AN APPLICATION OF THE FACET-FACTORIAL APPROACH TO SCALE CONSTRUCTION IN THE DEVELOPMENT OF A RATING SCALE FOR CLARINET MUSIC PERFORMANCE

by
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Dissertation submitted to the Faculty of the Graduate School
of the University of Maryland in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
1971

APPROVAL SHEET

Title of Thesis: An Application of the Facet-Factorial Approach to Scale Construction in the Development of a Rating Scale for Clarinet Music Performance

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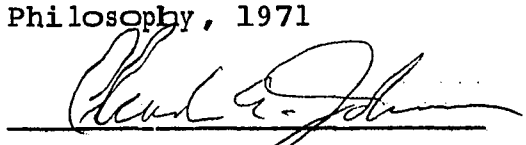
Thesis and Abstract Approved: 

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ABSTRACT

Title of Thesis: An Application of the Facet-Factorial Approach to Scale Construction in the Development of a Rating Scale for Clarinet Music Performance

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The purpose of this study was to examine a technique for the development of performance rating scales to measure achievement in courses where objectives require complex behaviors not easily measurable using paper and pencil achievement tests. A facet-factorial approach to rating scale construction was employed in the development of rating scales for the evaluation of clarinet music performance.

Achievement measures of complex behaviors such as music performance are typically subjective judgments, based on irregular and uncontrolled observations. Because of this, it seemed desirable to structure the evaluations of complex behaviors in order to improve the precision of measurement. This was achieved by constructing a rating scale to evaluate clarinet music performance.

The first step in the construction of the clarinet performance rating scale was to sample experts' criticisms

of clarinet performance by having instrumental music teachers write essays descriptive of the aural aspects of a memorable clarinet performance. These essays were then content analyzed and the resulting item pool together with items generated by a literature search were placed on a five-option response scale to be employed by instrumental music teachers to rate one hundred sample junior high clarinet performances. The results of these descriptions were factor analyzed in an attempt to determine the structure of clarinet performance. The five items which were most highly loaded on each of the six resulting factors were selected to define subscales of a thirty item clarinet performance rating scale. The resulting rating scale was employed in the evaluation of ten different performances. The inter-judge reliability of the rating scale was estimated from these administrations. In order to examine criterion-related validity of the rating scales, a global criterion measure was constructed by having judges rate the thirty performances using a paired-comparison procedure. Both zero-order and multiple correlation coefficients between the rating scale and the criterion measure were obtained.

The three major results of the study were: 1) a rating scale based upon a six factor structure of clarinet music performance (interpretation, tone, rhythm-continuity, intonation, tempo and articulation); 2) high inter-judge

reliability estimates for both the total score ($\geq$ .90) and scale scores ($\geq$ .60) for each of the three groups of judges, evaluating three different sets of ten performances, and 3) criterion-related validity coefficients greater than .80 for each of the three different sets of performances.

Results of the investigation suggest that the facet-factorial approach to scale construction can be an effective technique for the construction of rating scales to measure complex behaviors such as music performance. The rating scale for the evaluation of clarinet music performance demonstrated both high inter-judge reliability and high criterion-related validity.

Further research is recommended to: 1) investigate the musical selection and musical selection by performer interaction variance contributions to reliability and validity; 2) generalize the clarinet performance scale to other instruments and other ability levels; and 3) examine the facet-factorial technique of scale construction in evaluation achievement in other complex behaviors.

ACKNOWLEDGEMENTS

During the planning and completion of this dissertation project I received both timely counsel and support from the members of my dissertation committee, Drs. Charles E. Johnson, C. M. Dayton, and Corwin H. Taylor. I wish to express my appreciation to each of them. I am especially indebted to Dr. Charles E. Johnson, my advisor, for his guidance and understanding.

My appreciation is extended to the Board of Education of Prince Georges County who gave their permission for the study to be conducted. A special expression of gratitude goes to the teachers of the schools involved in the study for the cooperation and many courtesies extended which contributed greatly to the success of the project.

In addition, I would like to thank George Wayne who provided much needed technical assistance in the recording of the performances.

Finally, I would like to thank my wife, Mary. Her endurance, comments, and patience were greatly needed and appreciated.

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CHAPTER I

INTRODUCTION

> "To teach without testing is unthinkable. Appraisal of outcomes is an essential feedback of teaching. The evaluation process enables those involved to get their bearings, to know in which direction they are going."
>
> (Joint Committee of the American Association of School Administrators, 1962, pg. 9)

The purpose of this study is to examine a technique for the development of performance rating scales to measure achievement in courses whose objectives require complex behaviors not easily measurable using paper and pencil achievement tests. Examples of courses with such objectives are art, speech, student teaching and music performance. In this study the technique is applied to the construction of rating scales for the evaluation of clarinet music performance.

A facet-factorial approach (Butt & Fiske, 1968) to rating scale construction was employed in this study. Music performance was conceptualized as multi-dimensioned behavior. The content for the rating scales was developed by sampling "experts' " evaluative statements. A factor analysis of these statements as they were applied in

rating actual performances provided the basis for the formation of rating scales.

One of the main difficulties in the evaluation of complex behaviors is that the measures employed are typically subjective judgments based on irregular and uncontrolled observations (Ebel, 1965, pg. 9; Whybrew, 1962, pg. 63). Music performance in particular is extremely difficult to evaluate due to its complexity. A consensus among judges concerning adequacy of a performance is difficult to obtain. One method which may improve the evaluation of music performance is through the replacement of judges' general impressions by ratings arrived at by use of more systematic procedures.

Ratings scales may provide an improved basis for evaluation by forcing adjudicators to attend to a common set of evaluative dimensions rather than permitting each judge to develop his own criticisms. If the evaluative dimensions (e.g. items) adequately sample the content area under investigation, the scale should have satisfactory content validity. In this study a sample of experts' judgments provided a representative sample of aspects of performance. An additional benefit of directing raters to a common set of evaluative dimensions should be an increase in inter-judge reliability of performance ratings.

There is controversy among musicians over what aspects of music performance can be measured objectively.

Sanford (1970) says factors such as pitches, rhythms and tempos can be objectively assessed either by the physical measurement of frequencies and pulsations with electronic devices, or by a panel of judges. There is evidence which demonstrates the ability of a panel of musicians to agree on rating these factors (Watkins, 1942; Fleury, 1964). Other more expressive aspects of performance (e.g. interpretation) according to Sanford (1970, pg. 22) and Whybrew (1962, pg. 63) cannot be objectively measured. However, to obtain an overall evaluation of performance, it seems important to attempt to measure these expressive aspects in ways which reflect apparent common agreement over both good and bad aspects of music performance.

It is obvious that individual music teachers have unique objectives, particularly at more advanced levels. However, a basic assumption in this study is that there are generally agreed upon performance standards. Hoffren (1962) states:

> "It is assumed that a teacher's training and experience qualify him to correct the student's expressive rendition and guide him to the more culturally sanctioned interpretation. This is also the assumption at contests and festivals where adjudicators are presumed to possess a standard or ideal to which all students renditions are compared. Thus it can be said that normative standards of good taste in expression do exist." (pg. 19)

Under this assumption of common standards, it seems

desirable to develop an instrument to enable raters to effectively measure those aspects of performance over which there do seem to be common standards of proficiency.

In constructing scales to measure complex behavior such as music performance various procedures can be employed for item development. Items can be developed by examining previous attempts at evaluating the behavior (Fleury, 1964) or by analyzing method books used in the teaching of the behavior (Watkins, 1942). They might also be based upon a pre-conceived theoretical structure of the area being measured. The method used in this study was to obtain a sample of experts' criticisms of performance. By sampling many experts (e.g. teachers) it should be possible to obtain a relevant and broad sample of the behavior under investigation. In this study junior high school instrumental music teachers were asked to write essays describing a good or bad junior high school clarinet performance. The essays were content analyzed for the purpose of selecting items describing performance. In this way a wide range of descriptive items was collected.

In order to select items for scales to measure the behavior of interest, a strategy of item selection must be chosen. The "rational" and "theoretical" strategies of item selection each have certain values, but both are influenced by the bias of the test constructor (Butt & Fiske,

1968). The factor analytical approach to item selection has the merits of being more directly based upon the empirical relations among the items. In this study, a factor analysis was done on the item responses resulting from data generated by experts' rating of actual sample performances. Since a recommended use of factor analysis is as a procedure for confirming hypotheses about a pre-conceived structure (Guilford, 1948; Cronbach & Meehl, 1955; Jenkins & Lykken, 1957), a theoretical structure of music performance was developed based upon previous research. Varying numbers of factors were rotated until the best fit with the a priori theoretical structure of music performance was obtained. A final six-scale version of the measurement instrument was then constructed by selecting items that had high factor loadings and were also factor simple.

An important criterion in the evaluation of a rating scale is inter-judge reliability. This estimate provides an indication of the objectivity of the measure. The factor scales developed in this study were evaluated by obtaining measures of inter-judge reliability.

The use of experts' evaluative statements and factor analysis of the content developed help contribute to the construct validity of the rating scale. If such a scale is to be of practical use, however, it should correlate with other measures of performance. In this study criterion-

related validity coefficients were obtained by correlating scale scores with global performance ratings made by instrumental music teachers.

The construction of a reliable and valid measure of clarinet music performance by the facet-factorial approach to scale construction would seem to indicate this technique may be effective for the construction of scales to measure other complex behaviors.

CHAPTER II

RELATED RESEARCH

A. Research of the Techniques of Scale Construction

The strategy for scale construction in this study was based on a factorial approach to the selection of items and a multi-dimensional conceptualization of music performance. An a priori theoretical structure was used as a basis for the selection of a particular factor structure.

Although differences in scale construction strategies are frequently discussed (Butler, 1954; Flanagan, 1951; Guilford, 1954; Loevinger, 1957; Travers, 1951), few empirical studies have compared these strategies (Berkeley, 1953; Heilbrun, 1962; Schumacher, 1959). Two notable exceptions are studies by Hase and Goldberg (1967) and Butt and Fiske (1968).

Hase and Goldberg (1967) examined the differential validity of personality scales developed by six different strategies: factor analytic, empirical group discrimative, intuitive-theoretical, intuitive-rational, stylistic-psychometric and random. The stylistic scales were included to assess the relative influence of response styles (e.g. aquiesence) and sets (e.g. social desireability) in determining responses to structured personality inventories.

The random and stylistic strategies were included to provide a baseline for predictive utility. Items of the California Psychological Inventory (CPI) were used in the construction of eleven scales by each of the six strategies. The sample consisted of two hundred University of Oregon freshman girls who took the CPI and provided thirteen criterion measures. Criteria included: sorority membership, responsibility, femininity, average number of dates per month and several others. Results indicated that the four primary strategies of scale construction did not differ from one another in overall validity and were significantly more valid than the control strategies of stylistic-psychometric and random. The authors concluded that it should make little difference which of the primary strategies are employed for personality assessment.

Butt and Fiske (1968) compared strategies in developing scales for the measurement of dominance. The strategies employed in this study can be divided into trait versus facet and factorial versus rational approaches. The trait and facet categories were used to distinguish between conceptualization of the construct at a global level (trait) and conceptualization of the construct as subdivided or multi-dimensioned (facet). The rational versus factorial distinction refers to the procedure employed in the selection of items for the scales. The four approaches compared in the study were based upon the two different methods of

construct conceptualization, each combined with the two methods of item-selection (facet-rational, facet-factorial, trait-rational and trait-factorial). The sample consisted of groups of male and female undergraduates and airmen. The two hundred item pool employed for the construction of the four measurement scales was developed from the administration of eight standard tests of dominance.

The results indicated that both facet approaches produced scales with higher homogeneity indices than scales constructed by trait approaches. The results also indicated that scales developed employing factorial approaches correlated more highly with measures of theoretically related variables and with life data (e.g. sibling position) than did scales developed by the rational approaches.

Both of the studies reviewed indicate the factorial approach to item selection can yield high relationships with criterion variables, thus yielding high criterion-related validity. The factorial approach also has the additional advantage of providing an empirical basis for analyzing an item pool. This procedure is, therefore, especially suitable for application in areas where firm theoretical structures do not exist. The present investigation employed a facet-factorial approach to scale construction; that is, music performance was conceptualized as having a multidimensional structure and the items were selected factor-analytically.

B. Research on the Evaluation of Music Performance

Developments in the objective measurement of music performance have identified problems similar to the ones cited in this study. The major studies in this area will be reviewed in this section.

Watkin's (1942) development of an objective measure of instrumental performance was the first major step toward objectively measuring music performance. Taking pains to insure the validity of his test, Watkins created a guide which has been followed in the construction of other objective measures of music performance.

The first step in constructing this performance scale was to survey all methods employed in teaching cornet. Cornet was chosen because of its popularity, central range, and fairly definite intonation (as opposed to string instruments). Next, Watkins surveyed the popularity of the methods for teaching cornet and the number of months they took to complete. It was determined what concepts of music were introduced in these methods and in what order they were presented. Twenty exercises were written to embody these concepts with a difficulty range from two weeks to five years experience.

After the selections were written, they were evaluated until a definite order of difficulty was established. Errors were scored for mistakes in notes, rhythm, and time. A maximum of one mistake per measure was counted.

One hundred and five subjects were tested on these preliminary tests. From their results Form A and B of the test evolved. The correlation coefficient with teacher ranking of the performances was .82. The test-retest reliability with one judge scoring was .98 and with several judges scoring was .95. Practice by the subjects did not increase their scores significantly.

The only published example of a music performance test is the Watkins-Farnum Performance Scale (1954). The test is based upon the Watkins study cited above. The test was adapted for all instruments by transposition into reasonable keys, adjustments as to range and limits so as not to exceed the individual instrument's difficulties. The reported test-retest reliability was .92. The correlation with teacher ranking for all the instruments was .80. The test comes with a complete set of scoring rules and when it is properly scored seems to be quite accurate. It also presents norms to follow in the assignment of grades.

Robert Fleury (1963) in a study concerned with the adjudication of the traditional spring music festival developed a form to be used by judges burdened with evaluating the various musical organizations. The items on the form were developed by researching literature on what comprises a good musical performance. The items gathered by this method were then refined by graduate

students and submitted to "national adjudicators" for the establishment of face validity. The scale construction involved two techniques which are novel, separating criteria into auditory and visual stimuli and the weighting of factors. Sanford (1970) in a review of the dissertation states these may be the two weakest areas of the paper as the reasons for the dichotomizing of criteria are not explained and no provision is made for differential weighting of factors on different musical selections. The reliability of Form A is reported to be .96 (split-halves) using a sample of thirty college music students as judges. The value of this adjudication instrument lies in two areas: 1) It provides a detailed list of criteria to be employed by adjudicators and 2) it will lend consistency to festival adjudication if it is employed widely.

Mansur (1965) developed a paper and pencil achievement test for the purpose of objectively measuring music performance. His rationalization for this approach as opposed to an analysis of actual performances is that ". . . the overwhelming problem in aural evaluation is one of time allocated for the purpose on the part of both student and teacher." (page 40)

This test examines the ability to define music terms, recognize music literature, make interpretational judgements about scores, and identify music notation. Mansur administered it to a group of subjects auditioning for an

all-state band organization in Oklahoma. He found a point biserial coefficient of .34 between all-state selection and the Mansur test. A split-halves reliability of .62 was reported. The author concludes that his instrument can be valuable in screening and selecting students for such an organization, but that in his particular study the correlation was low due to the homogeneity of the group examined.

Mansur's test seems to have value for differentiating among a large group of instrumentalists on the paper and pencil aspects of music performance. This type of instrument may be most effective when time does not allow for close scrutinizing of the actual performing ability, but as Mansur suggests, the use of this instrument should not preclude the analysis of the auditory aspects of music performance.

Gutsch (1964) attempted to objectively measure music performance by employing the sight reading of rhythmic patterns. He developed a test composed of one hundred rhythmic problems which were screened by trained musicians. Scoring was done for each criterion on an all or none basis for each of the rhythmic patterns. Three criteria categories were examined, note values, ties, and rests. The instrument was administered to students at fifth grade or above in Mississippi, and judged by either a testing team from the university or various high school instructors. The data obtained from this investigation yielded an

equivalent form reliability coefficient of .92 with 77 subjects and an inter-scorer reliability coefficient of .99 with a selected board which carefully examined 72 tape recordings and the original scores of randomly selected judges.

The author claims the test has "construct validity" confined to the frame of reference which was measured (sight-reading rhythms). In his introduction, the author elaborated on the importance of sight-reading rhythms to music performance. Although his arguments are credible, it would be dangerous to state that the results of this test alone give an indication of music performing ability, as the complexity of performance extends beyond what this instrument examines.

The recent studies cited above are concerned with attempts to measure music performance but demonstrate the following limitations:

1. Fleury's (1964) research was concerned with the adjudication of group instrumental performance and his procedures do not lend themselves to differentiating between individual performances;

2. Mansur's (1965) instrument was a paper and pencil test and therefore does not deal with the important auditory aspects of music performance;

3. The Gutsch (1964) and Watkins-Farnum (1954) scales examine the student's ability to perform pre-constructed

musical exercises which may not sample the student's informational environment;

4. None of the measurement methods reviewed attempted to measure elements of musical expression or interpretation of individual performance.

The scales developed in this study are intended to differentiate among individuals on the auditory aspects of music performance and include measures of interpretation and expression. The measuring instrument developed attempts to measure music performance with a rating scale rather than a performance test of specific content, and therefore can be applied to any musical selection.

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

The purpose of this research is to examine a technique for the construction of measures of complex behaviors by developing a measure of clarinet music performance. The development of the measure involved eight major steps: 1) the gathering of a sample of performance descriptions written by experts; 2) the development of an a priori theoretical structure of clarinet performance; 3) the formation of an item pool based upon the experts' performance descriptions; 4) the collection of data descriptive of actual clarinet performances by having experts rate clarinet performances using the item pool; 5) a factor analysis of the item pool of ratings; 6) the selections of items for subscales to be included in a rating scale; 7) an analysis of the inter-judge reliability of the rating scales produced by the above procedures and 8) a validity study of the rating scales using performance rankings as a criterion.

A. Subjects

A sample of one hundred clarinet performances was collected. The performers were fifty clarinetists enrolled in four junior high schools (grades 7, 8, and 9) in Prince Georges County, Maryland during the fall of 1970. Each

clarinetist recorded two different performances. The clarinetists had been studying clarinet in the public schools from two to five years. Prince Georges County offers wind instrumental class lessons twice a week in the fifth and sixth grades and junior high ensemble instrumental music is usually offered every day. Private lessons are generally not given on popular instruments such as the clarinet in the junior high schools.

B. Judges

Sixty-three judges were employed in the study for the evaluation of clarinet performances. Forty-two of the judges participated in more than one phase of the study. The judges were either instrumental music teachers in the Prince Georges County school system or instrumental music teachers from nearby counties enrolled in graduate music education courses at the University of Maryland. Thirty-seven of the sixty-three judges were junior high school instrumental music teachers; the others were instrumental music teachers in elementary or senior high school. All judges volunteered to participate in the study. The teaching experience of the judges ranged from two to eighteen years with a median of six years. Both male and female judges were employed. No attempt was made to identify the judges' major instrument.

C. Music Performance Materials

Each student was asked to perform two pieces from materials he had been studying. If a student selected a piece previously recorded by another student he was asked to choose a different selection. No piece or etude was recorded more than once. The pieces came from numerous sources typical of junior high school repertoire. A complete list of the pieces recorded appears in Appendix A. Students were instructed to perform the pieces at a comfortable tempo and were asked to pay attention to dynamic, interpretation, and articulation markings.

The performances were recorded on a Wollensack Model 1520 AV tape recorder using a Wollensack microphone. They were played back for evaluation purposes on either the Wollensack Model 1520 AV or a Belcor Recorder Model B-303. In order to standardize conditions Koss Model Pro 4A earphones were employed for all evaluations. The only difficulty noticed by the researcher during the replay of the performances was when one of the judges commented that the tone quality of the performances was difficult to discriminate as a result of the recording equipment.

D. Procedures

The Development of the Item Pool

A first phase of the study was to obtain a sample of the aspects of clarinet performance with which instrumental music teachers are concerned in their evaluations of

performance. This sample was to provide a basis for an item pool. Twenty-five instrumental music teachers enrolled in graduate music education courses at the University of Maryland in the fall of 1970, were asked to write a one or two page essay describing the auditory aspects of a music performance by a junior high school clarinetist. Instructions for the essays appear in Appendix B. Half of the respondents were asked to write an essay on a good music performance which stood out in their minds, the other half on a poor performance. Seventeen essays were written and returned to the researcher, ten of which were written about a poor performance.

A content analysis of the essays was performed by the researcher and 54 different statements descriptive of the performances were identified. The statements were generally left in the words of the respondents with minor changes made in cases of ambiguity.

In order to better understand the aspects of music performance included in the 54 statements generated by the content analysis, an a priori theoretical structure of music performance was developed. This was based upon examinations of studies by music educators (Grabel, 1933; Lockardt, 1934; Krone, 1937; Hosemer, 1949) who found it necessary to establish structures upon which to base ratings of music performance. The structure used in this study was that developed by Hosemer. He identifies seven factors of music performance: tone, intonation,

interpretation, technique, rhythm, tempo and general effect (e.g. spirit). These factors include most of the aspects of performance considered by others (Grabel, 1933; Lockardt, 1934; Krone, 1937) and the structure has been used in recent studies of music performance (Fleury, 1964; Menc, 1957).

The 54 statements developed by the content analysis were listed under categories of the adopted a priori structure by the researcher and a faculty member of the music education department, University of Maryland. To broaden the sample of clarinet performance descriptions, a list of adjectives used to describe music performance was developed from an examination of the studies previously cited (Fleury, 1964; Grabel, 1933; Lockardt, 1934; Krone, 1937). The adjectives were put in sentence form similar to the statements generated by the content analysis of the descriptive essays. A total of 94 statements was developed.

The statements were next transformed to items so that they could be used by instrumental music teachers for rating actual clarinet performances. The items were phrased both positively and negatively in order that adjudicators would not develop a response set when responding. They were then randomly ordered and a five-point Likert-type response scale was developed. The responses ranged from "highly agree that the statement is descriptive (of the performance)" to "highly disagree that the statement is descriptive". Several examples of items appear in Table I.

TABLE I

SAMPLE ITEMS FROM
THE PERFORMANCE DESCRIPTION ITEM POOL

HD D NN A HA	7.	The attacks and releases were clean.
HD D NN A HA	18.	Effective musical communication.
HD D NN A HA	30.	Played with a natural tone.
HD D NN A HA	72.	Flat in the low register.
HD D NN A HA	86.	Played too slowly.

The items were judged to be positive or negative statements about performance by a panel of three instrumental music teachers who reviewed them independently. The three teachers agreed on all items. The clarinet performance item pool developed by the above procedures appears in Appendix C.

Obtaining Performance Ratings with the Item Pool

Fifty instrumental music teachers from Prince Georges County, Maryland were each asked in January, 1971, to evaluate two different randomly assigned performances, by rating them on each of the 94 items in the item pool. One hundred different performances (each of a different piece)

were evaluated. The judges were asked to "as accurately as possible describe the performance which you have just heard" employing the response scale and statements of the item pool. Each judge was told that the performer was an eighth grade student who had been enrolled in public school instrumental music for three years.

The fifty administrations of the two performance evaluations were done individually by the researcher. The time required by each judge to do the two adjudications varied, but averaged about twenty-five minutes. No time limit was imposed. During each administration the performance was played back several times to insure that the judge had the aural stimulus of the performance present during the evaluation of each item. Since evaluations were done at fifty different schools, earphones were employed in an effort to equalize conditions.

The Application of Factor Analysis

In order to empirically examine the factor structure of clarinet music performance as defined by the ninety-four items provided by the content analysis and literature search, a factor analysis was performed on the results of the administration of the item pool. The principal component technique was used. An orthogonal rotation of the factor matrix was performed with the communalities estimated by iteration. All computations were done on an

Univac 1108 employing the BMD series (Dixon, 1970) program X72.

Several authors (Humphreys, 1962; Overall, 1964) indicate an arbitrariness of criteria for determining the number of factors to be rotated. Ultimately, the usefulness of the structure may depend upon the ease with which it can be interpreted in relation to the behavior under investigation. In this study, twenty-four factors were produced by rotating factors with Eigen-values greater than 1.00. With only a few items per factor, this presented too complex a structure for adequate interpretation. For this reason from four to ten factors were rotated employing varimax rotation to enable the researcher to examine the number of factors which best agreed with the a priori theoretical structure previously described. The factor analysis solution that best agreed with the a priori structure was a six factor rotation. The factors were named: interpretation, intonation, rhythm-continuity, tempo, articulation and tone.

Construction of the Clarinet Performance Rating Scale (CPRS)

Items were selected for the CPRS based upon their factor loadings. Thirty items were selected to insure that the rating scale would not be too long for practical use. Five items were chosen to represent each of the six factors.

Items were chosen such that they: 1) had relatively high factor loadings on the factor they were selected to define and 2) were relatively factor simple (i.e. they had relatively low correlations with the five other factors). On factors where many items met these two criteria, the diversity of the items in sampling apparently different content of a factor was considered in the selection.

The thirty statements were grouped by factors and paired with a five point Likert-type scale as in the item pool previously described. Both positive and negative statements were selected from the item pool. The CPRS appears in Table II.

E. Evaluation of the Clarinet Performance Rating Scale

Administration of the Clarinet Performance Rating Scale

In order to estimate the inter-judge reliability of the CPRS and obtain initial data on criterion-related validity, instrumental music teachers were asked during Spring, 1971, to use the instrument to rate a set of recorded performances. The item ratings obtained in this phase of the study were also factor analyzed to examine the stability of the structure developed from the analysis of the original pool of ninety-four items.

A total of thirty-two instrumental music teachers enrolled in graduate music education courses at the

TABLE II

CLARINET PERFORMANCE RATING SCALE

The purpose of the following statements is to have you as accurately as possible evaluate the performance which you have just heard. Respond to each statement on the basis of how much you agree or disagree that the statement is descriptive of the performance. Use the following five point scale:

HD - Highly disagree that the statement is descriptive
D - Slightly disagree that the statement is descriptive
NN - Neither disagree nor agree that the statement is descriptive
A - Slightly agree that the statement is descriptive
HA - Highly agree that the statement is descriptive

Please choose only one response to each statement. Please attempt to answer every statement. Circle responses.

HD	D	NN	A	HA	1.	Effective musical communication. +
HD	D	NN	A	HA	2.	The interpretation was musical. +
HD	D	NN	A	HA	3.	The piece was played in character. +
HD	D	NN	A	HA	4.	Played with musical understanding. +
HD	D	NN	A	HA	5.	Played with traditional interpretation. +
HD	D	NN	A	HA	6.	Thin tone quality. -
HD	D	NN	A	HA	7.	Played with a natural tone. +
HD	D	NN	A	HA	8.	There was a lack of tonal color. -
HD	D	NN	A	HA	9.	The quality of the tone was rich. +
HD	D	NN	A	HA	10.	Sounded shallow. -
HD	D	NN	A	HA	11.	Uneven rhythm. -
HD	D	NN	A	HA	12.	Smoothness in execution. +
HD	D	NN	A	HA	13.	Melodic continuation. +

+ positively weighted - negatively weighted

TABLE II
(CONT)

HD	D	NN	A	HA	14.	Insecure technique. -
HD	D	NN	A	HA	15.	The rhythm was distorted. -
HD	D	NN	A	HA	16.	Played out of tune. -
HD	D	NN	A	HA	17.	Flat in low register. -
HD	D	NN	A	HA	18.	The intonation was good. +
HD	D	NN	A	HA	19.	Played overall flat. -
HD	D	NN	A	HA	20.	Tended to be flat. -
HD	D	NN	A	HA	21.	Played too fast. -
HD	D	NN	A	HA	22.	Seemed to drag. -
HD	D	NN	A	HA	23.	Hurried repeated notes. -
HD	D	NN	A	HA	24.	Played too slowly. -
HD	D	NN	A	HA	25.	Rushed. -
HD	D	NN	A	HA	26.	Squeaked. -
HD	D	NN	A	HA	27.	Free from tonguing noise. +
HD	D	NN	A	HA	28.	Attacks and releases were clean. +
HD	D	NN	A	HA	29.	Tonguing produced thunkie sound. -
HD	D	NN	A	HA	30.	Accents were played as indicated. +

University of Maryland were divided into three groups or adjudication panels. Group 1 consisted of nine judges, group 2 of eleven judges and group 3 of twelve judges. Some of the judges employed had participated in previous phases of this study. Three sets of ten performances each were randomly selected from the original one hundred performances. Members of each adjudication panel were asked to independently evaluate one set of performances. The judges were asked to "as accurately as possible evaluate the performance which you have just heard" employing the response scale and statements of the CPRS. The judges were told that the performer was an eighth grade student who had been enrolled in public school instrumental music for three years.

Each performance lasted approximately ninety seconds. In order to simulate an actual adjudication situation, a performance was heard only once. The performance was heard by each group as a whole. The time required for the adjudication of ten performances was approximately thirty minutes.

Inter-Judge Reliability Study

The results of the administration of the CPRS were used to provide an inter-judge reliability estimate for the rating scales. The Hoyt Analysis of Variance (Hoyt, 1941) procedure was used to obtain the reliability estimates. Estimates of the inter-judge reliability for the factor

scores as well as the total scores were obtained for each of the three adjudicator groups. To examine the effect of employing different numbers of judges, reliability estimates were obtained for adjudication panels varying in size from 1 through 10 by means of a generalized Spearman-Brown Prophecy Formula (Gulliksen, 1950, pg. 78).

Criterion-Related Validity Study

In order to examine the criterion-related validity of the CPRS each set of ten performances was rated using the method of paired-comparisons. To obtain the paired-comparison ratings, forty-two instrumental music teachers were divided into three equal-sized groups and each judge was asked to "In each pair select the performance which demonstrates the best overall musical ability." Each performance in a set was paired with the nine other performances of the set yielding a total of forty-five pairs. Presentation of the pairs was randomly ordered. Because of the length of the procedure, each performance was edited to last only between twenty and thirty seconds. Care was taken to ensure that the characteristic elements of the pieces were not excluded in the editing process.

Inter-judge reliability estimates were obtained for the paired comparison ratings using the Hoyt Analysis of Variance (Hoyt, 1941) procedure. These estimates were based on the rank-order (from the paired-comparisons) of the performances by the judges.

The results of the administration of the paired-comparison criterion were transformed to ranks and normalized scale values. The procedure employed to obtain the normalized scale values was similar to one described by Edwards (1957, pg. 40).[1]

Within each of the three performance sets zero-order correlation coefficients were obtained between the results of the administration of the CPRS and both the ranks and the normalized scale values of the paired-comparison data. Correlations were obtained with CPRS factor scores as well as the total scores.

To further examine the contributions of the factor scores of the CPRS in predicting the paired-comparison criteria a step-wise multiple regression analysis was performed within each of the three sets of data. The analysis was done with the BMD series (Dixon, 1970) program 02R. To examine the stability of the resulting

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[1]As the results of the paired-comparison investigation yielded many instances where one performance was judged more favorable than another by all of the judges, it was necessary to alter the Edwards "incomplete data technique." By empirically examining several z score substitutes for cases where "non-overlapping discrimination" occurred, it was found that substituting z scores of 2.00, 2.50 or 3.00 did not alter correlation coefficients between the paired-comparison data and the CPRS scores by more than .001. Z scores of 2.50 were selected to be employed in obtaining the scale values for the paired-comparison data.

weights for the factor scores, the weights for each set was applied to the factor scores of the other two sets. Since the samples of judges employed in the evaluation of the three sets of data were very small, the correction for bias in the multiple correlation coefficients were also obtained.

CHAPTER IV

RESULTS AND DISCUSSION

The purpose of this study was to examine a technique for the construction of measures of complex behaviors by developing a rating scale to evaluate clarinet music performance. The procedures described in the previous chapter were used to develop and evaluate the Clarinet Performance Rating Scale.

The results are presented in four major sections representing stages in the development and evaluation of the rating scale. The sections include: 1) the item pool developed from the content analysis of experts' descriptions and the adopted theoretical structure of music performance; 2) the factor structure of the item pool based upon the results of experts' performance ratings and the items selected for the final rating scales; 3) the results of the inter-judge reliability study; and 4) the relationship of CPRS ratings and teacher performance rankings.

A. Content Development

The fifty-four items developed from the content analysis of the seventeen essays written on "memorable

clarinet performances" are listed in Table III under the adopted a priori structure of music performance. An examination of this table shows that a large proportion of the items are in the category of technique with fewer items in the remaining categories of rhythm, tempo, tone, interpretation, intonation, and general effects. Many statements concerning the non-aural aspects of performance (e.g. hand positions) were included in the essays even though the instructions stated the essays were to be descriptive of only the aural aspects. The statements pertaining to the non-aural aspects of performance were not employed in the development of the performance scales.

Because of the small number of items in several of the a priori categories a list of adjectives was generated by a search of literature dealing with music performance. These adjectives were used to develop an additional forty items to supplement the items from the content analysis. These additional statements appear in Table IV. Table V presents the final set of ninety-four items generated by both the content analysis and the literature search.

B. Scale Development

Factor Analysis of the Item Pool

The initial factor analysis of the performance ratings using the ninety-four item pool produced twenty-four factors by rotating factors with Eigen-values greater than 1.00.

TABLE III

STATEMENTS GENERATED BY CONTENT ANALYSIS OF DESCRIPTIVE ESSAYS

Tempo

Rushed
Seemed to drag
The tempo was in good taste
Traditional tempo selected
Played at the specified tempo

General Effects

Melodic expression
Good contrasts in performance
Sounded comfortable
Played with musical understanding
Effective musical communication

Intonation

Tended to be sharp
Tended to flat
Played out of tune
Sharpness in throat register
Flat in low register
Major thirds sharp
Played overall flat

Tone

Sounded like the clacking of a chicken
The tone was round and full
The notes above the break had a nasal quality
The notes in the lower register sounded muddled
Played with a natural tone
Played with a breathy tone quality
Sounded shallow
The tone was dark
There was a distinct center to the tone
Projected the tone clearly and distinctly

Interpretation

The melodic line flowed
The interpretation was musical
Stylistic and expressive consideration neglected
End of phrases clipped off
Breaths taken in middle of phrases
Melodic continuation

Rhythm

The rhythm flowed
Dotted figures were played as triplets
Hurried repeated notes
Staccato notes were light and separated
The rhythm was played musically
Off-beats played properly
Performed syncopations correctly
Uneven triplets

Technique

Ugly cut-off tones when notes were released
Free from tonguing noises
Smoothness in execution
Ignored key signature
Accents were played as indicated
Made numerous errors in technique
Jumped octaves or more smoothly
Interrupted flow of melody by breathing
Played evenly
Squeaked
Tonguing produced "thunkie" sound
No tonguing
Sloppy tonguing
Insufficient breath support

TABLE IV

STATEMENTS GENERATED BY LITERATURE SEARCH

Tempo

The tempo was uneven
Played too fast
Played too slowly

General Effects

Played with spirit
Played with sincerity
Brillance
Performed with ease
Performance reflects sensitivity

Intonation

Bad intonation
The intonation was good
Played with clear intonation
The intonation was unreliable

Tone

The quality of tone was rich
The tone was well-defined
There was a lack of tonal color
Had a consistent tone quality in different registers
Smooth tone quality
Beautiful tone
Thin tone quality
The tone was free
Played with controlled tone
The timbre was good

Interpretation

The phrasing was accurate
Played with traditional interpretation
The attacks and releases were clean
The melodic line was smooth
The piece was played in character
The dynamics were played accurately
Impeccable articulation

Rhythm

Rhythm was distorted
The rhythm was steady
Rhythmically accurate
The rhythm was free
Uneven rhythm
Insecure rhythm

Technique

Played fluently
Played with precision
Insecure technique
Uncertain high notes
Clumsily executed

TABLE V

FINAL 94 STATEMENTS GENERATED BY BOTH LITERATURE SEARCH AND CONTENT ANALYSIS

Tempo

The tempo was uneven
Played too fast
Played too slowly
Rushed
Seemed to drag
The tempo was in good taste
Traditional tempo selected
Played at the specified tempo

General Effects

Played with spirit
Played with sincerity
Brilliance
Performed with ease
Performance reflects sensitivity
Melodic expression
Good contrasts in performance
Sounded comfortable
Played with musical understanding
Effective musical communication

Intonation

Bad intonation
The intonation was good
Played with clear intonation
The intonation was unreliable
Tended to be sharp
Tended to be flat
Played out of tune
Sharpness in throat register
Flat in low register
Major thirds sharp
Played overall flat

Interpretation

The phrasing was accurate
Played with traditional interpretation
The attacks and releases were clean
The melodic line was smooth
The piece was played in character
The dynamics were played accurately
Impeccable articulation
The melodic line flowed
The interpretation was musical
Stylistic and expressive consideration neglected
End of phrases clipped off
Breaths taken in middle of phrases
Melodic continuation

Rhythm

Rhythm was distorted
The rhythm was steady
Rhythmically accurate
The rhythm was free
Uneven rhythm
Insecure rhythm
The rhythm flowed
Dotted figures were played as triplets
Hurried repeated notes
Staccato notes were light and separated
The rhythm was played musically
Off-beats played properly
Performed syncopations correctly
Uneven triplets

TABLE V
(CONT)

Tone	Technique
The quality of tone was rich	Played fluently
The tone was well-defined	Played with precision
There was a lack of tonal color	Insecure technique
Had a consistent tone quality in different registers	Uncertain high notes
Smooth tone quality	Clumsily executed
Beautiful tone	Ugly cut-off tones when notes were released
Thin tone quality	Free from tonguing noises
The tone was free	Smoothness in execution
Played with controlled tone	Ignored key signature
The timbre was good	Accents were played as indicated
Sounded like the clacking of a chicken	Made numerous errors in technique
The tone was round and full	Jumped octaves or more smoothly
The notes above the break had a nasal quality	Interrupted flow of melody by breathing
The notes in the lower register sounded muddled	Played evenly
Played with a natural tone	Squeaked
Played with a breathy tone quality	Tonguing produced "thunkie" sound
Sounded shallow	No tonguing
The tone was dark	Sloppy tonguing
There was a distinct center to the tone	Insufficient breath support
Projected the tone clearly and distinctly	

This factor matrix is presented in Appendix D.

The six factor rotation upon which the final form of the rating scales was based is presented in Table VI. The factor names applied to the six factor matrix (Table VI) were an attempt to describe the items which were highly loaded on each factor. Factor I seemed to clearly represent the Interpretation element of a performance. Factor II seemed also to be easily interpreted as a Tone factor, as all the items with loadings above .60 dealt with some aspect of tone quality.

The third factor was somewhat more difficult to interpret as it seemed to combine items from the a priori categories of rhythm, technique and interpretation. Since all the items on this factor seemed descriptive of the flow of the music, the name Rhythm-Continuity was thought to be appropriate.

Items weighted highly on Factor IV involved the fast-slow aspects of the performance and therefore this factor was labeled Tempo. Factor V encompassed the items involving aspects of intonation and flatness and was named Intonation. The sixth factor was difficult to interpret but was thought to be a kind of Articulation variable, as the highly loaded items on it dealt with aspects of tonguing.

TABLE VI

VARIMAX SIX FACTOR MATRIX OF 94 STATEMENTS OF THE ITEM POOL

Question Number	Interpretation I	Tone II	Rhythm - Continuity III	Tempo IV	Intonation V	Articulation VI
1. Hurried repeated notes	.126	-.042	.168	.604	-.016	.327
2. Tonguing produced thunkie sound	.043	-.066	.123	-.007	-.076	.531
3. Bad intonation	.216	.330	.254	.124	.373	.166
4. Played out of tune	.338	.169	.050	.090	.549	.027
5. Played with sincerity	.566	.316	.107	.150	.017	-.039
6. The rhythm flowed.	.467	-.172	.439	.079	-.059	.113
7. The attacks and releases were clean	.133	-.257	.263	-.004	.227	.632
8. The melodic line flowed	.619	-.103	.376	-.023	.074	.250
9. Breaths were taken in the middle of phrases	.247	-.228	.536	-.011	-.067	.032
10. Uneven triplets	.340	-.098	.125	.275	.025	.119
11. Major thirds sharp	-.135	-.175	.115	.162	.298	.316
12. Insecure rhythm	.373	-.126	.666	.226	.138	.009
13. Melodic expression	.539	-.256	.367	.107	-.014	-.032
14. Impeccable articulation	.468	-.109	.227	-.022	-.056	.212
15. Sloppy tonguing	.187	-.263	.306	.074	.001	.314
16. Tended to be sharp	-.058	-.076	.097	.319	-.216	.215
17. Melodic continuation	.463	-.179	.633	.096	.007	-.070
18. Effective musical communication	.752	-.183	.310	.076	.091	.051
19. Played too fast	.113	-.183	.058	.553	.111	-.016
20. Performed with ease	.430	-.283	.662	-.031	.130	-.030

TABLE VI
(CONT)

Question Number	Interpretation I	Tone II	Rhythm - Continuity III	Tempo IV	Intonation V	Articulation VI
21. The piece was played in character	.722	.189	.269	-.009	.124	.016
22. The rhythm was free	.337	.025	.288	-.171	.121	.411
23. Played with controlled tone	.297	-.481	.300	.096	.033	.497
24. Played with precision	.449	-.168	.562	.061	-.043	.197
25. Projected the tone clearly and distinctly	.373	-.580	.185	.011	-.051	.314
26. Rhythm was distorted	.218	-.190	.538	.221	.136	-.074
27. The tempo was in good taste	.161	-.320	.331	.117	.296	.128
28. Free from tonguing noise	.226	-.102	.052	-.001	.132	.540
29. Ignored Key signature	-.007	-.245	.254	.103	.030	.053
30. Played with natural tone	.212	-.670	.152	.025	.024	.321
31. The timbre was good	.431	.020	.026	.197	.033	.446
32. The interpretation was musical	.778	-.154	.334	.068	.024	.140
33. End of phrases clipped off	.163	-.348	.168	.370	-.040	.192
34. Played with traditional interpretation	.673	-.044	.170	.072	.271	.071
35. No tonguing	.041	-.191	.259	.026	.169	.123
36. Stylistic and expressive consideration neglected	.444	-.031	.440	.116	-.034	.285
37. The melodic line was smooth	.548	-.111	.569	-.020	.051	.388
38. The tone was dark	-.058	.473	.016	-.058	.157	.187
39. Dotted figures played as triplets	.310	-.131	.016	.216	.144	-.090
40. Played with a breathy tone	.012	-.327	.298	.160	.020	.406
41. Good contrasts	.263	-.363	.380	.047	.445	.199

TABLE VI
(CONT)

Question Number	Interpretation I	Tone II	Rhythm - Continuity III	Tempo IV	Intonation V	Articulation VI
42. Off-beats played properly	.215	-.157	.164	.242	.044	-.074
43. Uneven rhythm	.344	-.078	.694	.238	.036	.092
44. Consistent tone quality in different registers	.109	-.123	.029	.120	.039	.365
45. Insufficient breath support	.255	-.464	.465	.054	.066	.056
46. Beautiful tone	.402	-.514	.152	-.157	-.121	.291
47. Jumped octaves or more, smoothly	.224	-.207	.154	-.037	.070	.272
48. Squeaked	.233	-.184	.212	.015	.204	.591
49. Performed syncopations correctly	.466	.047	-.021	.036	.085	.094
50. Sounded comfortable	.416	-.375	.378	-.044	.171	.318
51. The intonation was unreliable	.135	-.357	.358	.108	.246	.248
52. Performance reflected sensitivity	.098	-.021	.228	-.469	.435	.103
53. Played with spirit	.517	-.242	.249	-.010	.155	-.005
54. The rhythm was played musically	.609	-.165	.499	.140	.130	.136
55. Sounded shallow	.063	-.705	.262	.048	.198	-.065
56. Insecure technique	.212	-.204	.642	.042	.191	.176
57. Rushed	.151	.071	.266	.643	.112	.231
58. The quality of the tone was rich	.307	-.721	.183	-.176	-.124	.103
59. Smooth tone	.200	-.516	.329	-.013	-.029	.430
60. Seemed to drag	.048	.085	.258	-.603	.144	.163

TABLE VI
(CONT)

Question Number	Interpretation I	Tone II	Rhythm - Continuity III	Tempo IV	Intonation V	Articulation VI
61. Played fluently	.517	-.226	.481	-.165	.084	.307
62. There was a lack of tonal color	.113	-.613	.040	-.122	.128	.116
63. Played overall flat	.102	-.404	.127	-.065	.516	.183
64. Sounded like the clacking of a chicken	-.073	-.347	.142	.140	.159	.481
65. The tone was free	.240	-.642	.174	-.030	.169	.303
66. Played evenly	.279	-.098	.405	.012	.059	.130
67. Uncertain high notes	.106	-.162	.321	-.090	.077	.298
68. Sharpness in throat register	-.094	-.245	.200	.243	.008	.027
69. The dynamics were played accurately	.348	.182	.006	.217	.053	.201
70. The notes in the lower register sounded muddled	.120	-.509	.196	.114	.155	.113
71. There was a distinct center to the tone	.338	-.620	-.099	.023	.055	.186
72. Flat in the low register	.059	-.216	.272	-.017	.450	.119
73. Smoothness in execution	.398	-.196	.570	-.125	.134	.399
74. Ugly cut-off tones when notes were released	.011	-.366	.116	.040	.151	.382
75. Brilliance	.393	-.455	.236	-.092	.066	.117
76. Tended to be flat	-.010	-.244	.123	-.138	.534	.108
77. Traditional tempo selected	.610	.145	.024	.080	.330	-.171
78. Interrupted flow of melody by breaths	.218	-.318	.446	.058	.067	.209

TABLE VI
(CONT)

Question Number	Interpretation I	Tone II	Rhythm - Continuity III	Tempo IV	Intonation V	Articulation VI
79. Made numerous errors in technique	.333	-.331	.332	.194	.000	.352
80. The notes in the lower register had a nasal quality	-.099	-.382	.185	.106	.330	.201
81. Accents were played as indicated	.227	-.352	.036	-.116	-.046	.669
82. Played at specified tempo	.415	.092	.125	.014	.467	-.038
83. The rhythm was steady	.304	-.024	.543	-.008	.159	.193
84. The Phrasing was accurate	.545	-.164	.421	-.004	.123	.121
85. The tone was well defined	.258	-.619	.174	-.084	-.089	.324
86. Played too slowly	.046	-.281	.327	-.634	.066	.089
87. Played with clear intonation	.196	-.428	.195	-.018	.379	.443
88. The intonation was good	.139	-.251	.184	-.000	.659	.184
89. Clumsily executed	.059	-.194	.121	.171	.077	.362
90. The tempo was uneven	-.060	-.000	.432	.463	.180	.204
91. Rhythmically accurate	.474	-.025	.599	.082	.138	.168
92. Played with musical understanding	.698	-.165	.339	-.023	.175	.101
93. Staccato notes light and separated	.379	-.340	.005	.019	.282	.247
94. Thin tone quality	.006	-.654	.205	.100	.132	.050

Examination of the six factor matrix (Table VI) shows the Interpretation factor has many items that are loaded .40 or above. Several items that are highly weighted on other factors are also substantially weighted on this factor. This seems to indicate the Interpretation factor is somewhat of a general factor. This is supported by the results reported in Table VII which shows that this factor accounted for 30 percent of the total variance of the item pool. Table VII also indicated that the six factor rotation accounts for 47 percent of the total variance.

TABLE VII

CUMULATIVE PROPORTION OF TOTAL VARIANCE
SIX FACTOR ROTATION OF THE ITEM POOL

Factor	Cumulative Proportion	Factor	Cumulative Proportion
I	.300	XI	.553
II	.357	XII	.566
III	.390	XIII	.579
IV	.421	XIV	.589
V	.447	XV	.600
VI	.471	XVI	.610
VII	.490	XVII	.619
VIII	.508	XVIII	.627
IX	.525	XIX	.635
X	.540	XX	.642

The communality estimates for the six factor matrix were obtained by the method of iteration by refactoring (Dixon, 1970). The communality estimates for the ninety-four items of the item pool appear in Table VIII.

The decision to use the six factor rotation as the basis for scale construction was based mainly upon the degree with which this factor structure agreed with the a priori structure. A comparison of the results of the factor structure of the item pool (Table VI) and item classification within the a priori structure (Table V) shows this agreement. The item placement for the factors of Interpretation, Tone, Tempo and Intonation in both structures is almost identical. The Rhythm-Continuity factor is mainly the result of the addition of statements to the a priori rhythm category which may have been misclassified in the original theoretical structure. The Articulation factor is basically the technique category minus items which did not seem to generalize across the various performances.

Table IX presents the results of various different orthogonal rotations of the factor matrix together with the three most highly loaded items on each factor. Inspection of these results reveals that the four factor rotation combines the Interpretation and Rhythm-Continuity factors, while the five factor rotation does not distinguish between

TABLE VIII

COMMUNALITIES FOR SIX FACTOR ROTATION OF THE ITEM POOL

Item	Communality	Item	Communality
1	.519	48	.524
2	.309	49	.237
3	.403	50	.590
4	.457	51	.409
5	.457	52	.483
6	.463	53	.413
7	.605	54	.703
8	.605	55	.617
9	.407	56	.568
10	.231	57	.580
11	.278	58	.707
12	.671	59	.601
13	.504	60	.488
14	.331	61	.679
15	.302	62	.436
16	.213	63	.495
17	.662	64	.432
18	.714	65	.622
19	.368	66	.273
20	.723	67	.245
21	.646	68	.169
22	.411	69	.245
23	.667	70	.362
24	.591	71	.547
25	.612	72	.341
26	.446	73	.716
27	.356	74	.318
28	.373	75	.444
29	.139	76	.391
30	.623	77	.540
31	.426	78	.400
32	.766	79	.463
33	.353	80	.351
34	.569	81	.666
35	.150	82	.417
36	.488	83	.450
37	.791	84	.531
38	.291	85	.601
39	.190	86	.603
40	.387	87	.601
41	.587	88	.585
42	.165	89	.222
43	.674	90	.480
44	.171	91	.638
45	.508	92	.671
46	.573	93	.402
47	.198	94	.501

TABLE IX

STRUCTURE OF CLARINET MUSIC PERFORMANCE BASED UPON THE ITEM POOL DATA WITH DIFFERENT NUMBERS OF FACTORS ROTATED

FOUR FACTOR STRUCTURE

I	III
1. The interpretation was musical	1. Seemed to drag
2. The piece was played in character	2. Tended to be flat
3. Effective musical communication	3. Flat in the low register
II	**IV**
1. The timbre was good	1. Hurried repeated notes
2. Played with natural tone	2. Rushed
3. The quality of the tone was rich	3. The tempo was uneven

FIVE FACTOR STRUCTURE

I	IV
1. The melodic line was smooth	1. Hurried repeated notes
2. Uneven rhythm	2. Rushed
3. Melodic continuation	3. Tended to be sharp
II	**V**
1. The timbre was good	1. Played with traditional interpretation
2. The quality of the tone was rich	2. Effective musical communication
3. Played with natural tone	3. The piece was played in character
III	
1. Played overall flat	
2. Tended to be flat	
3. Flat in the low register	

SIX FACTOR STRUCTURE

I	IV
1. The interpretation was musical	1. Hurried repeated notes
2. Effective musical communication	2. Rushed
3. The piece was played in character	3. Played too slowly
II	**V**
1. The quality of the tone was rich	1. The intonation was good
2. Sounded shallow	2. Played out of tune
3. Played with natural tone	3. Tended to be flat
III	**VI**
1. Uneven rhythm	1. Accents were played as indicated
2. Insecure technique	2. Squeaked
3. Melodic continuation	3. The attacks and releases were clean

TABLE IX
(CONT)

SEVEN FACTOR STRUCTURE

I	V
1. The melodic line was smooth	1. Traditional tempo selected
2. Melodic continuation	2. The tempo was in good taste
3. Rhythmically accurate	3. Played at specified tempo
II	VI
1. The quality of the tone was rich	1. Free from tonguing noise
2. The timbre was good	2. Tonguing produced thunkie sound
3. There was a distinct center to the tone	3. Accents were played as indicated
III	VII
1. The intonation was good	1. Performed syncopations correctly
2. Played overall flat	2. Dotted figures played as triplets
3. Played out of tune	3. Uneven triplets
IV	
1. Hurried repeated notes	
2. Rushed	
3. Played too fast	

EIGHT FACTOR STRUCTURE

I	V
1. Bad intonation	1. Traditional tempo selected
2. The intonation was good	2. The tempo was in good taste
3. Played out of tune	3. Played at specified tempo
II	VI
1. The quality of the tone was rich	1. Tonguing produced thunkie sound
2. The timbre was good	2. Free from tonguing noise
3. There was a distinct center to the tone	3. Accents were played as triplets
III	VII
1. Played out of tune	1. Uneven triplets
2. Bad intonation	2. Dotted figures played as triplets
3. No tonguing	3. Sloppy tonguing
IV	VIII
1. Played too fast	1. Melodic continuation
2. Rushed	2. The melodic line was smooth
3. Hurried repeated notes	3. Rhythmically accurate

the Tempo and Articulation factors. The rotation of more than six factors yields divisions in the Tempo factor (fast-slow vs. tempo), Intonation factor (flat vs. sharp) and Articulation factor (technique vs. tonguing). The rotation of a small number of factors also presented the problem of accounting for a small proportion of the total variance, while the rotation of a large number of factors yielded few items per factor.

Selection of Items for the Clarinet Performance Rating Scale

The thirty items selected for the CPRS appear in Table X grouped under the factors which they were selected to measure. Items were selected based upon their loadings on the six factor matrix of the ninety-four item pool. In general the five items most highly loaded on each factor were selected. When one of these items was also highly loaded on another factor it was replaced by an item which had lower correlations with other factors. If more than five items met the criteria of high primary factor loadings and factor simplicity, items were chosen which appeared by their content to sample more varied aspects of the factor. The range of the primary factor loadings of the items selected from the item pool was from .45 to .77 (Table X). Communalities ranged from .34 to .76 with most greater than .50 (Table VIII).

TABLE X

FACTOR LOADINGS FOR
ITEMS SELECTED FOR THE CPRS

	Factors					
I. Interpretation	I	II	III	IV	V	VI
1. Effective musical communication.	.752		.310			
2. The interpretation was musical.	.778		.334			
3. The piece was played in character.	.722		.269			
4. Played with musical understanding.	.698		.339			
5. Played with traditional interpretation.	.673				.271	
II. Tone						
1. Thin tone quality.		-.654	.205			
2. Played with a natural tone.	.212	-.670				.321
3. There was a lack of tonal color.		-.613				
4. The quality of the tone was rich.	.307	-.721				
5. Sounded shallow.		-.705	.262			
III. Rhythm-Continuity						
1. Uneven rhythm.	.344		.694	.238		
2. Smoothness in execution.	.398		.570			.399
3. Melodic continuation.	.463		.633			
4. Insecure technique.	.212	-.204	.642			
5. The rhythm was distorted.	.218		.538	.221		
IV. Intonation						
1. Played out of tune.	.338				.549	
2. Flat in low register.		-.216	.272		.450	
3. The intonation was good.		-.251			.659	
4. Played overall flat.		-.404			.516	
5. Tended to be flat.		-.244			.534	
V. Tempo						
1. Played too fast.				.553		
2. Seemed to drag.			.258	-.603		
3. Hurried repeated notes.				.604		
4. Played too slowly.		-.281	.327	-.634		
5. Rushed.			.266	.643		.231
VI. Articulation						
1. Squeaked.	.233		.212		.204	.591
2. Free from tonguing noise.	.226					.540
3. Attacks and releases were clean.		-.257	.263		.227	.632
4. Tonguing produced thunkie sound.						.531
5. Accents were played as indicated.	.227	-.352				.669

C. Evaluation of the Clarinet Performance Rating Scale

Factor Analysis of the Clarinet Performance Rating Scale

The factor matrix produced by factor analysis of the thirty items of the CPRS forcing a six factor structure is shown in Table XI. The communalities for this administration appear in Table XII. A six factor rotation of the CPRS ratings accounted for 70 percent of the total inter-item variability as shown in Table XIII. These results produced a factor structure similar to the one based upon the factor analysis of the ninety-four item pool results. The results also indicated a pattern of item loadings which supported the item selection procedure for the six factor sub-scales.

Reliability Study

Inter-judge reliability coefficients were obtained for the three groups (n=9, n=11, and n=12) of instrumental music teachers who served as judges for the administration of the CPRS. The Hoyt Analysis of Variance procedure was employed. The results of this analysis appear in Table XIV (Appendix E contains analysis of variance tables).

TABLE XI

VARIMAX SIX FACTOR MATRIX OF THE CPRS

Variable	I Intonation	II Rhythm - Continuity	III Tempo	IV Articulation	V Tone	VI Interpretation
1. Effective musical communication.	-.09	.37	-.09	.12	.13	-.78
2. The interpretation was musical.	-.09	.29	-.13	.11	.16	-.82
3. The piece was played in character.	-.08	.24	-.00	.14	.06	-.80
4. Played with musical understanding.	-.08	.23	-.09	.19	.06	-.81
5. Played with traditional interpretation.	-.08	.31	-.00	.21	.06	-.74
6. Thin tone quality.	-.20	.15	.03	.21	.82	.06
7. Played with a natural tone.	-.35	.03	.01	.21	.67	-.21
8. There was a lack of tonal color.	-.20	.14	-.01	.10	.67	-.16
9. The quality of the tone was rich.	-.17	.14	.02	.24	.69	-.14

TABLE XI
(CONT)

Variable	I Intonation	II Rhythm - Continuity	III Tempo	IV Articulation	V Tone	VI Interpretation
10. Sounded shallow.	-.23	.12	.09	.23	.81	-.02
11. Uneven rhythm.	-.05	.74	-.06	.06	.10	-.26
12. Smoothness in execution.	-.15	.73	-.06	.14	.07	-.30
13. Melodic continuation.	-.11	.77	-.09	.12	.09	-.29
14. Insecure technique.	-.12	.79	.05	.15	.17	-.25
15. The rhythm was distorted.	-.12	.82	-.06	.05	.17	-.23
16. Played out of tune.	-.67	.22	.07	.16	.33	-.23
17. Flat in low register.	-.80	.10	-.15	.15	.21	-.06
18. The intonation was good.	-.65	.12	.00	.15	.34	-.29
19. Played overall flat.	-.86	.05	-.06	.19	.16	-.01
20. Tended to be flat.	-.82	.12	-.02	.15	.20	-.00
21. Played too fast.	-.08	.13	-.79	.05	-.00	-.08
22. Seemed to drag.	-.03	.11	.75	-.05	.18	-.12

TABLE XI
(CONT)

Variable	I Intonation	II Rhythm - Continuity	III Tempo	IV Articulation	V Tone	VI Interpretation
23. Hurried repeated notes.	-.01	.12	-.69	.04	.18	-.19
24. Played too slowly.	.02	.07	.73	-.05	.14	-.02
25. Rushed.	-.07	.17	-.86	.00	.05	-.15
26. Squeaked.	-.24	.15	-.14	.56	.09	-.04
27. Free from tonguing noise.	-.12	.03	-.07	.83	.21	-.09
28. Attacks and releases were clean.	-.25	.12	.05	.65	.24	-.22
29. Tonguing produced thunkie sound.	-.09	.12	-.07	.76	.15	-.17
30. Accents were played as indicated.	-.10	.09	.00	.68	.27	-.24

TABLE XII

COMMUNALITIES FOR FACTOR MATRIX OF THE CPRS

Item	Communalities	Item	Communalities
1	.814	16	.708
2	.832	17	.755
3	.740	18	.675
4	.778	19	.822
5	.710	20	.756
6	.792	21	.662
7	.675	22	.643
8	.561	23	.571
9	.621	24	.566
10	.807	25	.812
11	.654	26	.427
12	.688	27	.766
13	.732	28	.617
14	.770	29	.670
15	.784	30	.630

TABLE XIII

CUMULATIVE PROPORTION OF INTER-ITEM VARIABILITY FOR THE SIX FACTOR ROTATION OF THE CPRS

Factor	Cum Proportion	Factor	Cum Proportion
I	.336	IX	.745
II	.459	X	.752
III	.556	XI	.758
IV	.615	XII	.761
V	.661	XIII	.764
VI	.701	XIV	.765
VII	.720	XV	.765
VIII	.734	XVI	.766

TABLE XIV

INTER-JUDGE RELIABILITY ESTIMATES
FOR CPRS TOTAL SCORES

Group 1 (n-9)	Group 2 (n-12)	Group 3 (n-11)
.939	.949	.978

Table XV reports the inter-judge reliability estimates for each of the five item scales and within each of the adjudication groups. An examination of these tables shows all but two of the scale reliability coefficients were above .70. All three of the coefficients for the total score were above .90.

TABLE XV

INTER-JUDGE RELIABILITY ESTIMATES
FOR CPRS SCALE SCORES

		Group 1 (n-9)	Group 2 (n-12)	Group 3 (n-11)
Interpretation	I	.899	.952	.945
Tone	II	.659	.766	.716
Rhythm	III	.956	.876	.939
Intonation	IV	.578	.835	.980
Tempo	V	.786	.922	.847
Articulation	VI	.779	.883	.892

In order to estimate inter-judge reliability for adjudication panels of different sizes, a generalized Spearman Brown Prophecy formula (Gulliksen, 1950, pg. 78) was applied to the results reported in Tables XIV and XV. Table XVI reports the inter-judge reliability estimates for 1 through 10 judges. An examination of Table XVI shows that the reliability estimate for the total scores was above .80 for as few as three judges. The scale score's reliability of scale estimates for six or more judges were generally above .70 except for the tone sub-scale which had coefficients of about .60. Tables XIV, XV and XVI also indicate reasonable consistency in the reliability estimates across the three sets of evaluations. An examination of the scale reliability estimates show the scale of intonation and tone yielded lower average estimates than did the other four scales.

Criterion-Related Validity Study

In order to examine the criterion-related validity of the CPRS, the ten performances in each of the three sets used for the reliability analysis were given a global rating by instrumental music teachers, utilizing a paired-comparison procedure. The inter-judge reliability of the criterion is shown in Table XVII for each of the three groups. All three of the coefficients demonstrate a high degree of agreement among the judges as they are above .97.

TABLE XVI

RELIABILITY ESTIMATES FOR
CLARINET PERFORMANCE RATING SCALE
FOR FROM 1 TO 10 JUDGES

Inter-judge
Total

	Gp1	Gp2	Gp3
1	.628	.597	.805
2	.771	.753	.892
3	.835	.822	.925
4	.871	.859	.943
5	.894	.885	.954
6	.910	.903	.961
7	.922	.915	.966
8	.931	.925	.970
9	.939	.933	.973
10	.944	.939	.976

Interpretation
Factor I

	Gp1	Gp2	Gp3
1	.492	.614	.612
2	.661	.766	.761
3	.745	.833	.826
4	.796	.868	.863
5	.830	.892	.888
6	.854	.909	.904
7	.872	.920	.917
8	.886	.929	.926
9	.899	.937	.934
10	.908	.943	.940

Tone
Factor II

	Gp1	Gp2	Gp3
1	.174	.207	.187
2	.296	.349	.315
3	.388	.449	.408
4	.448	.519	.479
5	.514	.576	.535
6	.560	.621	.579
7	.597	.655	.616
8	.629	.685	.647
9	.659	.710	.674
10	.681	.731	.697

Rhythm
Factor III

	Gp1	Gp2	Gp3
1	.704	.360	.583
2	.826	.532	.736
3	.877	.639	.807
4	.905	.700	.848
5	.922	.746	.875
6	.934	.780	.893
7	.943	.804	.907
8	.950	.826	.918
9	.956	.841	.926
10	.960	.854	.933

Intonation
Factor IV

	Gp1	Gp2	Gp3
1	.129	.287	.823
2	.231	.454	.903
3	.310	.558	.933
4	.375	.625	.949
5	.428	.677	.959
6	.474	.717	.965
7	.513	.745	.970
8	.546	.771	.973
9	.578	.791	.976
10	.603	.807	.979

Tempo
Factor V

	Gp1	Gp2	Gp3
1	.286	.489	.335
2	.445	.663	.502
3	.547	.749	.603
4	.617	.798	.669
5	.668	.832	.717
6	.707	.857	.752
7	.730	.874	.779
8	.763	.888	.802
9	.786	.899	.820
10	.802	.908	.835

Articulation
Factor VI

	Gp1	Gp2	Gp3
1	.281	.377	.430
2	.454	.556	.601
3	.537	.655	.693
4	.615	.715	.751
5	.659	.759	.791
6	.699	.792	.819
7	.730	.815	.841
8	.756	.835	.858
9	.779	.851	.871
10	.796	.863	.883

TABLE XVII

RELIABILITY OF PAIRED-COMPARISON CRITERION

Group 1 (n-14)	Group 2 (n-14)	Group 3 (n-14)
.993	.985	.978

The zero-order correlation between the CPRS scores and both the rank order and the normalized scale scores for the global performance rating appear in Tables XVIII, XIX and XX. Coefficients for both the CPRS total and scale scores are reported. Inspection of these tables indicates strong (above .80) relationships between total scores of the CPRS and the global performance ratings. The Interpretation scale seems to have the strongest relationship (above .80) with the criterion.

To examine the combined contributions of the scale scores in predicting the global criterion a step-wise multiple regression analysis was performed on the date generated by the CPRS. The results of the analysis for each of the three sets are reported in Tables XXI, XXII and XXIII. The weighting of the individual factors seems to be somewhat inconsistent across the three sets of evaluations.

In order to examine the stability of the weights for the scale scores generated by the step-wise multiple regression across the three sets, the weights for each set

TABLE XVIII

ZERO-ORDER COEFFICIENTS FOR SET I

	Factor I	Factor II	Factor III	Factor IV	Factor V	Factor VI	Total Score	Paired-Comparison Ranks	Paired-Comparison Z Scores
Factor I		.828	.762	.578	.889	.792	.916	.915	.869
Factor II			.551	.783	.755	.940	.927	.804	.869
Factor III				.616	.726	.615	.797	.781	.707
Factor IV					.717	.857	.842	.750	.852
Factor V						.847	.903	.846	.918
Factor VI							.941	.762	.872
Total Score								.916	.940
Paired-Comparison Ranks									.950
Paired-Comparison Z Scores									

TABLE XIX

ZERO-ORDER COEFFICIENTS FOR SET II

	Factor I	Factor II	Factor III	Factor IV	Factor V	Factor VI	Total Score	Paired-Comparison Ranks	Paired-Comparison Z Scores
Factor I		.408	.900	.105	.689	.325	.885	.722	.683
Factor II			.506	.506	.160	.086	.628	.256	.237
Factor III				.095	.693	.319	.903	.694	.659
Factor IV					.317	.150	.424	.272	.300
Factor V						.144	.717	.751	.765
Factor VI							.509	.674	.669
Total Score								.831	.809
Paired-Comparison Ranks									.991
Paired-Comparison Z Scores									

TABLE XX

ZERO-ORDER COEFFICIENTS FOR SET III

	Factor I	Factor II	Factor III	Factor IV	Factor V	Factor VI	Total Score	Paired-Comparison Ranks	Paired-Comparison Z Scores
Factor I		.774	.535	.712	.872	.752	.877	.800	.765
Factor II			.509	.778	.880	.925	.920	.750	.771
Factor III				.763	.550	.310	.740	.628	.622
Factor IV					.675	.735	.916	.946	.892
Factor V						.799	.887	.684	.754
Factor VI							.853	.756	.734
Total Score								.888	.871
Paired-Comparison Ranks									.954
Paired-Comparison Z Scores									

TABLE XXI

STEPWISE MULTIPLE REGRESSION SET I

Paired Comparison
Ranks as Criterion

Multiple R .993
Standard Error of Estimate .612
R^2 Corrected .925

Analysis of Variance

	DF	Sum of Squares	Mean Square	F Ratio
Regression	6	81.375	13.563	36.173 *
Residual	3	1.125	.375	

Paired Comparison
Normalized Scores as Criterion

Multiple R .987
Standard Error of Estimate .226
R^2 Corrected .903

Analysis of Variance

	DF	Sum of Squares	Mean Square	F Ratio
Regression	6	5.962	.994	19.404 *
Residual	3	.154	.051	

* Significant at .05 level

TABLE XXII

STEPWISE MULTIPLE REGRESSION SET II

Paired Comparison
Ranks as Criterion

Multiple R .959
Standard Error of Estimate 1.480
R^2 Corrected .740

Analysis of Variance

	DF	Sum of Squares	Mean Square	F Ratio
Regression	6	75.926	12.654	5.775 *
Residual	3	6.574	2.191	

Paired Comparison
Normalized Scores as Criterion

Multiple R .964
Standard Error of Estimate .586
R^2 Corrected .740

Analysis of Variance

	DF	Sum of Squares	Mean Square	F Ratio
Regression	6	13.707	2.284	6.632 *
Residual	3	1.033	.344	

* Significant at .05 level

TABLE XXIII

STEPWISE MULTIPLE REGRESSION SET III

Paired Comparison
Ranks as Criterion

Multiple R .980
Standard Error of Estimate 1.039
R^2 Corrected .870

Analysis of Variance

	DF	Sum of Squares	Mean Square	F Ratio
Regression	6	79.259	13.210	12.228**
Residual	3	3.241	1.080	

Paired Comparison
Normalized Scores as Criterion

Multiple R .932
Standard Error of Estimate .7214
R^2 Corrected .578

Analysis of Variance *

	DF	Sum of Squares	Mean Square	F Ratio
Regression	5	13.958	2.792	5.364**
Residual	4	2.082	.520	

* Factor 2 is not included

** Significant at .05 level

were applied to the scale scores of the other two sets. The results of this procedure are reported in Table XXIV. The data indicates the weights for sets one and three are somewhat comparable, but the weights for set two produced inconsistent results when applied to the other sets.

TABLE XXIV

CROSS VALIDATION STUDY OF
STEP-WISE REGRESSION WEIGHTS

Set I

Weights Employed	Criterion	Validity Coefficient
Set II	Ranks	.827
	Z scores	.904
Set III	Ranks	.815
	Z scores	.923

Set II

Weights Employed	Criterion	Validity Coefficient
Set I	Ranks	.395
	Z scores	.584
Set III	Ranks	.164
	Z scores	.123

Set III

Weights Employed	Criterion	Validity Coefficient
Set I	Ranks	.910
	Z scores	.871
Set II	Ranks	.587
	Z scores	.599

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to examine a technique for the construction of a performance rating instrument. This was achieved through the development and evaluation of an instrument to measure clarinet music performance.

This chapter presents: 1) a summary of the study; 2) conclusions based upon the results of the study; and 3) recommendations for further research.

A. Summary

The first step in the construction of the clarinet performance rating scale was to sample experts' criticisms of clarinet performance by having instrumental music teachers write essays descriptive of the aural aspects of a memorable clarinet performance. These essays were then content analyzed and the resulting item pool together with items generated by a literature search were placed on a five option response scale to be employed by instrumental music teachers to rate one hundred sample junior high clarinet performances. The results of these descriptions were factor analyzed in an attempt to determine the structure of clarinet performance. The five items which were most highly loaded on each of the six

resulting factors were selected to define subscales of a thirty item clarinet performance rating scale. The resulting rating scales were employed in the evaluation of three sets of ten different performances. The inter-judge reliability of the rating scale was estimated from these administrations. In order to examine criterion-related validity of the rating scales a global criterion measure was constructed by having judges rate the thirty performances using a paired-comparison procedure. Both zero-order and multiple correlation coefficients between the rating scale and the criterion measure were obtained.

The three major results of the study were: 1) a rating scale based upon a six factor structure of clarinet music performance (interpretation, tone, rhythm-continuity, tempo, intonation and articulation); 2) high inter-judge reliability estimates for both the total score ($>.90$) and scale scores ($>.60$) for each of the three groups of judges, evaluating three different sets of ten performances; and 3) criterion-related validity coefficients greater than .80 for each of the three different sets of performances.

B. Conclusions

The conclusions of the study can be divided into three major sections: 1) conclusion concerning the development of the rating scale; 2) conclusions concerning the inter-judge reliability of the scale; and 3) conclusion

concerning the criterion-related validity of the rating scale.

In the development of the Clarinet Performance Rating Scale (CPRS) the most substantial result concerned the structure of clarinet music performance. The six factor structure produced from the factor analysis of the results of the performance descriptions using the original ninety-four item pool, seemed to be essentially the same as the a priori theoretical structure based upon a literature search. This six factor structure for clarinet performance would also seem appropriate for taxonomizing music performance in general, as none of the factors seem to reflect idiosyncratic clarinet characteristics. Additional investigation would be needed to support this generalization.

The inter-judge reliability estimates for the CPRS were consistently high ($>.90$). These results, though similar to ones obtained in other evaluations of music performance (Watkins, 1942; Fleury, 1964; Gutsch, 1964), may be partly a result of two sources of inflation: 1) the heterogeneity of the sample and 2) the added cues provided by all the performances involving different pieces of music. Although the performers employed did represent the intended ability level (junior high school grades), the subjects from four different schools may have increased the sample heterogeneity and therefore inflated the results.

The use of different pieces of music by each performer creates a problem in determining sources of variance. The total variance is comprised of both variance due to the difference among pieces as well as the difference among performers. In this study these two sources could not be examined separately. Additional studies which require judges to evaluate several different performers playing the same pieces seem warranted.

The criterion-related estimates for the CPRS with the paired-comparison criterion seemed quite substantial ($>.80$). These results again parallel validity coefficients reported in other studies (e.g. Watkins, 1942), but also may be influenced by the heterogeneity of the sample or the use of different pieces.

The results of this study also demonstrated that the facet-factorial method of scale construction employed to evaluate the complex behavior of music performance seemed to produce an instrument which was both reliable and valid. The scale demonstrated good inter-judge reliability, though these results must be interpreted in light of the number of judges employed. The inter-judge reliabilities of the subscales were also high, but were even more dependent upon the number of judges employed as there were so few items (five) contributing to each scale score. The construct validity of the rating scale was supported by the procedures of gathering performance descriptions

supplemented by a literature search and the item selection process based upon the factor structure of the behavior. The predictive utility of the scale was demonstrated by the relationship between the rating scale and a global measure of performance.

C. Recommendations

This study was a pilot study to 1) investigate a technique of scale construction for the evaluation of complex behaviors and 2) develop an instrument for the evaluation of clarinet music performance. The research implications can also be divided into these two areas.

Research Implications for the Evaluation of Clarinet Music Performance

1) An investigation of the CPRS reliability and validity as a function of piece variance and performer by piece interaction should be attempted.

2) The construction of scales for the evaluation of clarinet performance at different age and ability levels and the evaluation of music performance on instruments other than the clarinet should be attempted.

3) Further investigation seems warranted to resolve the problem of sample heterogeneity by applying the CPRS to performers within a class in a single school.

4) An examination of the generalizability of the structure of clarinet music performance generated in this

study to music performance in general should be attempted.

Research Implications for the Investigation of the Facet-Factorial Technique of Scale Construction

1) Attempts should be made to construct rating scales for the evaluations of other complex behaviors using the procedure described in this study.

2) Other scale construction strategies (e.g.rational-trait) should be examined in comparison to the strategy employed in this study as possible techniques for the construction of rating scales for the evaluation of complex behaviors.

APPENDIX A

PIECES RECORDED BY JUNIOR HIGH CLARINETISTS

1st Division Band Method (Weber, 1963)

Book I

pg.	16, no. 4

Book II

pg.	4, no. 1
	4 6
	4 7
	5 1
	6 4
	7 2
	8 5
	8 6
	9 2
	9 4
	9 7
	10 3
	13 2
	14 5
	16 3
	17 5
	19 4
	19 5
	30 4

Book III

pg.	10, No. 6
	11 2
	11 4
	12 2
	12 4
	12 6
	13 3
	14 3
	14 5
	14 6
	15 2
	16 2
	16 4
	17 3
	17 4

Music Time Band Folio (Frank, 1960)

pg.	1
	3
	4
	5
	8
	9
	10
	11
	14
	15
	17
	18
	19
	23
	25
	27

Breeze Easy Book II (Kinyon, 1958)

pg.	16, no. 7
	19 6
	22 7
	24 3
	24 5
	25 3
	26 4
	26 6
	27 3
	28 3
	29 8
	30 4

Everybody's Favorites
(Arnold, 1941)

pg. 132
133
134
135
136
138
140
141

Three Sketches for Band
(Morrissey, 1954)

Hayride Meas. 1 - 1st Clar.
2nd Clar.
3rd Clar.

Hayride Letter E - 1st Clar.
2nd Clar.
3rd Clar.

Clarinet Student
(Weber, 1968)

pg. 20, no. 5
21 3
21 4
24 5
24 7
26 5
33 6
33 7
34 2
35 3
35 6

Time for Concert
(Buchtel, 1958)

Champions on Parade
1st Clar.
2nd Clar.
3rd Clar.

On the Hike
1st Clar.
2nd Clar.
3rd Clar.

Pals on Parade
1st Clar.
2nd Clar.
3rd Clar.

America
1st Clar.
2nd Clar.
3rd Clar.

APPENDIX B

Write an essay describing the aural aspects of a (good or bad) junior high clarinet performance that stands out most in your mind. The essay should be one or two pages long.

Purpose:

The purpose of asking instrumental music teachers to write these essays is to sample the aspects of clarinet performance which music teachers feel are important. These essays will be used to generate statements for a clarinet performance adjudication sheet.

Example:

Students asked to write essays describing a college course which stood out in their minds generated the following statements:

1. I would recommend this course to anyone.
2. The lecture instructor is patient with the students in class.
3. The lab is interesting.
4. The tests are very fair.
5. The textbooks are chosen well for the course.

APPENDIX C

Judge Number _____

The purpose of the following questions is to have you as accurately as possible describe the performance which you have just heard. Respond to each statement on the basis of how much you agree or disagree that the statement is descriptive of the performance. Use the following five point scale:

HD - highly disagree that the statement is descriptive
D - slightly disagree that the statement is descriptive
NN - neither disagree nor agree that the statement is descriptive
A - slightly agree that the statement is descriptive
HA - highly agree that the statement is descriptive

Please choose only one response to each question. Please attempt to answer every question. Circle responses.

HD	D	NN	A	HA	1.	Hurried repeated notes.
HD	D	NN	A	HA	2.	Tonguing produced thunkie sound.
HD	D	NN	A	HA	3.	Bad intonation.
HD	D	NN	A	HA	4.	Played out of tune.
HD	D	NN	A	HA	5.	Played with sincerity.
HD	D	NN	A	HA	6.	The rhythm flowed.
HD	D	NN	A	HA	7.	The attacks and releases were clean.
HD	D	NN	A	HA	8.	The melodic line flowed.
HD	D	NN	A	HA	9.	Breaths taken in the middle of phrases.
HD	D	NN	A	HA	10.	Uneven triplets.
HD	D	NN	A	HA	11.	Major thirds sharp.
HD	D	NN	A	HA	12.	Insecure rhythm.
HD	D	NN	A	HA	13.	Melodic expression.
HD	D	NN	A	HA	14.	Impeccable articulation.
HD	D	NN	A	HA	15.	Sloppy tonguing.
HD	D	NN	A	HA	16.	Tended to be sharp.

HD	D	NN	A	HA	17.	Melodic continuation.
HD	D	NN	A	HA	18.	Effective musical communication.
HD	D	NN	A	HA	19.	Played too fast.
HD	D	NN	A	HA	20.	Performed with ease.
HD	D	NN	A	HA	21.	The piece was played in character.
HD	D	NN	A	HA	22.	The rhythm was free.
HD	D	NN	A	HA	23.	Played with controlled tone.
HD	D	NN	A	HA	24.	Played with precision.
HD	D	NN	A	HA	25.	Projected the tone clearly and distinctly.
HD	D	NN	A	HA	26.	Rhythm was distorted.
HD	D	NN	A	HA	27.	The tempo was in good taste.
HD	D	NN	A	HA	28.	Free from tonguing noise.
HD	D	NN	A	HA	29.	Ignored key signature.
HD	D	NN	A	HA	30.	Played with natural tone.
HD	D	NN	A	HA	31.	The timbre was good.
HD	D	NN	A	HA	32.	The interpretation was musical.
HD	D	NN	A	HA	33.	End of phrases clipped off.
HD	D	NN	A	HA	34.	Played with traditional interpretation.
HD	D	NN	A	HA	35.	No tonguing.
HD	D	NN	A	HA	36.	Stylistic and expressive consideration neglected.
HD	D	NN	A	HA	37.	The melodic line was smooth.
HD	D	NN	A	HA	38.	The tone was dark.
HD	D	NN	A	HA	39.	Dotted figures played as triplets.
HD	D	NN	A	HA	40.	Played with a breathy tone.
HD	D	NN	A	HA	41.	Good contrasts.
HD	D	NN	A	HA	42.	Off-beats played properly.

HD	D	NN	A	HA	43.	Uneven rhythm.
HD	D	NN	A	HA	44.	Consistent tone quality in different registers.
HD	D	NN	A	HA	45.	Insufficient breath support.
HD	D	NN	A	HA	46.	Beautiful tone.
HD	D	NN	A	HA	47.	Jumped octaves or more, smoothly.
HD	D	NN	A	HA	48.	Squeaked.
HD	D	NN	A	HA	49.	Performed syncopations correctly.
HD	D	NN	A	HA	50.	Sounded comfortable.
HD	D	NN	A	HA	51.	The intonation was unreliable.
HD	D	NN	A	HA	52.	Performance reflected sensitivity.
HD	D	NN	A	HA	53.	Played with spirit.
HD	D	NN	A	HA	54.	The rhythm was played musically.
HD	D	NN	A	HA	55.	Sounded shallow.
HD	D	NN	A	HA	56.	Insecure technique.
HD	D	NN	A	HA	57.	Rushed.
HD	D	NN	A	HA	58.	The quality of the tone was rich.
HD	D	NN	A	HA	59.	Smooth tone.
HD	D	NN	A	HA	60.	Seemed to drag.
HD	D	NN	A	HA	61.	Played fluently.
HD	D	NN	A	HA	62.	There was a lack of tonal color.
HD	D	NN	A	HA	63.	Played overall flat.
HD	D	NN	A	HA	64.	Sounded like the clacking of a chicken.
HD	D	NN	A	HA	65.	The tone was free.
HD	D	NN	A	HA	66.	Played evenly.
HD	D	NN	A	HA	67.	Uncertain high notes.
HD	D	NN	A	HA	68.	Sharpness in throat register.

HD	D	NN	A	HA	69.	The dynamics were played accurately.
HD	D	NN	A	HA	70.	The notes in the lower register sounded muddled.
HD	D	NN	A	HA	71.	There was a distinct center to the tone.
HD	D	NN	A	HA	72.	Flat in the low register.
HD	D	NN	A	HA	73.	Smoothness in execution.
HD	D	NN	A	HA	74.	Ugly cut-off tones when notes were released.
HD	D	NN	A	HA	75.	Brilliance.
HD	D	NN	A	HA	76.	Tended to be flat.
HD	D	NN	A	HA	77.	Traditional tempo selected.
HD	D	NN	A	HA	78.	Interrupted flow of melody by breaths.
HD	D	NN	A	HA	79.	Made numerous errors in technique.
HD	D	NN	A	HA	80.	The notes in the lower register had a nasal quality.
HD	D	NN	A	HA	81.	Accents were played as indicated.
HD	D	NN	A	HA	82.	Played at specified tempo.
HD	D	NN	A	HA	83.	The rhythm was steady.
HD	D	NN	A	HA	84.	The phrasing was accurate.
HD	D	NN	A	HA	85.	The tone was well defined.
HD	D	NN	A	HA	86.	Played too slowly.
HD	D	NN	A	HA	87.	Played with clear intonation.
HD	D	NN	A	HA	88.	The intonation was good.
HD	D	NN	A	HA	89.	Clumsily executed.
HD	D	NN	A	HA	90.	The tempo was uneven.
HD	D	NN	A	HA	91.	Rhythmically accurate.
HD	D	NN	A	HA	92.	Played with musical understanding.
HD	D	NN	A	HA	93.	Staccato notes light and separated.
HD	D	NN	A	HA	94.	Thin tone quality.

APPENDIX D

VARIABLE	FACTOR 1	2	3	4	5
1	.15590	-.09997	.82421	.09219	-.02659
2	.13985	-.10587	.07129	-.01983	-.10356
3	.30551	-.21057	.13400	-.08044	.04135
4	.26305	-.17986	.02072	.03448	-.02103
5	.52616	-.22311	-.03017	.34712	-.02389
6	.64710	-.16635	.09097	-.08231	.00294
7	.41918	-.32453	.25693	-.02538	-.01789
8	.70595	-.17637	.00520	-.15474	.06220
9	.46090	-.18710	.04766	-.03000	-.10066
10	.24797	-.08642	.12907	.11451	-.07114
11	.00186	-.16860	.22403	-.33638	.14584
12	.66436	.03304	.07675	-.06898	.11591
13	.67001	-.15762	-.06949	.12853	-.00262
14	.46636	-.17909	.01906	.01736	.03156
15	.29354	-.26386	-.04257	.03495	-.01001
16	.01121	-.09170	.15069	.02227	-.04773
17	.77042	-.06981	.06423	-.08350	-.09373
18	.82661	-.19626	.00338	.15692	.15059
19	.15330	.14750	.44856	.43095	.37513
20	.70232	-.17175	-.05990	-.04492	-.00644
21	.75375	-.23238	-.08581	.07963	.24508
22	.44916	-.19500	.03118	-.09491	.15470
23	.38770	-.55123	.05051	-.03859	-.05935
24	.71940	-.19677	.19390	.01035	-.03844
25	.36328	-.60992	-.03589	.01611	-.07078
26	.44138	-.03244	.09347	.00388	.05448
27	.23879	.02508	.09496	-.06902	.82404
28	.17224	-.17635	.05991	-.15349	.04245
29	.12170	-.18529	.07129	.05471	-.01383
30	.26744	-.68696	.07148	-.06187	-.10806
31	.24278	-.79135	-.08811	-.00017	-.09176
32	.82010	-.21652	.10290	.06370	.16473
33	.30175	-.25923	.37987	.19167	-.06317
34	.63403	-.09722	.08159	-.08930	.38699
35	.14034	-.18310	.08284	-.09840	.03243
36	.63191	-.05688	.21606	.05431	-.06334
37	.77735	-.23984	.11554	-.09694	.03913
38	-.01085	.32015	.17518	-.14652	.04688
39	.18126	-.12885	.11081	.07628	.09988
40	.12244	-.38423	.13196	-.02747	.01943
41	.60367	-.32382	.03145	-.07654	.20080
42	.19758	-.09637	.17917	-.03010	.06739
43	.63287	-.03292	.25620	-.13643	-.06291
44	.11226	-.16154	.21085	.01304	-.03362
45	.44256	-.34737	.18544	-.17734	-.04497
46	.40915	-.62261	.02524	-.09447	-.17364
47	.21032	-.18319	.08050	-.08993	-.04784
48	.07822	-.17832	.05628	.12359	.00676
49	.30003	.06243	-.06051	.09809	.04688
50	.54829	-.45549	.04698	-.07429	.05724
51	.22412	-.22953	-.01694	-.02556	-.05603

FACTOR

VARIABLE	1	2	3	4	5
52	.70316	-.28761	.13258	.03393	.06368
53	.58057	-.12724	-.12666	-.06791	.10677
54	.79042	-.16337	.19290	-.11093	.11096
55	.17247	-.55341	-.00009	-.05034	.11752
56	.48919	-.15120	-.01369	-.02431	.04133
57	.24735	.03563	.78694	.13375	.11100
58	.34037	-.73250	-.07725	-.07724	-.16699
59	.31520	-.58633	.10547	-.08186	-.05963
60	.19111	-.08255	-.11480	-.76483	-.01899
61	.67673	-.38046	.00147	-.11971	.02835
62	.08832	-.03446	-.02803	-.09475	.01440
63	.09124	-.35723	.15673	-.13246	.09080
64	.04069	-.43176	.26993	-.14573	.06197
65	.22949	-.77084	.06572	-.01344	.09926
66	.48772	-.05083	.09530	-.13551	-.01159
67	.23054	-.19834	.05721	-.17434	.00028
68	.08539	-.05787	.10663	.06783	-.09911
69	.20514	-.15242	.08649	.01775	.03878
70	.22875	-.37124	-.11304	.12696	-.04143
71	.17471	-.70214	.00562	.14480	.16608
72	.16567	-.15011	-.16660	.04925	.26566
73	.60471	-.33013	.05657	-.17057	.03600
74	.09506	-.41702	.23051	-.17607	-.07830
75	.43316	-.51412	-.01997	-.08954	-.09149
76	.08423	-.15253	.03568	-.20733	.15065
77	.19607	.08460	-.01654	-.03797	.86614
78	.39476	-.30242	.22085	-.14724	.05581
79	.40129	-.23603	.00122	-.09669	.01618
80	.06930	-.24902	.08819	-.27332	.02775
81	.25250	-.18291	.31603	-.09758	.02013
82	.24872	-.03436	.02983	-.07522	.56884
83	.49251	-.11897	.14248	-.35393	.05539
84	.58869	-.20276	.12978	-.19964	.16951
85	.22813	-.70706	.08931	.01970	.19062
86	.13459	-.07959	-.23677	-.68461	.28544
87	.22653	-.53775	.06036	-.07200	.18136
88	.33837	-.25172	-.02671	-.09588	.18527
89	.47171	-.14384	-.07720	-.03483	.11062
90	.28993	.04760	.31147	-.11823	.06304
91	.68494	-.05344	.17443	-.24744	.09381
92	.70199	-.26614	-.03434	.02796	.25409
93	.19102	-.36654	.10551	-.05442	.18734
94	.05844	-.53644	.09817	-.01516	.09285

VARIABLE	FACTOR 6	7	8	9	10
1	-.04460	.06977	-.07660	.13810	-.09981
2	-.03846	-.00545	.06427	.13486	-.05083
3	-.10676	.81436	.03162	.06324	-.02919
4	-.01356	.82053	-.08276	.00423	.01104
5	-.10798	.06954	-.14980	-.03322	-.11080
6	-.04568	-.01844	-.07200	.07229	-.26579
7	-.01111	.23359	.09504	-.17205	-.24631
8	-.16891	.18260	-.12819	.07081	-.14441
9	.02799	.20933	.10924	-.32006	.03758
10	-.37085	.09969	-.62278	-.23508	-.06317
11	-.00614	.20906	.00200	-.00230	.10750
12	.10586	.18940	-.21617	.00539	-.22331
13	.11734	.07096	-.28768	.12937	-.00895
14	-.02430	.01913	.06971	.06955	.01708
15	.13527	.26392	-.00166	-.04664	-.31790
16	.02901	.03357	.03667	.07585	.04685
17	-.07159	.18467	-.16167	.05684	-.04559
18	-.09919	.18593	-.04985	-.03905	-.00682
19	.17387	.05265	.03935	-.01247	.00450
20	.03789	.15869	-.14895	-.07151	-.07223
21	-.10810	-.03081	-.10842	-.11691	-.05138
22	-.15574	-.06249	.13013	.04377	.08142
23	-.14593	.16970	-.02955	.06669	-.06002
24	.04353	.07721	.14147	-.12338	-.05207
25	-.21036	.12110	.01946	.11540	-.13786
26	-.02048	.20841	-.32577	-.35691	.02640
27	-.07007	-.03010	-.02978	-.06084	-.10595
28	-.17500	.24527	-.00001	-.00373	.19682
29	-.08840	.02891	-.04076	-.09046	-.12237
30	.02938	.10967	-.01975	-.11209	-.21971
31	-.02439	.13536	-.08446	.00110	-.11106
32	-.14098	.09733	.10907	.01597	-.03324
33	.07571	.13607	.12380	.11733	-.12371
34	-.11002	.14315	.09372	.09895	.12588
35	-.01219	.03913	.03053	-.03911	-.82785
36	.11596	.10295	.14916	.03641	.03015
37	-.02245	.13313	.02030	.13431	.00295
38	.02202	.05383	-.03088	.01702	-.09374
39	.00870	.03163	-.81660	.06514	.05596
40	-.00090	.13317	-.02681	.11839	-.10489
41	-.06618	.05706	-.13918	.05081	.23803
42	-.03827	.04460	-.14316	-.08460	.00450
43	-.04807	.16670	-.19343	.00120	-.05444
44	-.08474	.09647	.01147	.79109	.05131
45	.01574	.21988	.13795	-.15376	-.00182
46	-.19167	.06812	-.08235	.02920	.02869
47	-.37438	.11088	-.03530	.14440	.12804
48	-.05560	.08094	-.09036	-.14059	-.01683
49	-.77592	.11079	-.05674	.08911	.03640
50	-.15019	.24333	.08929	.09574	.06983
51	-.05855	.49830	-.07924	-.02058	.05319

VARIABLE	FACTOR 6	7	8	9	10
52	.02114	.03089	.00986	-.04799	-.10785
53	-.06292	.04793	-.04095	.03435	.10391
54	-.13188	.10914	-.07249	-.05592	.05430
55	.16314	.13574	.02061	.01843	-.07256
56	.04512	.20272	-.10158	-.05099	.04173
57	.00798	.04766	-.13091	.03279	.02925
58	.00107	.07445	-.05617	-.02442	.03044
59	.13949	.12790	.00947	-.03851	-.02856
60	.08447	.08888	.18394	-.06382	-.04673
61	-.07089	.02295	.01980	.10658	.04841
62	.03120	.16247	-.06833	.10598	.18929
63	-.04113	.52931	-.10447	.06598	-.18930
64	.26551	.01780	-.04399	.00072	.00950
65	.01172	.08422	-.03060	.06699	.00787
66	.22049	.07437	-.26091	.12107	-.14882
67	.03744	.08241	-.09020	.06927	.04246
68	.02694	.08522	.11249	.03690	.04781
69	-.13099	.00991	-.14251	.04043	-.08751
70	-.05756	.14146	-.12767	.17482	-.27100
71	-.00021	.08482	-.08714	.22591	-.04283
72	-.01115	.35291	-.00814	.08835	-.21311
73	-.06521	.04107	.04159	.19833	-.07937
74	-.00263	.03003	-.00319	-.08262	-.15465
75	-.10481	.14178	-.18934	.02171	.02566
76	.07105	.49720	.05069	.16474	-.09088
77	.04826	.14109	.00438	.03265	.08593
78	.15225	.12742	.07113	.01836	-.00280
79	-.10991	.24753	.11496	.03165	-.17949
80	.01830	.12049	-.05716	.14929	-.15562
81	-.39391	.02323	-.14394	.00730	-.09155
82	-.14407	.03327	-.19216	-.02993	-.07292
83	-.03352	.04408	-.27135	.05404	.13255
84	-.22603	.10836	.01572	-.00359	-.23434
85	-.07840	.06025	.11387	.03472	-.21496
86	.01093	.08165	-.04648	.05747	-.12282
87	-.04697	.47338	.11434	-.06808	.00695
88	-.15010	.60649	-.15816	-.07426	-.01032
89	.11708	.19892	.12222	.02011	-.16236
90	.08997	.04061	-.03184	-.00079	-.19638
91	-.16791	.06963	-.14499	-.06389	-.08695
92	.00590	.08869	-.04574	-.00457	-.05304
93	-.47224	.19099	-.08587	-.04722	-.20117
94	.13215	.09262	-.17390	-.20517	-.05838

FACTOR

VARIABLE	11	12	13	14	15
1	.08497	-.07659	-.07954	-.12004	-.07525
2	.02934	.02335	-.09990	-.84618	-.03151
3	.04491	.01944	-.04348	.03070	-.00006
4	.04030	-.10959	-.09838	-.09345	.00819
5	-.05459	-.03785	.08234	.02554	-.14352
6	.12227	-.07022	.09031	-.11320	-.20182
7	.21073	-.04655	-.01181	-.27592	-.07745
8	.03321	-.05236	.07672	-.12417	-.05298
9	.10255	-.17967	.01052	.05438	-.10541
10	.02157	-.09053	-.08037	-.15960	-.10534
11	.20360	.06101	-.51000	-.10875	.04969
12	.11905	-.15273	-.14123	-.05662	-.03574
13	.13183	.01145	.01822	-.00091	-.01202
14	-.02055	-.09116	.04715	-.10987	.12588
15	.32364	-.16853	.23543	-.34201	.01360
16	.85586	-.01594	-.06073	-.01674	-.04489
17	.09158	-.13410	-.18477	.13224	-.03661
18	.03372	.09817	-.05287	-.01866	.04466
19	.13851	-.08242	.07994	.19439	.06338
20	-.23075	-.20915	-.24359	-.05189	-.05903
21	-.07668	.03900	-.06987	-.05268	.00915
22	-.14610	-.15737	.01428	-.32629	-.06555
23	.12300	-.24691	-.12690	-.12205	.06101
24	.02111	-.04677	.03642	-.09645	-.08899
25	.09792	-.03969	-.10071	.04236	-.03058
26	.14081	-.17746	-.12876	.02067	-.05050
27	-.00934	.02686	.02375	-.02331	.05901
28	.02996	-.10677	.17597	-.61321	.05826
29	.00295	-.10200	-.03983	-.01419	-.79125
30	.01630	.04220	-.07067	.02532	.07353
31	.02557	.03739	.05842	-.97031	.11690
32	-.00206	.03008	.04674	-.08249	.09231
33	.12018	-.01217	-.03457	-.06344	-.10143
34	.06353	.05608	.01234	-.02921	-.00945
35	-.10373	-.16158	-.00194	.01596	-.12125
36	.00437	-.11471	-.00362	-.16759	.11553
37	.05269	-.18971	-.00462	-.14854	-.09064
38	.03663	.02070	.11522	.00548	.07579
39	-.07245	.01295	.12262	.14004	.01641
40	.23443	-.17398	-.04007	-.17337	-.01734
41	.03455	.05219	-.01131	.04047	.08415
42	.06073	-.03746	-.03925	.11943	.05146
43	.09496	-.31359	.00935	.01999	-.14776
44	.08271	-.05452	-.12161	-.14726	.08717
45	.01761	-.03029	-.08962	.07474	-.20185
46	-.05224	.10107	.04435	-.10237	.05841
47	-.03676	.17450	-.01091	.01166	-.04927
48	-.02715	-.05401	-.11191	-.20371	-.12355
49	-.02460	.03994	.04301	-.05998	-.15065
50	-.02734	-.17969	-.11299	.01130	-.11399
51	.09989	-.29416	-.11660	.00788	-.04080

VARIABLE	FACTOR 11	12	13	14	15
52	-.14776	-.01557	.03904	.07103	.13356
53	.05569	.04027	-.04004	.07295	-.08570
54	-.02094	-.08327	-.10752	-.08013	-.07962
55	-.03959	-.09541	-.26133	-.06294	-.05076
56	.02175	-.42196	-.01247	-.07888	-.14597
57	.03225	-.11425	-.11612	-.01253	-.01873
58	.04434	.09492	.01394	-.00695	-.12920
59	.09355	-.21707	-.00301	-.10477	-.03754
60	-.02299	-.16089	-.02416	-.06296	.01503
61	-.12921	-.25740	-.01787	.00549	-.07113
62	-.05434	.05619	-.00220	-.03761	-.19492
63	-.39583	.03115	-.00382	.07822	-.01921
64	.03929	-.04260	-.13793	-.19484	-.23167
65	-.17760	-.23815	-.12027	.07678	-.10383
66	-.24080	.03650	-.15058	-.25825	-.19001
67	-.00578	-.11042	-.03789	-.11646	-.07682
68	.05031	-.07692	-.85330	.02007	-.00226
69	.05683	-.04871	-.16120	-.09218	.08641
70	-.11100	-.02660	-.49241	.01322	-.06212
71	.07567	.21747	.01049	-.08423	-.21237
72	.02396	-.24079	-.05987	-.07481	-.14171
73	-.11369	-.32024	-.05410	-.06368	-.19822
74	-.02606	-.08300	.09647	-.26737	.11967
75	-.04837	-.08575	-.14046	.00152	.23067
76	-.47543	.08803	.01592	.04076	-.27574
77	-.03246	-.03306	.01765	.12385	-.05613
78	-.08789	-.14226	.00207	-.08495	.09219
79	.08031	-.49730	-.07030	.06348	-.02564
80	-.06184	-.08913	-.45748	-.09594	-.21730
81	.22131	-.16094	.13672	-.05365	.19272
82	-.22888	-.33660	.04983	-.07597	-.00008
83	-.02423	-.45560	-.02389	-.09922	-.18172
84	.12339	-.00567	.03507	.05804	-.02512
85	.17463	-.12707	-.03263	-.11804	-.21549
86	-.08809	-.06782	.07461	.00810	.08030
87	.07176	-.17816	-.03493	-.11157	.10155
88	-.04556	-.12829	-.20090	-.17996	.00271
89	.01491	-.00526	-.05882	-.12920	.03995
90	.06717	-.72015	-.08202	.01753	-.06653
91	.01532	-.31139	-.03080	-.17568	-.00621
92	-.11343	-.21280	.02122	-.06656	.17518
93	-.20132	.03043	-.15686	-.17732	.26112
94	-.00635	-.06975	-.34814	-.24889	-.05707

FACTOR

VARIABLE	16	17	18	19	20
1	-.07990	.04852	-.03290	-.00071	.03460
2	.06187	.06005	-.04258	.08022	-.04713
3	-.00234	-.07014	-.00094	-.00338	.16481
4	-.07406	.03207	-.02924	.01871	-.04197
5	.23449	-.10657	-.15619	-.23176	-.04492
6	-.04993	-.16295	-.15209	-.05920	.10341
7	.00492	-.07830	-.16233	-.08987	-.19315
8	-.24014	-.04651	-.13121	-.05692	.10058
9	-.02949	-.00133	-.09499	.00614	.06213
10	-.14105	.07951	-.05824	-.04399	.07304
11	.13755	.07772	-.00913	-.02909	.21945
12	.06983	-.21569	-.07516	.26058	-.15251
13	.21330	-.00679	-.07150	.04507	-.04282
14	-.06399	-.07535	.05119	.04085	-.69518
15	.07664	-.05306	-.10097	.06756	-.06765
16	.03637	.01890	.01352	.08903	.01199
17	.01825	-.09829	-.03942	.05285	.10336
18	.00020	.07363	-.06678	-.08695	.07271
19	-.06933	-.12464	-.11559	.19030	.11517
20	.03160	-.01184	-.10198	.09531	-.16195
21	.05679	.05760	.00449	-.00197	-.03984
22	-.05315	.29733	-.11261	.37477	.09693
23	.01638	-.15213	-.05818	.06817	-.09012
24	.11499	.14921	-.13436	.11401	-.06713
25	-.03611	-.16414	-.09174	.00470	-.26719
26	.24401	-.15463	-.14469	.22319	-.10837
27	.11438	.09145	-.02000	.10646	-.04670
28	.05299	-.20593	-.09204	.02600	-.02989
29	.02035	-.06539	-.03926	.02131	.05496
30	.14948	-.10177	-.09458	.23442	-.00835
31	-.04793	-.08422	-.09054	.05836	.06359
32	-.09103	-.09480	.02251	.05091	.01842
33	.19831	-.42964	-.01894	-.22873	.07496
34	.06499	-.03259	.12694	-.25278	-.06645
35	.09692	.06389	.08377	.06050	.01591
36	.08570	.21056	-.08009	.06114	-.15427
37	-.01711	.14061	-.08127	.04496	-.09305
38	.04930	.73350	-.06402	-.04791	.08955
39	.06160	.01796	-.06325	.03722	.02542
40	-.00604	-.04593	-.01123	.63550	-.06066
41	.08083	-.00763	-.03397	.04007	-.20554
42	.00935	-.10523	.00091	.00841	.02824
43	.05148	-.08135	.10828	.26788	-.08447
44	.02907	-.01433	-.13318	.10259	-.06391
45	.12741	-.20838	-.18074	.17058	-.14059
46	-.03463	-.05073	.00333	.09196	.00080
47	.15046	.06270	-.53249	.27518	-.23977
48	.09813	.02114	-.15551	.05939	-.07798
49	.00355	.00878	.00067	.00189	.00438
50	.01228	.03186	-.10293	.02044	-.08040
51	.20230	-.04649	-.26760	.21727	-.37398

VARIABLE	FACTOR 16	17	18	19	20
52	.08389	-.12904	-.04584	.02848	-.13098
53	.37748	-.09088	-.09057	.06736	-.08667
54	.07131	-.11969	.08307	.07395	.00417
55	.27791	-.29268	-.06324	.01025	.07867
56	.24755	.00701	-.33423	.22549	-.08242
57	.10633	.08977	-.02865	.08325	-.06885
58	.10132	-.00637	.02526	-.02572	.07434
59	-.09025	.11299	.05520	.17162	.00384
60	-.02958	.08849	-.11424	.09977	-.00846
61	-.00728	.17661	-.13731	.03322	-.02673
62	.18397	-.05880	-.00226	.14079	.16933
63	.26338	.12726	-.06938	-.02337	-.05665
64	.14312	.11005	-.22340	.09294	.19588
65	-.05443	-.05242	-.14704	.04349	-.01770
66	-.20239	.00888	.04261	.25670	-.19252
67	-.08916	.03268	-.79161	-.07015	.08064
68	-.09349	-.08703	-.06799	-.00419	-.04042
69	-.03203	-.02472	.07631	.03267	-.02797
70	.13597	-.00445	.10341	.34295	-.00224
71	.05500	.03487	.00819	-.11280	-.26422
72	.49239	.15921	.06200	.04040	-.11434
73	.02676	.22678	-.13690	.09403	-.15134
74	.57007	-.02568	.02116	-.07682	.18305
75	.11275	.07874	-.02611	-.10609	-.07308
76	.21452	-.00407	.02962	.05415	.06226
77	-.03415	-.06445	.00741	-.02725	-.00263
78	-.01003	-.30827	-.18416	.09266	.09658
79	.23993	.03960	-.26548	.21313	.10007
80	.37772	-.11536	.10965	.05943	.06748
81	-.02758	.18130	.01740	-.08741	-.10130
82	-.08444	.08421	.05379	-.14661	.09668
83	-.03082	-.01320	.03778	-.06728	-.05251
84	.03320	.04288	-.08314	-.05749	-.16102
85	.08789	-.14128	-.06063	-.06532	-.24274
86	.15537	.06153	-.19638	-.05841	.03855
87	.19149	.11640	-.05101	-.01118	-.18246
88	.08454	-.04478	-.15819	.13204	-.17831
89	.12073	-.07059	-.21846	.04092	.01370
90	.01026	-.02712	.04504	.06549	-.08988
91	.06532	-.17439	.10133	.02309	-.04255
92	-.09071	.01179	-.04061	-.09005	-.02975
93	.03005	-.14529	-.10281	.08661	-.03647
94	.13054	-.15208	-.20971	-.05794	-.04370

	FACTOR			
	21	22	23	24
VARIABLE				
1	-.12590	-.06165	-.10165	.05577
2	.01521	.10377	.06545	.06817
3	-.05083	.00648	.01040	.01929
4	.00301	-.01889	-.16802	.07720
5	-.30909	-.17207	.14698	-.17763
6	.01364	-.08370	-.11297	-.09174
7	-.19746	-.03555	.00653	.01604
8	-.06120	.09137	-.05417	-.16156
9	-.04713	.11242	.00901	.58620
10	-.12703	.15085	-.14202	-.02107
11	.08046	.30722	-.06287	-.12969
12	.02311	.03082	-.01465	.09935
13	-.14013	-.06362	-.07941	.10152
14	-.06431	.07480	.05052	-.02809
15	-.16484	.00985	-.04755	-.02934
16	-.04558	.03360	-.01971	.03297
17	.13400	-.10648	.03834	.09778
18	-.04164	-.00430	.05154	-.00917
19	.09855	.11223	.08465	-.24299
20	.07853	.03384	-.24145	.11262
21	-.02983	.05861	-.06806	-.06213
22	-.03275	-.07040	.15575	-.13323
23	-.03019	.37780	.00417	-.09954
24	.06084	.04575	-.18506	.07445
25	-.00636	.25852	-.07315	-.01132
26	.14467	-.02124	.09414	.14886
27	.09486	.05253	-.00459	-.06738
28	-.20629	.17737	.08337	-.23574
29	.07579	.07362	.04401	.02279
30	-.19973	.09200	.04910	-.16452
31	.01800	.12750	.05755	-.10743
32	-.14767	-.00533	.02962	.07251
33	.02707	.18662	.19435	.01307
34	-.16701	.03706	-.14129	-.01486
35	-.05669	.01333	.01117	.00444
36	-.23309	.09038	-.16962	.12383
37	.05441	.12679	.09167	.01455
38	.02713	.04952	.14546	-.00155
39	-.10920	.01194	-.08858	-.06080
40	-.03776	.09060	-.03107	.02008
41	-.30855	.08536	.16261	.10386
42	-.11535	.05607	-.75400	.00774
43	.06325	.01115	-.13999	.06070
44	-.03317	-.10506	.10630	-.07822
45	-.14649	-.21084	-.09292	.07417
46	.04520	.03190	.10843	.16832
47	.03706	.14215	-.16994	.06939
48	-.12302	.70798	-.07309	.11782
49	-.09232	.02529	-.08991	-.04707
50	.03895	.11299	.06632	-.08218
51	-.22147	-.00766	-.00670	-.20906

VARIABLE	FACTOR 21	22	23	24
52	-.22913	.04120	.02164	.01866
53	-.38320	-.10593	-.00877	-.11093
54	-.03690	.03147	.03754	-.00441
55	-.05348	-.24819	-.27757	.13513
56	.05934	.04471	-.10765	-.04425
57	.03033	.11187	-.11474	.03460
58	-.06928	-.08314	-.14483	.26493
59	-.10673	.15959	-.02543	.10627
60	.06765	-.09314	-.04628	-.07714
61	-.02007	.14344	-.02380	.00838
62	-.16462	-.22785	.04502	.13462
63	-.05266	.10689	.12778	.20840
64	-.25363	.31493	.08243	-.09424
65	-.11989	.12653	.01300	-.03933
66	-.03037	-.00858	.10477	.05426
67	.03695	.10274	.05716	.05715
68	-.09418	.02843	-.00767	.05167
69	-.72760	.11842	-.15450	.04952
70	-.14017	.10055	-.05023	-.04713
71	.01097	-.03486	-.11430	.05155
72	.12811	.10011	.05310	.06066
73	-.00227	.19676	-.09082	.07152
74	-.03449	.19842	-.06839	-.02347
75	.03859	-.14928	-.13243	-.04284
76	.03655	.18185	.08004	-.07204
77	-.06527	-.00953	-.01605	.02345
78	-.05961	.25224	-.05438	.45804
79	-.01517	.11225	-.03159	.17308
80	-.11169	.05321	-.00700	-.30113
81	-.35456	.13434	.06852	-.05520
82	-.25336	-.16453	-.12420	.09828
83	.06193	.02052	.02797	-.00475
84	-.02549	.00707	-.07653	.36972
85	.00765	.04819	-.08822	.01991
86	-.12306	-.00728	.04776	.16304
87	.05171	.14257	.10831	-.13651
88	.02756	.04497	.01635	.10948
89	-.15253	.14758	-.18567	.08309
90	-.05420	-.01669	.02361	.02130
91	.09597	.02484	.06325	.06530
92	-.21377	-.01670	-.10400	.00094
93	-.18245	-.04083	.12309	.14792
94	.06514	-.27238	-.15275	.10303

APPENDIX E

RELIABILITY ANALYSIS OF GROUP 1 CPRS RESULTS

TOTAL
Analysis of Variance

	DF	Sum of Squares	Mean Square
Judges	8	5284.37	660.55
Performers	9	15750.63	1750.07
Residuals	72	7686.00	106.75

INTERPRETATION
Analysis of Variance

Judges	8	428.00	53.50
Performers	9	1245.06	138.34
Residuals	72	1005.84	13.97

TONE
Analysis of Variance

Judges	8	172.70	21.59
Performers	9	288.18	32.02
Residuals	72	786.24	10.92

RHYTHM
Analysis of Variance

Judges	8	218.93	27.37
Performers	9	1674.63	186.07
Residuals	72	589.68	8.19

INTONATION
Analysis of Variance

Judges	8	238.59	29.82
Performers	9	235.35	26.15
Residuals	72	794.88	11.04

TEMPO
Analysis of Variance

Judges	8	173.33	21.67
Performers	9	315.18	35.02
Residuals	72	539.28	7.49

ARTICULATION
Analysis of Variance

Judges	8	244.70	30.59
Performers	9	301.86	33.54
Residuals	72	533.52	7.41

RELIABILITY ANALYSIS OF GROUP 2 CPRS RESULTS

TOTAL
Analysis of Variance

	DF	Sum of Squares	Mean Square
Judges	11	3350.38	304.58
Performers	9	11423.79	1269.31
Residuals	99	6408.27	64.73

INTERPRETATION
Analysis of Variance

Judges	11	327.58	29.78
Performers	9	970.56	107.84
Residuals	99	512.82	5.18

TONE
Analysis of Variance

Judges	11	552.64	50.24
Performers	9	101.16	11.24
Residuals	99	260.37	2.63

RHYTHM
Analysis of Variance

Judges	11	339.79	30.89
Performers	9	585.81	65.09
Residuals	99	798.93	8.07

INTONATION
Analysis of Variance

Judges	11	807.18	73.38
Performers	9	361.62	40.18
Residuals	99	656.37	6.63

TEMPO
Analysis of Variance

Judges	11	370.15	33.65
Performers	9	426.42	47.38
Residuals	99	366.30	3.70

ARTICULATION
Analysis of Variance

Judges	11	142.56	12.96
Performers	9	551.61	61.29
Residuals	99	709.83	7.17

RELIABILITY ANALYSIS OF GROUP 3 CPRS RESULTS

TOTAL
Analysis of Variance

	DF	Sum of Squares	Mean Square
Judges	10	5629.20	562.92
Performers	9	14100.21	1566.69
Residuals	90	3102.30	34.47

INTERPRETATION
Analysis of Variance

Judges	10	292.00	29.20
Performers	9	801.18	89.02
Residuals	90	441.00	4.90

TONE
Analysis of Variance

Judges	10	754.50	75.45
Performers	9	188.37	20.93
Residuals	90	534.60	5.94

RHYTHM
Analysis of Variance

Judges	10	278.80	27.88
Performers	9	1419.39	157.71
Residuals	90	865.80	9.62

INTONATION
Analysis of Variance

Judges	10	273.70	27.37
Performers	9	1272.06	141.34
Residuals	90	254.70	2.83

TEMPO
Analysis of Variance

Judges	10	119.50	11.95
Performers	9	157.95	17.55
Residuals	90	242.10	2.69

ARTICULATION
Analysis of Variance

Judges	10	205.30	20.53
Performers	9	668.16	74.24
Residuals	90	721.80	8.02

APPENDIX F

RELIABILITY ANALYSIS OF
PAIRED-COMPARISON CRITERION RESULTS

GROUP 1
Analysis of Variance

	DF	Sum of Squares	Mean Square
Judges	13	0.00	0.00
Performers	9	104.40	11.60
Residuals	117	9.36	.08

GROUP 2
Analysis of Variance

Judges	13	0.00	0.00
Performers	9	90.54	10.06
Residuals	117	17.55	.15

GROUP 3
Analysis of Variance

Judges	13	0.00	0.00
Performers	9	90.00	10.00
Residuals	117	25.74	.22

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East Hartford, Connecticut, 1962

Collegiate institutions attended	Dates	Degree	Date of Degree
University of Connecticut Storrs, Connecticut	1962-66	B.S.	1966
University of Connecticut Storrs, Connecticut	1966-68	M.A.	1968
University of Maryland College Park, Maryland	1967-71	Ph.D.	1971

Major: Measurement and Statistics

Positions held: Teacher, 1966-67, Ashford, Connecticut

Teacher, 1967-70, Prince Georges County, Maryland

Graduate Assistant, 1970-71, University of Maryland, College Park, Maryland