EVALUATION

COMPONENT: BY GROUPS

1. BREATH SUPPORT

Evaluation

	First	Second	Third	Total
Girls	92	96	108	296
Boys	57	80	90	227
Mixed	93	132	131	356
Totals	242	308	329	879

Computation:

Total S. S.:

$$\frac{(92)^2}{21} + \frac{(96)^2}{21} + \ldots + \frac{(131)^2}{24} - \frac{(879)^2}{189} =$$

$$4,184.81 - 4,088.04 = 96.77$$

Group:

$$\frac{(296)^2}{63} + \frac{(227)^2}{54} + \frac{(356)^2}{72} - \frac{(879)^2}{189} =$$

$$4,105.19 - 4,088.04 = 17.15$$

Evaluation:

$$\frac{(242)^2}{63} + \frac{(308)^2}{63} + \frac{(329)^2}{63} - \frac{(879)^2}{189} =$$

$$4,153.47 - 4,088.04 = 65.43$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	17.15	2	8.57
Evaluation	65.43	2	32.71
Group X Eval.	14.18	4	3.55
Total	96.77	8	

APPENDIX N

SUBJECTIVE EVALUATION

COMPONENT: BY GROUPS

1. BREATH SUPPORT

Adjudicators

	K	M	O	Total
Girls	136	98	62	296
Boys	94	71	62	227
Mixed	162	116	78	356
Totals	392	285	202	879

Computation:

Total S. S.:

$$\frac{(136)^2}{21} + \frac{(98)^2}{21} + \ldots + \frac{(78)^2}{24} - \frac{(879)^2}{189} =$$

$$4{,}413.30 - 4{,}088.04 = 325.26$$

Group:

$$\frac{(296)^2}{63} + \frac{(227)^2}{54} + \frac{(356)^2}{72} - \frac{(879)^2}{189} =$$

$$4{,}105.19 - 4{,}088.04 = 17.15$$

Adjudicator:

$$\frac{(392)^2}{63} + \frac{(285)^2}{63} + \frac{(202)^2}{63} - \frac{(879)^2}{189} =$$

$$4{,}376.07 - 4{,}088.04 = 288.03$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	17.15	2	8.52
Adjudicator	288.03	2	144.01
Group X Adj.	20.08	4	5.02
Total	325.26	8	

APPENDIX N

SUBJECTIVE EVALUATION

COMPONENT: BY GROUPS

2. BREATH CONTROL

	Evaluation			
	First	Second	Third	Total
Girls	96	99	116	311
Boys	68	86	98	252
Mixed	102	145	142	389
Totals	266	330	356	952

Computation:

Total S. S.:

$$\frac{(96)^2}{21} + \frac{(99)^2}{21} + \ldots + \frac{(142)^2}{24} - \frac{(952)^2}{189} =$$

$$4,897.37 - 4,795.25 = 102.12$$

Group:

$$\frac{(311)^2}{63} + \frac{(252)^2}{54} + \frac{(389)^2}{72} - \frac{(952)^2}{189} =$$

$$4,812.93 - 4,795.25 = 17.68$$

Evaluation:

$$\frac{(266)^2}{63} + \frac{(330)^2}{63} + \frac{(356)^2}{63} - \frac{(952)^2}{189} =$$

$$4,863.37 - 4,795.25 = 68.12$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	17.68	2	8.84
Evaluation	68.12	2	34.05
Group X Eval.	16.32	4	4.08
Total	102.12	8	

APPENDIX N

SUBJECTIVE EVALUATION

COMPONENT: BY GROUPS

2. BREATH CONTROL

Adjudicators

	K	M	O	Total
Girls	140	98	73	311
Boys	100	82	70	252
Mixed	166	128	95	389
Totals	406	308	238	952

Computation:

Total S. S.:

$$\frac{(140)^2}{21} + \frac{(98)^2}{21} + \ldots + \frac{(95)^2}{24} - \frac{(952)^2}{189} =$$

$$5{,}052.62 - 4{,}795.25 = 257.37$$

Group:

$$\frac{(311)^2}{63} + \frac{(252)^2}{54} + \frac{(389)^2}{72} - \frac{(952)^2}{189} =$$

$$4{,}812.93 - 4{,}795.25 = 17.68$$

Adjudicator:

$$\frac{(406)^2}{63} + \frac{(308)^2}{63} + \frac{(238)^2}{63} - \frac{(952)^2}{189} =$$

$$5{,}021.33 - 4{,}795.25 = 226.08$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	17.68	2	8.83
Adjudicator	226.08	2	113.03
Group X Adj.	13.61	4	3.40
Total	257.37	8	

APPENDIX N

SUBJECTIVE EVALUATION

COMPONENT: BY GROUPS

3. TONE QUALITY

Evaluation

	First	Second	Third	Total
Girls	104	134	128	366
Boys	61	102	105	268
Mixed	99	152	148	399
Totals	264	388	381	1033

Computation:

Total S. S.:

$$\frac{(104)^2}{21} + \frac{(134)^2}{21} + \ldots + \frac{(148)^2}{24} - \frac{(1033)^2}{189} =$$

$$5{,}831.22 - 5{,}645.97 = 185.25$$

Group:

$$\frac{(366)^2}{63} + \frac{(268)^2}{54} + \frac{(399)^2}{72} - \frac{(1033)^2}{189} =$$

$$5{,}667.49 - 5{,}645.97 = 21.52$$

Evaluation:

$$\frac{(264)^2}{63} + \frac{(388)^2}{63} + \frac{(381)^2}{63} - \frac{(1033)^2}{189} =$$

$$5{,}800.02 - 5{,}645.97 = 154.05$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	21.52	2	10.76
Evaluation	154.05	2	77.02
Group X Eval.	9.68	4	2.42
Total	185.25	8	

APPENDIX N

SUBJECTIVE EVALUATION

COMPONENT: BY GROUPS

3. TONE QUALITY

Adjudicators

	K	M	O	Total
Girls	133	124	109	366
Boys	83	88	97	268
Mixed	152	122	125	399
Totals	368	334	331	1033

Computation:

Total S. S.:

$$\frac{(133)^2}{21} + \frac{(124)^2}{21} + \ldots + \frac{(125)^2}{24} - \frac{(1033)^2}{189} =$$

$$5,709.81 - 5,645.97 = 63.84$$

Group:

$$\frac{(366)^2}{63} + \frac{(268)^2}{54} + \frac{(399)^2}{72} - \frac{(1033)^2}{189} =$$

$$5,667.49 - 5,645.97 = 21.52$$

Adjudicator:

$$\frac{(368)^2}{63} + \frac{(334)^2}{63} + \frac{(331)^2}{63} - \frac{(1033)^2}{189} =$$

$$5,659.38 - 5,645.97 = 13.41$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	21.52	2	10.76
Adjudicator	13.41	2	6.70
Group X Adj.	28.91	4	7.23
Total	63.84	8	

APPENDIX N

SUBJECTIVE EVALUATION

COMPONENT: BY GROUPS

4. ATTITUDE

Evaluation

	First	Second	Third	Total
Girls	114	126	137	377
Boys	86	102	141	329
Mixed	129	172	185	486
Totals	329	400	463	1192

Computation:

Total S. S.:

$$\frac{(114)^2}{21} + \frac{(126)^2}{21} + \ldots + \frac{(185)^2}{24} - \frac{(1192)^2}{189} =$$

$$7,714.07 - 7,517.79 = 196.28$$

Group:

$$\frac{(377)^2}{63} + \frac{(329)^2}{54} + \frac{(486)^2}{72} - \frac{(1192)^2}{189} =$$

$$7,540.98 - 7,517.79 = 23.19$$

Evaluation:

$$\frac{(329)^2}{63} + \frac{(400)^2}{63} + \frac{(463)^2}{63} - \frac{(1192)^2}{189} =$$

$$7,660.47 - 7,517.79 = 142.68$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	23.19	2	11.59
Evaluation	142.68	2	71.34
Group X Eval.	30.41	4	7.60
Total	196.28	8	

APPENDIX N

SUBJECTIVE EVALUATION

COMPONENT: BY GROUPS

4. ATTITUDE

Adjudicator

	K	M	O	Total
Girls	151	134	92	377
Boys	111	117	101	329
Mixed	180	164	142	486
Totals	442	415	335	1192

Computation:

Total S. S.:

$$\frac{(151)^2}{21} + \frac{(134)^2}{21} + \ldots + \frac{(142)^2}{24} - \frac{(1192)^2}{189} =$$

$$7{,}666.40 - 7{,}517.79 = 148.61$$

Group:

$$\frac{(377)^2}{63} + \frac{(329)^2}{54} + \frac{(486)^2}{72} - \frac{(1192)^2}{189} =$$

$$7{,}540.98 - 7{,}517.79 = 23.19$$

Adjudicator:

$$\frac{(442)^2}{63} + \frac{(415)^2}{63} + \frac{(335)^2}{63} - \frac{(1192)^2}{189} =$$

$$7{,}616.09 - 7{,}517.79 = 98.30$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	23.19	2	11.59
Adjudicator	98.30	2	49.15
Group X Adj.	27.12	4	6.78
Total	148.61	8	

APPENDIX N

SUBJECTIVE EVALUATION

COMPONENT: BY GROUPS

5. ARTISTRY AND INTERPRETATION

Evaluation

	First	Second	Third	Total
Girls	99	114	123	336
Boys	57	82	114	253
Mixed	109	166	163	438
Totals	265	362	400	1027

Computation:

Total S. S.:

$$\frac{(99)^2}{21} + \frac{(114)^2}{21} + \ldots + \frac{(163)^2}{24} - \frac{(1027)^2}{189} =$$

$$5,832.31 - 5,580.58 = 251.73$$

Group:

$$\frac{(336)^2}{63} + \frac{(253)^2}{54} + \frac{(438)^2}{72} - \frac{(1027)^2}{189} =$$

$$5,641.85 - 5,580.58 = 61.27$$

Evaluation:

$$\frac{(265)^2}{63} + \frac{(362)^2}{63} + \frac{(400)^2}{63} - \frac{(1027)^2}{189} =$$

$$5,734.43 - 5,580.58 = 153.85$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	61.27	2	30.63
Evaluation	153.85	2	76.92
Group X Eval.	36.61	4	9.15
Total	251.73	8	

APPENDIX N

SUBJECTIVE EVALUATION

COMPONENT: BY GROUPS

5. ARTISTRY AND INTERPRETATION

	Adjudicators			
	K	M	O	Total
Girls	137	115	84	336
Boys	86	90	77	253
Mixed	165	152	121	438
Totals	388	357	282	1027

Computation:

Total S. S.:

$$\frac{(137)^2}{21} + \frac{(115)^2}{21} + \ldots + \frac{(121)^2}{24} - \frac{(1027)^2}{189} =$$

$$5{,}756.87 - 5{,}580.58 = 176.29$$

Group:

$$\frac{(336)^2}{63} + \frac{(253)^2}{54} + \frac{(438)^2}{72} - \frac{(1027)^2}{189} =$$

$$5{,}641.85 - 5{,}580.58 = 61.27$$

Adjudicator:

$$\frac{(388)^2}{63} + \frac{(357)^2}{63} + \frac{(282)^2}{63} - \frac{(1027)^2}{189} =$$

$$5{,}674.87 - 5{,}580.58 = 94.29$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	61.27	2	30.63
Adjudicator	94.29	2	47.14
Group X Adj.	20.73	4	5.15
Total	176.29		

APPENDIX N

SUBJECTIVE EVALUATION

COMPONENT: BY GROUPS

6. POSTURE

Evaluation

	First	Second	Third	Total
Girls	113	127	140	380
Boys	90	96	135	321
Mixed	124	166	171	461
Total	327	389	446	1162

Computation:

Total S. S.:

$$\frac{(113)^2}{21} + \frac{(127)^2}{21} + \ldots + \frac{(171)^2}{24} - \frac{(1162)^2}{189} =$$

$$7{,}291.14 - 7{,}144.15 = 146.99$$

Group:

$$\frac{(380)^2}{63} + \frac{(321)^2}{54} + \frac{(461)^2}{72} - \frac{(1162)^2}{189} =$$

$$7{,}152.41 - 7{,}144.15 = 8.26$$

Evaluation:

$$\frac{(327)^2}{63} + \frac{(389)^2}{63} + \frac{(446)^2}{63} - \frac{(1162)^2}{189} =$$

$$7{,}256.60 - 7{,}144.15 = 112.45$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	8.26	2	4.13
Evaluation	112.45	2	54.22
Group X Eval.	26.28	4	6.57
Total	146.99		

APPENDIX N

SUBJECTIVE EVALUATION

COMPONENT: BY GROUPS

6. POSTURE

Adjudicators

	K	M	O	Total
Girls	151	124	105	380
Boys	116	101	104	321
Mixed	182	152	127	461
Totals	449	377	336	1162

Computation:

Total S. S.:

$$\frac{(151)^2}{21} + \frac{(124)^2}{21} + \ldots + \frac{(127)^2}{24} - \frac{(1162)^2}{189} =$$

$$7{,}272.98 - 7{,}144.15 = 128.83$$

Group:

$$\frac{(380)^2}{63} + \frac{(321)^2}{54} + \frac{(461)^2}{72} - \frac{(1162)^2}{189} =$$

$$7{,}152.41 - 7{,}144.15 = 8.26$$

Adjudicator:

$$\frac{(449)^2}{63} + \frac{(377)^2}{63} + \frac{(336)^2}{63} - \frac{(1162)^2}{189} =$$

$$7{,}248.05 - 7{,}144.15 = 103.88$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	8.26	2	4.13
Adjudicator	103.88	2	51.94
Group X Adj.	16.69	4	4.17
Total	128.83	8	

APPENDIX N

SUBJECTIVE EVALUATION

COMPONENT: BY GROUPS

7. TEMPO

Evaluation

	First	Second	Third	Total
Girls	117	122	143	382
Boys	89	108	133	330
Mixed	110	180	185	475
Totals	316	410	461	1187

Computation:

Total S. S.:

$$\frac{(117)^2}{21} + \frac{(122)^2}{21} + \ldots + \frac{(185)^2}{24} - \frac{(1187)^2}{189} =$$

$$7{,}685.37 - 7{,}454.86 = 230.51$$

Group:

$$\frac{(382)^2}{63} + \frac{(330)^2}{54} + \frac{(475)^2}{72} - \frac{(1187)^2}{189} =$$

$$7{,}466.60 - 7{,}454.86 = 11.74$$

Evaluation:

$$\frac{(316)^2}{63} + \frac{(410)^2}{63} + \frac{(461)^2}{63} - \frac{(1187)^2}{189} =$$

$$7{,}626.62 - 7{,}454.86 = 171.76$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	11.74	2	5.87
Evaluation	171.76	2	85.88
Group X Eval.	47.01	4	11.75
Total	230.51	8	

APPENDIX N

SUBJECTIVE EVALUATION

COMPONENT: BY GROUPS

7. TEMPO

Adjudicators

	K	M	O	Total
Girls	157	121	104	382
Boys	111	109	110	330
Mixed	185	166	124	475
Totals	453	396	338	1187

Computation:

Total S. S.:

$$\frac{(157)^2}{21} + \frac{(121)^2}{21} + \ldots + \frac{(124)^2}{24} - \frac{(1187)^2}{189} =$$

$$7{,}617.64 - 7{,}454.86 = 162.78$$

Group:

$$\frac{(382)^2}{63} + \frac{(330)^2}{54} + \frac{(475)^2}{72} - \frac{(1187)^2}{189} =$$

$$7{,}466.60 - 7{,}454.86 = 11.74$$

Adjudicator:

$$\frac{(453)^2}{63} + \frac{(396)^2}{63} + \frac{(338)^2}{63} - \frac{(1187)^2}{189} =$$

$$7{,}559.82 - 7{,}454.86 = 104.96$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	11.74	2	5.87
Adjudicator	104.96	2	52.48
Group-X Adj.	46.08	4	11.52
Total	162.78	8	

APPENDIX N

SUBJECTIVE EVALUATION

COMPONENT: BY GROUPS

8. MEMORY

Evaluation

	First	Second	Third	Total
Girls	131	156	148	435
Boys	115	142	139	396
Mixed	166	205	196	567
Totals	412	503	483	1398

Computation:

Total S. S.:

$$\frac{(131)^2}{21} + \frac{(156)^2}{21} + \ldots + \frac{(196)^2}{24} - \frac{(1398)^2}{189} =$$

$$10,447.31 - 10,340.76 = 106.55$$

Group:

$$\frac{(435)^2}{63} + \frac{(396)^2}{54} + \frac{(567)^2}{72} - \frac{(1398)^2}{189} =$$

$$10,372.70 - 10,340.76 = 31.94$$

Evaluation:

$$\frac{(412)^2}{63} + \frac{(503)^2}{63} + \frac{(483)^2}{63} - \frac{(1398)^2}{189} =$$

$$10,413.37 - 10,340.76 = 72.61$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	31.94	2	15.97
Evaluation	72.61	2	36.30
Group X Eval.	2.00	4	.50
Total	106.55	8	

APPENDIX N

SUBJECTIVE EVALUATION

COMPONENT: BY GROUPS

8. MEMORY

Adjudicators

	K	M	O	Total
Girls	176	142	117	435
Boys	158	127	111	396
Mixed	216	175	176	567
Totals	550	444	404	1398

Computation:

Total S. S.:

$$\frac{(176)^2}{21} + \frac{(142)^2}{21} + \ldots + \frac{(176)^2}{24} - \frac{(1398)^2}{189} =$$

$$10{,}565.23 - 10{,}340.76 = 224.47$$

Group:

$$\frac{(435)^2}{63} + \frac{(396)^2}{54} + \frac{(567)^2}{72} - \frac{(1398)^2}{189} =$$

$$10{,}372.70 - 10{,}340.76 = 31.94$$

Adjudicator:

$$\frac{(550)^2}{63} + \frac{(444)^2}{63} + \frac{(404)^2}{63} - \frac{(1398)^2}{189} =$$

$$10{,}521.46 - 10{,}340.76 = 180.70$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	31.94	2	15.97
Adjudicator	180.70	2	90.34
Group X Adj.	11.83	4	2.98
Total	224.47	8	

APPENDIX O

SUBJECTIVE EVALUATION

COMPONENTS: BY GROUPS

	Evaluation			
	First	Second	Third	Totals
Girls	866	974	1043	2883
Boys	623	798	955	2376
Mixed	932	1318	1321	3571
Totals	2421	3090	3319	8830

Computation:

Total S. S.:

$$\frac{(866)^2}{168} + \frac{(623)^2}{144} + \frac{(932)^2}{192} + \ldots + \frac{(1321)^2}{192} - \frac{(8830)^2}{1512} =$$

$$52{,}697.63 - 51{,}566.73 = 1{,}130.90$$

Group:

$$\frac{(2883)^2}{504} + \frac{(2376)^2}{432} + \frac{(3571)^2}{576} - \frac{(8830)^2}{1512} =$$

$$51{,}698.40 - 51{,}566.73 = 131.67$$

Evaluation:

$$\frac{(2421)^2}{504} + \frac{(3090)^2}{504} + \frac{(3319)^2}{504} - \frac{(8830)^2}{1512} =$$

$$52{,}430.75 - 51{,}566.73 = 864.02$$

AN ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	131.67	2	65.84
Evaluation	864.02	2	432.01
Group X Eval.	135.71	4	33.93
Total	1130.90	8	

APPENDIX O

SUBJECTIVE EVALUATION

COMPONENTS: BY GROUPS

Adjudicator

	K	M	O	Totals
Girls	1181	956	746	2883
Boys	859	785	732	2376
Mixed	1408	1175	988	3571
Totals	3448	2916	2466	8830

Computation:

Total S. S.:

$$\frac{(1181)^2}{168} + \frac{(859)^2}{144} + \ldots + \frac{(988)^2}{192} - \frac{(8830)^2}{1512} =$$

$$52,779.51 - 51,566.73 = 1,212.78$$

Group:

$$\frac{(2883)^2}{504} + \frac{(2376)^2}{432} + \frac{(3571)^2}{576} - \frac{(8830)^2}{1512} =$$

$$51,698.40 - 51,566.73 = 131.67$$

Adjudicator:

$$\frac{(3448)^2}{504} + \frac{(2916)^2}{504} + \frac{(2466)^2}{504} - \frac{(8830)^2}{1512} =$$

$$52,525.62 - 51,566.73 = 958.89$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Group	131.67	2	65.84
Adjudicator	958.90	2	479.45
Group X Adj.	122.21	4	30.55
Total	1,212.78	8	

APPENDIX O

SUBJECTIVE EVALUATION

COMPONENTS: BY GROUPS

Adjudicator

	Group	Girls	Boys	Mixed	Girls	Boys	Mixed	Girls	Boys	Mixed	Totals
COMPONENTS	1	136	94	162	98	71	116	62	62	78	879
	2	140	100	166	98	82	128	73	70	95	952
	3	133	83	152	124	88	122	109	97	125	1033
	4	151	111	180	134	117	164	92	101	142	1192
	5	137	86	165	115	90	152	84	77	121	1027
	6	151	116	182	124	101	152	105	104	127	1162
	7	157	111	185	121	109	166	104	110	124	1187
	8	176	158	216	142	127	175	117	111	176	1398
Totals		1181	859	1408	956	785	1175	746	732	988	
Adjudicator Totals			3448			2916			2466		

Computation:

Total S. S.:

$$\frac{(136)^2}{21} + \frac{(94)^2}{18} + \frac{(162)^2}{24} + \ldots + \frac{(176)^2}{24} - \frac{(8830)^2}{1512} =$$

$$54,054.95 - 51,566.73 = 2,488.22$$

APPENDIX O

SUBJECTIVE EVALUATION

COMPONENTS: BY GROUPS

Evaluation

COMPONENTS	First	Second	Third	Totals
1	242	308	329	879
2	266	330	356	952
3	264	388	381	1033
4	329	400	463	1192
5	265	362	400	1027
6	327	389	446	1162
7	316	410	461	1187
8	412	503	483	1398
Totals	2421	3090	3319	8830

Computation:

Total S. S.:

$$\frac{(242)^2}{63} + \frac{(308)^2}{63} + \ldots + \frac{(483)^2}{63} - \frac{(8830)^2}{1512} =$$

$$53,508.34 - 51,566.73 = 1,941.61$$

Component:

$$\frac{(879)^2}{189} + \frac{(952)^2}{189} + \ldots + \frac{(1398)^2}{189} - \frac{(8830)^2}{1512} =$$

$$52,567.42 - 51,566.73 = 1,000.69$$

Evaluation:

$$\frac{(2421)^2}{504} + \frac{(3090)^2}{504} + \frac{(3319)^2}{504} - \frac{(8830)^2}{1512} =$$

$$52,430.75 - 51,566.73 = 864.02$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Component	1,000.69	7	142.96
Evaluation	864.02	2	432.01
Comp. X Eval.	76.90	14	5.49
Total	1,941.61	23	

APPENDIX O

SUBJECTIVE EVALUATION

COMPONENTS: BY GROUPS

		Groups			
		Girls	Boys	Mixed	Totals
COMPONENTS	1	296	227	356	879
	2	311	252	389	952
	3	366	268	399	1033
	4	377	329	486	1192
	5	336	253	438	1027
	6	380	321	461	1162
	7	382	330	475	1187
	8	435	396	567	1398
	Totals	2883	2376	3571	8830

Computation:

Total S. S.:

$$\frac{(296)^2}{63} + \frac{(227)^2}{54} + \ldots + \frac{(567)^2}{72} - \frac{(8830)^2}{1512} =$$

$$52,759.64 - 51,566.73 = 1,192.91$$

Component:

$$\frac{(879)^2}{189} + \frac{(952)^2}{189} + \ldots + \frac{(1398)^2}{189} - \frac{(8830)^2}{1512} =$$

$$52,567.42 - 51,566.73 = 1,000.69$$

Group:

$$\frac{(2883)^2}{504} + \frac{(2376)^2}{432} + \frac{(3571)^2}{576} - \frac{(8830)^2}{1512} =$$

$$51,698.40 - 51,566.73 = 131.67$$

ANALYSIS OF VARIANCE

SOURCE	S. S.	d.f.	M. S.
Component	1,000.69	7	142.95
Group	131.67	2	65.84
Comp. X Group	60.55	14	4.33
Total	1,192.91	23	

APPENDIX O

SUBJECTIVE EVALUATION

COMPONENTS: BY GROUPS

Evaluation

		First			Second			Third			Totals
	Group	Girls	Boys	Mixed	Girls	Boys	Mixed	Girls	Boys	Mixed	
COMPONENTS	1	92	57	93	96	80	132	108	90	131	879
	2	96	68	102	99	86	145	116	98	142	952
	3	104	61	99	134	102	152	128	105	148	1033
	4	114	86	129	126	102	172	137	141	185	1192
	5	99	57	109	114	82	166	123	114	163	1027
	6	113	90	124	127	96	166	140	135	171	1162
	7	117	89	110	122	108	180	143	133	185	1187
	8	131	115	166	156	142	205	148	139	196	1398
Totals		866	623	932	974	798	1318	1043	955	1321	
Evaluation Totals			2421			3090			3319		8830

Computation:

Total S. S.:

$$\frac{(92)^2}{21} + \frac{(57)^2}{18} + \frac{(93)^2}{24} + \ldots + \frac{(196)^2}{24} - \frac{(8830)^2}{1512} =$$

$$53,883.56 - 51,566.73 = 2,316.83$$

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