THE EFFECT OF A LIVE SYMPHONIC CONCERT EXPERIENCE ON LISTENING SKILLS AND INTEREST IN MUSIC

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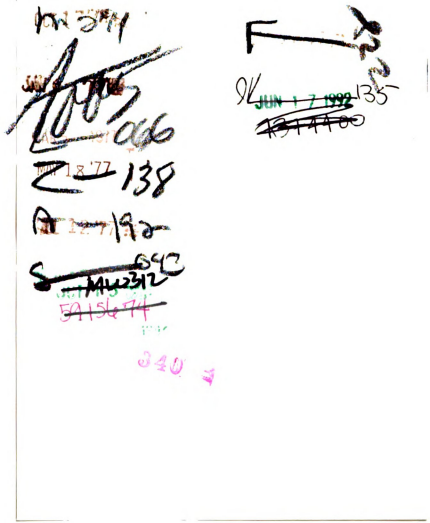

ABSTRACT

THE EFFECT OF A LIVE SYMPHONIC CONCERT EXPERIENCE ON LISTENING SKILLS AND INTEREST IN MUSIC

by

Gary Allen Sigurdson

Symphonic concerts for young people are an established part of American musical and educational life. The growing interest in the educational value of concerts is evidenced by the sheer numbers of such concerts and also by the number of research studies being done in this area. However, these studies have been limited by the lack of measuring instruments appropriate to assess learning which may result from these concerts.

The purpose of this study was to develop an evaluative instrument suitable for the measurement of the effects of a concert experience on the musical interest and listening skills of 5th grade children. This instrument was then used to measure such effects in a typical youth concert setting. A secondary purpose was to investigate the relationship between interest and listening skills.

Along with an inventory of musical interest four elements of musical experience (pitch, loudness, tempo, and timbre) were chosen for investigation as a means of assessing listening skills. These dimensions of learning were chosen because they are desirable learning outcomes

which appear to result from concert experiences and because they deal with basic perceptual and conceptual elements as distinguished from purely cognitive learning. Three group tests were adapted for this purpose.

The interest subtest (SRA, What I Like To Do) consists of fifteen statements about musical activities which are to be judged by subjects as something they would like, dislike, or about which they are uncertain. In the subtest of listening skills subjects hear fifteen recorded symphonic examples in which the music changes, becoming either faster or slower (tempo), higher or lower (pitch), or louder or softer (loudness). Discriminations as to which change is most important are then made from multiple choice answers. The subtest of instrument identification (Colwell MAT) is concerned with the element of timbre and consists of fifteen recorded examples of orchestral instruments, also to be identified from multiple choice answers. A unified answer form was devised which was suitable for fifth graders and pilot study was carried out to obtain data for reliability estimates and to review the testing procedures.

Selection of subjects was based on matching a pair of elementary schools from each of four representative SES groups within the Metropolitan Nashville Public Schools. A fifth grade class from each school was then

assigned to either a treatment (concert) or control (no concert) group. Although both groups ultimately heard the concert, the control group was tested before hearing the concert and the treatment group within two hours after hearing the concert. All subjects had normal hearing.

The concert experience was representative of children's concerts generally, being approximately one hour in length and consisting of high level performances of varied symphonic works along with appropriate commentary. The concert program was based on objectives stated in Exploring Music, the elementary music series used in the Metropolitan Nashville Public Schools.

Testing was carried out in the school classrooms. Tape recorded instructions made the testing procedures virtually identical from one school to another.

Six individual difference variables were controlled statistically: socio-economic status (SES), sex, out of school musical activity, school band or orchestra membership, music teacher rating, and reading achievement scores.

Results showed differences between treatment and control groups beyond the .01 level of significance for the subtest of instrument identification and for all three subtests in combination. Computer analysis of the data was employed using a multiple regression form of

covariance analysis.

Based on these data, concerts do appear to be of value in improving listening skills and interest in music. A low negative correlation was found between interest and listening skills.

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INTRODUCTION

Concerts for young people are an established part of American musical and educational life. This fact is well documented in the extensive 1967 study by Hill and Thompson for American University and the American Symphony Orchestra League. In a final report totaling 1,200 pages, virtually every aspect of the organization, administration, and presentation of symphony orchestra youth concert activities was discussed.[1]

Among the many substantive findings in this study was the conclusion that no appropriate procedures exist for the evaluation of youth concerts as learning experiences. Evaluative techniques for this purpose are usually in the form of interviews or questionnaires designed to obtain the opinions of teachers or administrators on the effectiveness of a concert presentation. Whereas this information is valuable it lacks the objectivity of research with more rigorous controls.

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[1]Thomas H. Hill and Helen M. Thompson, "The Organization and Presentation of Symphony Orchestra Youth Concert Activities for Music Educational Purposes in Selected Cities," Office of Education, Bureau of Research, No. BR-6-1548, January, 1968.

Another significant finding of the Hill-Thompson study is that few symphony orchestras or schools have related their youth concert presentations and teaching techniques to specific goals. Most have failed to state specific goals of any kind for their youth concert programs.

The purpose of the present study was to develop an evaluative instrument which would be suitable for the measurement of learning and interest gains in music resulting from a live concert experience. This instrument will then be used to measure such gains in a typical youth concert setting. It is hoped that this work might contribute toward the fullfillment of recommendations stated in the Hill-Thompson study and at the same time provide a possible basis for accountability of the many resources devoted to youth concert production.

Hilda Taba, in discussing evaluation of the outcomes of curricula, is of the opinion that validity of evaluation tends to improve to the degree that the measurements (1) are consistent with educational objectives, (2) are based on a sufficiently careful analysis of the behaviors to be evaluated, and (3) are addressed to what the students had had the opportunity to learn.[2]

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[2]Hilda Taba, Curriculum Development: Theory and Practice (New York: Harcourt, Brace and World, Inc., 1962), p. 321.

Objectives

For two seasons the Nashville Symphony Orchestra, under the musical direction of Dr. Thor Johnson has based its youth concert programs on the format provided in the music series Exploring Music.[3] In this comprehensive music series for elementary school students six categories of musical behavior are considered: listening, singing, playing, moving, creating and reading. Objectives for musical growth in each of these categories are broken down further into skill, literature and concepts. Concepts considered are melody, rhythm, harmony, form, expression and style. Concert planning and choice of repertory was based on the objectives for listening specified for all of these various areas.

The stated objectives in Exploring Music for the fourth grade in listening to expressive elements of music are:

> (The learner) is aware of the wide variety of expression possible in music. Feels the expressive contributions of melodic contour, rhythmic pattern, meter, tonality and harmonic sequence. Senses musical climax and is conscious of how tone color, tempo, and dynamics contribute to it.[4]

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[3]Beth Landis and Lara Hoggard, Exploring Music (New York: Holt, Rinehart and Winston, Inc., 1967), The Junior Book.

[4]Ibid., Volume Four, Teachers Edition, vi.

The objectives for that same area at the fifth grade level are changed only slightly:

> Is conscious of the ways tempo and dynamics contribute to musical expressiveness. Recognizes various instrumental timbres (in solos and ensembles) and their contributions to expression. Is sensitive to the expressive contributions of different tonalities, harmonies, rhythms, etc. Senses the expressive purpose of the musical climax.[5]

Analysis of Musical Behaviors

Presently the trend in music education circles is to describe changes in musical behavior in terms of conceptual development. The MENC publication, The Study of Music in the Elementary School: A Conceptual Approach, is a prime illustration of this advocacy. In this publication the musical concepts specified are melody, rhythm, harmony and form along with expressive elements of tempo, dynamics, phrasing and tone color.[6] As defined in The Magic of Music series, "a musical concept is a musical meaning developed in the mind of the child as a result of his experiences with the sound of music."[7] Several other recent listening guides are similarly oriented, including the Exploring Music series previously discussed.

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[5]Ibid., Volume Five, Teachers Edition, xvi.

[6]Charles R. Gary, ed., The Study of Music in the Elementary School: A Conceptual Approach (Washington, D.C.: Music Educators National Conference, 1967), pp. 4-8.

[7]Lorrain E. Watters et al., The Magic of Music (Boston: Ginn and Company, 1966), Book 3, x.

For purposes of this study, the four expressive elements of music chosen were pitch, loudness, tempo, and timbre. Based on the evidence of Andrews and Deihl (1967), the first three of these elements can be conceptualized by fourth grade children with limited musical training and with a minimum of verbal prerequisites.[8] Timbre, or tone color, is much more difficult to conceptualize due to the vagueness of words most often used to describe it and because of the difficulty in relating it to other phenomena. A tone sounding harsh to one listener might sound bright to another. Yet, the importance of timbre as an expressive element in symphonic music strongly suggests its inclusion in the present investigation.

Interest, as it relates to motivation, is a strong factor in learning of any kind. In the present study interest refers to general musical interest and not to interest in symphonic concerts alone. The interest subtest chosen for use in this study is designed to reflect such general musical interest and not in any specific area of music.

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[8]Frances M. Andrews and Ned C. Deihl, "Development of a Technique for Identifying Elementary School Children's Musical Concepts," Office of Education, Bureau of Research, ED 016 517, 1967, pp. 126-131.

Further analysis of the behaviors to be measured reveals their identity primarily with the psychomotor and affective domains of learning. Perception, defined by Simpson as "the process of becoming aware of objects, qualities, or relations by use of the sense organs," includes listening. According to Simpson the physical act of perceiving or in this case, listening, may be considered a psychomotor behavior.[9] The affective domain, in this case, refers to that area of interest which is expected to increase as a result of the live concert experience. Although closely related to both the psychomotor and affective domains purely cognitive aspects of listening skills have been minimized in this investigation.

Content Validity

The last of Taba's criteria for valid testing is that children should be tested on what has been taught. The hope is that young listeners will, by hearing live concerts, be able to attend more responsively to musical stimuli than without such experiences. Hearing a live concert becomes a teaching-learning experience as well as a reinforcer of musical concepts learned previously.

Since the behavior to be measured is assumed to have been affected by listening to a concert, an

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[9]Elizabeth Simpson, "The Classification of Educational Objectives, Psychomotor Domain," Office of Education, Bureau of Research, No. OE 5-85-104, pp. 25-27.

appropriate simulation of that experience in testing would also be a listening experience. In order to assure consistency within the testing situation itself, it was decided to use tape recorded musical excerpts from the symphonic literature. Six of the test excerpts were of works heard on the actual concert. The listener is asked to make discriminations based on what he has heard within the four elements of music chosen. In the subtest on instrumental timbres, the listener is asked to identify from recorded examples, the various instruments of the orchestra. All of these instruments were seen and heard in the concert; nine were identified by name and were heard as separate entities.

The inclusion of a measure of interest in music is based on the assumption that a live concert experience may be interesting and appealing to young people. Whereas some of this appeal may be extra-musical, a result of greater interest in music would nevertheless justify its inclusion.

Hypotheses

Based on the objectives stated earlier, four hypotheses can be stated for this evaluative study. Hearing a live symphonic concert will result in:

I. Increased interest in music.

II. Improved discrimination of tempo, pitch, and loudness.

III. Improved discrimination of instruments by sound. (II and III are herein both regarded as listening skills although separate listening and instrument identification subtests were used to measure these skills.)

IV. Improved listening skills and interest. (Hypotheses I, II, and III combined.)

A secondary purpose is to investigate the relationship between listening skills and interest in music. It is assumed that without interest a listener may not attend to musical stimulii with sufficient energy to fulfill the listening experience. In his Taxonomy of Educational Objectives: Affective Domain,[10] Bloom lists attending (receiving) as the lowest of five levels of affect, making it prerequisite to any higher order affective response. The relationship between higher order affective and cognitive responses suggests that attention or in this case, interest, might also be prerequisite to higher level cognition.

Limitations of the Study

Of some concern in the planning of this study was the problem of long-term versus short-term learning gains

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[10]Benjamin S. Bloom, Taxonomy of Educational Objectives: Handbook II: Affective Domain (New York: David McKay Company, Inc., 1956), p. 98.

and the related problems of effects of a single concert experience relative to several such experiences. The choice of investigating the short-term gains resulting from a single concert experience was based on a number of both practical and theoretical factors. Long-term gains are extremely difficult to assess due to continuous enculturation over a period of time. The same would be true of assessing gains resulting from several concerts over a period of time. Not enough is currently known about the areas of perception and affective responses to music to calculate the relative persistence of behavioral changes resulting from musical experiences. The effects of testing are well known in investigations requiring repeated testing over a period of time. It is assumed that if some cumulative effect of hearing a number of concerts over a period of time does in fact exist, that this same effect might be apparent in some small measure after a single concert hearing, provided adequate controls for its measurement are available.

The choice to investigate fifth grade listerners only was based in part on the finding by Hill and Thompson that the largest percentage of youth concerts are given to fourth, fifth and sixth graders.[11] In the Nashville

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[11]"Organization and Presentation of Youth Concerts," pp. 42-45.

Symphony Young People's Concerts the programs are designed for fourth through eighth grades but are attended primarily by fourth and fifth graders. The fifth grade group may be considered representative of the total population attending youth concerts.

Along with interest in music, the area of main concern in this study is that of listening skills. The rationale is found in Exploring Music: "The music we hear has meaning for us in accordance with our knowledge of what to think about as we listen to it. As we develop the ability to concentrate on the music and to follow all that we hear, the musical content will become clear to us."[12] Another of the many views supporting this reasoning is found in The Magic of Music: "Since perceptual experiences are absolutely essential as a prerequisite to conceptual development, and since the sounds of music are perceived only through the ear, listening to music is an indispensible first step in the development of musical concepts."[13]

In attempting to remove as much purely cognitive understanding from the path of measuring a largely perceptive skill, it was decided to limit the investigation to that area of listening which deals with expression in

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[12]Exploring Music, Junior Book, p. 6.

[13]The Magic of Music, Book 3, p. x.

music. The objectives for this area, as listed in Exploring Music, were stated earlier. Dealing directly with nontechnical expressive elements of music might well be a productive approach to the improvement of listening skills. Differences in cognitive learning experiences among children, particularly reading achievement, might be more pronounced than those in the affective or psychomotor domains and that to include information oriented test items would be to invalidate the testing. Since the test will be a pencil and paper test for groups of children, differences in verbal skills or in school achievement might have an effect on the testing outcomes.

General Procedures

Having first ascertained the need for a study of this kind and having been encouraged by both the musical director of the Nashville Symphony and the supervisor of music in the Metropolitan Nashville Public Schools, the investigator prepared a preliminary form of the testing instrument to be used. This measure was adapted from three existing tests, one of which is currently in print, another which is due for publication shortly, and the third being the result of extensive research development. A unified format for all three sections of the test was devised which would be understandable to fifth grade students. In addition, all instructions and statements on

the interest inventory were tape recorded to account for the possibility that some of the children to be tested might have reading difficulties.

With the testing instrument developed to an operational stage, a formal application was submitted to the Director of Educational Research of the Metropolitan Public Schools for permission to carry out this research in the schools. At the same time information was obtained from the Nashville Symphony Women's Guild about the exact scheduling of the different schools for attendence at the concerts. When permission to proceed with the research was obtained, conferences were arranged at which appropriate selection procedures were decided upon.

Selection was based on matching a fifth grade class from each of four schools which were yet to attend a concert, with a fifth grade class from each of four schools which had attended the concert. The four groups represented different socio-economic status: upper middle SES, lower middle SES, lower SES (predominantly white) and lower SES (predominantly black). Two additional schools representing upper and upper middle classes were selected for use in a pilot study designed to test administrative procedures and to obtain reliability estimates. The total sample, therefore, may be seen as representative of the population at large. It was felt that the approximately

300 subjects thus selected would constitute a sample adequate for statistical analysis.

The experimental treatment or independent variable in this study consisted of the fall, 1971, concert for young people by the Nashville Symphony. It was representative of a typical children's concert being one hour in length and made up of high quality performances of varied musical works combined with appropriate commentary. The program was designed to be consistent with the objectives stated earlier. The concerts were given during school time at 10:00 a.m. and again at 11:30 a.m. on each of five days during a twelve day period in mid-November. Students were bussed to and from the concerts and each audience totaled about 1,900 listeners.

The actual testing was carried out by the investigator in the various school classrooms. To minimize the hazard of treatment-test interaction, great care was taken that the subjects were unaware of any association between the testing and the concert experiences. The subjects were given no advence preparation for the test session. With tape recorded instructions the testing procedures were virtually identical from one school to another.

Due to the lack of random selection and to the small experimental effect anticipated, every attempt was made to control for individual differences among subjects. The

statistical procedure chosen for this purpose was a multiple covariance analysis using a multiple regression computer program. Six covariates were used in addition to the one independent and three dependent variables. Four F tests of significance were used to test the different hypotheses.

REVIEW OF LITERATURE

Listening to Music

> A considerable amount of writing has been done on the subject of listening and the best means of developing listening skills, but it cannot be categorically stated that exposure to structured listening experiences is the only means by which a person can learn to listen to music. The burden of proof, however, does favor the teaching of certain listening skills.[1]

Rasmussen defined listening skills as the "aural ability and intellectual capacity to perceive musical elements and their relationship to music."[2] Within its broader goal for music education of developing musicality, members of the Yale Seminar emphasized the importance of listening abilities, defined there as the ability "to grasp in its completeness a musical idea which has been expressed."[3]

Duerksen (1966)[4] found recognition skills to be related to listening experience and that liking and preference

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[1]Hill and Thompson, "Organization and Presentation of Youth Concerts," p. 57.

[2]Warren Irvin Rasmussen, "An Experiment in Developing Basic Listening Skills Through Programed Instruction," Dissertation Abstracts, Vol. XXVI, 7359.

[3]Music in Our Schools, A Search for Improvement. Report of the Yale Seminar on Music Education, prepared by Claude V. Palisca, U. S. Office of Education, No. OE-33033, Bulletin 1964, No. 28, p. 6.

[4]George L. Duerken, "A Study of the Relationship Between the Perception of Musical Processes and the Enjoyment of Music," U.S. Office of Education Project No. 6-8311, 1966, p. 135.

for classical music tend to improve with recognition skills. Haack (1969) supported the belief that the ability to perceive musical, thematic relationships is educable, and that it is an outgrowth of appropriately organized and actively directed experiences.[5]

Recent studies have also resulted in new curricula for music listening.[6] Oberdin (1967) found that, in teaching music appreciation, musical notation did not help aural recognition among fifth grade students.[7] This supports the decision to minimize cognitive aspects of music in the present study.

Kersey (1966) affirmed the positive effects of an introduction to four basic musical instruments on improving aural perception of instrumental timbre in fourth graders.[8]

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[5]Paul Haack, "A study in the Development of Music Listening Skills of Secondary School Students," Journal of Research in Music Education, Vol. XVII, Summer 1969, No. 2, pp. 193-201.

[6]Laura E. Tipton, "A Listening Program of Instrumental Music for the Elementary Schools," Dissertation Abstracts XXIV, p. 772, 1962; James B. Fitzpatrick, "The Development and Evaluation of a Curriculum in Music Listening Skills on the Seventh Grade Level," Dissertation Abstracts XXIX, p. 4037-A, 1968.

[7]Helen E. Oberdin, "The Use of Notated Examples in Fifth-grade Music Appreciation Classes," Journal of Research in Music Education, Vol. XV, 1967, No. 4, pp. 300-304.

[8]Robert E. Kersey, "Effects of an Exploratory Program in Instrumental Music on the Aural Perception of Instrumental Timbre," Journal of Research in Music Education, Vol. XIV, 1966, No. 4, pp. 303-308.

It is therefore expected that subjects in the current study who have had instrumental training would score higher on the instrument identification subtest than those without such training.

Music Appreciation

Broudy observed two opposing points of view in music appreciation, as follows:

> That the skills of listening should be among the outcomes of formal music education is not a matter for debate. The disagreement will come in what good listening is to mean and the theoretical grounds for adhering to one meaning rather than another.
>
> One camp of music educators regards listening as the total activity from which the hearer derives enjoyment. The important matter is that enjoyment accrues and that the desire to listen be established. The more radical version of this view is more interested in the enjoyment than in the music being enjoyed, and it is based on the notion that good music is whatever music one happens to enjoy. In the same way one will also find a less radical view; one that believes that there is a difference between good music and music that is not so good, but it also believes that somehow sufficient exposure to "good" music will eventually produce in the listener a preference to it.
>
> We may call this the exposure theory of teaching music appreciation. As to method, it is suspicious of emphasis on musical techniques, historical accounts of musical works, interpretations by the teacher, and analysis of musical compositions in general. All such dissection, it is believed, threatens to destroy the spontaneous and unified response of the listener. It is, in brief, suspicious of any attempt to intellectualize the art of appreciation.
>
> Opposed to this camp is another that believes the road to appreciation lies in the study of music. Reading, ability to discriminate in matters of melody, rhythms,

> tempo and tonality, and the ability to comprehend fairly large patterns of tonal material are regarded as essential to adequate appreciation.[9]

In his history of early music appreciation instruction, Dunham (1961) also pointed out differences of opinion as to the role of biographical, historical information in music appreciation as well as other technical material and visual imagery. The goals of music appreciation training expressed in his study included those of accurate listening, understanding relationships in form and style, perception of complex music, and the broadening of musical experiences. He also supported concerts for children as effective means to these ends.[10] Edmonston (1969) reported that familiarity with music rather than formal musical training tended to affect the esthetic evaluation of music.[11] Cahn (1960) suggested the use of non-verbal procedures in the teaching of music appreciation.[12]

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[9]Harry S. Broudy, "A Realistic Philosophy of Music Education," Basic Concepts in Music Education 57th Yearbook of the National Society for the Study of Education, Part I (Chicago: University of Chicago Press, 1958), pp. 78-9.

[10]Richard Lee Dunham, "Music Appreciation in the Public Schools of the United States, 1897-1930," Dissertation Abstracts, XXII, p. 2415, 1961.

[11]William E. Edmonston, Jr., "Familiarity and Musical Training in the Esthetic Evaluation of Music," Journal of Social Psychology, Vol. 79, No. 1, 1969, pp. 109-111.

[12]Meyer Martin Cahn, "Problems of Music Appreciation Teaching as Perceived by Students and Teachers in Northern California Colleges and Junior Colleges," Dissertation Abstracts, XX, p. 4406, 1960.

A difficult problem in concert preparation is finding the optimum balance of advance exposure to the concert music in order that the students may be familiar with it by the time they attend the concert, but not bored with it as a result of overexposure prior to the concert. Limited research has been done on this subject in the education field. Getz (1966) worked with a group of 7th grade students to attempt to determine the effects that familiarity, based on repetition of previously unfamiliar serious music, had on the degree of musical preference. Based on the results of the study, Getz suggested that the junior high school general music class teacher consider at least two or three hearings of the same composition, spread over several weeks. He found that by carefully spacing hearings to avoid the factor of fatigue, periods of a year or more might be used to provide carry-over from one grade to the next.[13]

Concepts in Music

Increasing interest in the investigation of perceptual behaviors is also evident in the music research studies devoted to how children conceptualize musical sounds. Pflederer (1967) applied Piaget's theory of

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[13]Russell P. Getz, "The Effects of Repetition on Listening Response," Journal of Research in Music Education, Vol. XVI, Fall 1966, pp. 178-192.

conservation to musical behaviors. Among her findings was that tonal patterns tended to be conserved or conceptualized before rhythmic patterns and that a plateau in conservation skills in children was reached in the fourth grade. Her conceptual elements included identity, metrical groupings, augmentation, diminution, transposition and inversion.[14]

Among the many graded music series and the several recent research studies in this area, there is some degree of agreement in the identification of musical concepts.[15] A composite of these elements would include melody, rhythm, harmony, form, tempo, dynamics, tone color, style, and phrasing.

Factors Related to Musical Abilities

The positive relationship between verbal reading skills and listening ability may have a bearing on the present study. Reading skills, as an indicator of

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[14]Marilyn Pflederer, "Conservation Laws Applied to the Development of Musical Intelligence," Journal of Research in Music Education, Vol. XV, No. 3, 1967, pp. 215-22.

[15]The Study of Music in the Elementary School, C. Gary, ed., pp. 4-8; Ned C. Deihl, "Certain Relationships Among Concept Development, Listening Achievement, Musicality, and the Quantification of Musical Performance Experience," Dissertation Abstracts, XXIV, p. 5449, 1963; Robert Joseph Neidlinger, "A Study in Teaching Musical Style and Form to Elementary School Children Through the Perception of Musical Dimensions," Dissertation Abstracts, XXVIII, p. 4201-A, 1967.

academic achievement, have therefore been statistically controlled by means of covariance analysis. Since differences in subjects' abilities to read test instructions would also affect the outcome, it was decided to tape record these instructions which are also printed on the answer form. Reeves, 1968, found the highest level of comprehension among sixth graders when using the combination of reading information while at the same time hearing it read.[16]

Socio-economic status is among the factors affecting musical achievement as well as all areas of school achievement.[17] SES also relates to musical preferences.[18] Further, curiosity, defined as preference for investigatory activities, appears to be higher in both the extremes

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[16]Mary B. Brassard, "Direct Comparisons Between Listening and Reading as Language Comprehension Abilities in the Intermediate Grades," Paper presented at the conference of the American Educational Research Association, Minneapolis, March 2-6, 1970; Rachael J. Reeves, "A Study of the Relationship Between Listening Performance and Reading Performance of Sixth Grade Pupils as Measured by Certain Standardized Tests," Unpublished doctoral dissertation, University of Alabama, 1968; Sandra L. Lyness, "The Relationship of Auditory Perception to Primary Grade Reading Abilities," Unpublished doctoral dissertation, Wayne State University, 1967.

[17]John D. Hill, "The Musical Achievement of Culturally Deprived and Advantaged Children," Journal of Music Therapy, Vol. 5, No. 3, 1968, pp. 77-84.

[18]Vincent R. Rogers, "Children's Expressed Musical Preferences at Selected Grade Levels," Dissertation Abstracts, XVI, p. 1917, 1956.

of socio-economic status than in the middle class.[19] In turn, interest in music is affected by participation in musical experiences.[20] Reports also show a relative stability of interest in fourth and fifth graders.[21]

Concert Experiences for Children

Hill and Thompson concluded that live youth concerts are held by both educators and symphonic organizations to be vital both as means toward the total education of young people and also as cultural ends in themselves. Similar findings were reported in 1947 by Hazel N. Morgan.[23] Strong arguments were advanced for organizing and presenting youth concerts so that they could serve a meaningful

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[19]Doris D. Salzer, "An Exploration of Group Differences in Curiosity of Fifth-grade Students," Unpublished doctoral dissertation, Clark University, 1967.

[20]Donald G. Richardson, "The Relationship Between Sixth Grade Children's Participation in a Musical Production and Their Attitudes Toward the Arts at the Secondary School Level," Dissertation Abstracts, XXX, p. 636-A, 1968.

[21]Beatrix MacGregor, "Music Activity Preferences of a Selected Group of Fourth-grade Children," Journal of Research in Music Education, Vol. XVI, 1968, No. 4, p. 302-307; Thomas Albert Houle, "A Methodological Study of Interest Assessment," Unpublished doctoral dissertation, Michigan State University, 1970.

[22]Hill and Thompson, "Organization and Presentation of Youth Concerts," p. 5.

[23]"Concerts for Children and Young People as a Part of Music Education," Chapter XXIII, Music Education Source Book, Hazel N. Morgan, ed., (Chicago: Music Educators National Conference, 1947), pp. 136-142.

educational purpose. Values were discussed along with specific aims, a proposed study, suggestions for future consideration and a short article by Lillian Baldwin. Implementation of those recommendations probably would have changed the current youth concert picture considerably.

Many of the problems relating to youth concerts are discussed in Max Kaplan's Foundations and Frontiers of Music Education. In particular he examines the schools' basic responsibility in presenting live concerts, the necessity of perpetuating live performance, the function of the audience ritual or conventions of concert going, and the type and frequency of concert exposure.[24] Hevner, in 1956, discussed the importance of attitudes of the professional musician and conductor as well as their understanding of the basic task of training an audience and the hazard of overly sophisticated presentations.[25]

Extensive documentation of youth concert programing practices are made in the Hill-Thompson study and are

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[24]Max Kaplan, Foundations and Frontiers of Music Education (New York: Holt, Rinehart and Winston, Inc., 1966), Chapter 6.

[25]Kate Hevner Mueller, "Studies in Music Appreciation," Journal of Research in Music Education, Vol. IV, Spring 1956, pp. 3-25.

also found in other works.[26] The well known New York Philharmonic Young Peoples' Concerts are also available both on records and on film along with their program guides.[27]

Evaluation of Concert Experiences

Relatively little success has been achieved in evaluating the success of youth concert activities other than on a subjective basis. "Neither symphony orchestras nor the schools have related their specific goals for youth concerts to their production and teaching techniques in a manner that has permitted clear-cut testing and evaluation of the effectiveness of the techniques."[28] Most efforts directed toward evaluation of live presentations in the performing arts are based on

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[26]"Young People's Concerts by the Phoenix Symphony Orchestra: A Teaching Manual," A Project of the MESA Public Schools through Public Law 89-10, Title III, Project No. R.C. 002327, 1968, 17 pp.; "Innovative Program in the Junior High School General Music and Listening in the Classroom," Wabash Valley Supplementary Education Center. U.S. Office of Education Project No. DPSC-66-451, 1966, 16 pp.

[27]"Young Peoples Concerts on Film," Music Educators Journal, No. 51, Fall 1965, p. 145.

[28]Hill and Thompson,"Organization and Presentation of Youth Concerts," p. 7.

the interview or questionnaire technique.[29] A St. Louis study based on this format revealed the following result: "The attractiveness of concert going seemed to be related to more elements than just the music performed. Many children talked about "seeing" the concert in contrast to just hearing it. They expressed preference for live performances because one could 'see what was going on.'"[30]

Two recent studies for Young Augiences, Inc., reveal interesting evaluative techniques which might well serve as patterns for future work. Kyme (1969) described the development of his test as follows:

> Video tapes of portions of six Young Audience programs were made in the winter concerts of 1969. From these excerpts, a series of twenty-six scenes were selected and presented in audio-visual form by way of closed-circuit television to students comprising experimental and control samples. Questions were asked concerning happenings on the tape. A description of the scenes and tasks involved are described later. Prior to the actual testing a preparatory test was given to each second grade class

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[29]Ann Morris, "An Analysis of Some of the Possibilities for Learning Provided During the Interaction of a Small Group of Instrumental Players and a Group of Kindergarten and Primary Grade Children," an unpublished research report for Young Americans, Inc., New York, June 10, 1969; Eric Baber, "Evaluation and Record of the Fine Arts Educational Improvement Project," U.S. Office of Education Project No. TE-499-861, 1969, p. 12; "A Unique Program for Understanding the Performing Arts," U.S. Office of Education Report No. DPSC-66-1476, 1968.

[30]Arthur Custer and Judith Aronson, "Evaluation of Projects of the Metropolitan Center in the Arts," A report on MECA, St. Louis, during period from June 1, 1967 to June 30, 1968, under Title III of ESEA, 150 pp.

which purported to minimize the verbal skills required to take the test. Since normal scoring sheets were much too sophisticated for second graders in this experiment a rather ingenious testing device was used. The use of pictures and "same and different" circles permitted the non-reading student to exercise his choice or judgement almost as effectively as a true-false test would operate for older students.

As hypothesized, the cognitive tasks required of the testee were indeed found to be hierarchical in their format. In the concepts of pitch, for example, the woodwind quintet demonstration of the effects of shortening a soda straw on pitch revealed that all students developed the concept of highness and lowness in pitch. The effect of pitch of emptying a coke bottle as one blows across the top further demonstrated the relationship of the length of the resonating chamber and resulting pitch. From these demonstrations children were led to anticipate the sound of the longest of the woodwinds, in the quintet, the bassoon. This, in turn, led to the definition of the word, "bass" as meaning low. This concept served as the basis for several additional tasks. For example, the task of remembering and generalizing the pitch concepts to the bass voice and bass recorder led finally to the making of an aesthetic judgement of the appropriateness of a bass or soprano voice for a prescribed effect. This final task represented the highest order of learning or generalization of experience.[31]

The four basic elements of music considered in the Kyme study were pitch, rhythm, timbre and form. Vaughn (1969) employed an observational technique of coding and analyzing listener behaviors during concert experiences.[32]

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[31]George Kyme, "The Appropriateness of Young Audience Programs for Primary Grade Children," an unpublished research report for Young Audiences, Inc., New York, Spring 1969.

[32]Napoleon N. Vaughn, "The Significance of Young Audiences Music Programs for Primary Grade Children," an unpublished research report for Young Audiences, Inc., New York, July, 1969.

Finally, the Fott study with the Nashville Symphony in 1958 attempted to measure shifts in musical taste resulting from live concert experiences. Although no significant differences were reported between concert and non-concert groups, the elusiveness of the factor of musical taste undoubtedly contributed to this finding.[33]

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[33]Solie Fott, "The Youth Education Activities of the Nashville Symphony Association," Unpublished doctoral dissertation, George Peabody College for Teachers, 1958.

METHOD OF INQUIRY

Preparation of the Tests

An investigation of the test literature revealed different testing instruments which, although not intended specifically for the present purpose, appeared to measure aspects of music learning which are consistent with the objectives of this study. Subtests from two such instruments were chosen for use in this study with a third being used as the format for developing a subtest. A combination of the three subtests appeared to be an appropriate means of measuring gains in interest and listening skills resulting from a live symphonic concert experience.

The literature on interest inventories for children revealed several techniques for measuring what appear to be relatively stable areas of interest of fifth grade children. Houle (1970)[1] compared three such techniques and concluded that the Science Research Associates

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[1]Thomas Albert Houle, "A Methodological Study of Interest Assessment," Unpublished doctoral dissertation, Michigan State University, 1970.

publication, What I Like To Do,[2] was a reliable inventory of children's interests. One of the eight areas of interest measured by this inventory is music.

What I Like To Do is designed for children in grades four through seven and is in relatively common use in elementary schools today. Upon inquiry, the test publishers expressed confidence that used independently of the interest areas outside of music, the music subtest would provide an excellent measure of musical interest in fifth grade children. Informal preliminary testing showed two parallel forms of fifteen items each within the thirty item music subtext. One of these fifteen item tests was used in the present study. The published reliability estimate on this music subtest is .873 for fifth grade boys and .838 for fifth grade girls.[3]

In this interest subtest each subject is asked to answer yes, no, or (?), meaning "I don't care one way or the other," to a series of fifteen questions about musical activities in which he might like to participate. The total number of yes responses constitutes that subject's raw score in musical interest. All fifteen questions as

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[2]Louis P. Thorpe et al., What I Like To Do: An Inventory of Children's Interests (Chicago: Science Research Associates, Inc., 1954).

[3]What I Like To Do, Examiner Manual, pp. 12-13.

well as the directions given for the interest inventory were tape recorded for the benefit of those fifth graders with reading limitations.

Andrews and Deihl[4] (1967) devised a test format suitable for measuring listening skills which deal with the expressive qualities of music of interest in this study. When it was found that their measure was presently unavailable, it was decided to develop a measure based on that format. The elements to be measured in this test are: pitch (higher or lower), loudness (louder or softer), and tempo (faster or slower).

A study of the standard symphonic repertory was made to isolate short segments of music in which these single elements would be heard as changes occurring in the music. Considerable difficulty was found in selecting examples in which the music changed in only one way and yet in which the changes were sufficiently obvious to be recognizable to fifth graders. For example, music becoming higher in pitch often becomes louder at the same time. After informal pretesting fifteen examples were chosen which appeared to be suitable for measuring a listener's ability to discriminate between pitch, loudness and tempo. Works were chosen from two classifications: works which

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[4]"Development of a Technique for Identifying Musical Concepts," pp. 126-31.

were included in the fall Nashville Symphony Young Peoples' Concert and those not on the concert but which are representative of the traditional symphonic literature.

Using two opposing dimensions of each of the three elements to be measured, each test item has a possibility of six answers: high or low (pitch), loud or soft (loudness), and fast or slow (tempo). Using the Andrews-Deihl format, five of these possible answers were used for each recorded example, and were arranged so that each of the six factors appeared with near equal frequency. The elimination of one of the six possible answers for each example made it possible to reduce the interference of rival incorrect responses and to adjust for the difficulty level of the test items by manipulating the choices of answers. In an example where the music became louder and at the same time somewhat higher, the removal of higher as a possible answer reduces the discrimination difficulty. To require a discrimination between two dimensions where each is operative would be to increase the item difficulty.

Actual discriminations were always based on the most important change heard in the musical example. In some cases the changes were more abrupt, such as forte changing to piano. Other changes were heard over a period of several seconds as in a crescendo, accelerando or a

gradually ascending or descending melodic passage.

It was first decided to repeat the playing of each of the test examples to assure that subjects had ample time to decide the most important change heard. Pretesting showed that after about six items the subjects consistently began to mark their answers after the first hearing and made no attempts to change their answers after the repeated hearing. As a result it was decided to repeat only the first six test items with the last nine being played only once. Two sample items were provided at the beginning after which questions were permitted to assure that each subject understood what he was to do.

Whereas conceptually it was felt that the element of instrumental timbre could be equated along the same dimension as the three aforementioned elements, the relatively complex matter of identifying different timbres by name required that timbre be treated as a separate dimension. It was decided to base this subtest on the identification of orchestral instruments by sound. Although it was recognized that prior musical training would have a greater effect on such a task than on the previous subtest, it was felt that the validity of its use relative to a live symphonic concert would justify its inclusion.

The test chosen for this purpose was from Richard

Colwell's Music Achievement Tests, Part Two.[5] Permission had been given the Michigan State University Music Department for the pre-publication use of this comprehensive battery of tests, originally scheduled for publication in the Spring of 1970. The subtest chosen, Instrument Recognition, measures a listener's ability to discriminate aurally the various orchestral instruments when played alone and in an orchestral setting. Given a short recorded performance on a given instrument, the listener is to choose the correct one from five possible answers. The Colwell test is advertised for grades four and up.

As was done in the other two subtests, all instructions are tape recorded in the subtest of instrument identification. In addition, the entire answer set was unified in form for easy administration.

Selection of the Test Sample

Of a total of one hundred and forty-five schools scheduled one month in advance to attend the Fall Young Peoples Concert of the Nashville Symphony, forty-two had by that time paid the per-student admission fee of 50¢. For many of these schools this admission fee was paid for by parents' organizations of in the case of lower SES

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[5]Richard Colwell, Music Achievement Tests. Test 3 (Chicago: Follett Educational Corporation, available Spring, 1970), Part Four, Instrument Recognition.

schools by the Symphony Women's Guild. It was decided to select the test sample from this reduced population in order to control for the possible confounding effect of each child's personally paying his own admission fee to attend the concert. Due to the arbitrary nature of this one month "cut-off" period and to the chance nature of schools having paid their fees by that time, the forty-two schools were a good representation of the SES levels within the Metropolitan Nashville Public Schools.

Based on the number of concert days available for testing, the SES groups needed to represent the population at large, and on the number of subjects needed for appropriate statistical analysis, it was decided to include eight schools in the study sample. Two schools were selected from each of the four SES groups and in turn, one class of fifth graders numbering approximately thirty was selected from each of those schools. The resulting sample totaled 228 students.

Assignment of four schools to the treatment or concert group was made unsystematically from the list of forty-two schools with the one limitation that each of the four SES levels be represented. Assignment of schools to the control group, the group to be tested before hearing the concert, was based on matching schools from the remaining list of thirty-eight schools with the previously

assigned experimental schools. Within the limitations stated above, assignment of these intact classes to the concert "treatment" was at random. Although no claim of random selection was made, a reasonable equation of experimental and control groups was achieved.

With the selection of schools completed, principals of these schools were contacted to confirm their concert attendence schedules and were asked to choose, at random, a fifth grade class from their school for the actual testing. Four matching pairs of fifth grade classrooms were selected in this manner with each pair being made up of a treatment and a control group. Based on these procedures it was possible to administer the test to an experimental class within two hours of their return from the concert itself, and on the same afternoon to test the matching class which would then hear the concert a day or two following.

Covariates

Since the effect of a single concert experience was expected to be slight, it was necessary to exert maximum control for differences among subjects in order to render this experimental effect visible. In addition to the SES variable accounted for in the selection of subjects, five other variables were also used as covariates in this study.

Reading achievement which is closely related to IQ and also a strong predictor of school achievement generally, was expected to have some effect on the outcome of the present study. Reading achievement scores[6] in grade equivalent form were made available by the Metropolitan Nashville Public Schools for all subjects in the study sample.

Musical training and experiences both in school and the home were also expected to affect test outcomes. Information about such experiences was obtained on three levels with the purpose of controlling for individual differences in the subject's musical abilities and their propensity for music and at the same time to provide cross-validation of these factors as covariates.

At the completion of each testing session all subjects were asked to give information about their out-of-school musical life by placing a check by their names for each affirmative answer to the following wuestions:

1) Are you now taking lessons on an instrument outside of school?
2) Does someone else in the immediate family play an instrument now?
3) Have you been to a concert before today?

The sum of these affirmative responses was used as the

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[6] Comprehensive Tests of Basic Skills. Grades 4, 5, and 6 (Published by the California Test Bureau, a division of the McGraw-Hill Book Company, 1969.

covariate value for out-of-school musical experiences.

In the Metropolitan Nashville Public Schools instrumental training is normally offered beginning in the fifth grade, although some string programs begin in the fourth grade. Informal aptitude tests and interviews by music teachers are used to select students for such training. Participation in such a program is also an indication of interest on the part of the students. School band or orchestra membership was therefore regarded as an indicator of musical interest and was used as a covariate. The value assigned was simply a plus one for school band or orchestra membership and a minus one for non-membership. A further indication of musical ability was that of the music teacher's rating. The instrumental music teachers in each of the schools to be tested were consulted to obtain their opinions as to which of the test subjects in their bands or orchestras have special talent for or interest in music. The following letter along with follow-up telephone calls was used to obtain this information:

Dear Mr. _____:

I am hoping to enlist your help in a research project dealing with music in the Metropolitan Nashville Public Schools. This work has, of course, been approved by the Metro system and by the Music Supervisor, Howard Brown, who gave me your name as being the instrumental teacher at _____ School.

> Would you be so good as to check the names on the enclosed list of fifth graders from your band and orchestra who you think might be specially talented in music or who might have a special interest or ability in music. This information will be most helpful in my accounting for individual differences in the children I have recently tested.
>
> Enclosed is a stamped, self-addressed envelope in which you can return the list to me.
>
> Thank you for your help.

No degree of interest, ability or talent was specified in this request, only the presence of the attributes. As a result, this covariate value was listed as a positive one or a minus one.

Sex, the sixth covariate, was included because of slight differences in musical interest found between boys and girls in the published norms of the interest inventory What I Like To Do.

With such diversity of dimension within the different covariates, assignment of uniform scale values was arbitrary at best. A redeeming factor in the interpretation of the relative effects of these covariates is the fact that the assigned values were automatically converted to standard scores by the multiple regression computer program employed.

A number of circumstances make it possible to claim that certain differences in school musical training which would tend to affect the outcomes of this study are minimal.

First, musical experiences provided for children in the Metropolitan Nashville Public Schools are remarkably consistent from school to school. More importantly, the concert experience which constitutes the quasi-experimental treatment in this study took place barely one month after the opening of school in the Fall. During this time systematic music classes were just being organized and virtually no preparation for this particular children's concert had taken place. Further, instrumental training in the Nashville schools is offered beginning in the fifth grade. As a result, the children tested were largely equal in this respect since they had barely begun their instrumental work when this study took place.

Finally, a list of all subjects was submitted to the Metropolitan Nashville Department of Health, which, based on recent tests, affirmed all subjects to have normal hearing.

A Pilot Study

In order to test administrative procedures and to obtain data for estimating the test reliability, a pilot study was carried out in fifth grade classrooms of two Nashville schools. Since this pilot study necessarily preceded the main study it was therefore impossible to include an experimental or "concert" group. Neither class

had heard the concert before being tested and therefore were regarded as control group schools. Both pilot schools were of high academic standing, one public, the other private. It was reasoned that if scores obtained in the pilot study were higher than in the actual test sample, the difference which would be expected due to the different academic levels, might tend to support some minor degree of concurrent validity.

No advance preparation was given the subjects or the teachers about either the test subject matter or the testing procedures. The investigator was given a brief introduction:

> Boys and girls, Mr. Sigurdson will be with us this period to do something a little different. Please give him your attention.

The test sets were passed out to each class member after which the investigator gave the following introduction:

> Good morning, boys and girls! On your desk you find what looks a little like a test. It is not really a test but more of a way for us to get some information from you which we hope will bring about better musical experiences for children. You will not be graded. All instructions will be given on the tape recording. If you don't understand the instructions, raise your hand and I'll help you. Let's begin on page one.

At that point the tape recorder was turned on and the testing began. The tape recorder used for this purpose was a high quality Ampex stereo machine with ample

undistorted power which made the recorded instructions and musical examples easily heard throughout the classroom. In the entire testing procedure two places were found in which it became necessary to stop the tape for additional explanation. The two places were in the Listening Subtest after SAMPLE A and again after SAMPLE B. It was decided to include these stops for explanation in all subsequent testing. The complete testing procedure required about 35 minutes.

Data obtained from this pilot study were transferred to data cards for computerized scoring and item analysis. The results of this analysis revealed satisfactory reliability estimates for the subtest of musical interest and of listening whereas the subtest on instrument identification showed low reliability. (See Table I.)

Table I

Means, Standard Deviations and Reliability Estimates for Pilot Study

N = 56			
SUBTEST	MEAN	S.D.	ALPHA*
Interest	6.76	3.22	.766
Listening	11.32	2.75	.695
Instrument Identification	5.00	1.94	.269

*Cronbach's Alpha: estimate of the mean of all possible split-half correlations.

The low reliability on the instrument identification subtest was attributed to the fact that, in a pencil and paper test for groups of children such as this, it is necessary to associate the sound of an instrument with its printed name. Since the printed names of many of these instruments would be unfamiliar to fifth graders it is likely that some confusion resulted. The alternatives of either deleting this subtest or of changing its format in an attempt to improve reliability were both considered. However, for three different reasons the test was used in its published form. First, the Colwell test from which this subtest was excerpted appeared to be a highly developed instrument and subsequent testing using a more heterogeneous sample than was found in the pilot study might well show higher reliability. Secondly, the lack of ability to recognize the printed name of an instrument might be randomized to some extent through the school population at large and that the essential differences in aural discrimination, however slight, might still be apparent. Finally, it was decided to maintain the existing unified form within the test set.

In addition to the data provided above, analysis of the pilot study data produced complete discrimination and difficulty indices for each item in the three subtests. (See Appendix B.) This information was of particular

importance for subtest two on listening skills as it was developed by the investigator on the Andrews-Deihl format and was not excerpted intact as were the other two subtests. Both of the item analysis indices revealed satisfactory results on the listening subtest. The relatively high mean score on this subtest was attributed to the elite pilot sample and would be expected to be lower in the actual study due to a more heterogeneous sampling.

The administrative procedures followed in the pilot study proved highly satisfactory and within the limitations listed above, the test reliability appeared adequate for its use in the study. An informal validation trial was also carried out using professional musicians from the Nashville Symphony as subjects. The high percentage of correct responses and in several cases totally correct responses on the subtests of listening and instrument identification indicated that the tests appeared to measure what they were intended to measure. This result was accepted as evidence suggesting content validity in these tests.

The Concert Experience

Based on the extensive summaries of data related to children's concert production as reported in the Hill-Thompson study, the children's concerts of the Nashville

Symphony Orchestra may be described as typical.[7] The actual concert program was chosen from suggested works listed in the Exploring Music series, Junior Book, based on the particular objectives for listening stated in that series. This concert program included a wide variety of musical styles:

KEY	Star Spangled Banner
FERNANDEZ	Batuque from Reisado do partoreio
BEETHOVEN	Symphony No. 5 in C minor, First Movement
MENDELSSOHN	Violin Concerto in E minor, Second Movement
PROKOFIEFF	Lieutenant Kije Suite The Birth of Kije Kije's Wedding
GRAINGER	Irish Tune from County Derry (Danny Boy)
HAYMAN (arr.)	Hullaballoo

Commentary about the many historical, stylistic or compositional elements relating to the concert was given by the conductor, Dr. Thor Johnson. In this context nine instruments of the orchestra were heard in solo passages demonstrating or illustrating these elements. Although these solo demonstrations were designed primarily to illustrate musical ideas, the listeners were at the same time able to attend to the sound and name of each of the solo instruments, a task consistent with the stated objectives as well as with part three of the present test.

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[7] "Organization and Presentation of Youth Concerts," pp. 144-46A, 684, 686, and 707.

Although no attempt was made to explain the concepts of dynamics, rhythm, or pitch in the course of the concert presentation, the musical examples provided ample illustration of these concepts. Increases in listening skills and in musical interest as defined in this study might well result from any symphonic concert of this general description and which is consistent with the stated objectives. Hearing the live concert performance is the learning episode considered central to the study.

All of the concerts presented were given at Nashville's War Memorial Auditorium which has a seating capacity of 2,200 and outstanding acoustics for music. Each of the approximately 1,900 students attending each concert had an excellent seat from which to view as well as to hear the concert. A public address system of only average quality resulted in a minor limitation with regard to the commentary. The concerts were presented in a relatively formal setting which resulted in relatively well disciplined and attentive audiences.

Testing Procedures

Great care was taken to avoid any interaction between the concert, herein considered as the quasi-experimental treatment, and the testing. No advance preparation was given either the classes or their teachers and in several cases the actual class to be tested was not chosen

by the school principal until the day of testing. Actual procedures remained the same as those used in the pilot study (see Appendix A). All of the classrooms proved to be well suited for the administration of this test with outside disturbances or interruptions being kept to a minimum. A nonthreatening but disciplined classroom condition was maintained by the investigator along with the classroom teacher who remained with the class.

The test proved to be of some value not only as an evaluative instrument but also as a learning experience in itself. Regularly the students would ask whether or not they might hear parts of the test again and be told what the correct answers were. As time permitted and only after the test papers had been collected, this "feedback" procedure was offered. The relatively short duration of the test, thirty-five minutes, made it possible to maintain a high level of concentration throughout. Although unrelated to the findings of this study, the above stated practical advantages might well prove valuable in gaining access to classrooms for future evaluations of this kind.

PRESENTATION OF DATA

Statistical Procedures

Since it was necessary in this study to use intact classrooms of subjects and since a number of variables were required, it was decided to use a multiple covariance analysis of the data, making it possible to account for and to adjust for initial differences. Further, the expected differences between control and treatment conditions was slight and a sensitive analytic tool was required to detect these differences. A multiple regression computer program, a form of covariance analysis, provided the needed precision and appeared to be the most satisfactory procedure available. A multiple regression analysis program[1] from Computer Center of George Peabody College for Teachers was chosen for this purpose.

This program produces the means and standard deviations for all variables, a multiple correlation matrix for all variables and the F ratios as requested. Other output includes partial correlation coefficients, regression

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[1] RO1: Regression Analysis with Generation and/or Transformation of Variables, Peabody Statistical Library (Nashivlle: George Peabody College for Teachers, Revision of 9/1/69).

constants, and scatter plots illustrating distributions of scores. (See Appendix C.)

Conditions in the present study may be considered only adequate for meeting the assumptions required for effective application of the analysis of covariance. However, within the limitations specified this analysis may be considered appropriate.

The use of covariance analysis is commonly accepted in situations where intact groups must be used instead of randomly constituted groups.[2,3] However, covariance adjustments do not substitute for randomization and the results of such adjustments must be interpreted with caution. In the present study the combination of carefully matched treatment and control groups with statistical control of individual differences on five other variables suggests an equation of groups adequate for covariance application.

It is assumed that no interaction exists between the treatment and covariates. Based on the obtained correlations between all variables (see Table VII, p. 58)

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[2]Fred N. Kerlinger, Foundations of Behavioral Research (New York: Holt, Ronehart and Winston, Inc., 1964).

[3]Janet D. Elashoff, "Analysis of Covariance, A Delicate Instrument," American Educational Research Journal, Vol. 6, No. 3, May 1969, pp. 383-401.

this assumption appears to be met. Only home musical activity correlates significantly with the concert treatment and this correlation may well be due to chance. All fifth grade children were allowed to attend the concert irrespective of their home musical activity or any other such factor and conversely, the concert experience could not logically have an effect on pre-existing home musical activity.

Although no attempt was made to estimate reliability coefficients for the six covariates used in this study, they are based on sound evidence and may be considered adequate for the present purpose. Sex and school band membership are dichotomous factors since subjects are either male or female, school band or orchestra members or not members. Reading achievement scores (see page 36) are based on a highly standardized test. SES classification is that of the Metropolitan Nashville Public Schools Department of Educational Research. The only covariates requiring subjective classification were those of the music teacher's rating and of the subject's own assessment of his home musical activity, both of which were based on structured questionnaires. In each case care was taken to explain the questions asked and the possible responses to these questions. (See pages 36 and 37.)

Every effort was made to control for rival causes which might affect the test results. Uniformity in both the treatment and testing procedures was maintained to minimize this possibility. Based on the records of the Metropolitan Nashville Board of Health which provides hearing tests to Nashville school children, all subjects were found to have normal hearing.

Finally, based on frequency histograms of the three dependent variable results, nearly normal distributions were found for each. This tends to suggest that, as hoped, the test sample represents an unbiased sample of the population from which it was drawn.

For purposes of testing, the four hypotheses are stated in null form. A live symphonic concert will have no effect on:

I. Interest in music.

II. Discrimination of tempo, pitch and loudness.

III. Discrimination of instruments by sound.

IV. Listening skills and interest in music (Hypotheses I, II, and III combined).

Four F tests were computed by determining the amount of total variance common to both the independent or predictor variable (concert or not concert) and to each of the three dependent variables (interest, listening and instrument identificaton) singly, or in combination

when all other variables are partialed. This variance value is herein referred to as the Full R^2 (R^2 measures the percentages of the variation in the dependent variable, explained jointly by the independent variables).[4] Another R^2, called the Reduced R^2, specifies the common variance between the same dependent variables and all other variables excepting the treatment variable (concert or no concert). The F ratio compares the difference between these two R^2 values with the proportion of the criterion (dependent variable) variance that is not predicted by any covariate or independent variable.

Results of Hypothesis Testing

Of the four F tests computed, two revealed significance at the .01 level. These significant differences were found between the experimental and control groups when all three dependent variables were grouped together and for the subtest or instrument identification considered separately. No significant differences were found with the interest subtest or with the subtest of listening skills.

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[4]David S. Huang, Regression and Econometric Methods (New York: John Wiley and Sons, Inc., 1970), p. 80.

Table II

Interest Variance Attributed to the Concert Treatment (Hypothesis I)

	R^2	df	F	p
Full Model	.2616			
Reduced Model	.2587			
Difference	.0028	1/218	.841	.6372

The relatively small proportion of interest variance that is attributed to the interest subtest is not a matter for concern since such a large part of the total variance is accounted for by the numerous other variables and by error. The difference in interest between the treatment and control groups is not significant (see Table II).

Applied to the interest subtest alone the null hypothesis is accepted. A single concert experience is inadequate to bring about significant changes in interest. It is possible, however, that a rival explanation may exist. A factor undoubtedly present in the control group which was not present in the treatment group was that of anticipation. Anticipation of the concert may have been recorded by the control group as increased interest in which case "true" interest differences between the groups would have been greater than that reflected in the data.

Table III

Listening Variance Attributed to the Concert Treatment (Hypothesis II)

	R^2	df	F	p
Full Model	.4626			
Reduced Model	.4568			
Difference	.0058	1/218	2.377	.1204

A substantial portion, 46 per cent, of the listening skills variance is in common with all other variables, but the portion that can be attributed to the concert treatment is minor.

Table IV

Instrument Identification Variance Attributed to the Concert Treatment (Hypothesis III)

	R^2	df	F	p
Full Model	.1204			
Reduced Model	.0887			
Difference	.0316	1/218	7.847	.0057*

*Significant beyond the .01 level.

Although the amount of variance in common with the subtest of instrument identification and all other variables appears to be small, that the concert experience does affect a fifth grader's ability to make these

discriminations appears unmistakable. As expected, actually hearing and seeing an instrument played in a concert appears to be an effective means of learning to discriminate between these instruments by sound.

Table V

Combined Variance of All Three Subtests Attributed to the Concert Treatment

	R^2	df	F	p
Full Model	.1104			
Reduced Model	.0618			
Difference	.0485	3/218	3.964	.0090*

*Significant beyond the .01 level.

Based on the data in Table V, the hypothesis that a live concert experience will not effect listening skills and interest in music is rejected. As explained earlier, aural identification of instruments is also regarded in this study as a listening skill although it was necessary to measure this skill in a separate subtest.

The use of multiple regression in the combining of the three subtests into a single predictor is

algebraically equivalent to that of Hotelling's T-Squared.[5]

A further illustration of the differences between the treatment and control groups may be seen in the following matrix of means and standard deviations on the three subtests for both groups.

Table VI

Means and Standard Deviations for Control and Treatment Groups by Subtest

N = 228

	Interest		Listening		Instrument Ident.	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Treatment Group (Concert) N = 130	8.738	3.476	8.269	3.418	5.446	1.827
Control Group (No Concert) N = 98	8.520	3.252	7.938	3.297	4.714	1.823

The small mean differences shown in Table VI between groups on all three subtests substantiates the results shown in Table V. The three subtests in combination do reflect gains in listening skills and interest in music resulting from a live concert experience.

[5]B. J. Winer, Statistical Principles in Experimental Design (New York: McGraw-Hill, 1962).

Correlations Among Variables

In addition to illustrating the relationship between listening skills and interest which was a secondary purpose of the study, the correlation matrix on page 58 is of value in the interpretation of the results as a whole. High correlations do not necessarily indicate causation and are relevant to causal hypotheses only as they expose them to disconfirmation.

Due to the lack of uniform values for the covariate data the actual degree of correlation reported may be misleading and requires careful interpretation. These data are systematically obtained however and may be considered reliable for the purposes intended. The computer's conversion of all covariate values to standard scores is of value in making the relative weight of each covariate more consistant.

Assignment of actual values for purposes of analysis is as follows: Concert or treatment group is +1, no-concert or control group is 0. SES groupings listed low SES (predominantly black) as 1, low SES (predominantly white) as 2, middle class as 3, and upper middle class as 4. For purposes of identification only sex is listed as female 0, and male 1. Out-of-school musical experience is valued as 1 for each positive response to each of the three questions asked the subjects at the conclusion of

the testing sessions. (See page 36.) These values, therefore, range from 0 (none of those experiences) to 3. Participation in the school band is +1, while non-participation is -1. The school music teacher's rating of subjects in his classes as specially talented or showing special ability or aptitide is +1, while the others are -1. Reading achievement scores were listed as grade equivalent values. See Appendix B for numerical makeup of each covariate category.

All variables with the exception of sex were assigned numerical values from smaller to larger based on the less to greater effects these variables or covariates were expected to have on the dependent or criterion variables. As a result, positive correlations consistently reflect positive relationships between variables with the reverse also being true.

Examining each of the variables in order as they appear on the correlation matrix, only home musical activities and the instrument identification subtest show significant correlations with the concert treatment. Since all subjects attended the concerts either before or after the testing took place (the control group was tested before the concert; the treatment group after the concert), no good reason other than chance can be found for explaining the negative correlation between home

Table VII

Correlations Among Variables

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. No concert - concert	1.000								
2. SES	-.080	1.000							
3. Sex	.093	.122	1.000						
4. Home Music	-.174*	.114	-.067	1.000					
5. Teacher Rating	.021	.055	.030	.209*	1.000				
6. School Band	-.007	.040	.106	.216*	.780*	1.000			
7. Reading Achievement	.041	.430*	-.026	.232*	.144	.082	1.000		
8. Interest	.031	-.427*	-.185*	.062	.021	.110	-.286*	1.000	
9. Listening	.048	.560*	-.029	.199*	.180*	.185*	.540*	-.262*	1.000
10. Instrument Ident.	.194*	.101	.111	.084	.154*	.191*	.201*	-.044	.195*

*With 226 degrees of freedom a correlation of .15 or greater is significantly different from 0 (p .01).

Note: See Appendix B for numerical makeup of covariate categories.

musical activities and treatment (concert) group membership. The lack of relationship between the six covariates and the concert treatment was intended and even required as a condition for the use of covariance analysis.

The correlation between the concert treatment and the instrument subtest is consistent with the results of the F test (Table IV, p. 53) of the relationship between these variables. Viewing and hearing a live symphonic concert appears to have a definite effect on the ability to discriminate orchestral instruments by sound.

Higher SES children predictably show small but consistent superiority in both home and school musical experiences and substantial differences in reading achievement. The high correlation between SES and listening skills shows that the upper SES groups performed much higher on this subtest than did the lower SES groups. This is related to the curious negative correlation between interest and SES. A possible explanation might be that whereas the upper SES children who have been exposed to music and culture might tend to be somewhat blase about concerts, the lower SES children who may never have attended a concert before might appear more interested due to greater curiosity and to the novelty of the experience. This inverse relationship is consistent

with another negative correlation between the results of the interest and of the listening subtests. The upper SES groups appear to demonstrate greater listening skill but less interest in music whereas the lower SES groups show greater interest and less aural discrimination ability. That the higher SES groups demonstrated greater success on both reading achievement and on listening skills is also substantiated by the higher correlation between these two variables.

Sex correlated significantly only with the interest subtest in which the girls demonstrated more interest in music than did the boys. This is consistent with the published norms of the interest inventory What I Like To Do.

Greater home musical experiences among children appear to be an indicator of success in musical activities at school including the listening skills subtest within this study. The relationship between these experiences and SES as well as reading achievement is also noted. The correlation between home musical experiences and interest in music is smaller than expected, again relating to the curious negative correlation between interest and SES previously described.

Columns 5 and 6 are closely related due to the fact that a student must first be a school band member

in order to receive his band teacher's rating. As expected, these variables are moderately good predictors of success on the subtests of listening skills and instrument identification but are curiously low in their relationship with interest.

Reading achievement is the best predictor of the ten variables. It reflects SES and shows the highest relationship of any of the variables with listening skills. However, it, too, correlated negatively with interest in music, further amplifying the difference between interest and the various aspects of achievement and SES.

Mean Scores, Standard Deviations and Reliability Estimates for the Complete Study

Means, standard deviations and reliability estimates (Cronbach's Alpha) were computed for test results of the entire sample as had been done for the pilot study. A complete item analysis was also performed using a computer program designed for that purpose.[6] The output of this program includes the test scoring, the three statistics listed above and indices of discrimination and difficulty along with reliability estimates for each item. (See Appendix B.)

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[6]TO2: Item Discrimination and Validity Analysis, Peabody Statistical Library (Nashville: George Peabody College for Teachers, 1970).

Table VIII

Means, Standard Deviations and Reliability Estimates for the Complete Study

N = 296			
Subtest	Mean	S.D.	Alpha
Interest	8.30	3.39	.757
Listening Skills	8.77	3.50	.761
Instrument Identification	5.06	1.91	.224

For purposes of the descriptive analysis above, all raw data obtained in the study were used including the 56 scores of subjects from the pilot study, 228 subjects from the main study and 12 subjects which were rejected from the multiple regression analysis because they had no reading achievement scores.

Based on these data the results may be compared with that of the pilot study and will contribute to the interpretation of the study as a whole. A substantial improvement is noted between the mean score for interest of the pilot study (Mean = 6.76), and that of the complete study (Mean = 8.30). On the other hand, the mean score for listening skills of the pilot study (Mean = 11.32) decreased to 8.77 in the main study. This finding further reinforces that revealed in the correlation matrix (see

Table VII, p. 58) where upper SES groups performed higher on the subtest of listening skills than did lower SES groups. Since the pilot study sample was taken from an elite population of upper SES schools, this finding is as expected. The much lower interest mean of the pilot group, then, illustrates the other half of the inverse relationship between interest and listening skills.

The reliability estimates for all three subtests remained essentially the same between the pilot study and the complete study. Thus these values may be seen as quite stable. Although it was hoped that a more heterogeneous test sample would improve the appearance of the instrument identification subtest reliability, it remained below acceptable limits. Based on this information it would be considered essential to reexamine the appropriateness of this subtest for use with fifth grade children, at least in its present form.

Insofar as this low reliability might affect the outcome of the present study, a comment needs to be made about its treatment. A major advantage of the multiple regression analysis is that of the statistical reduction of error variance. A component of error variance is the lack of test reliability and in that sense the multiple regression computation is able to partial out or reduce much of this error variance. Whereas this statistical

control of test reliability is not an acceptable substitute for a highly reliable test, and whereas this procedure does not remove all questions about the interpretation of the instrument identification subtest, it does lend strength to the finding of significant differences based on the results of that subtest.

SUMMARY

The purpose of this study was to investigate the effects of a live symphonic concert on listening skills and interest in music. Interest in music was regarded as general musical interest as opposed to interest only in symphonic music or any other particular area of music. Listening skills, as the aural ability to perceive musical elements, was measured on two related dimensions. The listening subtest measured a listener's ability to perceive pitch (higher or lower), loudness (louder or softer) and tempo (faster or slower). The instrument identification subtest measured a listener's ability to perceive timbre based on the sounds of orchestral instruments.

After only a single concert experience, fifth grade listeners scored significantly higher than those fifth grade listeners not hearing the concert when the results of all three subtests were combined. Based on these results a symphonic concert experience does appear to have a positive effect on listening skills and interest in music. Considering the subtests separately only the instrument identification subtest revealed significant differences. Positive but non-significant differences were found for

both the interest and listening subtests.

The evaluative instrument herein assembled shows promise as a means of measuring listening skills and musical interest. The interest subtest proved to be quite reliable and appeared to discriminate different levels of musical interest.

A more complete indication of interest gains would be desirable and should probably include observed differences of affective behavior such as increases in requests to hear symphonic music or to participate in musical activities. Based on the results of this investigation, the inclusion of an interest measure in assessing the educational value of symphonic concerts is highly valid.

The listening subtest also appears to be a productive means of measuring a listener's aural ability to perceive pitch, loudness and tempo. The non-significant gains found for this subtest require additional interpretation. The subtest procedures appear valid but simply hearing a live concert performance does not seem to measurably improve performance of such listening discrimination. The multi-sensory outputs in a live concert setting substantially reduce the likelihood that a listener will focus on elements such as pitch, loudness and tempo without prior direction in listening. With

prior training in the perception of these elements a listener would then find reinforcement of this training in the concert and the resulting gains would undoubtedly be significantly higher.

Of definite concern is the low reliability of the instrument identification subtest. If, as suggested earlier, this low reliability resulted from the necessity of a student's associating the printed name with the sound of an instrument, prior training in this task might render the subtest adequate in its present form. A possible solution would be to use pictures of instruments on the answer sheet instead of names, thereby reducing the verbal interference.

Another cause of low reliability is the sub-standard quality of performance by instrumentalists recording the musical examples. Better players would have produced more characteristic sonorities on their instruments and the differences between these sonorities would have been more apparent. Although this subtest is valid for an investigation of this kind, in its present form, it is inappropriate for fifth graders without prior training in instrument identification.

The procedures for the test administration are both efficient and effective enough for classroom use. Of particular value was the effect of the testing as a

learning experience in itself. At the conclusion of testing and after the answer sheets were collected, parts of the test were played again to provide immediate feed-back on the correct responses.

The present results suggest that evaluation of learning from only a single concert experience may be a productive approach. This single concert assessment does reveal measurable differences and at the same time is more consistent with the fact that most children hear only one such concert per school year.

The finding of significant differences between the treatment and control groups for all three subtests combined as well as for the instrument identification test in particular should be encouraging to orchestral and educational institutions which produce concerts for children. The use of this instrument in its present form is not recommended for use by such organizations due both to the imperfections described above and to its immediate purpose only as a research tool.

The finding of a negative correlation between listening skills and interest requires additional investigation. Along with possible explanations listed earlier it is also reasonable to assume that teachers' expectations of the students' responses to concert experiences might have a bearing on these responses. Lower

SES groups with little or no concert going backgrounds might tend to be given more encouragement as to the enjoyment that they might derive from hearing concerts with less emphasis on learning value. Upper SES groups are assumed to have greater interest because of greater exposure to music and might be given an orientation to concerts based more on information and learning than on personal satisfaction. A legitimate goal would be for children to improve both their listening skills and interest as a result of concert experiences. Both the concerts and pre-concert preparations should be directed to those ends.

Recommendations

Objectives for concert programs as school learning experiences are not in common use. Those objectives which are in use, such as those found in Exploring Music, tend to be vague and as a result are difficult to interpret and evaluate. Much work needs to be done toward the development of behavioral objectives for music listening which then may be used as the basis of concert formats by both orchestras and the schools.

It is important that appropriate objectives be developed in the areas of perception and affect as well as in the more readily accessible cognitive domain. A

possible example relating to children's interest is: "Given two separate concert programs and appropriate pre-concert exposure to all of the concert music through records and television, classes will choose the one concert they are to attend by a majority vote." Exercising choice in what they hear might stimulate interest through participation and at the same time force value judgements, which are indicative of higher order affective responses.

The various elementary music series available today are evidence of increasingly systematic ordering and sequencing of music listening materials which are based on sound instructional objectives. These series may be of particular value, in youth concert planning not only as they relate to objectives but also as a productive means of relating concert activity to the school music program itself. Widespread acceptance of these music series combined with an increasing awareness of the listening process as the first, essential step in the realization of musical value, has resulted in what might be characterized as the "music listening movement" in the schools.

Despite this emphasis on hearing music, youth concerts continue to be regarded as external to the school music program. Many opportunities to realize fully the potential of concert experiences for learning have been

lost due to the failure of both schools and orchestral organizations to coordinate their efforts. A tendency appears to exist for the schools to view concerts more as entertainment or recreation than as learning experiences. On the other hand, orchestras often regard youth concerts as supplementary activities which are often by-products of regular concert series programming. It is hoped that the results of this study might be accepted as evidence of the effectiveness of concert experiences for learning purposes and that schools and orchestras might renew their efforts to realize more of this potential.

Every effort should be made to provide appropriate concert orientation for classroom teachers so they may participate confidently in this aspect of their music listening programs. Instructional materials such as listening guides should also be highly developed for ready accessibility by these teachers who often have little musical background. These preparations along with educational television presentations related to the concerts and occasional presentations by music specialists could serve to meaningfully integrate concert experiences into the school music curriculum.

All facets of the learning value of concerts deserve continuing investigation. In particular, the relative value of live concerts as opposed to sound and video

recordings of music needs to be known. Sociological factors related to the physical presence of groups of listeners in a concert hall remain largely unknown with regard to the effectiveness of concert presentations. The relative effectiveness of full symphonic concerts should be compared with that of small scale chamber music programs, and perhaps an optimum combination of both realized. The interaction between youthful performers and youthful listeners should be compared with that of adult performers and youthful listeners.

The present study investigated the learning effects of a concert experience using only four basic elements of musical experience: pitch, loudness, tempo and timbre. Similar investigations should be carried out using other musical elements such as melody, harmony, style and phrasing. The present study was also related only to the perception of these basic elements and not to their value in realizing higher order musical meaning. Evaluative techniques also need to be devised in which listeners would make aesthetic judgements using their perception of these basic elements as tools. An example might be to choose from listed alternatives a word that best characterizes the musical effect of a change heard in pitch, loudness or tempo, in a given musical excerpt. Another example might be to choose from listed musical

instruments, the name of one instrument which would best express a given musical idea. A flute might represent a bird; a trombone, a bear, etc. Similarly, other musical effects such as crescendo, accelerando, dissonance or even silence might be used to represent specified ideas.

Finally, based on the substantial body of descriptive and historical research data now available in the Hill-Thompson study, there is a need for rigorously controlled experimental research of instructional and evaluative techniques relating to youth concerts as learning experiences. The present study was designed to contribute toward the fulfillment of that need. It is hoped that it also might encourage others to apply their efforts to this most worthwhile endeavor.

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APPENDIX A

TEST MATERIALS

Interest Subtest

DIRECTIONS:

Read each of the following items and decide whether you would like to do what it says.

> If you would like to do what the item says, mark the space under YES with an X.
>
> If you would not like what the item says, mark the space under NO.
>
> If you don't care one way or the other -- that is, if you neither like nor dislike what the item says, mark the space under the question mark. (?)

If you do not understand a word, ask your teacher to explain it to you before you mark the item.

Interest Subtest
(Continued)

WOULD YOU LIKE TO.....

	NO	?	YES
1. Take singing lessons.....	☐	☐	☐
2. Go to a concert.....	☐	☐	☐
3. Play in an orchestra.....	☐	☐	☐
4. Collect phonograph records.....	☐	☐	☐
5. Learn new songs.....	☐	☐	☐
6. Join a music club.....	☐	☐	☐
7. Listen to opera music.....	☐	☐	☐
8. Listen to talks on music.....	☐	☐	☐
9. Play in a band.....	☐	☐	☐
10. Make up a song or tune.....	☐	☐	☐
11. Read about great musicians.....	☐	☐	☐
12. Sing in a church choir.....	☐	☐	☐
13. Listen to the music of other countries....	☐	☐	☐
14. Listen to organ music.....	☐	☐	☐
15. Sing while you're working or playing.....	☐	☐	☐

Listening Subtest

DIRECTIONS:

We will hear some short musical examples. Each one will change in some way. Listen to the complete example and decide on the most important change. Read the answers on your paper, but before marking your answer, listen again as the same example is repeated. After hearing the example the second time, fill in the square beside the answer you think is right. Be sure you fill in only one answer square for each example.

SAMPLE A

- ☐ louder
- ☐ higher
- ☐ lower
- ☐ faster
- ☐ slower

SAMPLE B

- ☐ faster
- ☐ slower
- ☐ louder
- ☐ softer
- ☐ higher

Listening Subtest
(Continued)

1.

- ☐ louder
- ☐ softer
- ☐ higher
- ☐ lower
- ☐ slower

2.

- ☐ higher
- ☐ lower
- ☐ faster
- ☐ slower
- ☐ softer

3.

- ☐ lower
- ☐ louder
- ☐ softer
- ☐ faster
- ☐ slower

4.

- ☐ louder
- ☐ faster
- ☐ slower
- ☐ higher
- ☐ lower

5.

- ☐ faster
- ☐ slower
- ☐ softer
- ☐ higher
- ☐ lower

6.

- ☐ louder
- ☐ softer
- ☐ faster
- ☐ slower
- ☐ lower

Listening Subtest
(Continued)

DIRECTIONS:

In this part the examples will not be repeated. Listen carefully the first time and mark the square which tells how the music changed.

7.

- ☐ higher
- ☐ lower
- ☐ faster
- ☐ slower
- ☐ louder

8.

- ☐ faster
- ☐ slower
- ☐ higher
- ☐ lower
- ☐ softer

9.

- ☐ faster
- ☐ slower
- ☐ higher
- ☐ lower
- ☐ softer

Listening Subtest
(Continued)

10.

- ☐ louder
- ☐ softer
- ☐ higher
- ☐ lower
- ☐ slower

11.

- ☐ faster
- ☐ louder
- ☐ softer
- ☐ higher
- ☐ lower

12.

- ☐ louder
- ☐ softer
- ☐ higher
- ☐ faster
- ☐ slower

13.

- ☐ higher
- ☐ lower
- ☐ faster
- ☐ louder
- ☐ softer

14.

- ☐ faster
- ☐ slower
- ☐ louder
- ☐ softer
- ☐ lower

15.

- ☐ higher
- ☐ faster
- ☐ slower
- ☐ louder
- ☐ softer

Instrument Identification Subtest

DIRECTIONS:

We will hear some more short musical examples to see if you can tell which instrument is playing. Listen carefully and choose from the answers given. If none of the instruments listed is the one featured, mark the blank marked none (0). There is only one correct answer for each question.

One example will be played. Answer this example to make sure that you understand what you are to do.

EXAMPLE A

- ☐ trumpet
- ☐ bassoon
- ☐ french horn
- ☐ violin
- ☐ none (0)

Instrument Identification Subtest (Continued)

1.

- ☐ flute
- ☐ clarinet
- ☐ trumpet
- ☐ piccolo
- ☐ none (0)

2.

- ☐ viola
- ☐ cello
- ☐ violin
- ☐ bassoon
- ☐ none (0)

3.

- ☐ bass drum
- ☐ timpani
- ☐ tuba
- ☐ conga drum
- ☐ none (0)

4.

- ☐ violin
- ☐ cello
- ☐ viola
- ☐ clarinet
- ☐ none (0)

5.

- ☐ trumpet
- ☐ trombone
- ☐ french horn
- ☐ english horn
- ☐ none (0)

6.

- ☐ flute
- ☐ clarinet
- ☐ trumpet
- ☐ piccolo
- ☐ none (0)

Instrument Identification Subtest (Continued)

7.

- ☐ saxophone
- ☐ cello
- ☐ french horn
- ☐ bassoon
- ☐ none (0)

8.

- ☐ maracas
- ☐ claves
- ☐ wood block
- ☐ castenets
- ☐ none (0)

9.

- ☐ saxophone
- ☐ cello
- ☐ english horn
- ☐ bassoon
- ☐ none (0)

10.

- ☐ harp
- ☐ violin
- ☐ viola
- ☐ cello
- ☐ none (0)

Instrument Identification Subtest (Continued)

DIRECTIONS:

In this group you will hear instruments in an orchestral setting. A short orchestral excerpt will be played with one instrument featured. Listen carefully, then choose from the answers given, the name of the solo instrument featured. There is only one correct answer for each question.

One example will be played. Answer this example to make sure that you understand what you are to do.

EXAMPLE A

- ☐ flute
- ☐ violin
- ☐ clarinet
- ☐ french horn
- ☐ none (0)

Instrument Identification Subtest (Continued)

11.

- ☐ trombone
- ☐ trumpet
- ☐ french horn
- ☐ english horn
- ☐ none (0)

12.

- ☐ oboe
- ☐ english horn
- ☐ bassoon
- ☐ viola
- ☐ none (0)

13.

- ☐ flute
- ☐ clarinet
- ☐ oboe
- ☐ piccolo
- ☐ none (0)

14.

- ☐ english horn
- ☐ viola
- ☐ clarinet
- ☐ bassoon
- ☐ none (0)

15.

- ☐ french horn
- ☐ trombone
- ☐ saxophone
- ☐ tuba
- ☐ none (0)

Directions for Test Administration

Distribute answer sheets. Make sure each child has a pencil with eraser. Instruct children to write their names at the top of their answer sheets.

SAY: "Good morning, boys and girls! On your desk you find what looks like a test. It is really not a test but more of a way for us to get some information from you which we hope will bring about better musical experiences for children. You will not be graded. All instructions will be given on the tape recording. If you don't understand the instructions, raise your hand and I'll help you. Let's begin on page one."

START TAPE

Play the tape through all of the Interest Subtest, the directions for the Listening Subtest and through the first playing of SAMPLE A of the Listening Subtest.

STOP TAPE after SAMPLE A.

ASK: "Which word describes the most important change?"

ALLOW CHILDREN TO ANSWER. (Correct answer is "faster.")

SAY: "Mark the space beside "faster." If you had a different answer, erase it. Let's listen to that sample again to hear the music become faster."

START TAPE

Play the tape through the repeat of SAMPLE A and through the first playing of SAMPLE B.

STOP TAPE

SAY: "Decide what you think is the biggest change. Look for that answer on the sheet, but listen again before marking your answer."

START TAPE

Play the tape through the repeat playing of SAMPLE B.

STOP TAPE

Directions for Test Administration (Continued)

AFTER CHILDREN HAVE MARKED ANSWERS, ASK, "What did you mark?" AFTER CHILDREN HAVE ANSWERED, "louder is right," ASK, "are there any questions about how to do this?" ANSWER ANY QUESTIONS ABOUT PROCEDURE, THEN SAY, "Let's begin with number one."

START TAPE

Play the tape through to the very end.

ASK: "Turn back to the first page of the test where you wrote your name. By your name, put an X if you are now taking lessons on an instrument outside of school. (Repeat.) By your name, put an X if you are now taking lessons on an instrument outside of school. Also, put an X by your name if someone else in your immediate family is now playing an instrument. (Repeat, if necessary.) Put another X if you have been to a concert before today. (Repeat, if necessary.) Some of you may have as many as three X's by your name and many will have no X's. Remember, please mark only one X by your name for each of the three questions you can answer yes."

COLLECT THE PAPERS

As time allows, replay parts of the listening and instrument identification subtests and give the children the correct answers immediately after the examples have been played.

Musical Sources for Listening Subtest

	Musical Source	Dimension Measured
SAMPLE A	Bartok, Concerto for Orchestra. Introduction, Measures 58-80.	Faster
SAMPLE B	Benjamin Britten, Four Sea Interludes, Opus 33a (Boosey and Hawkes). No. 4, The Storm, No. 12 to end.	Louder
1.	Prokofieff, Lt. Kije Suite, The Birth of Kije (Boosey and Hawkes). No. 5 to No. 6.	Louder
2.	Borodin, Second Symphony, First Mvt. (Boosey and Hawkes). 11 measures, beginning six after letter C.	Faster
3.	Beethoven 7th Symphony, Third Mvt. (Philharmonia ed.). Measures 88 - 106.	Softer
4.	Mendelssohn, Violin Concerto. Second Mvt. (Carl Fischer), Measures 27 - 29 after letter P.	Higher
5.	Stravinsky, The Fairy's Kiss (Boosey and Hawkes). No. 172 to one measure after No. 173	Slower
6.	Beethoven, 7th Symphony, Second Mvt. (Philharmonia ed.). Measures 139-148.	Lower
7.	Fernandez, Batuque. First 20 measures.	Louder
8.	Stravinsky, The Firebird (Leeds). Finale, Measures 167-175.	Slower
9.	Schumann, First Symphony, First Mvt. Measures 31-42.	Slower

Musical Sources for Listening Subtest
(Continued)

10.	Prokofieff, Peter and the Wolf (Leeds). No. 11 to No. 21.	Higher
11.	Beethoven, 5th Symphony, First Mvt. (Peters). 13 measures before letter B to letter C.	Softer
12.	Prokofieff, Lt. Kije Suite, The Birth of Kije (Boosey and Hawkes). No. 2 to No. 3.	Higher
13.	Tschaikowsky, 6th Symphony, First Mvt. Measures 285-300.	Lower
14.	Benjamin Britten, Young Person's Guide to the Orchestra. Measures 11-20.	Softer
15.	Prokofieff, Lt. Kije Suite, Kije's Wedding. No. 37 to the fifth measure of No. 38.	Slower

APPENDIX B

STATISTICAL DATA

Table IX

Makeup of Covariate Categories Within Treatment and Control Groups

N = 228		
	Treatment (Concert)	Control (No Concert)
Concert - No Concert	130	98
Socio-economic status		
Low SES, predominantly black	31	14
Low SES, predominantly white	27	28
Middle SES	45	30
Upper Middle SES	27	26
Sex		
Girls	66	59
Boys	64	39
Home musical activities		
No indications of activity	36	16
One indication of activity	49	38
Two indications of activity	38	28
Three indications of activity	7	16

Table IX
(Continued)

Makeup of Covariate Categories Within
Treatment and Control Groups

	Treatment (Concert)	Control (No Concert)
Music teacher rating		
Specially talented	7	15
Not specially talented	108	83
School band or orchestra		
Member	31	24
Non-member	99	74
Mean grade equivalent on reading achievement scores	49.776	48.469

Table X

Item Analysis of Interest Subtest

N = 296

	Item to Test Correlation	Lowest 27% Passing Item	Highest 27% Passing Item	Discrimination Index
1.	.527	.09	.86	.77
2.	.318	.57	.95	.38
3.	.364	.07	.66	.59
4.	.170	.59	.89	.30
5.	.342	.59	.99	.40
6.	.473	.05	.75	.70
7.	.379	.09	.72	.63
8.	.464	.04	.65	.61
9.	.384	.20	.85	.65
10.	.339	.24	.84	.60
11.	.381	.17	.82	.65
12.	.422	.20	.87	.67
13.	.270	.57	.94	.37
14.	.300	.31	.87	.56
15.	.245	.36	.84	.48

Table XI

Item Analysis of Listening Subtest

N = 296

	Item to Test Correlation	Lowest 27% Passing Item	Highest 27% Passing Item	Discrimination Index
1.	.366	.20	.82	.62
2.	.341	.30	.85	.55
3.	.425	.25	.90	.65
4.	.539	.30	.97	.67
5.	.423	.19	.90	.71
6.	.381	.20	.80	.60
7.	.314	.29	.84	.55
8.	.518	.25	.96	.71
9.	.156	.52	.89	.37
10.	.440	.25	.91	.66
11.	.338	.35	.90	.55
12.	.528	.11	.89	.78
13.	.470	.17	.91	.74
14.	-.021	.50	.61	.11
15.	.264	.24	.74	.50

Table XII

Item Analysis of Instrument
Identification Subtest

N = 296

	Item to Test Correlation	Lowest 27% Passing Item	Highest 27% Passing Item	Discrimination Index
1.	.171	.19	.72	.53
2.	.193	.20	.64	.44
3.	.130	.00	.09	.09
4.	.170	.14	.65	.51
5.	-.038	.44	.67	.23
6.	.013	.46	.80	.34
7.	.022	.20	.42	.22
8.	.024	.00	.04	.04
9.	.093	.21	.65	.44
10.	.078	.01	.15	.14
11.	.116	.09	.50	.41
12.	-.014	.32	.60	.28
13.	.067	.22	.56	.34
14.	.013	.17	.45	.28
15.	-.021	.17	.45	.28

Table XIII

Raw Scores for Interest Subtest

Subject	Score	Subject	Score	Subject	Score
1.	5	21.	5	41.	5
2.	3	22.	6	42.	9
3.	6	23.	5	43.	7
4.	8	24.	4	44.	6
5.	9	25.	9	45.	9
6.	5	26.	10	46.	5
7.	9	27.	15	47.	3
8.	6	28.	3	48.	6
9.	6	29.	10	49.	6
10.	5	30.	6	50.	6
11.	8	31.	5	51.	7
12.	6	32.	10	52.	7
13.	12	33.	15	53.	4
14.	15	34.	15	54.	3
15.	5	35.	3	55.	3
16.	8	36.	7	56.	6
17.	3	37.	5	57.	13
18.	1	38.	9	58.	14
19.	3	39.	10	59.	10
20.	4	40.	8	60	7

Table XIII
(Continued)

Raw Scores for Interest Subtest

Subject	Score	Subject	Score	Subject	Score
61.	9	81.	13	101.	4
62.	5	82.	9	102.	10
63.	9	83.	10	103.	5
64.	15	84.	10	104.	7
65.	10	85.	14	105.	5
66.	5	86.	8	106.	9
67.	10	87.	3	107.	8
68.	2	88.	10	108.	5
69.	10	89.	6	109.	7
70.	8	90.	5	110.	7
71.	5	91.	6	111.	5
72.	11	92.	6	112.	5
73.	6	93.	0	113.	6
74.	13	94.	10	114.	9
75.	11	95.	4	115.	7
76.	10	96.	6	116.	5
77.	12	97.	2	117.	8
78.	10	98.	5	118.	5
79.	11	99.	10	119.	6
80.	14	100.	12	120.	6

Table XIII
(Continued)

Raw Scores for Interest Subtest

Subject	Score	Subject	Score	Subject	Score
121.	10	141.	4	161.	12
122.	12	142.	14	162.	9
123.	8	143.	11	163.	5
124.	10	144.	4	164.	13
125.	10	145.	10	165.	10
126.	12	146.	9	166.	6
127.	8	147.	11	167.	14
128.	10	148.	7	168.	7
129.	6	149.	9	169.	11
130.	5	150.	11	170.	14
131.	12	151.	10	171.	7
132.	4	152.	12	172.	9
133.	8	153.	12	173.	6
134.	6	154.	14	174.	6
135.	5	155.	13	175.	7
136.	7	156.	12	176.	8
137.	9	157.	4	177.	6
138.	11	158.	6	178.	8
139.	5	159.	9	179.	6
140.	11	160.	11	180.	9

Table XIII
(Continued)

Raw Scores for Interest Subtest

Subject	Score	Subject	Score	Subject	Score
181.	10	201.	9	221.	15
182.	3	202.	11	222.	14
183.	10	203.	13	223.	1
184.	8	204.	12	224.	9
185.	8	205.	11	225.	15
186.	8	206.	10	226.	8
187.	4	207.	8	227.	9
188.	7	208.	11	228.	15
189.	8	209.	12	229.	8
190.	10	210.	10	230.	8
191.	9	211.	10	231.	9
192.	12	212.	5	232.	12
193.	4	213.	10	233.	15
194.	14	214.	7	234.	6
195.	9	215.	15	235.	11
196.	5	216.	14	236.	10
197.	6	217.	7	237.	6
198.	11	218.	9	238.	15
199.	14	219.	10	239.	2
200.	14	220.	9	240.	13

Table XIII
(Continued)

Raw Scores for Interest Subtest

Subject	Score	Subject	Score	Subject	Score
241.	3	261.	3	281.	10
242.	5	262.	4	282.	12
243.	3	263.	5	283.	12
244.	9	264.	5	284.	11
245.	4	265.	4	285.	8
246.	12	266.	6	286.	8
247.	9	267.	8	287.	12
248.	3	268.	2	288.	10
249.	4	269.	8	289.	9
250.	7	270.	11	290.	10
251.	8	271.	13	291.	14
252.	2	272.	9	292.	8
253.	2	273.	10	293.	6
254.	12	274.	10	294.	10
255.	6	275.	12	295.	10
256.	11	276.	15	296.	10
257.	8	277.	10		
258.	12	278.	13		
259.	3	279.	11		
260.	4	280.	9		

Table XIV

Raw Scores for Listening Subtest

Subject	Score	Subject	Score	Subject	Score
1.	11	21.	13	41.	14
2.	12	22.	14	42.	12
3.	8	23.	9	43.	5
4.	14	24.	6	44.	7
5.	13	25.	4	45.	15
6.	12	26.	4	46.	11
7.	11	27.	11	47.	12
8.	10	28.	14	48.	15
9.	13	29.	13	49.	11
10.	13	30.	8	50.	10
11.	12	31.	10	51.	12
12.	14	32.	11	52.	6
13.	12	33.	10	53.	15
14.	11	34.	10	54.	15
15.	14	35.	14	55.	11
16.	13	36.	15	56.	13
17.	13	37.	13	57.	8
18.	14	38.	10	58.	3
19.	9	39.	10	59.	6
20.	10	40.	12	60.	9

Table XIV
(Continued)

Raw Scores for Listening Subtest

Subject	Score	Subject	Score	Subject	Score
61.	6	81.	8	101.	12
62.	3	82.	10	102.	11
63.	11	83.	7	103.	11
64.	11	84.	1	104.	10
65.	10	85.	1	105.	13
66.	11	86.	9	106.	13
67.	9	87.	9	107.	10
68.	11	88.	12	108.	10
69.	10	89.	9	109.	12
70.	14.	90.	10	110.	8
71.	11	91.	13	111.	14
72.	10	92.	10	112.	14
73.	8	93.	4	113.	12
74.	10	94.	11	114.	12
75.	11	95.	10	115.	11
76.	10	96.	11	116.	10
77.	11	97.	10	117.	5
78.	7	98.	8	118.	12
79.	9	99.	12	119.	12
80.	3	100.	13	120.	11

Table XIV
(Continued)

Raw Scores for Listening Subtest

Subject	Score	Subject	Score	Subject	Score
121.	10	141.	11	161.	13
122.	5	142.	3	162.	12
123.	8	143.	11	163.	4
124.	10	144.	9	164.	4
125.	5	145.	14	165.	5
126.	5	146.	14	166.	6
127.	11	147.	9	167.	11
128.	12	148.	4	168.	5
129.	7	149.	12	169.	10
130.	10	150.	12	170.	13
131.	6	151.	14	171.	12
132.	10	152.	8	172.	12
133.	9	153.	4	173.	8
134.	5	154.	11	174.	8
135.	11	155.	12	175.	4
136.	10	156.	8	176.	10
137.	8	157.	14	177.	8
138.	5	158.	12	178.	10
139.	10	159.	8	179.	11
140.	7	160.	13	180.	10

Table XIV
(Continued)

Raw Scores for Listening Subtest

Subject	Score	Subject	Score	Subject	Score
181.	13	201.	5	221.	9
182.	13	202.	3	222.	9
183.	5	203.	7	223.	4
184.	8	204.	5	224.	5
185.	8	205.	5	225.	3
186.	6	206.	4	226.	5
187.	9	207.	6	227.	6
188.	7	208.	3	228.	2
189.	2	209.	3	229.	2
190.	6	210.	6	230.	3
191.	3	211.	2	231.	8
192.	3	212.	4	232.	2
193.	6	213.	5	233.	10
194.	9	214.	6	234.	3
195.	5	215.	6	235.	6
196.	8	216.	2	236.	4
197.	6	217.	5	237.	6
198.	2	218.	4	238.	4
199.	2	219.	6	239.	9
200.	5	220.	4	240.	6

Table XIV
(Continued)

Raw Scores for Listening Subtest

Subject	Score	Subject	Score	Subject	Score
241.	7	261.	12	281.	7
242.	13	262.	11	282.	4
243.	6	263.	10	283.	4
244.	12	264.	13	284.	7
245.	12	265.	13	285.	5
246.	13	266.	13	286.	9
247.	7	267.	12	287.	9
248.	8	268.	13	288.	12
249.	14	269.	9	289.	15
250.	5	270.	5	290.	8
251.	8	271.	10	291.	9
252.	13	272.	2	292.	5
253.	8	273.	2	293.	5
254.	11	274.	6	294.	5
255.	8	275.	8	295.	12
256.	10	276.	8	296.	5
257.	9	277.	5		
258.	9	278.	5		
259.	9	279.	10		
260.	9	280.	4		

Table XV

Raw Scores for Instrument Identification Subtest

Subject	Score	Subject	Score	Subject	Score
1.	1	21.	6	41.	7
2.	3	22.	5	42.	1
3.	2	23.	5	43.	5
4.	7	24.	5	44.	3
5.	6	25.	2	45.	7
6.	5	26.	2	46.	3
7.	7	27.	4	47.	5
8.	8	28.	4	48.	6
9.	6	29.	6	49.	5
10.	5	30.	2	50.	7
11.	6	31.	1	51.	7
12.	7	32.	6	52.	3
13.	8	33.	6	53.	3
14.	11	34.	6	54.	7
15.	4	35.	6	55.	4
16.	4	36.	5	56.	6
17.	4	37.	6	57.	2
18.	4	38.	5	58.	4
19.	6	39.	5	59.	6
20.	6	40.	4	60.	7

Table XV
(Continued)

Raw Scores for Instrument
Identification Subtest

Subject	Score	Subject	Score	Subject	Score
61.	4	81.	10	101.	9
62.	6	82.	10	102.	5
63.	10	83.	8	103.	5
64.	6	84.	4	104.	6
65.	6	85.	4	105.	7
66.	6	86.	6	106.	3
67.	5	87.	5	107.	3
68.	5	88.	6	108.	3
69.	7	89.	6	109.	5
70.	4	90.	8	110.	4
71.	7	91.	10	111.	4
72.	4	92.	4	112.	3
73.	3	93.	4	113.	6
74.	8	94.	8	114.	7
75.	8	95.	1	115.	3
76.	8	96.	2	116.	8
77.	5	97.	3	117.	6
78.	3	98.	5	118.	7
79.	6	99.	6	119.	7
80.	4	100.	5	120.	5

Table XV
(Continued)

Raw Scores for Instrument
Identification Subtest

Subject	Score	Subject	Score	Subject	Score
121.	4	141.	5	161.	6
122.	4	142.	3	162.	3
123.	6	143.	4	163.	4
124.	7	144.	5	164.	2
125.	6	145.	8	165.	3
126.	6	146.	6	166.	6
127.	6	147.	4	167.	2
128.	5	148.	5	168.	4
129.	8	149.	9	169.	5
130.	6	150.	4	170.	5
131.	4	151.	8	171.	4
132.	7	152.	4	172.	5
133.	8	153.	4	173.	3
134.	3	154.	4	174.	4
135.	3	155.	1	175.	2
136.	7	156.	5	176.	4
137.	7	157.	4	177.	6
138.	1	158.	4	178.	6
139.	3	159.	1	179.	6
140.	5	160.	2	180.	5

Table XV
(Continued)

Raw Scores for Instrument
Identification Subtest

Subject	Score	Subject	Score	Subject	Score
181.	4	201.	4	221.	3
182.	6	202.	4	222.	2
183.	5	203.	4	223.	5
184.	8	204.	3	224.	7
185.	4	205.	7	225.	6
186.	5	206.	5	226.	2
187.	4	207.	5	227.	2
188.	4	208.	6	228.	7
189.	6	209.	6	229.	5
190.	4	210.	7	230.	2
191.	5	211.	4	231.	8
192.	3	212.	3	232.	4
193.	5	213.	5	233.	7
194.	7	214.	5	234.	3
195.	4	215.	5	235.	5
196.	6	216.	3	236.	4
197.	6	217.	7	237.	4
198.	4	218.	7	238.	6
199.	6	219.	5	239.	5
200.	4	220.	5	240.	7

Table XV
(Continued)

Raw Scores for Instrument
Identification Subtest

Subject	Score	Subject	Score	Subject	Score
241.	5	261.	6	281.	4
242.	6	262.	9	282.	2
243.	3	263.	7	283.	5
244.	7	264.	5	284.	3
245.	4	265.	5	285.	3
246.	5	266.	4	286.	5
247.	7	267.	4	287.	6
248.	6	268.	8	288.	6
249.	4	269.	1	289.	5
250.	5	270.	3	290.	4
251.	8	271.	7	291.	4
252.	4	272.	5	292.	8
253.	2	273.	6	293.	8
254.	10	274.	3	294.	5
255.	7	275.	3	295.	4
256.	8	276.	4	296.	3
257.	9	277.	1		
258.	6	278.	7		
259.	7	279.	5		
260.	5	280.	3		

APPENDIX C

DESCRIPTION OF COMPUTER PROGRAMS

Peabody Statistical Library User's Manual
Class R - Regression Analysis

R01: Regression Analysis with Generation and/or Transformation of Variables

1. GENERAL DESCRIPTION

a. This program, in addition to computing means, standard deviations, Pearson product-moment correlations, regression equations, and F tests for comparison of R-squares of selected regression equations, permits extensive transformation of input data and/or generation of new variables based upon input data. Output of predicted criterion scores for each subject, scatter plots of predicted criterion scores against residuals and scatter plots of predictors against residuals are also available as options.

b. The output consists of:

(1) Means

(2) Stand Deviations

(3) Correlation Matrix (optional)

(for each regression equation)

(4) Beta Weights

(5) Raw Score (b) Weights

(6) Regression Constant

(7) Multiple R

(8) Multiple R-squared

(9) Interation Sequence (optional)

(10) Predicted Criterion Score for Each subject (optional)

(11) Scatter Plot of Predicted Criterion Scores Against Residuals (optional)

R01: Regression Analysis with Generation and/or Transformation of Variables (Continued)

(12) Scatter Plots of Predictors Against Residuals (optional)

(for each F test)

(13) Degrees of Freedom

(14) F Ratio

(15) R-Squares of Two Equations

(16) Probability of Chance Occurence of F Ratio

c. Limitations

(1) The number of variables (all criteria and predictors) may not exceed 50.

(2) The number of subjects may not exceed 9,999. If output of predicted criterion scores or or scatter plots is requested, the number of subjects may not exceed 1,000.

(3) The number of equations may not exceed 99.

(4) The number of F tests may not exceed 99.

(5) The number of cards per subject may not exceed 99.

Peabody Statistical Library User's Manual
Class T - Test Scoring and Item Analysis

TO2: Item Discrimination and Validity Analysis

1. GENERAL DESCRIPTION

a. This program accepts as input item responses punched as single-digit integers in the range from 1 through 9. Both right-wrong (e.g., multiple choice quizzes) and continuously scored (e.g., attitude inventories) tests consisting of on scale of up to 200 items for up to 999 subjects may be processed. An external criterion may be included in the analysis.

b. The output consists of:

(for the total score)

(1) Mean

(2) Sigma

(3) Skewness

(4) Kurtosis

(5) Cronbach's Alpha

(6) Frequency Histogram

(7) Correlation with External Criterion

(for each item)

(8) Scoring Key Entry

(9) Mean

(10) Sigma

(11) Correlation with Total Score

(12) Correlation with External Criterion

(13) Choice Distributions within Upper 27% and Lower 27% with Respect to Total Score

TO2: Item Discrimination and Validity Analysis (Continued)

(14) Choice Distributions within Upper 27% and Lower 27% with Respect to External Criterion

(15) Reliability Index

(16) Validity Index

(for each subject)

(17) Punched Output of Total Score (optional)

(18) Printed Output of Total Score (optional)

c. Limitations

(1) The number of items may not exceed 200.

(2) The number of choices may not exceed 9.

(3) The number of subjects may not exceed 999.

(4) The number of data cards per subject may not exceed 9.

(5) Each subject's identification field may not exceed 12 consecutive columns.

(6) The external criterion field (if any) may not exceed 20 columns.