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NO. 3491

THEORETICAL CONSTRUCTS OF  
JAZZ IMPROVISATION  
PERFORMANCE

DISSERTATION

Presented to the Graduate Council of the  
University of North Texas in Partial  
Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

Charles D. Tumlinson, B.M.E., M.M.E.

Denton, Texas

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Charles David Tumlinson, Theoretical Constructs of Jazz Improvisation Performance, Doctor of Philosophy (Music Education), December 1991, 175 pp., 29 tables, 3 figures, reference list, 80 titles.

The purpose of this study was to develop and test systematically a theoretical model that delineated the constructs and subsumed variables of jazz improvisation performance. The specific research questions were; what specific performance variables are related to single line jazz solo improvisation performance? and; what is the most cogent groupings of variables into underlying constructs which characterize single line jazz solo improvisation performances for all performers, student performers, and professional performers?

The development of constructs took place in two phases: (1) The development of theoretical constructs based on an analysis of the content of the literature, and (2) testing of the theoretical model.

Thirty-three variables were identified from a list of 266 variables collected from fourteen different sources. These variables were grouped into seven hypothesized constructs: 1) Harmonic Appropriateness, 2) Rhythmic Usage 3) Melodic Usage, 4) Jazz Style, 5) Individuality, 6) Expressiveness, and 7) Form.

A performance tape containing sixty student and sixty professional jazz improvised performances was created and judges rated the contents of those performances as related to the thirty-one variables. Results of factor analyses for the total sample indicated a three construct solution, 1) Overall, 2) Use of Melody, and 3) Harmonic Divergence. The latter two constructs contained

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simple loadings with only one variable each. The student sample yielded a five construct solution, 1) Rhythmic and Melodic Variety, 2) Fluency, 3) Jazz Style/Time Feel, 4) Melodic Breadth, and 5) Melodic and Harmonic Congruity. The professional sample also yielded a five construct solution, (1) Jazz Style/Time, (2) Harmonic, Melodic, and Rhythmic Congruity, (3) Melodic Development, (4) Use of Rhythmic Repetition and Variety (only one variable), and (5) Fluency. The solutions for student and professional samples more closely approximated the hypothetical model than did the solutions for the combined sample. The hypothesized construct model was not confirmed. Instead the resultant constructs for student and professional samples were compromised of variables from across different hypothesized constructs.

## ACKNOWLEDGMENTS

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## CHAPTER I

### INTRODUCTION TO THE STUDY

Improvisation, the simultaneous composition and performance of music, has occupied an important place throughout the history of music. Though improvisation has been an important component of performance in many styles, no contemporary musical style has assimilated this practice to a greater extent than jazz. Improvisation represents an essential ingredient in most current jazz performances. Most performers in small jazz groups improvise extensively, many at all times.

Jazz improvisation has evolved into an increasingly complex performance skill that has been characterized by some writers to contain underlying elements, such as use of harmony, melody, or originality. However, little attention in the research literature has been paid to the definition or configuration of these elements in jazz improvisation. Researchers have determined, however, that other types of musical performances, such as clarinet, euphonium-tuba, voice or snare drum solo performances (Abeles, 1971, Bergee, 1987, Jones, 1986, Nichols, 1985) contain various underlying mechanisms, known as constructs. Some of the elements that these researchers have established include interpretation, tone, technique, rhythm, and tempo. It is logical to assume that since jazz is also a musical performance medium, it might also include similar types of mechanisms, yet no research to date has systematically investigated these in jazz improvisation. This study, therefore, seeks to contribute to a better understanding of the phenomenon of jazz improvisation of elements, or

constructs, within that phenomenon by defining and establishing those elements, and by examining the interrelationships among them.

#### Definition of Jazz Improvisation

Jazz improvisation has evolved into a complex skill which involves a myriad of cognitive and psychomotor processes in performance. In the earlier part of this century, it often was characterized by simple embellishment of the melody. It evolved to the extreme of 'free' improvisation without any designated harmonic, melodic, or rhythmic basis that gained acceptance in the 1960's. Most current jazz music, however, consists in part of improvising a melody over a pre-determined harmonic framework. (Gridley, 1991, p. 14) All of these previously described jazz improvisation practices exist today, making it difficult to characterize the practice of improvisation in a single cogent definition. The task is further complicated by the incorporation of harmonic, melodic, rhythmic, and other elements together with their interactions into a single, on-going, temporal, musical event which has been difficult to capture in a single, simple definition.

Gridley defined improvisation in a jazz context as a combination of simultaneous composition and performance (1991, p. 4). Brown, however, disputed the idea that jazz improvisation is entirely composed in performance since many patterns and phrases are practiced in advance (1984). A more comprehensive definition of improvisation in a jazz context was advanced by Bash:

A creative process of musical performance that encompasses use of spontaneous and prepared material based on a predetermined harmonic structure, and presented in a manner which sounds extemporaneous (1983, p. 19,20).

This definition referred to the harmonic framework, or structure that is previously determined. It also took into account the use of previously learned, or prepared, material as well as extemporaneous performance. Bash indicated that not all jazz is fully improvised at the point of performance. It is, however, intended to sound improvised.

Duke proposed the following definition of improvisation:

...Musical performance wherein the performer is granted creative freedom to change or create basic elements of the music at the time of performance. Basic elements include melodic contour, rhythm, harmonization, and texture (1972, p. 9).

This definition also takes into account the possibility that improvisation is not entirely composed at the point of performance, acknowledging that the performer has the choice to either create or change the music. He also mentions the existence of several elements in improvisation and lists examples of those elements. Jazz improvisation was operationally defined for the present study as,

Jazz performance practice based on a predetermined harmonic framework wherein the performer is granted freedom to create or change basic musical elements, and which is presented in a manner which sounds extemporaneous.

## Rationale

### Need for Theory

Duke's definition of jazz improvisation mentions the existence of several elements in improvised music and lists examples of those elements -- melodic contour, rhythm, harmonization, and texture. Various writers (Briscuso, 1972, Baker, 1979, Bash, 1983, Burnsed and Price, 1984, Rose, 1985, Schilling, 1987) also have attempted to delineate the elements of jazz

improvisation for pedagogical, descriptive, and evaluative purposes. They have, however, shown considerable disagreement as to what these elements are, and have lacked in some cases systematic empirical study which support their suppositions.

These writers have lacked an undergirding theoretical framework to guide their efforts. The development of such a theoretical frame of reference that could systematically order and explain all its integral elements and guide further attempts at confirmation of the theory, therefore, was needed.

Rainbow and Froehlich supported the development of such a theoretical structure in music education research in order to develop views "regarding how and why things work the way they do" (1987, p. 10). Agreeing with and amplifying this idea, Travers (1969) decried the more common situation in which multiple isolated studies are conducted that do not relate to one another. This situation accurately describes the current state of research in jazz improvisation research. Research has been conducted in the area of jazz improvisation, but the lack of focus or continuity from one study to another has failed to provide results which could combine to form a cogent theory of jazz improvisation.

In a critique of doctoral research conducted in jazz improvisation from 1972 to 1985, Bowman cited deficiencies which reveal a failure to explicitly describe and subsequently examine a hypothetical model of the process of jazz improvisation (1988). He contended, "It is clear what is needed are more investigations guided by genuine issues whose exploration has significant potential for the illumination of the nature of the learning, teaching, and doing of jazz improvisation" (p. 71). Before any substantial progress can be made in building a definitive body of knowledge in the research of jazz

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improvisation, there needs to be a theoretical basis clarifying the elements and relationships within jazz improvisation.

This initial, hypothetical framework should “simplify and enlighten rather than obscure” the understanding of the nature of jazz improvisation (Rainbow and Froehlich, 1987, p. 10). Because of the lack of systematic theoretical research, an exploratory study was required. Kaiser argues the need for this kind of exploratory research and encourages the hypothetical testing of many possibilities in attempting to derive some meaningful results (1970).

#### Constructs and Variables in a Theoretical Framework

In the formulation of a theory, constructs are typically employed.

Travers stated that,

It is common practice for the scientist to develop theories that postulate underlying mechanisms. In a sense these ideas concerning underlying mechanisms can be considered to be products of the scientist's imagination, but they help him immensely in thinking about the phenomena he is studying. These underlying, imagined mechanisms are known as constructs... Most theories of behavior involve constructs (p. 13).

Related to this discussion, constructs are then operationally defined for this study as underlying, imagined mechanisms that make up the component parts of a theory in jazz improvisation performance. These mechanisms may also be conceived of as factors, or collections of other items, or variables, that simplify the task of describing a complex phenomena such as jazz improvisation. Constructs help to reduce a large number of items, or variables to a smaller, more understandable set of components. The constructs of jazz improvisation were defined by referring to these variables.



The term "variable" referred to the items used to describe jazz improvisation in the present study. These variables, as defined by Borg and Gall (1983, p. 466-468) were observational variables. The observational variables in this study were of two types: descriptive and evaluative. Descriptive variables usually require little inference, they merely require a respondent to measure the incidence of qualities in a jazz improvised solo. Evaluative variables involve some judgment of quality and inference of perceived qualities in a jazz improvised solo.

Theoretical studies involving constructs have been conducted in music education. For example, Rainbow (1963, 1965) reduced a large number of variables affecting musical aptitude into a smaller, more understandable set of constructs. Other researchers (Abeles, 1971, Cooksey, 1974, DCamp, 1980, Nichols, 1985, Jones, 1986, Bergee, 1987) have established similarly devised models for evaluation of musical performance. Using factor analyses, these researchers successfully reduced large numbers of variables into smaller sets of underlying constructs, and, in doing so, simplified the task of understanding complex phenomena.

#### Constructs in Jazz Improvisation

In jazz improvisation, writers attempting to delineate the important components of jazz improvisation have used various terms, such as "factors," "elements," "categories," "areas," or "dimensions," that seem to describe underlying constructs, yet they exhibit considerable disagreement in doing so. The following provides the reader with an idea of the range of opinion on this issue. Briscuso (1972) delineated five basic elements of jazz improvisation: harmonic awareness, rhythmic development, melodic expression, ability to play in the jazz style, and individuality. Schilling (1987)

listed five factors of harmonic awareness, rhythm, melodic content, melodic phrasing, and style. Burnsed and Price (1984) instead differentiated six categories: tonal materials, melodic and rhythmic development, emotional effect, technical facility, and overall effect. Rose (1985) described eight elements: transition (departure from and return to an expected melody or subsequent improvisation); scales, modes, and nonharmonic tones; response; expressiveness; continuity; technical skill; accuracy; and exploration. Baker (1979, p. 169) suggested nine factors: tone, time, technique, harmonic control, line construction, use of language, style, use of drama, problem-solving ability, and overall effect. Bash (1983) listed ten factors: note accuracy, progression accuracy, intonation, time, style, excitement, communication, phrasing, expression, and articulation, while he separated jazz improvisation into two large dimensions, "technical" and "non-technical."

All the aforementioned writers seemed to agree that jazz improvisation contains underlying constructs, yet they disagreed on the basic content and the number that characterize jazz improvisation. In these studies, the methods used to determine the stated constructs were based largely on personal experiences and opinions, thus it is not surprising that differences of opinion exist. Distinct delineation of the relationships among the sub-elements of jazz improvisation was not established in this literature. Burnsed and Price and Schilling cited this lack of clear conception and recommended investigation of the constructs in jazz improvisation. To arrive at a usable theoretical model of jazz improvisation, it was necessary to systematically ascertain which constructs and variables are involved in the performance of jazz improvisation, to attempt to confirm these constructs and variables, and to explore their interrelationships.

### Possible Differences Between Professionals and Students

Several writers have suggested the possibility that the constructs and related variables of jazz improvisation may differ among student and professional performers. Bash (1983, p 30-32) proposed that jazz teaching overemphasizes a supposed "technical" dimension and cited studies that provide evidence that the "non-technical" dimension exerted importance in professional performances. The studies Bash cited included Owens' analysis of Charlie Parker solos (1975), Howards' analysis of Art Tatum (1978), and McKinneys' discourse on the pedagogical practices of pianist Lennie Tristano (1978). Some of the so-called "non-technical" elements that these studies revealed included repetition of motives, judicious use of silence, and careful use of pacing.

Elliott (1983) also criticized many student jazz performance contexts, asserting they deny the opportunity that professional performances have to utilize open ended forms (p. 207). In an analysis of results from the administration of a jazz improvisation rating scale, Burnsed and Price indicated that judges' responses to some items differed from professional and student performers, such as "tone and articulation" and "outside playing." In addition, some jazz performers have been critical of jazz education, maintaining that the teaching environment in academia neglects aspects that are important to jazz performance (Deffaa, 1991, p. 28). Witmer and Robbins (1988) also criticized many current jazz improvisation method books, arguing that they underemphasize many aspects, such as rhythm and melodic development that are important to professional performances, but lacking in student performances.

Implicit in these arguments is the assumption that students should emulate professional level performers. It would therefore be important to investigate if, as these individuals claim, there are differences among constructs for student and professional performers. It would also be important to know if a combined sample of student and professional performers contained underlying constructs.

### Models in Theory

To help to simplify and clarify a theory of jazz improvisation, the formulation of a model which included all the elements and interrelationships was needed. Models are analogies that "provide simple ways of thinking about very complex phenomena" (Travers, 1969, p. 24). Such analogies, whether symbolic or linguistic, frequently are used by researchers and teachers to facilitate comprehension of complex phenomena (Good, 1963, p. 7). A theoretical model of jazz improvisation incorporating constructs would serve to explain and simplify the phenomenon of jazz improvisation. At present, no such model existed which embodied all the elements recognized by experts in the field.

### Statement of Purpose

The purpose of this study was to develop and test systematically a theoretical model that delineated the constructs and subsumed variables of jazz improvisation performance.

### Research Questions

1. What specific performance variables are related to single line jazz solo improvisation performance?

2. What is the most cogent grouping of variables into underlying constructs which characterize single line jazz solo improvisation performances for all performers?

3. What is the most cogent grouping of variables into underlying constructs which characterize single line jazz solo improvisation performances by student performers?

4. What is the most cogent grouping of variables into underlying constructs which characterize single line jazz solo improvisation performances by professional performers?

#### Need for the Study

A study of this type would serve several types of practical needs in jazz education and music education. These include evaluation, diagnosis, pedagogy, and curriculum development in jazz improvisation.

Evaluation is an important part of the process in any music performance discipline (Abeles, 1971). Evaluation in jazz improvisation is, likewise, an important part of that discipline. Evaluation of improvisation performance takes place in assigning classroom grades, as part of the jazz ensemble audition process, and as an increasingly important part of the adjudication of jazz performances at jazz festivals (Curnow, 1989).

It would be of benefit for evaluative purposes to determine a model of the process of jazz improvisation that delineated the underlying constructs of jazz improvisation performance. If these constructs of improvisation performance were clear, it would also aid in evaluation. Further, it would also help validate the evaluation process if the relative importance of these constructs was determined.

Another important aspect of music performance education is diagnosis, or problem solving. The primary focus of diagnosis involves analyzing a problem and offering an effective solution. The formulation of a theory for jazz improvisation that delineated separate constructs would aid the ability to place a problem in context and offer a solution.

It would also be of pedagogical value if the constructs of jazz improvisation were clearly delineated. A clear understanding of the configuration of the constructs of jazz improvisation would aid in clarification for pedagogical issues. Buckner stated that to “free jazz more from its mysterious past, there is a need for more scientific studies to be conducted in the specific area of jazz improvisation as related to learning.” (1986, p. 73) Again, a theory of knowledge in a field of study should help simplify the phenomena, and thus should be of great value in reducing this mystery.

Music educators have supported the idea that students can benefit from instruction in improvisation (Leonhard, 1984). Since improvisation is both an important tool in promoting musical understanding and a learned skill, the music educator has a vested interest in methods, procedures, and practices associated with teaching the skill and with the outcomes of such teachings. A theoretical model that explains and simplifies the phenomenon of jazz improvisation would improve the development of strategies in teaching of jazz improvisation.

Jazz educators have been criticized for giving improvisation a relatively low priority in their curriculum (Leonhard, 1984, p. 13). This has been attributed to the still elusive, mysterious, and intimidating nature of the phenomenon of improvisation for both teachers and students (Bowman,

1984, p. 15). Improvisation, however, provides an opportunity for creative self-expression or, at least, individual music making on the part of the student performer. Bowman suggested that jazz improvisation offers a "creative, expressive experience which is ... simply inaccessible to our students elsewhere." (1982, p. 15) Jazz improvisation may also be used as a teaching and learning device to promote understanding of such concepts as scale systems and chord progressions. Knowledge of the descriptor items that comprise jazz improvisation, the delineation of constructs, and of their inter-relationships, would clarify understanding of the musical elements involved in jazz improvisation.

The curriculum of jazz improvisation is rich in quantity. A plethora of materials is currently available for jazz improvisation instruction. Through the Winter of 1990, John Kuzmich reviewed over 500 improvisation or improvisation related materials for the *Jazz Educators Journal* (1990). Modern methods in common use included those by Baker (1977a, 1977b), Aebersold (1967-91), Coker (1980), and Reeves (1989) among many others. Again, most of these methods were prepared using intuitive, experience-based means and lacked a cogent theoretical framework to bind them together. Some have attempted to identify constructs using similar terms, but none are based on systematic methods. Witmer and Robbins and Bash criticized many of these works for overemphasizing the technical, "easily objectified" elements, or constructs at the expense of other elements, such as Rhythmic Usage or Melodic Development. If a theoretical framework incorporating constructs were devised, this could help to identify strengths and weaknesses of existing jazz improvisation curricula.

### Delimitations

This project was limited to single line wind instrument jazz improvisation solo performances. While the rhythm section instruments (generally piano, bass, drums, guitar and/or percussion) are important in jazz improvisation, they present different issues for construct delineation that are considered beyond the scope of this study. Some of these kinds of issues include use of chords, double-stops, and soloing on a non-melodic instrument such as drum set.

This study also was limited to performance areas that are considered unique to jazz improvisation. Aspects considered a part of instrumental technique, such as, correct intonation, embouchure strength and flexibility, or breath control are peripheral to this study. These are generic issues that differ according to the individual instruments involved and are not directly associated with jazz style per se.

This study emphasized performance outcomes. While various notions that govern the skills of the performer affect the improvised solo such as aptitude, aural skills, intuition, habits, educational and socio-economic background, and intellect, these were considered beyond the scope of this study.

"Jazz" and "Jazz Improvisation" are wide ranging terms, with differing, often subjective meanings to different people. However, as alluded to in the definition of jazz improvisation, this study was limited to improvisations based on conventional or modal harmonic structures, or chord changes. Most current jazz improvisation based on this type of material is heavily influenced or derived from the historical sub-style known as bebop, which is considered to be the common practice style of jazz (Baker, 1985). Most later



sub-styles , such as, cool, hard bop, funky, modal, contemporary mainstream, third-stream, and fusion have been heavily influenced by the practices of the bebop sub-style. Jazz educators generally agree that fluency in bebop is required to play in these styles (Baker, 1985).

Free form or avant garde jazz is one modern sub-style that is less influenced by bebop. Evaluation, or description, of that style according to the framework of other styles is problematic, since it proposes to reject some of the elements, or constructs, that the other styles embrace (Tirro, 1977, p. 341). It also frequently uses pre-bebop, rather than bebop, styles as major influences. (Baker, 1985). The present study did not attempt to describe the free form sub-style.

## CHAPTER II

### RELATED LITERATURE

This chapter surveyed extant literature, both that which is research-based and that which is opinion-based, related to construct delineation in a musical context. This included discussion of previous jazz improvisation literature and other studies in music education concerned with construct delineation. Much of the following discussion benefited from critiques by Witmer and Robbins (1988) and Bowman (1988).

Writers have utilized various expressions such as factors, elements, categories, areas, or dimensions to describe phenomena similar to the term construct used in this study. The discussion throughout this chapter retained those author's terms when feasible.

#### Non-Empirically Based Constructs and Variables

##### Pedagogical Sources

The history of jazz improvisation pedagogy has been traced previously (Witmer and Robbins, 1988; Suber, in Baker, 1979). This discussion will highlight only those works that relate to speculated construct delineation in jazz improvisation. In all cases, the configurations of constructs by these writers appeared to be based on prior experience and opinion, rather than more systematically derived elements.

John Mehegan's Jazz Improvisation (1959-1965) is considered a landmark pedagogical work. It was credited as the first to introduce the concepts of chord-scale relationships, modes, and roman numeral analysis in

jazz (Witmer and Robbins, 1988). It emphasized the learning of scale and arpeggio patterns for the purpose of gaining the ability to improvise with tunes containing multiple chord changes. Though he did not specifically refer to constructs, Mehegan revealed his views of construct configuration with his statement, "This book analyzes the basic musical facts utilized by every jazz musician from Buddy Bolden to Dizzy Gillespie. These facts, strangely enough can be expressed in the eternal trinity of all music, 1) Melody, 2) Harmony, and 3) Rhythm." (p. 2) In explaining rhythm, he claimed that jazz musicians refer to rhythm as "time." He further explained that "time" includes aspects such as tempo, beat, pulse, and swing. Mehegan referred to "swing" as the most important of these, yet it is the most difficult to objectively define and evaluate. Mehegan believed that the difficulty lay in the multiple levels of pulsation which combine to create swing: "Melodic Swing, Harmonic Swing, and Rhythmic Swing." Defining rhythm in this manner, Mehegan thus returned full circle to his original "trinity of music, melody, harmony, and rhythm" (p. 3). This confusing, circular discussion showed the need for more clarity concerning the elements, or constructs, of jazz improvisation. It also suggested the possibility that these constructs may be strongly related to one another.

Originally written as a master's degree thesis Jerry Coker's Improvising Jazz (1964) is widely used by students and teachers. It has had a major influence on subsequent pedagogical methods and supplements. In the use of arpeggios, scale-chord relationships, and roman numeral analysis for the purpose of gaining proficiency in improvising with chord changes, Coker's book reflected the influence of Mehegan. Original ideas relating to delineation of constructs appeared in an appendix entitled "Aesthetic

Criteria for the Evaluation of a Jazz Artist", an early attempt at the informal evaluation of jazz improvisation. In that section, Coker stated that

Jazz is made up of many intangible qualities that create appeal. This appeal becomes a matter of personal taste. However, there are some definite questions that the listener can ask that are necessary to a well-rounded evaluation (p. 81).

Coker's use of the phrase "intangible qualities" alluded to the idea of constructs, or "underlying mechanisms." The criteria included were "Choice of Materials, Emotional Content, Versatility, Taste, Originality, and Intellectual Energy" (p. 81). The purpose of these criteria, however, was for the student to evaluate recorded solos by professionals, not for the evaluation of student performances.

Coker later wrote several other important works which address jazz improvisation. One of these, The Jazz Idiom (1975), suggested that the jazz players must think about chord-scale structures, motif development, form, intensity level, absorption and use of musical ideas heard in the accompaniment, and rhythmic levels and feelings (p. 57). These related to constructs concerned with the skills and cognitive actions by the performer, not actual performance outcomes. Additionally, another section on troubleshooting in improvisation listed ten commonly heard problems with proposed solutions in student improvised performances. This section did not attempt a delineation of constructs, but did offer useful variables toward formulating a theory of jazz improvisation. Some of these included "inability to find right notes fast enough, even with a reference sheet at hand," "difficulty in execution," "inability to keep up with accompaniment or

relate to pulse," and "though isolated chords are relatively easy to handle, difficulty is felt when moving from chord to chord."

How to Listen to Jazz (1990), another important book by Coker intended as a guide for the non-jazz oriented listener, included a sort of speculated construct delineation which presented nine "criteria" by which one could informally evaluate jazz improvisors performances: sound, technique, time, tonal materials, spirit/drive, lyricism, repertoire, versatility, and innovation. "Tonal materials" referred to the "selected.. chords, scales, and emphasized melody notes." "Spirit/drive" referred to "the emotional feeling and the vitality and conviction of the rhythms and pulse." He equated "Lyricism" as "melodiousness." As part of his explanation for "Versatility," Coker referred to the ability to use different types of material while retaining effectiveness. "Innovation" included "the qualities of inventiveness, creativity, and originality" (p. 72-73).

Jamey Aebersold's multi-volume A New Approach to Jazz Improvisation (1967-1991) has been an extensively used jazz improvisation method. It emphasized recorded practice tracks utilizing professional rhythm sections who play the chord progressions with which the student improvises or practices.

In Aebersold's view, presented in the first volume of the series, "The basic ingredients in music are SCALES and CHORDS" (1979, p. 1, Aebersold's capitals). His pedagogical approach is derived from this simple delineation of speculative constructs, with chords and corresponding scales meticulously notated for each of the chord progressions throughout many of his book and record sets. He did, however, address other possible constructs such as "time," "melodic development," and "articulation" in other sections. His

explanations of these nevertheless usually included references to the use of correct scales and chords.

Among the large body of jazz literature by David Baker was a chapter on the teaching of improvisation in Jazz Pedagogy (1979). In that chapter Baker included a "Student Evaluation Sheet for Improvisation." This evaluation sheet had ten categories of tone, time, technique, harmonic control, line construction, use of language, style, use of drama, problem solving ability, and overall effect (p. 169). Each category contained several items that describe it. These categories were apparently determined from the personal experience and opinions of the author.

Baker's method book, Jazz Improvisation (1977a) contained a chapter that depicted a possible melodic construct with eight tenets of good melody. These tenets helped to explain some of the items in his later evaluation sheet in Jazz Pedagogy. They were: 1) the need for "proper balance between diatonic movement and skips," 2) direction of the solo toward a climax point, 3) "contrast and interplay" in density, tension and relaxation, and intensity, 4) use of repetition as a "unifying factor," 5) contrast with rhythmic activity in the rhythm section, 6) need for a unique, distinguishing melodic feature, 7) balance between old and new, and 8) varied phrase length (p. 93-94). While Baker essentially described a possible melodic construct, some of these descriptions might also relate to other constructs.

Tonal Organization of Improvisational Techniques (LaPorta, 1981), listed twenty-four improvisation techniques that were apparently determined by non-empirical means. These were divided into two general areas of Tonal Devices ("in" techniques) and Ideo-Kinetic Techniques. The "Tonal Devices" included: melodic expression, rhythm displacement, harmonic continuity,

comping, chord tone improvisation, rhythm displacement of chord tone melodies, guide tones, chord tone melodies using guide tones, chord scale melodies, paraphrasing a melody, embellishments, and extension of embellishments. The "Ideo-kinetic techniques" included pitch area, rhythmic units, moods, narrative concepts and word phrases, extra-harmonic relationships, color impressions, timbre, varied articulation, dynamics, musical effects, space, and contrasting tonality. He listed musical examples with suggestions for practice to help the student learn to utilize each of these techniques.

Riposo (1989) introduced the concept of brain hemisphericity into jazz improvisation pedagogy, suggesting that the two hemispheres of the brain play different roles in improvisation. The left hemisphere of the brain performs such functions as linear (step by step) thinking, labelling harmonic structure, playing with knowledge, pre-planning musical ideas, hearing ideas after playing, analyzing, and playing chord ideas. The right hemisphere plays from feeling, plays by ear, conceives whole patterns of ideas, hears ideas before playing, plays ideas over progressions, and is intuitive, emotional, holistic, non rational, and non verbal (p. 2,3). Riposo claimed that an improviser should learn to use both hemispheres, becoming "double dominant" (p. 2). This claim again appeared to be based on experience, although it is superficially based on psychological research in hemisphericity. While these functions should not be considered to be constructs, different functions that correspond with purported left hemisphere and right hemisphere activity seemed to resemble underlying mechanisms, or constructs, of jazz improvisation.

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Rose (1985) identified eight elements of jazz improvisation. He contended that for better evaluation and diagnosis of student solos, the elements of improvisation need to be isolated and criteria need be defined. He did not, however, document any means by which he arrived at the selection of his elements or criteria. These elements were intended to be "guidelines for the objective and thorough analysis of individual performance. This should assist in selecting appropriate teaching materials and for detailed, reliable evaluation" (p. 46). The elements he identified include "Transition"; "Scales, modes, and nonharmonic tones"; "Response"; "Expressiveness"; "Continuity"; "Technical skill"; "Accuracy"; and "Exploration." "Transition" was described as "departure from and return to an expected melody or subsequent improvisation." "Response" involved the ability of the performer to make adjustments due to the rhythm section and environmental conditions such as room acoustics. "Accuracy" referred to the ability of a performer to respond to mistakes that occur by the soloist and the rhythm section. "Continuity" referred to the sense of direction that the soloist creates. "Exploration" referred to the soloist "exploring his emotional being, his musical universe, and acoustical aspect of the environment, and the mood or ambience created by the environment" (p. 46-47).

Dan Haerle, Jack Peterson, and Mike Steinel devised an Improvisation Jury Critique (1988) for use in jazz improvisation classes at the University of North Texas. The items in this critique were later explained and amplified by Steinel (1990). They identified the following speculated categories: Basic Musicianship, Rhythmic Elements, Harmonic Elements, Melodic and Developmental Elements, and Other. Several items appear for each category.



From a compilation of jazz solos transcribed and analyzed by graduate students, Riggs (1990) listed the following speculated elements of style: melodic, compositional, harmonic, rhythmic, scales, sound, articulation. Within each category was a comprehensive list of techniques that were found in the solo literature. The intention was to assist students in "performing in the Bebop tradition." Items in the list included "anticipatory pick-up notes - aggressive attitudes," "wave form melodic line," "saw-tooth melodic line," "extended phrases," and "large interval skips."

Each of these aforementioned authors utilized differing speculated construct delineations for the description, diagnosis, or evaluation of jazz improvisation or in describing areas of study. With the exception of LaPorta, they all emphasized the importance of the chord/scale correspondence. All of the speculated constructs described in this section were apparently selected by their authors using non-empirical methods.

### Research Sources

Research Incorporating Rating Scales With Previously Determined Constructs. Briscuso (1972) sought to investigate the relationship between scores on the Musical Aptitude Profile (MAP) by Edwin Gordon and ability in jazz improvisation. As a part of the study, Briscuso devised a rating scale in an attempt to measure abilities in "spontaneous" and "prepared" jazz improvisation<sup>1</sup> that utilized the following five criteria: harmonic awareness,

<sup>1</sup>Briscuso uses the terms "spontaneous improvisation" and "prepared improvisation" without any definition or explanation. On the surface, "prepared improvisation" appears to be a oxymoron. One could speculate that the materials (chord changes and reference melody) were prepared in advance by the improviser, while the materials for the "spontaneous improvisation" were read at sight. The reader is, again, given no information in order to clarify this.

rhythmic development and interest, melodic expressiveness, ability to play with jazz style, and individuality. These criteria were apparently determined by the researcher without prior documented evidence to support the methods by which they were developed. There were no other explanations or items other than these five criteria.

The only significant finding reported by Briscuso was a positive relationship between the MAP Musical Sensitivity sub-test and improvisation achievement. Here, he measured jazz improvisation as a global phenomenon, even though the measure of improvisation achievement was arrived at as a composite of non-empirically determined criteria, or constructs. A global measure would mean that only one overall measure of jazz improvisation is needed to describe it. If a global measurement were sufficient there would be no need for constructs.

McDaniel (1974) investigated the relationship of musical achievement, experience, and background between collegiate jazz improvising and non improvising musicians. A portion of the study was concerned with selecting a pool of jazz improvising musicians. Three judges listened to tapes over two chord progressions and rated each subject's jazz improvisation ability according to six factors: melodic conception, harmonic conception, originality of solo, direction of solo, maturation of ideas, and ability to play in a jazz style. These factors were apparently previously determined according to the personal experience and opinions of the researcher. The Alferis Musical Achievement Test was used to measure musical achievement, while a researcher-developed measure was used to measure experience and background. McDaniel found a positive correlation between improvisation ability and music achievement, and between improvisation ability and

experience. With these findings he also regarded improvisation as a global phenomenon, despite his identification of separate constructs earlier in the study. These results were also compromised by problems in sampling and the achievement measure, which were acknowledged by the researcher.

Bash (1983) examined the differences between two purported dimensions in jazz music: technical and non-technical. His procedure compared three different treatments: 1) a straightforward, technical presentation of material only, 2) the technical presentation and an "aural perception procedure," and 3) the technical presentation with an "historical-analytical sequence." To evaluate the comparative teaching success of his three treatments, Bash created a rating scale (the Improvisation Performance Instrument, or IPI) with ten factors. These speculated factors, or constructs, were note accuracy, progression accuracy, intonation, time, style, excitement, communication, phrasing, expression, and articulation. Bash reported conducting an investigation of the speculated non-technical dimension consisting of a questionnaire regarding the appropriateness of seven terms that purportedly described the non-technical domain. Even though he reported a high degree of agreement among respondents that those terms were descriptive of the non-technical domain, Bash did not apparently include any of these terms in his IPI, nor did he document this omission.

While Bash found a statistically significant difference between the exclusive technical description and the other two treatments, he did not find a significant difference between those two treatments. Reliabilities of his rating scale ranged from .68 to .93 (p. 91). Bash's study suggested that there may be several constructs that undergird jazz improvisation performance.

The actual configuration of those constructs, however, was not clarified by this study.

Rating Scale Research. Two known studies developed rating scales to evaluate jazz improvisation. Both seemed to indicate the presence of only one construct of jazz improvisation, although their constructs were not devised through systematic means. Both also indicated the need for further study of the constructs, or dimensions, of jazz improvisation.

Noting the inconsistency of past efforts to evaluate improvisation performance, Burnsed and Price (1984) developed a rating scale with six category headings: 1) technical facility, 2) melodic and rhythmic development, 3) style, 4) tonal materials, 5) emotional effect, and 6) overall. There was no evidence to support the designation of these particular category headings. However, the authors did conduct a survey from three university jazz programs and a "review of jazz improvisation literature" for the "constructs of jazz improvisation" that yielded thirty-three terms (p. 36). These terms were then grouped under the first five category headings. Eight judges were utilized for this study. Four of the judges had significant jazz experience, the other four did not. The interjudge reliability calculated using Kendall's Coefficient of Concordance was found to be significant ( $W = .73$ ), though the observed correlation of the jazz judges scores ( $W=.92$ ) was higher than the non-jazz judges ( $W=.77$ ). A correlation matrix of the six category ratings indicated a high correlation between category ratings, leading the researchers to conclude that each of the categories "may represent the same construct of jazz improvisation" (p. 39). However, the categories, or constructs, of this rating scale were apparently determined according to a survey and not through systematic, empirical means.

Most of the judges also responded that the nature of the accompanying group, or rhythm section, had an effect on their ratings. A wide variety of situations such as play-along recordings, studio and live performances were used. The authors recommended that future research control this factor. Content validity was claimed from the process of selection of variables. Concurrent validity was also claimed from the results of the judges evaluations.

Citing the validity problems inherent in most current improvisation evaluations, Schilling (1987) sought to "determine the feasibility of objective diagnostic measurement of jazz improvisation achievement." He designed and tested separate rating scales for five dimensions: 1) harmonic awareness, 2) melodic phrasing, 3) melodic content, 4) rhythm, and 5) style. These rating scales were of two types, continuous and additive as suggested by Gordon. A continuous rating scale utilizes succeeding items arranged in a continuum that represents hierarchical advancement on the part of the performer. An additive scale takes the form of a checklist, without any hierarchical ordering.

Estimated reliabilities for the rating scales ranged from .74 to .88 with a composite reliability of .90. The highest reliabilities were reported for the style and melodic phrasing dimensions. Similar to Burnsed and Price, the inter-correlations of the five rating scales were high (.63 to .98) again leading the researcher to suggest that there may be only one global dimension, or construct, in jazz improvisation. Again, the use of a priori constructs could have contributed to this finding. Despite this finding, Schilling stated his belief that the dimensions, or constructs, of jazz improvisation are unique. He also suggested that "dimensions with more clearly defined criteria" were needed (p. 165).

Other Jazz Research that Described Constructs. Paulson (1985) sought to develop an instructional approach centered on effective melodic statements in improvised jazz solos that emphasized an imitative, aural strategy. No evaluation of the method was conducted and the study was limited to the development of the approach. Paulson did, however, list four "Contributing Factors Affecting Basic Improvisation Elements": Sound, Rhythm, Pitch, and Dynamics. Also included was a listing of "Formal Techniques Pertaining to Melody," which was considered as a fifth factor. Each factor contained several variables which were discussed later in this study.

In a comprehensive study of the foundations for jazz education, Elliott (1983) presented a philosophical position on the nature and value of jazz education as aesthetic education. While Elliott did not attempt to delineate constructs, he included descriptions of several variables and constructs that apply to the present study.

In the main section of his study, Elliott recommended broadening the concept of music education as aesthetic education to admit an additional dimension of musical meaning: that of "processual" musical meaning. This would be added to the current "syntactical" dimension that has been advocated by Leonard Meyer, Bennett Reimer, and Susanne Langer. Briefly, this position encouraged jazz education and the more intuitive, less notation bound performing and teaching processes inherently involved in jazz improvisation. In a later article, Elliott (1988, p. 13, 33) re-couched the term "processual" to "statistical" to be consistent with later works of Meyer. He stated a reluctance toward the use of this term, but retained it to retain

consistency. This study retained the original term of "processual" evidently preferred by the author.

In contrast to some of the previously mentioned studies and methods, Elliott's emphasis was on the "process" of performing jazz through the "time-feel dimension." To Elliott, form in jazz music was seen as a verb (1983, p. 194). This concept of form is different from a mere imitation of the kind of architectonic form seen in Western European art music. Concepts such as the importance of timing of important phrases, climaxes, quotes and/or gestures (p. 208), spontaneity, and repetition had importance for Elliott. Each of these were re-couched as variables in the present study.

Summary. Of the aforementioned researchers, Briscuso, McDaniel, Bash, Burnsed and Price, and Schilling used various speculative construct delineations for the description or evaluation of jazz improvisation. All of the constructs described in the preceding section were selected by non-empirical means. It is evident that there is no standard theory at the basis of these works. The situation resembles the undesirable situation depicted by Travers as a series of isolated studies that are not "tied to a common thread of theory" (1969).

To measure jazz improvisation proficiency, researchers often developed their own rating scales marked by their own personal perception of construct delineation. Each author had a different perception of this delineation. Schilling accurately expressed the need of each of these studies, citing the need for "dimensions with more clearly defined criteria" (1987, p. 165). This stands in contrast to the standardized tests that were sometimes used in their studies, such as the Musical Aptitude Profile and the Alferis Musical Achievement test.

Music and Music Education Studies Concerned  
with Construct Delineation

Objective techniques to arrive at the constructs of jazz improvisation were not present in the current literature. An examination in the larger field of music education, however, revealed a body of literature related to this type of issue.

In an early study related to the delineation of constructs of music ability, Drake (1939) factor analyzed eight different music tests. These include tests by Seashore, Kwalwasser-Dykema, and Drake. He found one common factor. In similar fashion, Karlin (1942) also factor analyzed several tests and found three factors of tonal sensibility, memory for musical elements, and memory of musical form.

Henkin (1955, 1957) investigated the components of music as perceived by music appreciation students. A factor analysis was performed on the results of a test that examined the preference toward certain selected pieces. Pieces were selected that seemed to exhibit strong tendencies toward four hypothesized constructs, melody, harmony, rhythm, and orchestral color. The factor analysis performed on the results, however, yielded only two strong factors of melody and rhythm and a third, weaker, factor of orchestral color. Rotation performed on the data later revealed another melodic factor (1957). The hypothesized harmony factor did not emerge, possibly due to the lack of sophistication on the part of the subjects.

Gorder (1980) investigated constructs of musical creativity based on the theories of Guilford. A factor analysis performed on a researcher developed measure demonstrated constructs of fluency, flexibility, originality, and quality.



Many other recent studies have utilized the facet factorial procedure to devise rating scales for various performing media. A major process of the facet factorial process involved delineating constructs of the performing area in order to establish categories for the rating scales. The first of these studies was conducted by Abeles (1971). He believed that the facet factorial process could be employed to create a rating scale to evaluate a complex behavior, clarinet performance. His procedure involved gathering of performance descriptions from music teachers and previous research, placing those descriptions into an a priori structure, and developing an item pool resulting in 94 statements presented with a five point Likert-type rating scale. He then obtained performance ratings with the item pool utilizing 50 judges, factor analyzed the ratings to establish constructs to serve as rating scale category headings, and selected items for the rating scale sub-scales. These procedures resulted in a rating scale with six constructs: Interpretation, Tone, Rhythm/Continuity, Intonation, Tempo, and Articulation. The five items that loaded most highly on each of the six constructs, without loading highly on other constructs, were retained to comprise the sub-scales of his Clarinet Performance Rating Scale (CPRS). Interjudge reliability was estimated through Hoyt's Analysis of Variance, yielding  $r$ 's ranging from .66 to .98., Abeles demonstrated that factor analysis could be used effectively to help describe relationships within an area of music performance. He also established methodological procedures utilizing factor analysis that have become standard in music education research. The remainder of the studies presented in this section largely adopted those procedures.

Cooksey (1975) employed the facet-factorial technique to create a rating scale for high school choral music performance. Procedures were similar to

the Abeles study with a few distinctive features that will be described below. The Choral Performance Rating Scale (CPRS) underwent two factor analyses. From the first analysis, eight factors were initially identified. Items were assigned to form the initial CPRS. The data were then again factor analyzed and revised to contain seven constructs: Diction, Precision, Dynamics, Tone Control, Tempo, Balance/Blend, and Interpretation/Musical Effect.

DCamp (1980) employed the facet-factorial approach in developing a Band Performance Rating Scale (BPRS) for high school band performance. Procedures again resembled the two previously discussed studies. To collect statements, the researcher performed a content analysis of extant adjudication ballots, previous research, and essays which were then factor analyzed in a manner similar to the other studies. While an eight-factor model provided the best fit with the a priori configuration, the resulting scale consisted of five constructs which met a simple structure criterion: Tone-Intonation, Balance, Musical Interpretation, Rhythm, and Technical Accuracy. Six items with the highest factor loadings were selected for each of the five sub-scales. The composite Test-Retest reliability was reported as .91 with sub-scale *r*'s ranging from .63 to .88. The reported correlation between a rank order based on the BPRS and a paired comparison criterion was .90.

Nichols (1985) employed factor analysis techniques to create a Snare Drum Rating Scale (SDRS). A four-factor solution provided the best fit with the a priori model derived from Abeles' research, however only three constructs were interpretable: Technique-Rhythm, Interpretation, and Tone Quality. Intra-judge reliability ranged from .88 to .95 with an overall correlation coefficient of .91. Interjudge reliability ranged from .47 to .81,

considerably lower than the other measure. A paired-comparison criterion related validity yielded a corrected coefficient of .60.

Jones (1986) utilized the facet-factorial approach in developing a Vocal Performance Rating Scale (VPRS). Initial rotation indicated a five-factor solution which was confirmed by a subsequent factor analysis; Interpretation/Musical Effect, Tone-Musicianship, Technique, Suitability/Ensemble, and Diction. Interjudge reliability sub-scores ranged from .39 to .88 with a total score of .89. A criterion-related validity study yielded a global criterion ranging from .59 to .82.

Bergee (1987) developed a Euphonium-Tuba Performance Rating Scale (ETPRS) that also utilized the facet-factorial approach. The initial factor analysis resulted in a five factor model which was revised to four factors after another factor analysis: Interpretation/ Musical Effect, Tone Quality/ Intonation, Technique, and Rhythm/Tempo. An interjudge reliability ANOVA yielded  $r$ 's that were all  $>.9$  except one sub-scale. Two criterion related validity studies were conducted resulting in global ranking yielded  $r$ 's ranging from .50 to .99.

Table 1 lists a summary of the constructs derived from all of these studies. It should be noted that all of the previously discussed studies employed the principal components factor analysis method. Listed together on a horizontal plane are identical, or similar, constructs found in these studies. The collection of each researcher's constructs can be seen by viewing through each column vertically. Tables utilizing this format were used throughout the present study to demonstrate constructs and variables of various authors in relation to jazz improvisation performance.

Table 1

Comparison of Constructs Derived from Previous Research  
in Music Education

Abeles	Bergee	Nichols	Jones	DCamp	Cooksey
Clarinet Tuba	Euphonium/ Drum	Snare	Voice	Band	Choral
Tone	Tone/ Intonation	Tone Quality	Tone	Tone/ Intonation	Tone Control
Rhythmic Continuity	Rhythm/ Tempo	Technique/ Rhythm		Rhythm	Precision
Interpre- tation/ Musical Effect	Interpre- tation/ Musical Effect	Interpre- tation	Interpre- tation	Musical Interpre- tation/Musical Effect	Interpre- tation
Articu- lation	Technique		Technique	Technical Accuracy	
Intonation					
Tempo					Tempo
				Balance	Balance/ Blend
			Suitability/ Ensemble		
			Diction		

All of these studies employed orthogonal rotations utilizing the varimax procedure. Decisions made on the number of factors retained were generally based on three criteria: 1) best fit with the established a priori model, 2) eigenvalues over 1, and 3) Cattell's scree test. In most cases, the first of these three criteria was found to be the most useful in determining the configuration of constructs for these studies.

These studies have demonstrated that factor analysis is a consistent procedure that has been utilized in the reduction of many possible variables to a smaller number of constructs in various domains of music performance.

#### Summary

It is evident that there was a lack of agreement in the jazz field indicating any existing theoretical model of jazz improvisation. Each author, or researcher forwarded somewhat different concepts and delineations of constructs of jazz improvisation. There was no underlying theory that includes all these various views of jazz improvisation. However in the larger field of music education, several studies have established constructs for various performing disciplines such as intonation, tone, rhythmic continuity, and interpretation. All of these utilized factor analysis to determine the configuration of constructs as a part of studies devising rating scales to measure musical performance. The current study sought to identify constructs of jazz improvisation. This type of objective research to arrive at constructs has not been conducted in the jazz area, yet a strong need exists for this type of theoretical model construction. The literature indicated that the kind of situations exist in the jazz improvisation pedagogical fields that could benefit from factor analysis.

## CHAPTER III

### METHODOLOGY

#### Introduction

The purpose of this study was to develop and test systematically a theoretical model that delineated the constructs and and subsumed variables of jazz improvisation performance. This was accomplished for three samples: Total, student, and professional jazz improvisation performances.

#### Overview of Procedures

The initial phase of the study sought to determine the descriptor variables that have been used to describe jazz improvisation. It involved these steps: gathering descriptions relating to jazz improvisation performance, comparing and summarizing those descriptions into preliminary variables and theoretical constructs, formulating a preliminary model, placing the descriptions according to the preliminary construct model, and then synthesizing variables from the various constructs to create a pilot scale to describe, evaluate, and diagnose jazz improvisation.

The second phase involved administering a pilot study with the pilot measurement instrument and modifying judges' instructions and rating instruments as needed.

A pool of 120 performers was selected for the main study, and two expert judges measured the jazz improvisation performances. The final phase began with factor analyses of the ratings. Initial extractions were rotated to attempt to obtain interpretable factor solutions. A detailed description of these procedures for the study follows.

## Detail of Procedures

### Gathering Descriptions

The list of potential variables was collected from a survey of the Journal and Research Proceedings of the National (now International) Association of Jazz Educators as well as several texts on jazz improvisation, jazz pedagogy, and rating scales of jazz improvisation. Fourteen different sources yielded a total of two hundred sixty-six different variables that describe jazz improvisation. The constructs and variables of Baker (1979), Haerle, et al. (1988), Burnsed and Price (1983), Schilling (1987), Rose (1985), Coker (1975, 1964, and 1990), Bash (1983), McDaniel (1974), Paulson (1985), LaPorta (1981), and Riggs (1990) were listed and compared. Added to this were variables by Baker in his chapter from Jazz Improvisation entitled "Techniques to be Used in Developing a Melody" (1977a), and from the dissertation by Elliott (1983) discussed in Chapter Two.

### Comparison of Previous Constructs and Variables

A comparison by the investigator of the jazz rating scales and other descriptions of jazz improvisation revealed points of agreement and disagreement. These points of agreement and disagreement were noted and used as guidelines for the synthesis of the constructs as described by various authors into categories of similarity. Though none of the author's whose ideas were used in the construction of categories actually conceived of their notions as factors, or constructs, the investigator assumed that similarities which seemed to bind certain of their terms together might have been the same phenomena which would later bind together the variables into constructs. Out of these categories the first hypothetical model was developed (see Table 2).

All eleven authors listed in Table 2 identified some type of harmonic construct. All authors except for Rose and McDaniel identified some type of rhythmic construct. Baker, Coker, and Bash referred only to "Time", while Haerle et al., Schilling, Paulson, Riggs, and Briscuso spoke of the idea of "Rhythm." Burnsed and Price combined both Melodic and Rhythmic development together. All eleven of these authors addressed some type of melodic usage, though Burnsed and Price did combine constructs as noted above. Beyond these there was much less agreement, though constructs of jazz style, individuality, expressiveness, and form did appear to receive some support.

The second developmental stage consisted of grouping the 266 variables into their proper places according to the hypothetical set of constructs: 1) Harmonic Appropriateness, 2) Rhythmic Usage 3) Melodic Usage, 4) Jazz Style, 5) Individuality, 6) Expressiveness, and 7) Form. This synthesis (of constructs) was performed by the researcher. First, the variables, or equivalents, were compared and grouped together by comparing identical or similar terms and themes. Those variables that resembled each other or matched were listed together on the same horizontal plane. These were then synthesized and summarized in the synthesis column. Tables 3 through 9 list each of these statements within their proposed constructs. entitled "Test Instrument Items" lists variables that form the item pool for the study.



Table 2

Comparison of Proposed Constructs by Various Authors

CONSTRUCT TITLES (Proposed for this research)	Baker	Haerle, Peterson, and Steinel	Burnsed/Price	Schilling	Rose
HARMONIC APPROPRIATENESS	Harmonic Control	Harmonic Elements	Tonal Materials	Harmonic Awareness	Scales, Modes & non-harmonic tones
RHYTHMIC USAGE	Time	Rhythmic Elements	(Melodic and) Rhythmic Development	Rhythm	-
MELODIC USAGE	A. Line Construction B. Use of Language	Melodic Elements	Melodic (and Rhythmic) Development	A. Melodic Phrasing B. Melodic Content	Transition
JAZZ STYLE	A. Style  B. Tone	-	Style	Style	-
INDIVIDUALITY					Exploration
EXPRESSIVENESS	Use of Drama Expressiveness	Other	Emotional Effect		
FORM					Continuity
MISCELLANEOUS	A. Problem solving ability B. Technique C. Overall Effect				A. Response B. Accuracy C. Technical Skill

table continues

<u>Coker - How to Listen to Jazz</u>	Bash	McDaniel	Paulson	Riggs	Brisuso
Tonal Materials	A. Note accuracy B. Progression accuracy	Harmonic conception	Pitch	Harmonic	Harmonic Awareness
Time	Time	-	Rhythm	Rhythmic	Rhythmic development and interest
Lyricism	Phrasing	Melodic Conception		A. Melodic B. Compositional C. Scales	Melodic expressiveness
Sound	A. Style - Approp- riate to the music B. Articulation - uses variety	Jazz Style	Sound	A. Sound B. Articulation	Ability to play with jazz style
Innovation		Originality of Style			Individuality
Spirit/Drive	A. Expression B. Communication C. Excitement		Dynamics		
Versatility Repertoire Technique		A. Direction of Solo B. Maturity of Ideas			

A third phase in this analysis adjusted comparable items found in differing constructs in the following manner. If a proposed construct or item from one author corresponded with items in another construct, it was moved to the construct that exhibited the strongest support. This was an attempt to reduce the number of items. The results of this phase are shown and discussed in Tables 15 to 21 in Chapter Four. These were again summarized in the synthesis column. The last column reading from left to right entitled "Test Instrument Items" lists variables that form the item pool for the study.

Creation of a Pilot Test Instrument to Characterize Jazz Improvisation

The wording of the items in the "synthesis" column was recouched in a manner appropriate to a descriptive scale that characterizes jazz improvisation. Two University of North Texas Jazz faculty members verified that this met the requirements for reducing the variables as much as possible while including all concepts that described jazz improvisation in the literature. They were also asked if any other sources that were not consulted would add new concepts, or if the summaries over-generalized the concepts presented. They expressed no disagreements with the summaries by the researcher. One suggested that some terms be clearly defined.

All items from the "Test Instrument Items" column were assembled together. The items were randomly ordered with the aid of a random number table. In an attempt to avoid the possibility of a response set on the part of the judges, items were couched in both positive and negative manners in the original pilot test instrument and then translated them into a five point, Likert-type scale.

Table 3  
Harmonic Appropriateness

Author	Baker	Haerle, et al.	Burnsed & Price	Schilling	Rose	Coker	Coker - How to Listen ...
Proposed Construct Headings	Harmonic Control	Harmonic Elements	Tonal Materials	Harmonic Awareness	Scales, Modes & non-harmonic tones		Tonal Materials
Variables		Chord/scale choices	Chord/scale choices Right/wrong	Changes blues scale at I,IV,V tonal areas  Uses one blues scale	Use of appropriate musical materials	Inability to hear right notes fast enough.	The selected chords and scales
.....							
		Color tones	Use of non-harmonic tones	Diatonic, chromatic chord extensions			Emphasized melody notes
Sideslipping							
.....							
Traditional formulae	Command of II-V's (major and minor)			Implies all written chord changes	Ability to manipulate melodic material in relation to the underlying harmonic progression	Difficulty in moving from chord to chord	
Cycles Turnarounds				Implies cadences to I,IV,V tonal areas		Losing place when reading progression	
Substitutions				Plays turnaround at end of form		Inability to hear progressions	
.....							
		Guide tones	Voice leading				
.....							
		Typical arpeggiated ideas					

table continues

Bash	McDaniel	Paulson	LaPorta	Riggs	Synthesis
A. Note accuracy	Harmonic conception	Pitch		Harmonic	
B. Progression accuracy					
Note accuracy	Ability to construct melody dictated by the harmonies	Chord-scales Playing "inside" of the basic harmony			'Inside' harmonic usage- in relation to the sounding chord
		Non-harmonic tones Playing "outside" of the basic harmony	Extra-Harmonic relationships: 1. Harmonic juxtaposition (over chord) 2. Dovetailing moving chords in & out of written harmonic symbol	Non-harmonic tones Symmetrical planing (also called sideslipping)	More extended usage in relation to the sounding chord
Progression accuracy					Command of chord progressions
				Tri-tone substitution	
			Guide Tones	Guide tone melodic lines	Guide tones and voice leading -
		Arpeggiation			Arpeggiation

Table 4

Rhythmic Usage

Author	Baker	Baker - <u>Jazz Improvisation</u> Constructing a Melody	Haerle, et al.	Burnsed and Price	Coker	Coker- <u>How to Listen to Jazz</u>
Proposed Construct Headings	Time		Rhythmic Elements	(Melodic and) Rhythmic Elements	Rhythm	
Variables	Metronomic sense Feeling for the Beat		Basic time feel		Difficulty in relating to pulse	The consistent accuracy and feeling of the pulse
	Use of the rhythm section Swing feel	Move when rhythm is static, relax when there is a lot of rhythmic motion	Eighth note feel and concept			
			Jazz articulation			
	Rhythmic variety and interest		Use of repetition		Continuity/ variety Motivic development	
			Rhythmic variety		Rhythmic invention	
			Phrasing and use of space			

table continues

Schilling	Bash	Paulson	LaPorta	Riggs	Elliott	Synthesis
Rhythm	Time	Rhythm		Rhythmic		
	Time	Playing "inside" of basic pulse		Straight to swing eighth note style	Time- steadiness of pulse Feel - sub- divisions Kinesthetic response	Basic time feel
		Articulation Style Accent		Style & articulation	Repetition	Continuum between rhythmic repetition and variety-- develop- ment
Little cohesiveness, sporadic rhythms Develops rhythmic motive through arpeggiation, diminution, frequency, sequence, and repetition				Rhythmic motivic development Active rhythmic variations	Shifted accents	
		Syncopation	Rhythmic elaboration			
Constant rhythm, little variation or space. Rhythm rests and breathes		Separation	Use of space	Use of space	Silence	

Table 5

Melodic Usage

Author	Baker	Baker - <u>Jazz</u> Improvisation	Haerle, et al.	Burnsed and Price	Schilling
Proposed Construct Headings	A. Line Construction B. Use of Language		Melodic Elements	Melodic (and Rhythmic Development)	A. Melodic Phrasing B. Melodic Content
Variables	B. Use of language is appropriate and authentic B. Balance between bebop and contemporary constructs B. Grasp of variety of ii-V7 patterns and other formulae	Balance between new and old	Command of basic jazz vocabulary	Use of cliches/patterns	
	A. Effective melodies with contours A. Balance A. Continuation techniques	Balance between diatonic mvt. and skips Balance and contrast/interplay in density, tension/relaxation, and intensity	Lyricism and melodic sense	Phrasing Melodic cadences	
		Some repetition of melody to unify	Motivic development	Motivic development Transposition of ideas Development techniques	Departure from and return to expected melody
	A. Variety A. Variety of note choice A. Variety of intervals	Variety of phrase length		Tessitura	
					Manipulation of the melody in relation to the harmonic progression
	B. Balance between personal and public domain material A. Intelligent and effective use of materials	Melody should have a distinctive feature		Originality Awareness of form	

table continues



Schilling	Coker - <u>The Jazz Idiom</u>	Coker- <u>How to Listen To Jazz</u>	Bash	McDaniel
A. Melodic Phrasing B. Melodic Content		Lyricism	Phrasing	Melodic conception

Bored with hum-  
drum phrases

Melodiousness

Phrasing

- A. Repetition
- A. Sequence

- A. Relationship between phrases
- A. Use of targets and goals

- B. Correct chord tones
- B. Correct scale tones
- B. Unintentional dissonance
- B. Intentional chromatic color tones
- B. Deliberate superimposed tonalities

Ability to play  
melody over a  
given set of  
chords

table continues

Paulson	LaPorta	Riggs	Elliott	Synthesis
	Melody	A. Melodic B. Compositional C. Scales		
				Use of jazz language (vocabulary)
		A. Melodic quotes		
Phrasing	Theme and variations	A. Wave form or sawtooth melodic line A. Angularity A. Paraphrasing a melody	Improvised melody matches phrases of song	Melodicism (some vagueness) note Bash's "Phrasing" others place that in rhythmic
Motivic construction		B. Augmentation, diminution, fragmentation B. Antecedent-consequent melodic development B. Sequence A. Extended phrases A. Elongated intensity A. Extending melodies through bar lines B. Generating repeating, inverted motif		Melodic and motivic development Concept of motivic or continuous melodic concepts
Melodic variation				Variety
	Arpeggiation	A. Change running A. Chromatic approaches		Correspondence of melody to the given harmony -Could belong in Harmonic Appropriateness
				Unique Variables Resembles Individuality and Form Constructs

Table 6

Jazz Style

Author	Baker	Burnsed/Price	Schilling	Coker	Coker - <u>How to Listen to Jazz</u>	Bash
Proposed Construct Headings	A. Style B. Tone	Style	Style		Sound	Style - Appropriate to the music B. Articulation - Uses Variety
Variables	Is sound consistent with style? Control of tone	Sound/tone	Sound quality representative of style		Tone quality- small to large, mellow to brilliant, dull to lively	
	Tone: flexibility, effectiveness, vibrato, personalization	Sound effects	Special effects			
	Is articulation consistent with the style?		Appropriateness of articulation			B. Articulation- uses variety
	Does the student play in a convincing manner consistent with the stylistic imperatives?				Style is indistinct and/or naive and execution lacks conviction	
	Are harmonic, rhythmic, and melodic devices consistent with style?	Rhythmic projection	Rhythmic figures appropriate to style			
		Time feel	Swing eight notes (upbeat accent)			
		Cliches/ patterns	Special effects			
		Sound effects				

table continues

McDaniel	Paulson	LaPorta	Riggs	Elliott	Synthesis
Jazz Style	Sound		A. Sound B. Articulation		
	Control of Timbre	Timbre		Timbral aspects of solo	Variables referring to sound -
	Range or Register	Musical effects: falls, scoops, plops, ghost notes, doits, smears	A. Jazz inflections		
	Vibrato				
	Articulation	Varied articulation	B. Doodle or Doo-n tonguing B. Repeated note doodle tonguing B. Articulation variation		Articulation
Devices, materials, expressive elements indigenous to jazz	Style				Appropriate style
			A. BeBop dynamics with the shape of the line		Unique- note obvious correspondence with other constructs

Table 7

Individuality

Author	Rose	Coker- Improvising Jazz	Coker- <u>How to Listen to Jazz</u>	McDaniel	Synthesis
Proposed Construct Headings	Exploration	Originality	Innovation	Originality of Style	
Variables	Ability to develop new material	Uses own material	Originality	Ability to render a fresh, novel, and inventive solo	Uses own material-
		Creative urge, enriched with new musical ideas	Creativity		Creativity

Table 8

Expressiveness

Author	Baker	Haerle, et al.	Burnsed and Price	Rose	Coker - <u>How to Listen to Jazz</u>
Proposed Construct Headings	Use of Drama	Other	Emotional Effect	Expressiveness	Spirit/Drive
Variables	Idiomatic/non-idiomatic use of instrument	Use of dramatic and idiomatic usage			
	Predictability/non-predictability		Tension/ release	Emotive use of tension & release	
			Intensity Momentum Spirit/drive Climax Dramatic devices		
		Basic emotional quality			The emotional feeling and vitality
	Rhythmic, harmonic contrast				Convictions of rhythms and pulse
	Range contrast Dynamic contrast Sound contrast Inflection Sound alteration			Expressive use of articulation  Dynamics	
	Melodic Contrast Characteristic Jazz cliches Space		Shape	Emotive use of tone Emotive use of phrasing	

table continues

Bash	Paulson	LaPorta	Elliott	Synthesis
A. Expression B. Communication C. Excitement	Dynamics			
				Continuum referring to balance between idio/non-idiomatic use of instrument
				Tension/release, Predictability/ non-predictability
				Intensity, momentum
Excitement	Dramatic Devices			
Expression	Emotional mood of the solo	Moods		Emotion
Communication	Group communication		Communication with other musicians	Communication
	Style		Dramatic use of articulation	As Baker alludes, many of the other listed proposed constructs can be employed to create expressiveness, emotional effect, or drama
		Dynamics	Dynamic dramatic devices	
			Timbral dramatic devices	

Table 9

Form

Author	Baker- Constructing a Melody	Rose	Coker	Elliott	Synthesis
Proposed Construct Headings		A. Continuity			
Variables	Melody should aim toward a climax point	B. Response A. Sense of direction B. Relation of internal ideas	Solo lacks cohesiveness, feels the same from tune to tune		Sense of direction
				Repetition in form	Developmental (could relate to melodic)
				Spontaneity	Spontaneity
				Sense of timing of important phrases, climaxes, quotes, and/or gestures	Timing



### Administration of Pilot Study Using Judges Rating Taped Performances

A pilot study was conducted to determine the feasibility of the test instrument developed for this study. The purpose of the pilot study was to determine the clarity and effectiveness of the items on the test instrument. The researcher played recordings of three student jazz performances for a eventual total of seven judges. The judges had the opportunity to comment on the clarity of the items of the test instrument and of their ability to use it to make distinctions from the recordings. Appendix A contains a copy of the original pilot test form. The three performances represented a wide spectrum of performance ability: one beginning student, one intermediate student, and a professional performer. They also played different instruments, trumpet, alto saxophone, and trombone, respectively.

### Pilot Test Results

The judges in each phase of the pilot study listened to the same three jazz improvisation performances covering a wide range of abilities and judged these performances according to the pilot test instrument. Each pilot test judge was selected for his high level of expertise in jazz improvisation. The subjects were also encouraged either to write down or verbalize any difficulties in the use of the test instrument. In addition, the subjects were asked to respond whether the quality of the recordings detracted from their ability to make distinctions.

The first phase of the pilot study was conducted with two experienced jazz performer/teachers in the presence of the researcher. One was an experienced high school and elementary school band director who has extensively taught jazz improvisation privately and at the university level. The other was Bill McFarlin, the executive director of the International

Association of Jazz Educators. One of these individuals mentioned that it was difficult to evaluate a jazz performance on the basis of a Likert type scale with responses such as "Strongly Agree" and "Neutral." The same individual also commented that the negatively stated items were difficult and confusing. Both persons also remarked on the difficulty of interpreting a few items, such as "Balance between idiomatic and non-idiomatic use of instrument," "There is a balance between individual and public domain material," and "The performer uses typical arpeggiated ideas." In two of the three stimulus tapes, music containing the original melody and chord changes was provided. The evaluators commented that this was helpful in making judgments when the tune was not familiar. They also remarked about the difficulty making judgments when the rhythm section is weak, as it was in two instances.

One evaluator also commented that a five point scale made it difficult to account for the entire range of performances that exist in jazz music. They both found it helpful to listen to the performance once before responding to the test instrument.

In response to some of the objections met by subjects during phase one, the items were recast in the pilot study test instrument. All statements were phrased positively. Instead of offering a range of descriptions from "Strongly Agree" to "Strongly Disagree," the range of possible reactions included "Superior," "Good," "Average," "Below Average," and "Poor." The scale was expanded to include ten possible responses.

The second version of the test instrument was administered in the presence of the researcher to two different evaluators experienced in jazz improvisation instruction. One was the director of jazz studies and music

education professor of a large university music school. The other was a university level instructor of jazz improvisation. These judges listened to the same five tapes. The descriptors ranging from "superior" to "poor" were a point of concern to the judges. One of the evaluators was not clear whether he was to rate on the aesthetics of or simple occurrence with the ten point scale. The difficulty of rating professional and student performances with the same rating scale was another point of concern. They also objected to certain items, such as "Exhibits use of emotion" and "There is a balance between skips and stepwise movement." Again, as in the first phase, "Uses typical arpeggiated ideas," "Balance between idiomatic and non-idiomatic use of instrument," and "There is a balance between individual and public domain material" were met with objections. These evaluators again remarked that making some judgments were difficult when the rhythm section was weak.

A third phase involved two other university level jazz educators using the same rating scale as that used in phase two. Objections were raised regarding "Communicates with the eighth note concept in the rhythm section," "Is able to select the correct notes that correspond with the sounding chord," "Exhibits use of emotion," "Exhibits a good sense of timing of the events in the solo," "Sound and vibrato are appropriate to the style," "Melodies contain contour," and "Exhibits a sense of metronomic, steady time," and again, "Uses typical arpeggiated ideas." The researcher also evaluated the three tapes according to the second version of the pilot test instrument to gain familiarity with the process and to provide another measurement for determining reliability.

### Reliability and Validity of the Pilot Test Instrument

Reliability for the seven judges' responses on the pilot test was estimated at an average of .87 for the three players (Cronbach's Coefficient Alpha). This level of alpha indicated that the test developed for this study, although flawed in its initial stages, should possess strong reliability.

At this stage, items were rewritten in response to the pilot judges' suggestions. Many items were made more precise, while others were clarified. Some examples of these alterations follow. "Communicates with the eighth note concept in the rhythm section." was changed to "Corresponds..." "Is able to select the correct notes that correspond with the sounding chord" was changed to "Demonstrates control in selecting tones that correspond with the sounding chord. "Exhibits use of emotion," was changed to "Exhibits emotional conviction." "Exhibits a good sense of timing of the events in the solo," was changed to "Exhibits control over the timing..." "Sound and vibrato are appropriate to the style" was expanded to two variables: "Tone and timbral manipulation are appropriate to the style" and "Vibrato is appropriate to the stylistic context." "Melodies contain contour" was changed to "Phrases contain melodic contours." "Exhibits a sense of metronomic, steady time" was changed to "Is able to play with a sense of steady time." "Uses typical arpeggiated ideas" was changed to "Uses arpeggiated ideas." Three items, "Balance between idiomatic and non-idiomatic use of instrument," "Utilizes melodic and/or motivic development," and "Style is appropriate within a jazz context," were eliminated. Other items were expanded. In rewriting these items, the researcher strived to remain in agreement with the literature. The researcher also decided to return to the descriptors ranging from "Strongly Agree" to "Strongly Disagree" in a five

point scale. The entire final test instrument, the Descriptive Improvisation Measurement Instrument (DIMI), is listed in Appendix B. A list of the variables appears in Table 10.

#### Selection of a Performer Pool for Main Study

This study intended to describe the population of student and professional single line instrument jazz improvisation performers that presently exist in the United States. A single line instrument was defined as a melodic instrument normally capable of only one note at a time. These performances were selected as typical of the range of be-bop and post be-bop styled performances. The final performer pool consisted of 120 taped improvised jazz solo performances.

The pool of 120 subjects contained sixty student and sixty professional performances. A student performer was defined as one who studied jazz improvisation as a member of a school jazz improvisation class or a member of a school jazz ensemble. A professional performer was defined as one who derived some income from the performance of jazz music and was not a student. The sixty student performances were divided into twenty of each of the following ability levels: advanced, intermediate, and beginner. Advanced students were defined as those who sounded comfortable and assured playing tunes with moderate to difficult chord progressions. Intermediate students were defined to have ability to play competently, but not with assurance over tunes with chord changes of moderate difficulty. Beginning students were defined as those unable to meet the preceding criteria. The sixty professional performers were divided as follows: Half (thirty) were historically important performers who established their reputations prior to 1980, such as Charlie Parker, Fats Navarro, or J.J. Johnson. Of the remaining thirty performances,

Table 10

Variables Developed for the Descriptive Improvisation MeasurementInstrument (DIMI)

1. Displays control in selecting tones that correspond with the sounding chord.
2. Incorporates space in a convincing manner
3. Skillfully emphasizes altered,extended harmonies in relation to the sounding chord.
4. Alludes to the original melody(ies) of the tune.
5. Uses arpeggiated ideas.
6. Moves with fluency inside and outside the tonality.
7. Develops motives and melodies
8. Plays phrases and melodies with extended length
9. Moves toward goals and climaxes
10. Corresponds with the eighth note division in the rhythm section
11. Exhibits inventiveness
12. Vibrato is appropriate to the stylistic context
13. There is communication between the soloist and other musicians.
14. Effectively exploits tension and release.
15. Exhibits emotional conviction.
16. Exhibits control over the timing of events of the solo.
17. Tone and timbral manipulation are appropriate to the style.
18. Articulation is consistent with the style.
19. Melody contains variety.
20. Exhibits use of stylistically appropriate jazz vocabulary.
21. Phrases contain melodic contours.
22. Moves with fluency through chord progressions.
23. Makes good use of rhythmic development and variation.
24. Effectively incorporates "guide tones", or voice leading.
25. Uses a wide variety of articulations.
26. Solo has momentum.
27. Is able to play with a sense of steady time.
28. Solo has a sense of spontaneity.
29. Demonstrates an ability to solve problems and make adjustments.
30. Maintains balance between diatonic movement and skips.
31. Sustains balance between predictability and non-predictability.
32. Use of quotes and commonly used patterns are balanced with individual material.
33. Effectively balances rhythmic repetition and rhythmic variety.

half were less well established artists from large cities (over two million in population) such as Branford Marsalis or Terrance Blanchard, and small to medium-sized cities (less than two million in population). No more than four performances were to be included for each performer. However, few performers were included more than once.

In order to assure that the performances were typical of these styles, the following tune types as defined by Coker (1990) were included: Be-bop, modal, blues, standard, and contemporary. The rhythmic styles included jazz swing (slow, medium, and fast tempos), jazz waltz, fusion, latin, and ballad in a variety of tempos. Fusion is defined as any combination of rock and jazz music with improvisation. Both combo (bass, drums, and piano or guitar accompaniment) and big band contexts were included. The big band selections needed to feature the soloist prominently with bass, drums, and piano or guitar included in the accompaniment. The performer pool included the following instruments: soprano sax, alto sax, tenor sax, bari sax, trumpet, flugelhorn, trombone, and flute.

A panel of two experienced jazz teachers that previously participated in phase three of the pilot study verified that these performances appeared to represent the level of performance of the seven classifications and that all of the above criteria were included in the performance pool. If the researcher and panel did not all agree, those recordings in question were eliminated and others in the same category were considered. The researcher and the panel did not unanimously agree on one subject. That subject was dropped from the pool and replaced by another of the same category which was verified by the panel.

The literature (Burnsed and Price, 1983) and the pilot test confirmed that the quality and nature of the accompanying group and/or rhythm section had an effect on the evaluation of the entire performance. An inadequate rhythm section would detract from the evaluation of the performance and introduce confounding variables. The panel, therefore, also determined whether the quality of the rhythm section's performance detracted from the soloist's performance. If the rhythm section was judged to detract from the performance, those recordings were removed, and others were considered. The panel verified that all of the rhythm section performances were adequate. A listing of the instrument, tune, and playing ability of each subject that appears on the stimulus tape is listed in Table 11. These stimulus tapes are available to other researchers from the investigator.

#### Rating of Jazz Improvisation Performances by Judges

Two judges, Shelton Berg and Michael Steinel, measured the improvised performances according to the finalized test instrument - the Descriptive Improvisation Measurement Instrument (DIMI). Steinel had also participated in the earlier phase of verifying the original analysis. The letters sent to the judges and the listing of soloists that they received appear in Appendix C. These judges were well experienced in rating jazz improvisation performances. The first twenty-nine items were assigned scores ranging from Strongly Agree, five points, to Strongly Disagree, one point. The respondents were also instructed to use "Not Applicable" for instances where a variable did not apply. This was to given a response of '10' on the original



Table 11

Contents of the Stimulus Tape

Tune Title	Instrument	Playing Level	Tune Title	Instrument	Playing Level
There Will Never Be Another You	Trumpet	PH	E.S.P.	Soprano Sax	SA
There Will Never Be Another You	Alto Sax	PL	Caribbean Fire Dance	Tenor Sax	PH
Strawberry Jam	Alto Sax	SB	Caribbean Fire Dance	Trumpet	PH
What is This Thing Called Love	Trumpet	PH	Caribbean Fire Dance	Trombone	PH
Goodbye Pork Pie Hat	Tenor Sax	SA	Tune Up	Tenor Sax	SI
I'll Take Romance	Alto Sax	PL	Tune Up	Trumpet	SI
Autumn Leaves	Tenor Sax	SI	Teenie's Blues	Alto Sax	PH
Autumn Leaves	Tenor Sax	SA	Mr. PC	Trumpet	SI
Autumn Leaves	Trombone	SI	Evening Sunset (Maiden Voyage)	Alto Sax	SB
Solar	Alto Sax	SI	Evening Sunset	Alto Sax	SB
My Romance	Tenor Sax	PL	Flora and Fauna (Forest Flower)	Bari Sax	SA
Webb City	Alto Sax	PH	Flora and Fauna	Trumpet	SA
Webb City	Trumpet	PH	Thriving on a Riff	Alto Sax	PH
Alice in Wonderland	Alto Sax	SI	Four	Tenor Sax	SA
I Don't Know, Either	Trumpet	PH	Green Dolphin St.	Alto Sax	SA
I Don't Know, Either	Tenor Sax	PH	Green Dolphin St.	Trumpet	SA
Flugoway	Trumpet	SB	Round Midnight	Trombone	PL
Stella by Starlight	Bari Sax	SA	Scrapple from the Apple	Tenor Sax	SA
Day and Night (Night and Day)	Soprano Sax	PH	Con Alma	Tenor Sax	PH
Ornithology	Trumpet	SB	Con Alma	Trumpet	PH
I Hear a Rhapsody	Alto Sax	PL	When the Saints	Trumpet	PL
Someday My Prince Will Come	Trumpet	PH	Crawlin Blues	Trumpet	SB
Doobie	Tenor Sax	SI	Autumn Leaves	Alto Sax	PH
If I Should Lose You	Tenor Sax	PS	ESP	Tenor	PH
Satin Doll	Tenor Sax	PL	Laura	Tenor	PH
Better Get It In Your Soul	Trumpet	PL	Forest Flower	Alto Sax	SA
Good Bait	Trumpet	PH	Autumn in New York	Trumpet	PH
Moontrane	Trumpet	PS	Ecaroh	Trumpet	SI
Moontrane	Tenor Sax	PS	The Song is You	Trumpet	PL
			I've Got Rhythm	Alto Sax	SA
			Stella by Starlight	Trombone	SA
			Stella by Starlight	Trumpet	SA
			Body and Soul	Tenor Sax	PS
			Caravan	Tenor	SA

table continues

Caravan	Trombone	SA	Take the "A" Train	Flugelhorn	PH
Keep Your Soul Together	Soprano Sax	PS	Cherokee	Alto Sax	SI
To Kill A Brick	Trombone	PL	When You're Smiling	Tenor Sax	SB
Monk's Dream	Tenor	PL	Stompin at the Savoy	Bari Sax	PS
Crawlin Blues	Trumpet	SB	Desifinado	Tenor Sax	PH
Four	Trumpet	SB	Ecaroh	Tenor Sax	SA
Ornithology	Trombone	SB	Sho Nuff Did	Trumpet	PH
Old Devil Moon	Trombone	PH	Spring Can Really Hang You Up	Flugelhorn	SI
Evening Sunset	Trombone	SB	Like Someone in Love	Trumpet	PH
Evening Sunset	Trumpet	SB	Take the A Train	Alto Sax	PS
Home at Last	Flute	PS	Doobee	Alto Sax	SB
Home at Last	Flugelhorn	PS	Evening Sunset	Trombone	SB
All The Things	Trumpet	SB	Without a Song	Tenor Sax	PH
I Hear a Rhapsody	Trombone	PS	Evening Sunset	Trumpet	SB
Hub-tones	Alto Sax	SA	Dan's Blues	Trumpet	SA
Autumn Leaves	Trumpet	SI	Dan's Blues	Trombone	SA
Autumn Leaves	Alto Sax	SI	Strawberry Jam	Trumpet	SB
Invitation	Tenor Sax	SI	The Waltz you Blew for Me	Tenor Sax	PS
Sandu	Trumpet	PS	I Hear a Rhapsody	Alto Sax	PL
Sandu	Trombone	PS	When I Fall In Love	Alto Sax	SI
Autumn Leaves	Trombone	SI	Crawlin Blues	Alto Sax	SB
Epistrophy	Trumpet	PL	You'd Be So Nice To Come Home To	Trombone	PS
Bessie's Blues	Tenor Sax	PH	Straight, No Chaser	Tenor Sax	SI
I Hear a Rhapsody	Tenor Sax	PS	Doobee	Trumpet	SB
I Hear a Rhapsody	Trumpet	PS	If I Should Lose You	Tenor Sax	PS
SubconsciousLee	Alto Sax	PH	Milestones	Trombone	SA
Spring is Here	Tenor Sax	PL			
I Mean You	Tenor Sax	PS			
Doobee	Trombone	SB			
Milestones	Trumpet	SI			
High Octane	Bari Sax	SB			

Codes used:

- PH Professional Performer of Historical Importance
- PL Professional Performer from a Large City
- PS Professional Performer from a Small City
- SA Advanced Level Student
- SI Intermediate Level Student
- SB Beginning Level Student

form, but was later re-scored to zero points. Table 12 lists the scale for the first twenty-nine items. The final four items on the test instrument resembled a Semantic-Differential Scale, with the emphasis on the midpoint representing "Balance." These response were re-coded so that a '3' received three points, '4' and '2' received two points, and '5' and '1' received one point.

Table 12

Scale Used for the First Twenty-nine Items of the DIMI

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Not Applicable
A	B	C	D	E	*J
1	2	3	4	5.....	*10

Table 13 is an example of one of the balance items. Both of these scales yielded interval scale data for factor analysis. Each of the responses to the 120 improvised jazz solos were recorded by the judges on General Purpose NCS Answer Sheets, form number 6703.

Table 13

Example of a Balance Item on the DIMI

*33. Effectively balances rhythmic repetition and rhythmic variety*

Very repetitious	Somewhat repetitious	Balanced	Somewhat more variety	Much more variety
1	2	3	4	5

### Determination of Reliability and Validity

Cronbach's Coefficient Alpha procedure was performed on each of the 33 variables to determine the reliability of the variables of the DIMI. Two variables, numbers 29 and 31, had reliabilities below .60 and were dropped from consideration for factor analysis. As noted in Table 14, variable 29 was incalculable and was listed at zero reliability. This was likely due to the sharp disagreement among the judges regarding the "Not Applicable" response on this item. The values of alpha for the remainder of the variables ranged from .60 to .87 and are listed in Table 14. It is evident that the use of the balance items (items 29 through 33) with their more unique scales did not result in greater reliability. The reliability of these items was generally somewhat weaker than the other items.

The procedures of this study furnished evidence of content validity. The process of collection of variables was based on the content of existing opinion in jazz improvisation pedagogy. The writings of experts were consulted to assure that the model accounted for all concepts that have been presented in the field. This was then verified by two experts. This model also represented a diversity of opinion in the jazz improvisation field. The high correlations between variables that were hypothesized to be related on all three analyses for total, student, and professional samples also provided evidence toward strong content validity.

Table 14

Results of the Cronbach's Coefficient Alpha on the DIMI

Variable	Alpha	Variable	Alpha	Variable	Alpha
1	.86	12	.70	23	.79
2	.78	13	.60	24	.83
3	.76	14	.83	25	.66
4	.71	15	.83	26	.87
5	.73	16	.84	27	.81
6	.72	17	.74	28	.73
7	.74	18	.78	*29	.00
8	.81	19	.78	30	.70
9	.79	20	.85	**31	.58
10	.80	21	.87	32	.69
11	.77	22	.87	33	.62

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\*Variable incalculable and dropped from the study

\*\*Alpha less than .60 , dropped from the study.

### Factor Analysis of the Results

Factor analysis was the main procedure used in the present study. Factor analysis was defined as "a multi-variate method that has as its aim the explanation of relationships among several difficult-to-interpret, correlated variables in terms of a few conceptually meaningful, relatively independent factors" (Kleinbaum and Kupper, 1978, p. 376). In the present study, factor analysis sought to reduce the many descriptors of jazz improvisation to a smaller number of constructs.

Factor analysis has been employed as a means to explore unknown areas in a "domain of interest in which the complex interrelations of phenomena have undergone little systematic investigation" (Rummel, 1970, p. 31). As described in chapter two, factor analysis has been used in music education in the delineation of constructs in performance areas. Factor analysis should lend itself to study of jazz improvisation. Asmus states that, "in hypotheses creating, factor analysis is used as a tool for developing theory. The concerns some music educators have placed on the development of theory in the field indicated a strong need for factor analytic studies." (1989, p. 3) Gorsuch contended that, "A prime use of factor analysis has been in the development of.. the theoretical constructs for an area." (1983, p. 350) The purpose of the present study was concerned with establishment of a theory of jazz improvisation and with the delineation and development of constructs. Factor analysis thus appeared to be well suited for this study.

Factor analyses were performed on the ratings obtained on the pool of jazz improvisation performances. The common factor analysis model and the principal axes technique was employed. The Measure of Sampling Adequacy (MSA) was employed to determine the adequacy of the sample for

factor analysis. That measure yields a value as high as 1, with any values below .5 considered inadequate for factor analysis (Kaiser and Rice, 1974). If the MSA for any of the samples of this analysis was below .5, it was not considered for factor analysis. In this study all three samples easily met this criterion, yielding values of .965, .914, and .896, respectively for the combined, student, and professional samples. Those samples that met this criteria were then subjected to factor analysis as follows. Decisions regarding the number of factors to retain for an oblique rotation were determined primarily by Cattell's (1952) scree test. This provides a graphic picture of eigenvalues, and the point of a noticeable drop off determines where to select the number of factors for extraction and subsequent rotation. Examination of the number of factors with an eigenvalue greater than 1 also provided guidance in the selection of the number of factors.

Oblique rotation was then performed since the literature (Burnsed and Price, 1983, and Schilling, 1987) revealed evidence to support the strong possibility that the constructs would be related. Factors were rotated obliquely using the direct oblimimum method with communalities estimated by iteration. Oblique rotation yields two representations of the loadings on each factor. The *pattern* loading yields a value based on projecting each point onto each rotated axes with lines parallel to the two axes. The *structure* loading yields a value based on projecting each point one each rotated axis with perpendicular to the two axes. In general, the pattern loading is of more value when seeking to ascertain the uniqueness of each factor. This study sought to find uniqueness in the constructs of jazz improvisation, so the pattern loading was the major consideration used in the interpretation of factors in this study. All computations were performed on a PRiME 9750

Computer at Washburn University using the SPSSx (version 3.0, 1988) procedure FACTOR. The factor analysis procedures were then repeated for the sixty student performances. The factor analysis procedures were then repeated again for the sixty professional performances.



## CHAPTER IV

### RESULTS

The purpose of this study was to develop and test systematically a theoretical model that delineated the constructs and subsumed variables of jazz improvisation performance.

Research Question 1. What specific performance variables are related to single line jazz solo improvisation performance?

The variables were originally placed in the construct as labelled by the original author. The results of this phase are found in Tables 3 through 9. If there was a conflict pertaining to the placement of variables within constructs, the researcher then made the necessary adjustments to reflect majority opinion of most authors. The results of this later phase are shown in Tables 15 through 21 and are discussed below.

#### Hypothesized Constructs

##### Harmonic Appropriateness

Table 15 lists the statements that have been collected which this researcher placed in a hypothetical harmonic construct. The two columns to the extreme right hand side of the table list a synthesis of these items and the test instrument items that were developed.

Table 15

Harmonic Appropriateness Final

Author	Baker	Haerle, et al.	Burnsed & Price	Schilling	Rose	Coker	Coker <u>How to Listen ...</u>
Proposed Construct Headings	Harmonic Control	Harmonic Elements	Tonal Materials	A. Harmonic Awareness B. Melodic Content	Scales, Modes & non-harmonic tones		Tonal Materials
Variables		Chord/scale choices	Chord/scale choices Right/wrong	A.Changes blues scale at I,IV,V tonal areas A.Uses one blues scale B. Correct Chord/Scale Tones B. Unintentional Dissonance	Use of appropriate musical materials	Inability to hear right notes fast enough.	The selected chords and scales
		Color tones	Use of non-harmonic tones	A. Diatonic, chromatic chord extensions B. Intentional chromatic color tones B. Deliberate superimposed tonalities			Emphasized melody notes
	Sideslipping						
	Traditional formulae	Command of II-V's (major and minor)		A. Implies all written chord changes A. Implies cadences to I,IV,V tonal areas A. Plays turnaround at end of form	Ability to manipulate melodic material in relation to the underlying harmonic progression	Difficulty in moving from chord to chord Losing place when reading progression Inability to hear progressions	
	Cycles Turnarounds						
	Substitutions						
		Guide tones	Voice leading				
		Typical arpeggiated ideas					

table continues

Bash	McDaniel	Paulson	LaPorta	Riggs	Synthesis	Test Instrument Items
A. Note accuracy	Harmonic conception	Pitch		Harmonic		
B. Progression accuracy						
Note accuracy	Ability to construct melody dictated by the harmonies	Chord-scales  Playing "inside" of the basic harmony			'Inside' harmonic usage- in relation to the sounding chord	1. Displays control in selecting tones that correspond with the sounding chord. 2. Skillfully emphasizes altered, extended harmonies in relation to the sounding chord. 3. Moves w. fluency inside and outside the tonality...
		Non-harmonic tones  Playing "outside" of the basic harmony	Extra-Harmonic relationships: 1. Harmonic juxtaposition (over chord) 2. Dovetailing moving chords in & out of written harmonic symbol	Non-harmonic tones  Symmetrical planing (also called sideslipping)	More extended usage in relation to the sounding chord	4. Moves with fluency through chord progressions.
Progression accuracy	Ability to play a melody over a given set of chords				Command of chord progressions	
				Tri-tone substitution		4. Effectively incorporates "guide tones," or voice leading.
			Guide Tones	Guide tone melodic lines	Guide tones and voice leading -	5. Uses arpeggiated ideas.
		Arpeggiation	Arpeggiation		Arpeggiation	

The hypothesized harmonic construct was the subject of a great amount of attention by jazz pedagogues. Major contributions have focused on the chord/scale association centered on the chords, or harmonies, of a tune. The use of "chord/scale choices" by Haerle, et al. (1988), and Burnsed and Price (1984) was identical. Rose's "ability to manipulate melodic materials in relation to the underlying harmonic progression" (1985) and McDaniel's "Ability to construct a melody dictated by the harmonies" (1974) referred to the same phenomena. All of these, as noted, referred to 'inside' harmonic usage in reference to the sounding harmony. Chord/scale choices referred to selecting from the tones of the scale that corresponds with the sounding chord as defined and standardized by jazz educators.<sup>1</sup> In his rating scale, Schilling (1987) did not define the blues scale to which he referred. Most teachers believe the blues scale consists of a root and the tones a minor third, perfect fourth, lowered fifth, perfect fifth, and minor seventh above the root (Haerle, 1975). Schilling also placed two variables referring to correct chord and scale tones originally in his Melodic Content construct and were thus listed in Table 5. However, all variables in this construct of Schillings' corresponded with other variables in the harmonic construct and were moved accordingly.

A second group of variables alluded to more extended harmonic usage, such as sideslipping (Baker, 1979), color tones (Haerle et al., 1988), use of

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<sup>1</sup>For example, a major scale corresponds with a major seventh or sixth chord, a dorian mode (a major scale with a lowered third and seventh) generally corresponds with a minor seventh chord, and a mixolydian mode (a major scale with a lowered seventh) corresponds with a dominant seventh chord. More exotic choices, such as modes of melodic or harmonic minor scales, and diminished or whole tone scales would correspond with chords with altered tones (Haerle, 1975).

non-harmonic tones (Burnsed/Price, 1984), and diatonic, chromatic chord extensions (Schilling, 1987). The term "sideslipping" referred to a contemporary jazz practice of starting with a phrase "inside" the given key or chord, moving to a dissonant set of notes "outside" of the key, and concluding "inside" the key (Reeves, 1989, p. 234, Coker, 1980, p. 50). Again, three variables by Schilling were moved to this area that were originally placed in the melodic construct. This category resulted in two variables, (a) extended, altered harmonies and (b) ability to play inside and outside the tonality.

The third grouping from this table presents variables that relate to the chord progression. The traditional formulae to which Baker (1979) referred could include the major and minor II-V's (progressions) that Haerle et al. (1988) presented as well as the cycles and turnarounds mentioned by Baker. "Cycles" referred to a series of chords that use the root progression down a fifth. In jazz, a turnaround is a I-vi-ii-V<sup>7</sup>-I cadential progression or substitute thereof that occurs at the end of a phrase or chorus (Haerle, 1980, p. 15). Schilling also listed use of turnaround at the end of the (blues) form. The cadences to the I, IV, and V tonal areas of the blues progressions are often II-V<sup>7</sup> progressions. There were also less precise references to chord progressions listed by authors, such as "progression accuracy" (Bash, 1983) and "implies all written chord changes" (Schilling, 1987).

A fourth grouping related to guide tones, voice leading, or graceful chord connections. "Use of typical arpeggiated ideas" (Haerle et al., 1988) and "arpeggiation" (Paulson, 1985) corresponded. "Arpeggiation" by LaPorta (1981) was also moved to this construct from Melodic Usage. The unique variables of Paulson that were listed earlier in Table 5 appeared to correspond

with the hypothesized Expressiveness and Jazz Style constructs and were moved accordingly.

### Rhythmic Usage

Table 16 lists the statements that were placed in the hypothesized Rhythmic Usage construct. Many writers emphasized the importance of the rhythmic dimension in jazz, yet others have criticized its lack of attention by jazz pedagogues. It has been characterized as a difficult area to explain or teach (Witmer and Robbins, 1988).

There appear to be three basic groupings that relate to the hypothesized rhythmic construct. The first is associated with use of a steady beat or pulse in the solo. "Time" is a term used by Baker (1979), Bash (1983) and Haerle, et al. (1988) in reference to this. Closely related to this is matching the sub-division of eighth or sixteenth notes in the rhythm section. The swing feel in jazz generally uses a resemblance to a triplet sub-division of eighth notes in medium tempos. As the tempo increases, this triplet approaches even eighth notes. In rock or latin rhythmic styles, the eighth notes are generally even. Elliott (1985) lauded the concept of "time-feel" exemplified by these two concepts as the life blood of jazz and African or Afro-American music. The two variables that resulted from this grouping referred to (a) the ability to play with steady time and (b) the ability to match the eighth note subdivision in the rhythm section.

A second grouping dealt with the use of rhythmic variety or repetition. These two concepts lay on opposite ends of a possible continuum. Haerle, et al. (1988) and others cited the need for balance between these ideas along the

Table 16

Rhythmic Usage Final

Author	Baker	Baker - <u>Jazz Improvisation</u> Constructing a Melody	Haerle, et al.	Burnsed & Price	Coker	Coker- <u>How to Listen to Jazz</u>
Proposed Construct Headings	Time		Rhythmic Elements	(Melodic and) Rhythmic Elements	Rhythm	
Variables	Metronomic sense Feeling for the Beat  Use of the rhythm section  Swing feel	Move when rhythm is static, relax when there is a lot of rhythmic motion	Basic time feel  Eighth note feel and concept		Difficulty in relating to pulse	The consistent accuracy and feeling of the pulse
	Rhythmic variety and interest		Use of repetition  Rhythmic variety	Continuity/variety Motivic development  Rhythmic invention		
			Phrasing and use of space			

table continues

Schilling	Bash	Paulson	LaPorta	Riggs	Elliott	Synthesis	Test Instrument Items
Rhythm	Time	Rhythmic		Rhythmic			
	Playing Time "inside" of basic pulse			Straight to eighth note style	Time-steadiness of pulse Feel - sub-divisions Kinesthetic response	Basic time feel	1. Is able to play with a sense of steady time  2. Corresponds with the eight note division in the rhythm section
Little cohesiveness, sporadic rhythms Develops rhythmic motive through arpeggiation, diminution, frequency, sequence, and repetition				Rhythmic motivic development Active rhythmic variations	Repetition  Shifted accents	Continuum between rhythmic repetition and variety--development	3. Effectively balances rhythmic repetition and variety.  4. Makes good use of rhythmic development and variation.
Constant rhythm, little variation or space. Rhythm rests and breathes		Syncopation	Rhythmic elaboration	Use of space	Silence		5. Incorporates space in a convincing manner



continuum, while Schillings' items represent an actual continuum (1987). Also related to this was the concept of rhythmic motivic development, repetition, and the use of space in phrasing.

### Melodic Usage

Table 17 lists statements in the hypothesized Melodic Usage construct. While melodic usage may be seen as a separate construct, it should be noted that the entire substance of a single line improvised solo is melodic. This must be carefully considered when seeking to determine separate constructs. The statements seem to group into five categories with several unique variables.

The first grouping may be summarized by use of basic jazz vocabulary (Haerle, et al., 1988)) such as Bakers' (1979) "appropriate and authentic," need for balance between "bebop and contemporary," and use of II-V patterns. These were related to harmonic listings of other authors. Baker's use of "bebop" referred to patterns that are derived from those in common use during the bebop period in jazz which started in the early 1940s. "Contemporary" refers to use of wider intervals such as fourths and fifths, pentatonic scales and the use of devices such as "sideslipping" (Baker, 1985). Burnsed and Price's "Use of Cliches/Patterns" is also related to this grouping.

The second group was best described by Baker as "effective melodies with contours" (1979). "Lyricism and melodic sense" (Haerle, et al., 1988) also helped describe this grouping. Baker (1977a) offered more concrete variables with specific directions for creating a balanced melody.

A third grouping relates to melodic or motivic development. "Motivic development" and "use of sequence" (Haerle, et al., 1988) and "use of targets and goals" (Schilling, 1987) best depicted this grouping. A fourth grouping

Table 17

Melodic Usage Final

Author	Baker	Baker - <u>Jazz</u> <u>Improvisation</u>	Haerle, et al.	Burnsed and Price	Schilling
Proposed Construct Headings	A. Line Construction B. Use of Language		Melodic Elements	Melodic (and Rhythmic Development)	A. Melodic Phrasing B. Melodic Content
Variables	B. Use of language is appropriate and authentic B. Balance between bebop and contemporary constructs B. Grasp of variety of ii-V7 patterns and other formulae	Balance between new and old	Command of basic jazz vocabulary	Use of cliches/patterns	
	A. Effective melodies with contours A. Balance A. Continuation techniques	Balance between diatonic mvt. and skips Balance and contrast/interplay in density, tension/relaxation, and intensity	Lyricism and melodic sense	Phrasing Melodic cadences	
		Some repetition of melody to unify	Motivic development	Motivic development Transposition of ideas Development techniques	Departure from and return to expected melody
	A. Variety A. Variety of note choice A. Variety of intervals	Variety of phrase length		Tessitura	

table continues

Schilling	Coker - <u>The Jazz Idiom</u>	Coker- <u>How to</u> <u>Listen To Jazz</u>	Bash
A. Melodic Phrasing B. Melodic Content		Lyricism	Phrasing
	Bored with hum-drum phrases	Melodiousness	Phrasing

.....

A. Repetition  
A. Sequence

A. Relationship between  
phrases  
A. Use of targets and  
goals

.....

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table continues

Paulson	LaPorta	Riggs	Elliott	Synthesis	Test Instrument Items
	Melody	A. Melodic B. Compositional C. Scales			
				Use of jazz language (vocabulary)	1. Exhibits use of stylistic appropriate jazz vocabulary.
		A. Melodic quotes			
Phrasing					
		A. Wave form or sawtooth melodic line A. Angularity A. Paraphrasing a melody	Improvised melody matches phrases of song	Melodicism	2. Phrases contain melodic contour. 3. Maintains balance between diatonic movement and skips.
Motivic construction	Theme and variations				
		B. Augmentation, diminution, fragmentation B. Antecedent-consequent melodic development B. Sequence A. Extended phrases A. Elongated intensity A. Extending melodies through bar lines B. Generating repeating, inverted motif		Melodic and motivic development Concept of motivic or continuous melodic concepts	4. Alludes to the original melody of the tune. 5. Develops motives and melodies. 6. Plays phrases and melodies with extended length
Melodic variation					
				Variety	8. melodies contain variety.

A fifth grouping from Table 5 relates closely to the hypothesized harmonic construct, labeled "Correspondence of melody to harmony" and was thus moved to that construct. This concept as part of both Melodic Usage and Harmonic Appropriateness demonstrates a possible close relationship of melody and harmony. There were several unique variables originally placed in this hypothesized construct that were moved to more appropriate constructs. Two of Burnsed and Price's variables in this hypothesized construct, "Originality" and "Awareness of Form" (1984) were moved to the hypothesized Individuality and Form constructs. Baker's urging toward "balance between personal and public domain material..." (1979) also related to the hypothesized Individuality construct.

### Jazz Style

Table 18 lists statements in the hypothesized Jazz Style construct. Almost all authors that referred to jazz style use this term, however the term style has many meanings. The following definition seemed to come closest to the manner in which these authors used the term, "Distinction, excellence, originality, and character in any form of artistic or literary expression" (Webster's New World Dictionary, 1984). The aspects of uneven eighth notes, articulation, and sound manipulation all contributed to the concept of a jazz style. Without this, an improvised solo would not be a jazz improvised solo. It is evident that several writers related sound, or at least appropriate use of sound to the concept of jazz style. Baker mentioned "Tone" with variables "flexibility, control, effectiveness, vibrato, personalization, etc" (1979). This was the first grouping of variables.

Table 18

Jazz Style Final

Author	Baker	Burnsed/Price	Schilling	Coker	Coker - <u>How to Listen to Jazz</u>	Bash
Proposed Construct Headings	A. Style B. Tone	Style	Style		Sound	A.Style - Appropriate to the music B.Articulation - Uses Variety
Variables	Is sound consistent with style? Control of tone	Sound/tone	Sound quality representative of style Special effects		Tone quality- small to large, mellow to brilliant, dull to lively	
	..... Tone: flexibility, effectiveness, vibrato, personalization .....					
	Is articulation consistent with the style?		Appropriateness of articulation			B.Articulation- uses variety
	Does the student play in a convincing manner consistent with the stylistic imperatives?			Style is indistinct and/or naive and execution lacks conviction		

table continues

McDaniel	Paulson	LaPorta	Riggs	Elliott	Synthesis	Test Instrument Items
A. Sound						
Jazz Style	Sound	B. Articulation				
	Control of Timbre	Timbre		Timbral aspects of solo	Variables referring to sound and vibrato	1. Tone and timbral manipulation are appropriate to the style
	Range or Register	Musical effects: falls, scoops, plops, ghost notes, doits, smears	A. Jazz inflections			2. Vibrato is appropriate to the stylistic context.
	Vibrato					
	Articulation	Varied articulation	B. Doodle or Doo-n tonguing B. Repeated note doodle tonguing B. Articulation variation		Articulation	3. Articulation is consistent with the style  4. Uses a wide variety of articulations
Devices, materials, expressive elements indigenous to jazz	Style				Appropriate style	

A second group referred to articulation. Most authors cited the need for appropriate articulation. Some also indicated the need for variety in articulation. Several variables relating to articulation listed in this table were originally placed in the rhythmic construct. The third grouping referred to the appropriateness of the style within the overall context. This area lacked distinctiveness from the other stylistic groupings, and no variable was developed for the final test instrument. All of the unique variables shown in this table corresponded strongly with variables from other hypothesized constructs. As an example, Baker's question, "Are harmonic, rhythmic, and melodic devices consistent with style?" (1979) obviously referred to the hypothesized harmonic, rhythmic, and melodic constructs. Other references to other hypothesized constructs included Burnsed and Price's "Rhythmic projection" and "Time feel" (1984) and Schilling's "Rhythmic figures appropriate to style" and "Swings eighth notes (upbeat accents)" (1987). This again indicated a strong interrelationship of constructs.

### Individuality

Table 19 lists statements in the hypothesized Individuality construct. This construct enjoyed less support than the previous constructs. Only Rose (1985), Coker (1990), and McDaniel (1974) referred to this area as a separate construct, or category. There did appear to be a strong correspondence among the relatively few variables presented. These all referred to personalization of material. Rose alluded to the hypothesized melodic construct with "ability to develop new melodic material" (1985). This again indicated a possible strong interrelationship, of constructs.



Table 19

Individuality

Author	Baker	Baker- Jazz Improvisation	Rose	Coker- Improvising Jazz	Coker- How to Listen to Jazz	McDaniel	Synthesis	Test Instrument Items
Proposed Construct Headings			Exploration	Originality	Innovation	Originality of Style		
Variables			Ability to develop new material	Uses own material  Creative urge, enriched with new musical ideas	Originality  Creativity	Ability to render a fresh, novel, and inventive solo	Uses own material- Creativity	1. Exhibits inven- tiveness
	Balance between personal and public domain material(from melodic)	Balance between new and old						2. Use of quotes and commonly used patterns are balanced with individual material

### Expressiveness

Table 20 lists statements in the hypothesized Expressiveness construct. This construct appeared to be a collection of unique variables with some areas of congruence. Many devices can be used to create expressiveness, drama, or excitement. Many of these devices and unique variables were related to the other hypothesized constructs. In addition to these, two groupings described emotion and communication in performance. As Baker alluded, elements from other hypothesized constructs could be employed to create expression (1979). It is possible that a separate construct for expression may not exist, or that the idea of expressiveness may lie within many, or all, constructs. Some of the concepts within this construct, such as momentum and emotion, seem rather well defined and corroborated by several sources.

### Form

Table 21 lists statements in the hypothesized Form construct. There was little agreement concerning the existence of this construct. Most variables in this construct cited the need for a sense of direction in the solo. Elliott suggested some unique variables that cited the need for spontaneity and a sense of timing in the solo.

One other concept that may be viewed loosely as part of a form construct was "Response" by Rose (1985) and "Problem-Solving Ability" by Baker (1979). Rose mentioned adjustments due to the rhythm section and room environment. "Accuracy" referred to the ability of a performer to respond to mistakes that occur by the soloist and the supporting musicians (generally the rhythm section). Errors should be successfully incorporated into the improvisation, not ignored or allowed to catch the soloist off guard.

Table 20

Expressiveness Final

Author	Baker	Haerle, et al.	Burnsed and Price	Rose	Coker - <u>How to Listen to Jazz</u>
Proposed Construct Headings	Use of Drama	Other	Emotional Effect	Expressiveness	Spirit/Drive
Variable	Idiomatic/non-idiomatic use of instrument	Use of dramatic and idiomatic usage			
			Tension/ release	Emotive use of tension & release	
	Predictability/non-predictability		Intensity Momentum Spirit/drive Climax Dramatic devices		
		Basic emotional quality			The emotional feeling and vitality

table continues

Table 20

Expressiveness Final p. 2

Bash	Paulson	LaPorta	Elliott	Synthesis	Test Instrument Items
A. Expression					
B. Communication	Dynamics				
C. Excitement					
				Balance between idio/non-idiomatic use of instrument	1. There is a balance between idiomatic and non-idiomatic use of instrument (discarded)
				Predictability/non-predictability	2. Effectively exploits tension and release 3. Sustains balance between predictability and non-predictability
Excitement	Dramatic Devices			Intensity, momentum	4. Solo has momentum
Expression	Emotional mood of the solo	Moods		Emotion	5. Exhibits emotional conviction
Communication	Group communication		Communication with other musicians	Communication	6. There is communication between the soloist and other musicians

Table 21

Form Final

Author	Baker	Baker- Constructing a Melody	Burnsed/ Price	Schilling	Rose
Proposed Construct Headings					A.Continuity  B.Response
Variables		Melody should aim toward a climax point		Targets and goals (in melodic)	A. Sense of direction Relation of internal ideas
				Awareness of form (from melodic)	
	Problem solving ability				Adjustments due to room environment Adjustments due to rhythm section

table continues

Coker	McDaniel	Elliott	Synthesis	Test Instrument Items
	A. Direction of Solo B. Maturity of Ideas			
Solo lacks cohesiveness, feels the same from tune to tune	Working toward goals and climaxes	Repetition in form	Sense of direction	1. Moves toward goals and climaxes
		Spontaneity	Spontaneity	2. Solo has a sense of spontaneity
		Sense of timing of important phrases, climaxes, quotes, and/or gestures	Timing	3. Exhibits control over the timing of events of the solo.
				4. Demonstrates an ability to solve problems and make adjustments

"Problem-Solving Ability" is category provided by Baker. In reference to this he asks five questions, "To what extent is the student able to analyze and solve problems as they arise? To what extent do the solutions carry over to similar problems in different contexts? Were the performers's intentions clear? Were the problems that the performer set for himself clearly evident, and were they successfully dealt with?" These corresponded with descriptions of "Response" and "Accuracy" by Rose.

### Other Miscellaneous Variables

The following discussion addressed variables and categories in the consulted sources that were considered beyond the scope of this study. One element by Rose, "Technical Skill, could not be easily be classified into one of these seven constructs (1985). Rose defined "Technical skill" as the necessity that the improviser possess the ability to accomplish musical goals. This was considered outside the scope of the present study.

Haerle et al. described "Overall Effectiveness" as part of "Other" (1985). They also described a possible construct entitled "Basic Musicianship" that contained variables beyond the scope of the present study, "Range, flexibility, and basic technique," and "Intonation." One other variable, "Sound," was placed in the Jazz Style construct.

Baker included a category of "technique" that did not easily fit in the aforementioned constructs. This area was again considered beyond the scope of the present study.

The previous discussion described the process of determining the specific performance variables that were related to jazz improvisation performance. Two hundred and sixty-six variables were gathered from fourteen sources. To reduce this number, these were compared, summarized, and categorized according to seven hypothesized constructs. These were first categorized according to the designations of constructs but later moved if similar material also appeared in different constructs. This process resulted in a list of 33 variables. Table 22 lists each variable along with the abbreviations that were used later in interpreting the factor analysis.

Table 22

Variable List for the DIMI with Abbreviations


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1. RhtNotes	Displays control in selecting tones that correspond with the sounding chord.
2. Space	Incorporates space in a convincing manner
3. Altered	Skillfully emphasizes altered, extended harmonies in relation to the sounding chord.
4. OrigMel	Alludes to the original melody(ies) of the tune.
5. Arpegg	Uses arpeggiated ideas.
6. Outside	Moves with fluency inside and outside the tonality.
7. DevMotMel	Develops motives and melodies
8. LngPhras	Plays phrases and melodies with extended length
9. GoalClim	Moves toward goals and climaxes
10. 8NotRhy	Corresponds with the eighth note division in the rhythm section
11. Inventiv	Exhibits inventiveness
12. Vibrato	Vibrato is appropriate to the stylistic context
13. Comunica	There is communication between the soloist and other musicians.
14. TensRel	Effectively exploits tension and release.
15. Emotion	Exhibits emotional conviction.
16. TimEvent	Exhibits control over the timing of events of the solo.
17. Tone	Tone and timbral manipulation are appropriate to the style.
18. Articul	Articulation is consistent with the style.
19. MeloVar	Melody contains variety.
20. ApVocab	Exhibits use of stylistically appropriate jazz vocabulary.
21. MelCont	Phrases contain melodic contours.
22. ThruProg	Moves with fluency through chord progressions.
23. RhythDev	Makes good use of rhythmic development and variation.
24. GuidTon	Effectively incorporates "guide tones," or voice leading.
25. ArticVar	Uses a wide variety of articulations.
26. Momentum	Solo has momentum.
27. SteadTim	Is able to play with a sense of steady time.
28. Spontan	Solo has a sense of spontaneity.
29. ProbSolv	Demonstrates an ability to solve problems and make adjustments.
30. BalSkip	Maintains balance between diatonic movement and skips.
31. BalPred	Sustains balance between predictability and non-predictability.
32. QuotPat	Use of quotes and commonly used patterns are balanced with individual material.
33. RhyRepVar	Effectively balances rhythmic repetition and rhythmic variety.

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This task was difficult, since there was considerable disagreement concerning both the configuration of constructs and the placement of variables within those constructs. As an example, "Phrasing" appeared in literature as part of three hypothesized constructs. A more systematic means of organizing these constructs and variables and a clear delineation of relationships among them was still needed.

Research Question 2. What is the most cogent grouping of underlying constructs which characterize single line jazz solo improvisation performances?

#### Factor Analysis of Assessments for the Combined Sample

The thirty-three items comprised the Descriptive Improvisation Measurement Instrument (DIMI). The complete DIMI is shown in Appendix B. Two judges measured 120 jazz improvisation performances according to the thirty-three item DIMI. The Cronbach's Coefficient Alpha procedure performed on the responses to each of the 33 variables determined that two variables, numbers 29 and 31, had reliabilities below .60 and were dropped from consideration for factor analysis. The 31 variables that were retained were then factor analyzed for the combined sample of professional and student performers. The Measure of Sampling Adequacy (MSA) for the total sample was .965, easily above the minimum level of .50. The correlation matrix for this factor analysis as presented in Appendix D revealed many high correlations.

The Principle Axes Factor analysis first extracted a number of factors that equals the number of variables, which was thirty-one in the present research. The primary criteria for selecting the number of factors to rotate was Cattell's Scree Test (1952). This provides a graphic picture of eigenvalues, and

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the point of a noticeable drop off determines where to select the number of factors for extraction and subsequent rotation. Eigenvalues for the DIMI are listed in Appendix E. Figure 1 illustrates the Cattell's scree on these data. It reveals a more noticeable drop after three factors, with a gradual slope after that number. Another method that has been used in selecting the number of rotate is the eigenvalue of one criterion. The number of eigenvalues greater than one determines the number of factors to rotate. There were three factors with eigenvalues greater than one in the factor analysis of the combined sample in the present study. This confirmed the indication of three factors in the scree test. It was therefore decided to select three factors for extraction and direct oblimum (oblique) rotation.

The rotated factors were then examined for best fit with the hypothesized structure. To aid in the interpretation of the variables, abbreviations were used to help visualize the loadings as presented by the factor analysis. Those abbreviations are presented along with the original variables of the DIMI in Table 22. The factor loadings on the initial extraction from the factor analysis on the combined sample is shown in Appendix F. After this initial extraction, oblique rotation was performed to gain more interpretable results. As described in the previous chapter, the pattern loadings were the major consideration using in interpreting the results of each factor analysis. The pattern and structure loadings are shown in Table 23.

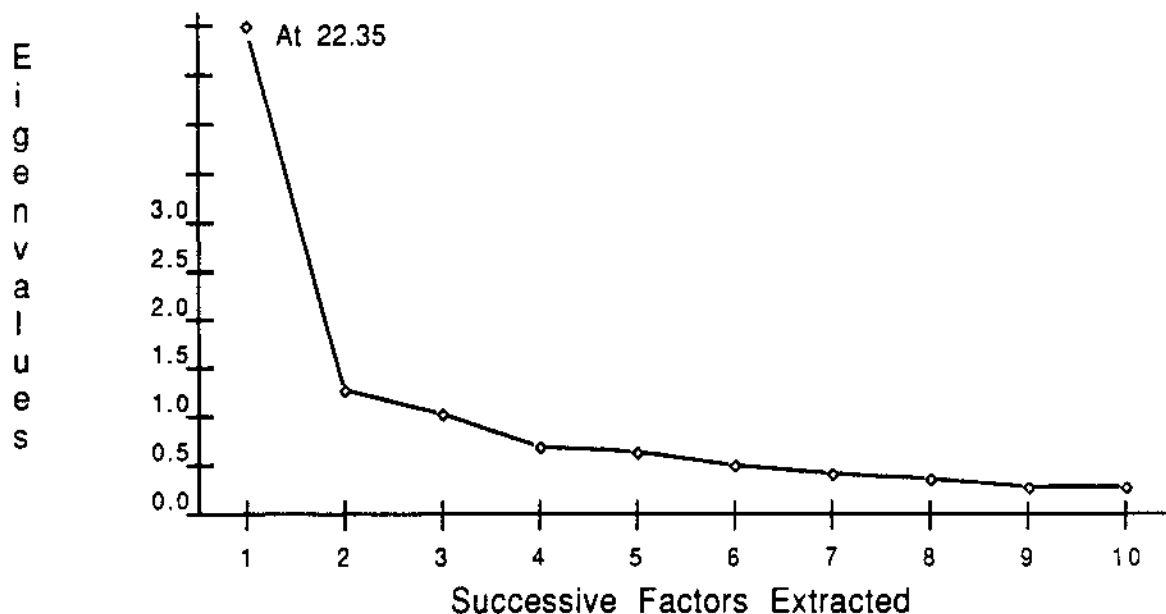


Figure 1. Results of the scree test for the combined sample.

A clear interpretation of the three factors was difficult. In this study, a variable loading of .35 or above was considered significant enough to regard as a salient loading on a factor. In analyzing the loadings on all the solutions, this seemed to be a logical break off point between upper values and zero. This factor analysis of the combined sample of professional and student jazz improvisors shown in Table 23 seemed to indicate that there was only one factor, or construct, of jazz improvisation. Thirty of the thirty-one variables loaded on this first factor. An examination of all the variables that loaded strongly on this factor revealed no more point of commonality than an overall Jazz Improvisation construct. However the three most strongly

Table 23

Pattern and Structure Loadings for the Combined Sample

PATTERN MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3
24. GuidTon	1.01825	-.32626	-.02221
1. RhtNotes	1.00106	-.16420	-.02215
22. ThruProg	.99673	-.13561	.02598
20. ApVocab	.97014	-.04285	-.08703
21. MelCont	.96335	-.04951	.02011
5. Arpegg	.93025	-.13217	-.01759
16. TimEvent	.90916	.05509	.07607
30. BalSkip	.90176	-.13891	-.21403
18. Articul	.88633	.03193	.02796
12. Vibrato	.87558	-.01450	.11899
27. SteadTim	.86821	.06761	-.07280
10. 8NotRhy	.86262	.01334	-.10967
17. Tone	.85101	.00258	.11956
11. Inventiv	.84895	.18119	.04574
14. TensRel	.84857	.12830	.20276
23. RhythDev	.84685	.13816	.07365
2. Space	.84065	-.06964	.36714
19. MeloVar	.82828	.16343	.09669
7. DevMotMel	.82354	.15701	.00549
28. Spontan	.77923	.25344	.07356
26. Momentum	.77628	.29447	-.16635
9. GoalClim	.75317	.29315	-.10438
33. RhyRepVar	.72774	.01644	-.12748
8. LngPhras	.71836	.18507	-.41354
13. Communica	.70697	.19563	.22460
15. Emotion	.66318	.32056	-.22443
25. ArticVar	.64811	.33046	-.00464
3. Altered	.64187	.40103	.07035
4. OrigMel	.54505	.05428	.40727
6. Outside	.20802	.61298	-.00288

table continues

## STRUCTURE MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3
20. ApVocab	.94475	.38480	-.01367
21. MelCont	.94308	.37398	.09304
16. TimEvent	.93910	.45413	.14378
22. ThruProg	.93904	.30250	.10236
11. Inventiv	.93208	.55409	.10755
1. RhtNotes	.92717	.27634	.05487
14. TensRel	.92024	.49931	.26512
23. RhythDev	.91316	.50983	.13577
19. MeloVar	.90743	.52668	.15714
18. Articul	.90247	.42146	.09421
28. Spontan	.89623	.59537	.12934
26. Momentum	.89330	.63772	-.11124
7. DevMotMel	.89302	.51918	.06565
27. SteadTim	.89248	.45028	-.00830
12. Vibrato	.87814	.36931	.18494
9. GoalClim	.87426	.62556	-.05100
24. GuidTon	.87308	.12184	.05787
5. Arpegg	.87080	.27718	.05376
17. Tone	.86113	.37558	.18347
10. 8NotRhy	.86025	.39395	-.04500
2. Space	.83761	.29610	.43107
30. BalSkip	.82458	.26005	-.14475
3. Altered	.82354	.68258	.11420
13. Communica	.80989	.50412	.27558
25. ArticVar	.79311	.61557	.04045
15. Emotion	.78731	.61470	-.17810
8. LngPhras	.76869	.50555	-.36158
33. RhyRepVar	.72540	.33792	-.07298
4. OrigMel	.59953	.28957	.44763
6. Outside	.47741	.70451	.00605

loading variables on this factor relate to the hypothesized "Harmonic Usage" construct. Those referred to use of guide tones, control in selecting tones that correspond with the sounding chord, and moves with fluency through chord progressions. It should also be noted that two variables that referred to use of guide tones and selection of notes that correspond with the chord had loadings over 1 on the first factor. This anomaly sometimes occurs in oblique rotation. (SAS/STAT Users Guide, 1990, p. 796).

Two smaller factors were identified by the pattern loading that appears in Table 23. The second factor contained a simple loading with only one variable, "Plays with fluency inside and outside the tonality" and one cross loading variable which referred to use of altered and extended tones. A simple loading occurs when a variable strongly loads on only one factor. A cross loading occurs when a variable loads strongly on more than one factor. This second, small, factor was labelled, "Harmonic Divergence" due to the nature of the two variables that loaded on it.

The third factor contained no simple loading variables. Three variables did cross load on this factor and the first factor. Those consisted of positive loadings for use of space and original melody, and a negative loading for use of extended length phrases. This small construct was labelled "Use of melody" since the variables either positively or negatively refer to melody in some way. Use of space actually originated in the rhythmic construct, but also could be regarded as a melodic entity.

The oblique rotation revealed information about the correlations between factors. Table 24 lists those correlations. The first and second factors, the only ones with distinct, simple loading variables were strongly related.

The third factor, with no simply loading variables was not related to the other two.

Table 24

Primary Factor Correlations for the Combined Sample

	FACTOR 1	FACTOR 2	FACTOR 3
FACTOR 1	1.00		
FACTOR 2	.44	1.00	
FACTOR 3	.08	-.01	1.00

Research Question 3. What are the most cogent groupings of underlying constructs which characterize single line jazz solo improvisation performances by student performers?

Factor Analysis of Assessments on Student Performers

The 31 variables that were retained were then factor analyzed for the responses to the sixty student performers. The procedures followed were identical to the previous factor analysis. The MSA for the student sample was .914, again easily above the minimum level of .50. The correlation matrix presented in Appendix D again revealed many high correlations. Figure 2 illustrates the Cattell's scree on these data. It revealed a sharp drop after five factors. Therefore, five factors were selected for rotation. The initial extraction from the factor analysis on student subjects is shown in Appendix F. Table 25 displays the pattern and structure loadings on this solution.

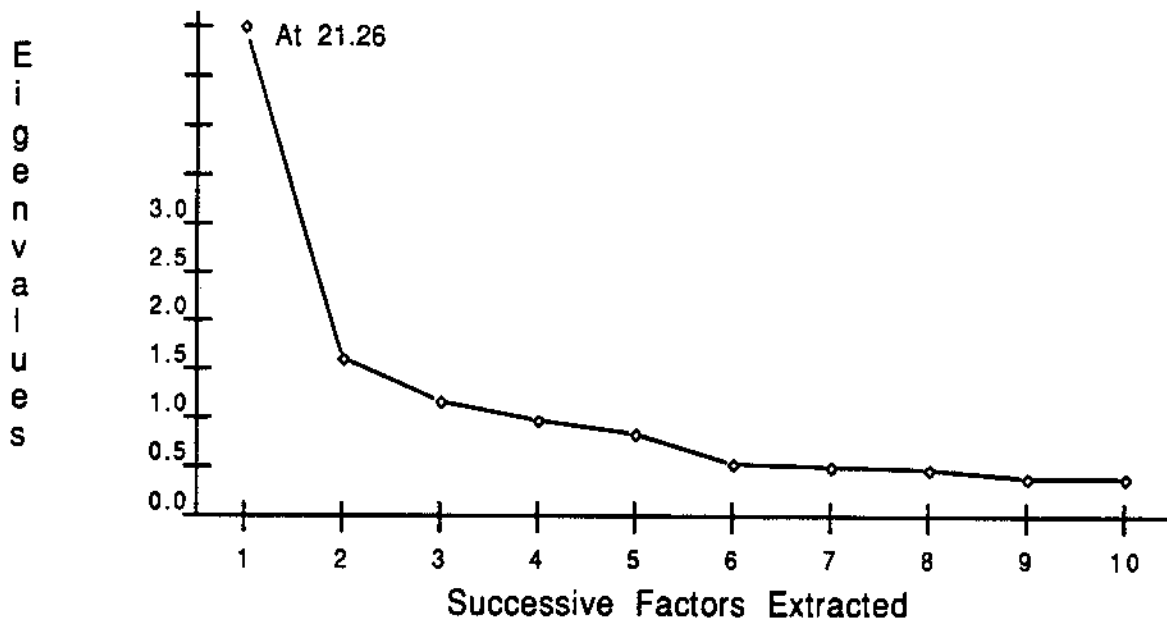


Figure 2. Results of the scree test for student subjects.

These factors demonstrated a more interpretable solution with more balanced factors than the analysis for the combined sample.

The first factor contained simple loadings for five variables. These came from various of the hypothesized constructs. Three of these variables originated in the hypothesized Rhythmic Usage construct referring to balance between rhythmic repetition and variety, rhythmic development and variation, and use of space. One variable referring to melodic variety originated in the hypothesized Melodic Usage construct. One other variable referring to use of tension and release originated in the hypothesized Expressiveness construct. However, the idea of tension and release was regarded as part of melodicism by Baker (1977a). One variable, addressing use of guide tones, cross-loaded on this factor and the fourth factor. The use of



guide tones, or voice leading, has been regarded as part of both melodicism and harmonic usage (Coker , 1980, p. 31-32). Due to the strength of rhythmic and melodic variables and the strength of the idea of variety in these, this construct was labelled Rhythmic and Melodic Variety.

The second factor contained simple loadings for nine variables and cross loadings with five variables. These originated in all seven of the hypothesized constructs. The two highest loading variables originated in the hypothesized Expressiveness construct, "Exhibits emotional conviction," and "Solo has momentum." Two variables from the hypothesized Harmonic Usage construct that loaded on this factor referred to moving with fluency inside and outside the tonality and playing altered, extended sounds in relation to the chord. Three variables appeared in this factor from Melodic Usage. These referred to playing phrases with extended length, developing motives and melodies, and use of appropriate vocabulary. Two variables appeared from the Form construct: "Solo has a sense of spontaneity," and "Moves toward goals and climaxes." "Exhibits inventiveness" originated in the Individuality construct and "Uses a wide variety of articulation" originated in the Jazz Style construct. Variables that cross loaded on this, and other, factors referred to use of rhythmic development, melodic variety and consistency of articulation with the style.

This large list of variables is difficult to summarize in terms of a single overriding or underlying construct. However, these all refer to more advanced concepts of playing, such as playing outside or exhibiting momentum that are not evident in all student performances. This construct will be

Table 25

Pattern and Structure Loadings on the Factor Solution for Students

PATTERN MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
33. RhyRepVar	.50423	.26005	.25502	.25033	-.32753
23. RhythDev	.48645	-.37824	.06582	.13636	.05670
19. MeloVar	.45316	-.36690	.01095	.32379	.01969
14. TensRel	.40765	-.21474	.19619	.15377	.26119
2. Space	.39485	.14488	.35842	.10761	.25598
15. Emotion	-.04191	-.91579	.03868	-.01862	-.03046
26. Momentum	.02733	-.88998	-.00921	.00048	.11378
6. Outside	.02977	-.78698	.08151	-.00833	.02351
8. LngPhras	-.18233	-.75483	-.02965	.36182	-.09742
28. Spontan	.22868	-.73790	.03773	.01970	.03373
11. Inventiv	.32741	-.71733	-.00677	-.02463	.10277
9. GoalClim	.01771	-.64751	.17907	.14885	.04265
25. ArticVar	-.02223	-.58785	.40731	.08025	-.09976
3. Altered	.15058	-.55940	.12638	.04095	.25978
7. DevMotMel	.20441	-.50545	-.00295	.23488	.14704
20. ApVocab	.12376	-.45315	.03178	.30369	.26306
16. TimEvent	.27644	-.28980	.26952	.16021	.19322
17. Tone	-.01514	.02814	.98311	-.02755	.04363
12. Vibrato	.09114	.03638	.72559	.12489	.11463
27. SteadTim	-.09577	-.33348	.48263	.22868	.08165
10. 8NotRhy	-.19966	-.28336	.46136	.34647	.05335
18. Articul	-.04949	-.35618	.43350	.13214	.21437
13. Comunica	.31252	-.34652	.42203	-.25280	.15947
30. BalSkip	.09548	.02452	.15523	.79399	-.00190
5. Arpegg	-.05589	-.15095	.08590	.55590	.25774
21. MelCont	.31727	-.23583	-.00378	.43312	.23990
32. QuotPat	.22370	-.26547	.10293	.40316	.08580
24. GuidTon	.35472	-.08471	.03080	.38878	.34433
4. OrigMel	-.06587	.01202	.07002	.00039	.56573
22. ThruProg	.24048	-.31552	.03622	.22712	.40786
1. RhtNotes	.27620	-.24702	.09602	.22657	.38703

table continues

## STRUCTURE MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
23. RhythDev	.76610	-.76496	.58453	.61656	.46035
14. TensRel	.74167	-.72896	.69837	.63834	.64858
33. RhyRepVar	.70266	-.70215	.56952	.60765	.17849
26. Momentum	.49676	-.94021	.59474	.63899	.44930
28. Spontan	.62083	-.89695	.59964	.62305	.41798
15. Emotion	.39943	-.89506	.54708	.58150	.30657
11. Inventiv	.70107	-.89367	.59582	.60462	.47617
9. GoalClim	.47260	-.87820	.67043	.68933	.43686
6. Outside	.44939	-.85355	.57402	.57363	.36486
8. LngPhras	.26625	-.85260	.47946	.74559	.23638
25. ArticVar	.41833	-.83794	.74003	.62601	.34872
3. Altered	.58239	-.83176	.67596	.62644	.60254
20. ApVocab	.56209	-.83123	.63829	.76350	.60688
19. MeloVar	.75931	-.81515	.58316	.74344	.44926
7. DevMotMel	.58678	-.81308	.57394	.69773	.49621
16. TimEvent	.65364	-.76355	.73253	.65795	.60026
22. ThruProg	.63941	-.75572	.64319	.69433	.71697
1. RhtNotes	.65810	-.73235	.66524	.68293	.71424
17. Tone	.37168	-.55286	.96886	.45050	.52052
12. Vibrato	.45168	-.56892	.86069	.53523	.55292
18. Articul	.42328	-.75971	.80259	.64535	.59985
27. SteadTim	.37184	-.75893	.79929	.68455	.50316
10. 8NotRhy	.26723	-.71335	.74995	.71047	.45153
13. Comunica	.61705	-.64282	.71222	.35825	.52365
2. Space	.60114	-.42800	.61401	.42717	.57101
30. BalSkip	.43152	-.64104	.57017	.88815	.40184
21. MelCont	.67421	-.76358	.60193	.79226	.60454
5. Arpegg	.34674	-.63985	.56076	.77519	.54607
32. QuotPat	.57048	-.73496	.59523	.74305	.47048
24. GuidTon	.67465	-.66070	.59234	.71751	.66773
4. OrigMel	.16407	-.20817	.32616	.21584	.56573

entitled Fluency since it refers to more advanced, or fluent, performance characteristics.

Most of the variables loading on the third factor match the variables in the hypothesized jazz style construct. Two variables referring to tone and vibrato loaded simply on this factor. In addition, two variables referring to appropriate articulation and variety in articulation also appeared in this factor. The latter variable cross loaded on the second factor. The hypothesized correspondence of tone and vibrato variables with articulation to make up jazz style did thus occur in this factor. In addition, two variables referring to time and time-feel loaded on this factor. One other variable from the hypothesized Expressiveness construct that addressed communication between the soloist and the musicians appeared on this factor. Communication could have stylistic components. Use of space cross loads on this and the first factor. This construct was labelled Jazz Style/Time Feel.

Most of the variables that loaded on the fourth factor originated in the hypothesized Melodic Usage construct. Those referred to balance of skips and diatonic movement, use of arpeggios, melodic contour, and use of quotes and patterns. One variable that referred to the use of extended length phrases, originally from the Melodic Usage construct, also cross loaded on the second construct. One variable loaded on this factor that was originally in the Harmonic Appropriateness construct, referring to the use of guide tones. Most of these variables refer to the idea of dimensions, or breadth of melodies. This construct will be designated Melodic Breadth.

The fifth factor contains three variables. Two of these, referring to the ability to play with fluency through chord progressions and to select the tones that correspond with the chord were from the Harmonic Appropriateness

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construct. The other was from the Melodic Usage construct and addressed references to the original melody of the tune. This construct will be labelled Melodic and Harmonic Congruity . These three variables also refer to some kind of correspondence, or congruity.

The five constructs that characterize student jazz improvisation performance were then (1) Rhythmic and Melodic Variety, (2) Fluency, (3) Jazz Style/Time-Feel, (4) Melodic Breadth, and (5) Melodic and Harmonic Congruity. The correlations between these resultant factors are shown in Table 26. This reveals strong relationships among all of these factors, with correlations ranging from .36 to .66.

Table 26

Factor Correlations for Student Subjects

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
FACTOR 1	1.00				
FACTOR 2	-.48	1.00			
FACTOR 3	.40	-.60	1.00		
FACTOR 4	.36	-.66	.49	1.00	
FACTOR 5	.37	-.37	.51	.38	1.00

Research Question 4. What is the most cogent grouping of underlying constructs which characterize single line jazz solo improvisation performances by professional performers?

#### Factor Analysis of Assessments for Professional Performers

The 31 variables that were retained were factor analyzed for the responses to the sixty professional performers. This factor analysis followed the same procedures as the previous analyses. The MSA for this sample was .896, once again easily above the minimum level of .50. The correlation matrix is presented in Appendix F. Figure 3 illustrates the Cattell's scree on these data. It indicated noticeable drops after three, five and seven factors. Eigenvalues for the the professional sample are listed in Appendix E. The factor analysis on these data yielded five factors with an Eigenvalue over 1 with a sixth very close (.980). From these criteria, it was decided to rotate five factors for rotation, since the scree revealed a drop after five factors and there were five factors with eigenvalues above one.

The initial extraction from the factor analysis on professional subjects is shown in Appendix F. Table 27 lists the pattern and structure loadings on this solution. All four variables from the hypothesized jazz style construct loaded on this factor. Those referred to appropriate tone, vibrato, articulation, and variety of articulation. Also a part of this factor were, "Exhibits control over the timing of the events of the solo," originally in the hypothesized form construct. "Use of stylistically appropriate jazz vocabulary," that was originally in the hypothesized melodic construct cross loads on both factor one and factor two. The language of this variable incorporates style. A variable referring to the ability to play with steady time also loads on this construct. This could have a correlation to style. "Momentum," originally

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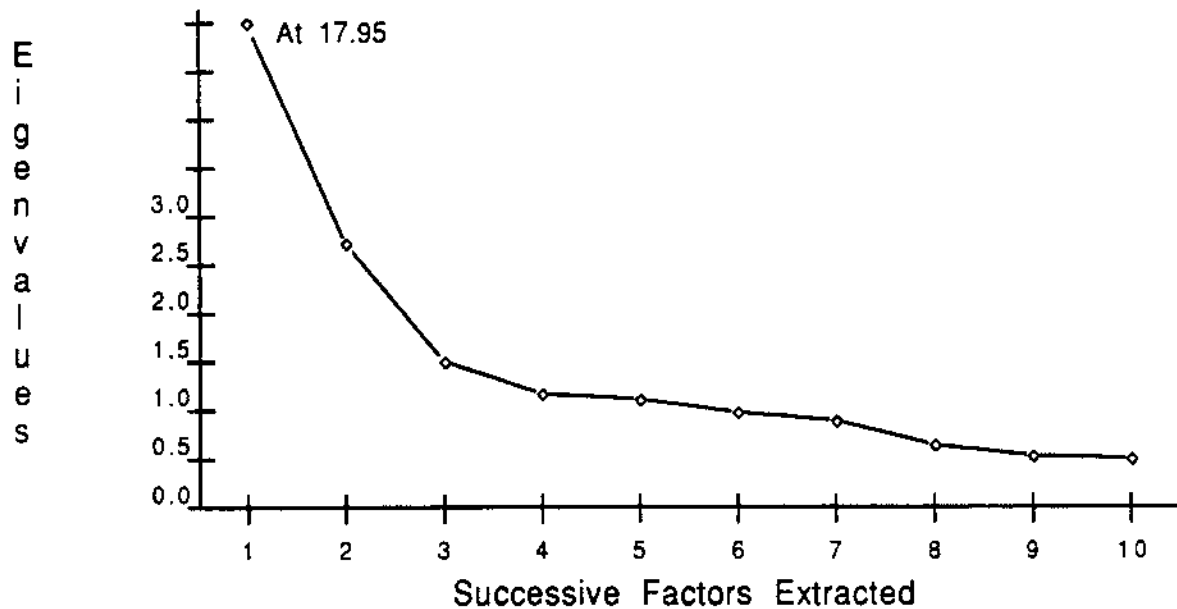


Figure 3. Results of the scree test for professional subjects.

part of the hypothesized Expressiveness construct also cross loads on this factor along with factor five. This first construct, then, will be labelled Jazz Style/Time because of the strength of the hypothesized style variables in defining this along with the variable referring to steady time.

The second factor contains variables from several of the hypothesized constructs, primarily Harmonic Appropriateness and Melodic Usage. All of the variables that loaded or cross loaded on this construct contained negative values. All of these variables showed close relationships since they all

Table 27

Pattern and Structure Loadings for Professional Subjects

PATTERN MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
17. Tone	.93234	.03321	.00864	.11827	-.07959
18. Articul	.90460	-.04554	-.01919	.08725	-.07676
12. Vibrato	.79020	-.16286	.05365	.01293	.05350
16. TimEvent	.55574	-.10083	.25330	.16911	.09056
27. SteadTim	.45585	-.35504	.03261	-.03452	.35723
25. ArticVar	.39875	.15542	.19915	.04925	.29489
24. GuidTon	.17979	-.83554	.08899	-.04894	-.12546
22. ThruProg	.13561	-.76267	.24808	-.08002	.08882
1. RhtNotes	.32393	-.74655	.03852	-.10702	.03183
30. BalSkip	-.06778	-.67458	-.00343	.23700	.16750
32. QuotPat	.03579	-.65977	.00819	.04693	-.23930
5. Arpegg	-.17206	-.64790	.27404	.25721	.16451
21. MelCont	.10286	-.51621	.36500	.16744	.16103
20. ApVocab	.36125	-.50283	.02943	.18374	.09452
10. 8NotRhy	.29442	-.45647	.03554	-.01983	.27686
4. OrigMel	-.01605	-.11997	.85718	-.18239	-.06789
2. Space	.25922	-.17551	.62959	.19635	-.20143
28. Spontan	-.01247	-.18866	.61196	.22638	.28656
19. MeloVar	.16729	-.09521	.54470	.28680	.16837
14. TensRel	.26942	-.03221	.49618	.25251	.16665
7. DevMotMel	.14731	-.16135	.44098	.26482	.18981
13. Communica.	.16137	.01255	.43123	.15471	.20340
11. Inventiv	.32580	-.24342	.37772	.16397	.21302
33. RhyRepVar	.08487	.02751	-.04145	.86280	-.12208
8. LngPhras	.05585	-.36774	-.28732	.19839	.58679
6. Outside	.03249	.24741	.26499	-.13500	.57876
26. Momentum	.48521	-.10984	-.00936	.04431	.52275
3. Altered	.09160	.05012	.33814	.12447	.48818
9. GoalClim	.27325	.03659	.16787	.23214	.46155
15. Emotion	.29666	-.12884	.09908	-.06578	.42100
23. RhythDev	.27702	-.14981	.25624	.17567	.37569

table continues



## STRUCTURE MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
17. Tone	.96533	-.55392	.48102	.49513	.39061
12. Vibrato	.93168	-.60492	.52043	.42815	.47415
18. Articul	.91877	-.53138	.43659	.45174	.36441
16. TimEvent	.84546	-.55123	.63725	.52089	.50757
11. Inventiv	.80631	-.63215	.73634	.54030	.59786
26. Momentum	.79781	-.47519	.48159	.41240	.77512
27. SteadTim	.76721	-.61357	.47336	.29168	.61478
23. RhythDev	.72839	-.51222	.62943	.50392	.67554
10. 8NotRhy	.66956	-.66380	.42232	.36306	.50774
25. ArticVar	.57395	-.18648	.47962	.26884	.54076
24. GuidTon	.58045	-.91203	.36628	.35703	.13715
22. ThruProg	.66428	-.89096	.55829	.36908	.37229
1. RhtNotes	.70229	-.88863	.40888	.34747	.31055
20. ApVocab	.75610	-.79217	.44122	.56692	.41223
21. MelCont	.69617	-.77694	.67407	.54849	.48950
5. Arpegg	.48261	-.77597	.50845	.55858	.37643
30. BalSkip	.45550	-.76652	.28719	.52504	.31872
32. QuotPat	.29120	-.65524	.13991	.27487	-.08465
28. Spontan	.61592	-.51056	.82965	.51718	.61178
4. OrigMel	.36793	-.27967	.81383	.05216	.23957
19. MeloVar	.68349	-.49312	.79247	.56761	.54765
2. Space	.65132	-.54034	.77975	.47802	.24676
14. TensRel	.71387	-.45442	.76710	.53703	.55401
7. DevMotMel	.64712	-.51301	.70155	.54449	.52608
13. Communica	.52727	-.30105	.62557	.36998	.48298
33. RhyRepVar	.34556	-.33407	.15469	.84636	.10609
9. GoalClim	.64646	-.33668	.53116	.48209	.70381
3. Altered	.51107	-.24040	.59106	.34266	.68446
6. Outside	.24895	.09851	.40212	-.01730	.61877
8. LngPhras	.45645	-.50206	.12897	.44459	.61688
15. Emotion	.58117	-.36444	.43487	.23471	.60540

displayed these negative values. They were viewed together. The harmonic variables addressed the use of guide tones, playing correct notes through progressions, playing the corresponding notes to the harmony, and arpeggiation. These all emphasize adherence, or congruity to rules governing which notes are appropriate in jazz improvised performance.

Three of the melodic variables refer to balance between skips and diatonic movement, melodic contour, and the use of appropriate vocabulary. "Plays melodies with extended length" cross loads on this factor and the fifth factor. Most of these relate to commonly held concepts regarding appropriate dimensions or breadth of melodies. The idea of congruity also applied to these. "Use of stylistically appropriate vocabulary" does not apply to dimensions of melodies but is compatible with the concept of congruity. The variable referring to the balance between use of quotes and patterns and individual material from the hypothesized Individuality construct also loads on this factor. It contains an evident melodic component, and was regarded as part of melodicism by Baker (1979). It also is compatible with the concept of congruity. One other variable, "Corresponds with the eighth note concept in the rhythm section" that loaded on this construct originated in the hypothesized Rhythmic Usage construct also could be a part of congruity. Another Rhythmic Usage variable addressing the ability to play in steady time cross loaded on this factor and factor one. Both of these variables were compatible with the concept of congruity. There, this construct was labelled Congruity. The variables came from across four hypothesized constructs, Harmonic Appropriateness, Melodic Usage, and Rhythmic Usage, and Individuality.

The third factor was also comprised of variables from across various constructs. The highest loading referred to use of the original melody from

the hypothesized melodic construct. Two other variables from the melodic construct that addressed variety in melody and development of motives and melodies also loaded strongly and simply on this factor. "Phrases contain melodic contours" cross loaded on this factor and the third factor. In addition, there is some indication in the literature that the use of tension and release (or relaxation), which loaded highly on this factor, could be part of melodicism (Baker, 1977, see this in Table 17 - Melodic Usage Final). "Exhibits inventiveness" also loaded simply on this factor. Inventiveness, or similar ideas such as originality and individuality have been categorized with melodicism by Baker (1979) and Burnsed and Price (1983). Though space was originally a part of the hypothesized rhythmic construct, and that view was held by all sources consulted, the idea of use of space could be seen as an integral part of melodic development. "Spontaneity" could also be a part of development in improvised performance. "Communication" also loads on this factor, along with the fifth factor. This is difficult to interpret. However, this factor will be labelled Development. This construct also emerged as a collection of variables relating to development that originated from across various hypothesized constructs.

The fourth factor only contained one variable, "Effectively balances rhythmic repetition and rhythmic variety." No other variables cross loaded on this factor, and this variable loads on no other factor. The reliability for this variable, as measured by Cronbach's Coefficient Alpha was only .62, one of the lowest measures for alpha accepted for the present study. Perhaps the lower reliability for the measure of this variable caused it to load by itself, instead of a more logical grouping with other variables. The construct

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defined by this variable will be labelled Balance of Rhythmic Repetition and Variety.

The fifth factor is more difficult to interpret. Eight variables from six hypothesized constructs loaded on this factor. Its highest loading refers to use of extended length phrases and melodies which also loads on the second factor. Two extended variables originating in the hypothesized Harmonic Appropriateness construct loaded on this factor. They were "Moves with fluency inside and outside the tonality," and "Skillfully emphasizes altered, extended harmonies in relation to the sounding chord." Two variables from the hypothesized Expressiveness construct, "... momentum," and "Exhibits emotional conviction" also load on this construct. The variable referring to momentum also cross loads on the second factor. "Moves toward goals and climaxes" from the hypothesized Form construct also simply loads on this factor, along with a variable from the hypothesized Rhythmic Usage construct referring to rhythmic development and variation. "Is able to play with steady time" cross loads on this factor along with the first factor.

A simple explanation according to the hypothesized constructs will not adequately describe this construct. However, each of these variables refer to mastery, or the ability to have control over the multiple aspects of an improvised solo. These are difficult to display until other basic criteria such as the ability to play correct tones, have been met. This stands in contrast to other constructs, such as Jazz Style/Time, or Congruity that imply more of a mere competence, or ability to meet a certain minimum criterion of performance. The variables in this construct seem to refer to a mastery of, or fluency in, performance. This construct will, then be labelled Fluency. This does bear resemblance to the Fluency construct identified for the student

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sample. With one exception, all of the variables that loaded on this construct for professionals loaded on the student construct. That exception was the variable that referred to the ability to maintain steady time.

Two of the hypothesized constructs, Individuality, and Form did not emerge as constructs in any of the factor analyses in the present study. The hypothesized Individuality construct only contained two variables in the final version of the DIMI. Those referred to (a) the balance between quotes and common patterns, and individual material; and (b) inventiveness. The former variable was a part of the Congruity construct, the latter part of Melodic Development. Both of these variables loaded on constructs with strong melodic components. This would be in agreement with the view of Baker (1979) that individuality is part of melodicism.

The three variables that were a part of the hypothesized Form construct loaded on three different factors. Apparently these were three separate variables loosely addressing form that don't correspond with one another in the measurement of jazz improvisation.

Table 28 lists the correlations between the resultant factors for professional subjects. Most of the resultant factors were highly related. However, Factor Two (Congruity) and Five (Fluency), and Four (Balance of Rhythmic Repetition and Variety) and Five were less strongly related than the other associations. The argument developed regarding the distinction between fluency versus competence could help to explain the lower relationship between the Congruity and the Fluency constructs.

Table 28

Primary Factor Correlations for Professional Subjects

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
FACTOR 1	1.00				
FACTOR 2	-.52	1.00			
FACTOR 3	.50	-.30	1.00		
FACTOR 4	.41	-.41	.24	1.00	
FACTOR 5	.46	-.19	.39	.24	1.00

## CHAPTER V

### SUMMARY, DISCUSSION, AND RECOMMENDATIONS

#### Summary

The present study sought to develop and test systematically a theoretical model that would delineate the constructs and subsumed variables of jazz improvisation performance. Prior to the study, there was a need for the construction and testing of a theoretical model which summarized the constructs, or underlying mechanisms, of jazz improvisation. Many writers have addressed the idea of constructs, but they have disagreed on their content and configuration. The field of jazz improvisation lacked a body of research that has systematically investigated the configuration of constructs in jazz improvisation.

The research proceeded by developing a hypothesized a priori model consisting of seven constructs. Thirty-five variables associated with those constructs were identified based on the extant literature which had attempted to describe and evaluate the practice of jazz improvisation. These thirty-five variables were categorized by the researcher according to the seven a priori constructs. After pilot testing, these were reduced to thirty-three variables.

An audio tape consisting of 120 jazz improvisation performances from a wide range of student and professional performers was then prepared. Two judges described these performances according to the thirty-three item Descriptive Improvisation Measurement Instrument (DIMI), a measurement device created by the author and determined to exhibit acceptable

characteristics of reliability and validity. Each item then was treated as a variable in subsequent analyses.

### Findings

Research Question 1. What specific performance variables are related to single line jazz solo improvisation performance?

After an extensive examination of the literature of descriptions of jazz improvisation, a model consisting of seven hypothetical constructs as found in the literature was developed. These seven constructs were 1) Harmonic Appropriateness, 2) Rhythmic Usage, 3) Melodic Usage, 4) Jazz Style, 5) Individuality, 6) Expressiveness, and 7) Form. This helped provide an initial framework for the collection and categorization of variables. Thirty-five variables originally were developed based on the summaries of each descriptor that was found in the literature. After pilot testing, this was modified to thirty-three variables, of which thirty-one demonstrated reliability above .50 (Cronbach's Coefficient Alpha). The thirty-one specific performance variables that demonstrated adequate reliability along with descriptions, if necessary, are shown in Table 29. A more complete version as was used in subsequent portions of the study is listed in Appendix D.



Table 29

Performance Variables Developed for the Study

1. *Displays control in selecting tones that correspond with the sounding chord.*

The performer is able to play notes that work with the sounding chord. This doesn't necessarily require that the performer plays the 'correct' scale.

2. *Incorporates space in a convincing manner*

The performer uses space effectively in the development of the solo, or uses enough space to allow the listener to breathe.

3. *Skillfully emphasizes altered, extended harmonies in relation to the sounding chord.*

This includes of altered tones (sharp or flat ninths, sharp elevenths, etc.) and extended tones (natural ninths, thirteenth, etc.).

4. *Alludes to the original melody(ies) of the tune.*

This refers to the original melody, or a contrafact. A contrafact is a new melody written to a the chord progression to an older melody, such as "Oleo" which was written to the progression to "I've Got Rhythm". In these cases, reference to either original or contrafact melody should be considered.

5. *Uses arpeggiated ideas*

Is there usage of arpeggiated ideas that outline a chord, or is the solo primarily made up of scalar patterns? The correctness of the arpeggio also should be considered.

6. *Moves with fluency inside and outside the tonality*

This includes the ability to get back "inside" in addition to moving "outside" the tonality.

7. *Develops motives and melodies*

This includes developing a short germ of an idea or melodic phrase (not necessarily from the original tune).

8. *Plays phrases and melodies with extended length*

table continues

9. *Moves toward goals and climaxes*

This includes the ending of the solo in addition to intermediate goals and climaxes during the solo.

10. *Corresponds with the eighth note division in the rhythm section*

This refers to whether the soloist is playing swing or straight eighth notes and whether this subdivision 'lines up' with the rhythm section. If the style is swing, but is closer to equal subdivision (as in an up tempo tune), it should still match. This item does *not* refer to sense of steady time.

11. *Exhibits inventiveness*

This refers to the degree of using apparently original material or original reworking of derived material.

12. *Vibrato is appropriate to the stylistic context*

Certain styles of vibrato are appropriate or inappropriate depending on the stylistic context, whether bop, cool, or fusion. In general, the vibrato should be varied and used with discretion.

13. *There is communication between the soloist and other musicians.*

14. *Effectively exploits tension and release*

15. *Exhibits emotional conviction*

This can include different types of use of emotion. This, of course, may manifest itself in different ways. A lyrical player can still exhibit emotional conviction, as can an exciting, fiery player.

16. *Exhibits control over the timing of events of the solo*

This includes important phrases, climaxes, and quotes. Is the soloist in total command of these elements or do they seem to be inserted in a random, haphazard way?

17. *Tone and timbral manipulation are appropriate to the style.*

Certain tones and timbres are appropriate in be-bop. Others are appropriate in fusion and other styles. The context of the solo is important. Mature, appropriate use of devices such as scoops, shakes, or doits is also desirable toward this.

table continues

18. *Articulation is consistent with the style*

In a swing style, the articulation should be legato most of the time. Within a rock rhythmic feel, more staccato can be appropriate. Appropriate use of accents at important times (first, last notes of a phrase, at the high note of a phrase, changes of direction, after skips) and on upbeats should be considered part of this. Both note length and accent components should be considered.

19. *Melody contains variety*

This refers to variety in the soloists' improvised melody, not the original melody of the tune.

20. *Exhibits use of stylistically appropriate jazz vocabulary*

By using commonly used patterns and quotes, chromatic ornamentations (in bebop), arpeggiation, and scale usage, the player demonstrates the use of the jazz vocabulary. The context of the tune is again important. For instance, a blues or pentatonic scale is effective in some types of tunes and inappropriate in others.

21. *Phrases contain melodic contours*

Is there a mature concept to the shape of the melodic line or do the lines instead seem to wander up and down randomly?

22. *Moves with fluency through chord progressions*

The emphasis is on skill in moving *through* a series of chord progressions. This can be different from playing 'correct' or colorful notes on isolated chords. Progressions include the common types such as II-V<sup>7</sup>-I's, cycles, and turnarounds as well as more unusual root movements.

23. *Makes good use of rhythmic development and variation.*

Some young players tend to start every phrase with the same rhythm, or only play constant eighth notes. Variety is especially needed at slower tempos.

24. *Effectively incorporates "guide tones", or voice leading*

This includes resolutions of thirds and sevenths of chords, and any other graceful connections between chords using common tones and stepwise resolutions.

25. *Uses a wide variety of articulations*

This refers to variety in note length and accent.

26. *Solo has momentum*

Does the solo move forward or does it lack a sense of direction?

27. *Is able to play with a sense of steady time*

Some performers play impeccable, steady time. Some other players 'lay back' or 'play on top' of the beat but still exhibit a *sense* of steady time. Other players, who would receive a lower response have trouble maintaining steady time through phrases, either falling back, rushing ahead or simply 'floating' the time, failing to define it.

28. *Solo has a sense of spontaneity*

While it is difficult to accurately determine actual spontaneity, the listener should consider the impression of spontaneity.

29. *Maintains balance between diatonic movement and skips*

30. *Use of quotes and commonly used patterns are balanced with individual material*

In the case of an innovator who may have helped to create the vocabulary (quotes and commonly used patterns) the historical context should be taken into account.

31. *Effectively balances rhythmic repetition and rhythmic variety*

Research Question 2. What is the most cogent grouping of underlying constructs which characterize single line jazz solo improvisation performances?

Factor analysis was performed on the combined responses on the DIMI for the combined sample of student and professional performers. Even after oblique rotation, the results indicated one global construct labelled Overall with two other small factors that contained simple loadings of only one variable each. Those other factors referred to Harmonic Divergence and Use of Melody. The latter two constructs were extremely small in comparison to the first, Overall, construct. The Harmonic Divergence construct contained only two variables, one of which was exclusive to this construct. The Use of Melody construct only contained three variables, all of which were a part of the first construct. These three constructs accounted for eighty percent of the total variance. Twenty percent of the total variance was unaccounted for by this analysis.

Research Question 3. What is the most cogent grouping of underlying constructs which characterize single line jazz solo improvisation performances by student performers?

Factor analysis and rotation were performed on the responses on the sixty student performers. The hypothetical model was not confirmed. However, five constructs of (1) Rhythmic and Melodic Variety, (2) Fluency, (3) Jazz Style/Time Feel, (4) Melodic Breadth, and (5) Harmonic and Melodic Congruity did emerge. This solution represented a greater degree of balance among the factors than the solution for the combined sample. The large, overall construct of the combined sample did not emerge, even though the Fluency construct did contain many variables. This factor analysis revealed

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constructs that were somewhat different than those that were hypothesized. These five constructs accounted for eighty percent of the total variance. Twenty percent of the variance was unaccounted for by this analysis.

Research Question 4. What is the most cogent grouping of underlying constructs which characterize single line jazz solo improvisation performances by professional performers?

Factor analysis and subsequent rotation on the sixty professional performers indicated a five factor solution which was somewhat similar to the solution for the student performers. Though the hypothetical model was not completely confirmed, the factor analysis revealed five constructs of (1) Jazz Style/Time, (2) Congruity, (3) Melodic Development, (4) Balance of Rhythmic Repetition and Variety (only one variable), and (5) Fluency. Again, this solution represented a greater degree of balance among the factors than the solution for the combined sample. Seventy-five percent of the total variance was accounted for by the five constructs, with twenty-five percent unaccounted for. This factor analysis on professional performers again revealed somewhat different clusters other than the traditional melodic, harmonic, and rhythmic associations. Constructs consisting of variables from across various constructs, were observed. One example of this is the Congruity construct which consisted of variables, or items, from several hypothesized constructs of Harmonic Appropriateness, Melodic Usage, and Rhythmic Usage.

## Discussion

### Exploratory Research

The present study was exploratory research. Because of a lack of systematic research in the field of jazz improvisation, the researcher found it

necessary to first develop and then test a hypothesized set of constructs. Gorsuch stated that factor analysis is appropriate in exploratory research when constructs are not well defined (1983). Kaiser (1970) also defended this type of practice, stating that in research of this type, many possibilities must be pursued to eventually derive some meaningful results. In the present study, factor analyses of jazz improvisation were conducted for combined, student, and professional samples. While the factor analysis for the combined sample yielded questionable results, this process needed to be undertaken to determine indications for future research. These results and this discussion were regarded as a preliminary model in need of further confirmation and testing. Nevertheless, these results can be couched in a theory of jazz improvisation that is derived from this study.

#### High Correlations of Factors and Variables

While devising rating scales for jazz improvisation, Schilling (1987) and Burnsed and Price (1984) found that their constructs, which were determined by subjective, intuitive based means, all correlated highly. The results of the present study generally agreed with those findings. This tendency toward high correlations was most evident in the factor analysis of the combined sample of student and professional performers which revealed a high, overall construct of jazz improvisation. The separate analyses of student and professional performers did reveal separate constructs. While these were more clearly delineated solutions which somewhat resembled the hypothetical model, high relationships were still evident between variables and resultant constructs. The tendency toward global measurement, and high relationships between constructs or test items has also been noted in

other performance areas in music (Drake, 1939; Bergee, 1987, p. 125; Burnsed, Hinkle and King, 1985; Fiske, 1979).

#### A Theory of Jazz Improvisation Based on This Study

The only clear, distinct sets of constructs were gleaned from the separate factor analysis performed on the separate student and professional samples. The analysis of the sample that combined student and professional performers only tended to reveal a large, overall construct of jazz improvisation. This is surprising since separate constructs emerged when the sample was split into two groups, student and professional. This indicated that the populations of student and professional performers are so unlike that combining them appeared to confound the results. This combined solution does not seem to offer any insight into a theory of jazz improvisation and will be discarded from the following discussion. The following discussion only addressed the constructs ascertained from the factor analyses of professional and student performers. The constructs delineated for professional performers was discussed. The constructs delineated for the student performers was then discussed and compared to the professional solution.

#### Constructs Emerging from Factor Analyses of Professional Performers.

Constructs derived from the factor analysis of professional performers were discussed as follows: (1) Jazz Style/Time, (2) Congruity, (3) Melodic Development, (4) Fluency, and (5) Balance of Rhythmic Repetition and Variety.

Jazz Style/Time. The construct of Jazz Style/Time was clearly identified for the professional performers. It also received strong support from both the hypothesized Jazz Style construct and the surveyed literature.

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This construct more closely matched the hypothesized model than did any of the other constructs. As mentioned in the previous chapter, the term "style" was troublesome since it can have many meanings. "Style" here refers to the manner of playing congruent with certain norms. Those norms centered around sound and articulation.

The factor analysis of the professional sample confirmed the hypothesized correspondence of sound and articulation. This corresponded with the matching of these types of variables by Burnsed and Price (1984) and Schilling (1987). Also, sound and vibrato, as expected, clustered together with variables related to consistency of articulation to the stylistic context and variety of articulation. There are some differences between these factor analyses and the opinions of some other sources that were consulted in forming the hypothetical model. Baker (1979), Bash (1983), and Riggs (1990) separated the ideas of "Style" or "Articulation," and "Tone." Haerle, Peterson, and Steinel (1989) categorized elements from this construct into "Basic Musicianship" and "Rhythmic Elements." However, the present research indicates that stylistic considerations of sound and articulation relate together and are important in jazz improvisation. Since these items clustered together, it appeared that it would be simpler to address Jazz Style rather than its several component parts of sound, vibrato, and articulation.

Items addressing "steady time" and "jazz style" clustered together in the factor analysis of the professional performers. The annotation to this variable (see Appendix B, number 27) has stylistic ramifications, addressing the possibility that the performer may "lay back" or "play on top of" the "time." This association also distinguished the idea of "Time" apart from other concepts in the hypothesized Rhythmic Usage construct. It appears that the

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concepts of "Jazz Style" and "Steady Time" relate together in professional level jazz improvisation. It also then appears that it would be simpler to address Jazz Style/Time rather than the separate elements of style and steady time.

Melodic Development. Although its label indicated a strong melodic component, this construct also contained variables related to other hypothesized constructs. The variables of this construct were related to concepts of developing a jazz solo through the use of the original melody, space, spontaneity, melodic variety, tension and release, developing motives and melodies, communicating with the other musicians, and exhibiting inventiveness. Half of these came from the hypothesized melodic construct. However, the variable referring to use of space originally was part of the hypothesized Rhythmic Usage construct. Spontaneity originated in the hypothesized Form construct.

Tension and release was a part of this construct, but was hypothesized to be a part of a Expressiveness construct. However, tension and release was considered a part of melodic development (or Line Construction) by Baker (1979). The idea of inventiveness was part of the hypothesized Individuality construct in the present research, but was viewed as a part of melodicism by Baker (1977a) and Burnsed and Price (1984). This construct then partly supported the hypothesized Melodic Usage construct while incorporating other ideas relating to development. The literature did support the existence of these variables with Melodic Development.

Witmer and Robbins (1988) maintained that the melodic area has been neglected in the jazz pedagogy literature. They also stressed the need for an early introduction to melodic development in jazz improvisation pedagogy.

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Coker, however, suggested delaying the introduction of these kinds of elements until after a rigorous introduction to component parts of the Congruity construct, such as arpeggiation and learning to play the correct notes of the chords and scales (1975, p. 58-61). Witmer and Robbins did acknowledge the difficulty of teaching melodic developmental concepts. The present study, does not resolve this conflict, but it does indicate that Melodic Development is important to professional level jazz improvisation.

Congruity. The construct of Congruity referred to following of guidelines regarding playing correct notes and dimensions of melodies. Its component variables came primarily from the hypothesized Harmonic Appropriateness and Melodic Usage constructs. In general, the correspondence of the Harmonic and Melodic areas was not observed in the literature surveyed, though it was inadvertently supported by Schilling (1987), whose Melodic Content construct contained primarily harmonic elements. Also, as with Melodic Development, this construct was made up of parts of other hypothesized constructs. Many of the individual variables that contributed to this construct could be viewed as part of both harmonic and melodic conception, such as arpeggiation, use of guide tones, and appropriate use of the vocabulary. Steinel's statement concerning guide tones highlights this connection, "Guide tones are devices that show the relationship between the vertical (harmonic) and horizontal (melodic) forces at work in a progression" (1990). Perhaps, as if found in professional performers, improvisation teachers and students would be better served by addressing many melodic and harmonic concepts as intertwined instead of separate entities.

Fluency. This construct was the most difficult to interpret, since its variables come from five of the seven hypothesized constructs, Melodic Usage, Harmonic Appropriateness, Expressiveness, Form, and Rhythmic Usage. However, each of its component high loading variables seemed to address the idea of command of, or fluency, in jazz improvisation performance. The wording of the variables indicate this, "Plays phrases and melodies with extended length," "Moves with fluency inside and outside the tonality," "... has momentum," "Skillfully emphasizes altered, extended harmonies..." "Moves toward goals and climaxes," "Exhibits emotional conviction," "and "Makes good use of rhythmic development and variation." These demonstrate artistry in performance that surpasses the ability to follow the rules (Congruity) with the right style (Jazz Style/Time). One variable that was a part of both this construct and the Jazz Style/Time construct referred to the ability to play with steady time.

This analysis of professional performers seemed to indicate that melodicism was important to jazz improvisation with a strong association to three constructs in the analysis, Melodic Development, Fluency, and Congruity. This type of importance of the melodic aspect is supported in the literature by many, including Schilling (1987), Paulson (1985), Baker (1977a), and Coker (1964).

Balance of Rhythmic Repetition and Variety. The only variable that comprised this construct was "Maintains a balance between rhythmic repetition and variety." This variable loaded simply on this factor and was the only one with a strong loading. This did not relate with any of the other rhythmic variables in the professional analysis, though it was a part of the Rhythmic and Melodic Variety construct for the student performers. This

variable may not be effective in describing professional jazz improvisation performance.

Constructs Emerging from Factor Analyses of Student Performers.

The following constructs as delineated from the factor analysis of student performers were discussed: (1) Jazz Style/Time Feel, (2) Harmonic and Melodic Congruity, (3) Melodic Breadth, (4) Rhythmic and Melodic Variety, and (5) Fluency. These will be compared to identical or similar constructs from those ascertained by the analysis on professional performers.

Jazz Style/Time Feel. This construct was similar to the Jazz Style/Time construct from the solution for professional performers. The only major difference was the inclusion of the variable referring to corresponding with the eighth note concept in the rhythm section in the student analysis only. The placement of this variable in this construct confirmed the hypothesized association of the ability to maintain steady time and the matching of the eighth note concept in the rhythm section. The professional analysis did not confirm this association. The constructs of Jazz Style/Time (Feel), as delineated from both the professional and student sample, were evidently important to jazz improvisation performance.

Harmonic and Melodic Congruity. This construct was not as strong in the student sample as the Congruity construct of the professional sample. It only consisted of three variables that referred to use of the original melody, the ability to play through chord progressions, and the ability to play the notes defined by the sounding chord. Other variables that loaded on the professional solution included all of the variables that loaded on the Melodic Breadth construct for students.

Melodic Breadth. Most of the variables that were a part of this construct originated in the hypothesized Melodic Usage construct. All of the variables were also subsumed in the Congruity construct for professional performers. It is not clear why one construct in the professional solution emerged as two in the student solution. Even when dividing into two constructs, the variables did not divide according to the hypothesized constructs. Instead, both constructs were comprised of variables from both the hypothesized Harmonic Appropriateness and Melodic Usage constructs. This provided further evidence that the harmonic and melodic areas are closely related in jazz improvisation performance.

Rhythmic and Melodic Variety. This construct for student performers was related to the Melodic Development construct delineated from the professional sample. It was defined by many of the same variables that constituted the Melodic Development construct. However, the Rhythmic and Melodic Variety construct embodied additional rhythmic concepts. These were balance between rhythmic repetition and variety, development of rhythm, and use of space. The only one of these that was a part of the Melodic Development construct for professional performers was the use of space. This construct was regarded as "variety" instead of "development" because the concept of variety was more important in the variables that comprised this construct. Those referred to balance of rhythmic repetition and variety and variety in melody. One developmental variable did appear referring to rhythmic development and variety, but it had a less significant loading than the rhythmic variety variable. This also indicated that rhythm and melody are interrelated in the use of variety, or development in student level jazz improvisation.

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Fluency. In the analysis on the student sample, the Fluency construct could instead be considered to as an overall construct, since it was comprised of fifteen of the thirty-one variables of the DIMI. It contained many more variables and was somewhat less well defined than the Fluency construct for professional performers. This construct for student performers did not seem to indicate the degree of mastery or artistry implied by the professional construct of the same name. Nevertheless, as with the professional sample, this construct again indicated a dimension of performance that transcended the implied "following of rules" inherent in either Congruity or Jazz Style/Time Feel.

#### Constructs That did not Emerge from Factor Analyses.

The following section discussed the hypothesized constructs that did not emerge in the factor analysis. Those were Individuality and Form.

Individuality. The omission of any constructs relating to Individuality, as developed in the a priori model, could have occurred for several reasons. As discussed in chapter four, the notion of individuality in jazz improvisation has received little attention in the surveyed literature. Despite the emphasis of some in jazz improvisation pedagogy, such as Coker, those concepts do not appear to be of that much importance in describing jazz improvisation performances at the present. Also, as noted in chapter four, one variable that purported to describe individuality, "exhibits inventiveness," loaded on the Melodic Development construct of professional performers. This corresponds to the groupings by Baker (1979) and Burnsed and Price (1984) in the Melodic area. Burnsed and Price's placement of "originality" in the melodic area came closest to this idea.

Form. The hypothesized form construct was not supported by present research. Its variables were a part of various resultant constructs. The variable referring to the sense of timing of important events, which was supported by Elliott (1983) curiously loaded with the style construct on professional performers.

### Summary of the Theory

Most of the constructs ascertained by the factor analyses of professional and student performers consisted of variables from across various of the hypothesized constructs. The results of this study, then, suggest that while it may be convenient for purposes of simple categorization to divide jazz improvisation into melodic, harmonic, rhythmic and other related areas, jazz improvisation is instead governed by underlying constructs of a somewhat different nature that are highly related to one another. The results of the present research indicated that the constructs which describe professional jazz improvisors were (1) Jazz Style/Time, (2) Congruity, (3) Melodic Development, (4) Fluency, and (5) Balance of Rhythmic Repetition and Variety. The constructs which describe student jazz improvisors were (1) Jazz Style/Time Feel, (2) Harmonic and Melodic Congruity, (3) Melodic Breadth, (4) Rhythmic and Melodic Variety, and (5) Fluency. Within these solutions, most of these constructs were strongly related to one another. These two solutions did resemble one another, but did not resemble any of the proposed construct groupings proposed by the present research or any of the literature surveyed to create the hypothesized model.



### Recommendations

This study revealed similar constructs, or mechanisms, at work in governing student and professional jazz improvisation performances. Combining these samples, however, resulted in a tendency toward a global, overall, construct of jazz improvisation. Future studies should focus on these individual areas to continue to clarify the constructs involved. The development of the variables, or criteria, could then focus on the specific playing level to be measured and yield more reliable and valid measures of jazz improvisation performance. It is possible that evaluative variables would be more effective in distinguishing constructs for the student level, while detailed, descriptive variables would be more effective in distinguishing constructs for professional performers. Since all the values for the Measure of Sampling Adequacy were quite high (.86 to .96) the sample size could be reduced and still provide adequate samples for factor analysis. This could help reduce possible dangers of rater fatigue that could have existed in the present study where the judges measured 120 different performances, each lasting one to two minutes.

Since the present study was exploratory research, the constructs delineated for professional subjects should be subjected to a confirmatory factor analysis. In preparation for this, variables could be modified according to these constructs. From twenty to twenty-five percent of the total variance was unaccounted for by the present analyses. Although that is a relatively low figure in factor analysis, it is still possible that some of that variance would contain important information relating to construct configuration. Future studies should attempt to shed light on that variance.

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Rating scales based on the constructs of jazz improvisation should be developed. The variables as developed by the present study could serve as material upon which to develop the items for such as rating scale. The body of literature surveyed could also serve as supplementary material upon which to build these rating scales. These scales should focus on the specific playing level to be rated, student or professional.

The variables that were collected could also be utilized to offer diagnostic information to the student and teacher. Pedagogy and curriculum development could also utilize these variables as a check-list to insure that all important jazz improvisation concepts have been addressed.

The present research did not include rhythm section instruments. Future studies should consider these and role accompaniment instruments play in jazz improvisation. The present research also was limited to improvisation within a jazz context. Theoretical constructs of improvisation outside the jazz realm such as organ improvisation, baroque or other early musics, and aleatoric music should also be investigated and compared to the constructs of jazz improvisation.

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APPENDIX A  
PILOT STUDY RATING SCALE

Rating scale for pilot study:

Please use the items below to characterize as accurately as possible the taped performances that you will hear. Respond by circling the number of which corresponds to the response which most accurately describes your evaluation of that item. Choose only one response to each statement. Respond to each item. Use the following five-point scale:

Strongly				Strongly
Agree	Agree	Neutral	Disagree	Disagree
1	2	3	4	5

Your range of variability should reflect the entire range of professional and student improvisation performances that exists in jazz music.

1. 1 2 3 4 5      Moves toward targets and goals in melody.
2. 1 2 3 4 5      There is a balance between skips and stepwise movement.
3. 1 2 3 4 5      There is a balance between predictability and non-predictability.
4. 1 2 3 4 5      Does NOT communicate with the eighth note concept in the rhythm section.
5. 1 2 3 4 5      Does NOT use space effectively.
6. 1 2 3 4 5      Exhibits both originality and inventiveness.
7. 1 2 3 4 5      There is a balance between idiomatic and non-idiomatic use of instrument.
8. 1 2 3 4 5      Style is inappropriate within a jazz context.

9. 1 2 3 4 5 Does NOT communicate with the rhythm section.
10. 1 2 3 4 5 The performer is NOT able to select the correct notes that correspond with the sounding chord.
11. 1 2 3 4 5 Makes good use of tension and release.
12. 1 2 3 4 5 Solo does NOT exhibit use of emotion.
13. 1 2 3 4 5 There is a balance between individual and public domain material.
14. 1 2 3 4 5 Solo exhibits a good sense of timing of the events in the solo.
15. 1 2 3 4 5 Does NOT incorporate the original melody.
16. 1 2 3 4 5 Sound and vibrato are appropriate to the style.
17. 1 2 3 4 5 Articulation is inappropriate.
18. 1 2 3 4 5 Melodies contain no variety.
19. 1 2 3 4 5 Works toward goals and climaxes.
20. 1 2 3 4 5 Does NOT exhibit typical use of the jazz vocabulary.
21. 1 2 3 4 5 The performer uses typical arpeggiated ideas.
22. 1 2 3 4 5 Utilizes melodic and/or motivic development.
-

23. 1 2 3 4 5      Melodies contain no contour.
24. 1 2 3 4 5      The performer is NOT able to play extended harmonies.
25. 1 2 3 4 5      The performer demonstrates the ability to play appropriate notes through a chord progression.
26. 1 2 3 4 5      Uses no rhythmic development and variation.
27. 1 2 3 4 5      Makes use of guide tones, or voice leading.
28. 1 2 3 4 5      Utilizes balance and contrast between rhythmic repetition and variety.
29. 1 2 3 4 5      Develops motives and ideas throughout the solo.
30. 1 2 3 4 5      Does NOT use a variety of articulations.
31. 1 2 3 4 5      Does NOT display intensity and momentum.
32. 1 2 3 4 5      Does NOT exhibits a sense of metronomic, steady time.
33. 1 2 3 4 5      Solo has a sense of spontaneity.
34. 1 2 3 4 5      Uses a continuous melodic concept. (as opposed to motivic)
35. 1 2 3 4 5      Demonstrates an inability to solve problems and make adjustments.
-

After rating these performances, please circle the number of any question that you believe was difficult to interpret, or difficult to use when evaluating these performances. Please either write out or explain to the investigator why it was difficult for you.

Please add any descriptions that will help characterize these performances. Also, please comment whether or not the quality of the recordings affected your ability to make distinctions in evaluating these performances.

Thank you for the kind assistance of your time toward this project.

APPENDIX B



## Descriptive Improvisation Measurement Instrument (DIMI)

### Instructions

Please use the items that follow to describe the taped performances that you will hear. Indicate responses on the computerized answer sheet. Use a separate sheet for each solo. The number in the "Special Codes" section on the lower left of the first page should correspond with the number of the soloist to which you are listening.

You will be listening to 120 different performances. For each you will complete 33 descriptive items. You do not have to complete this task in one sitting. Respond to every item for every performer. Choose only one response to each statement. Before beginning, please look over the entire form to make sure you understand each item. I suggest that you use a counter or search on your tape player to keep track of where each solo starts for repeated listenings. Feel free to listen as many times as you need to complete the scale accurately. A list of item with descriptions follows. When you are comfortable with the items, you may want to use the sheet on the last page which is simply a listing of each item.

This rating scale is divided into two categories: descriptive items and balance items. Please note the items should only describe the contents of each solo and do NOT evaluate quality. The 'best' solo will not necessarily include all of these contents. Therefore, top level solos will not necessarily receive a highly positive response on all these descriptive items. Likewise, the 'weakest' solo may still include some of these contents and may receive a high score on some items. Merely use the scale to help describe what you hear.

Generally, if someone displays superior fluency with a given technique, they should receive an '5' (Strongly Agree) for that item. If someone aptly demonstrates the technique, but doesn't seem in total control, or uses it in a superficial manner, give a '4' (Agree). A '3' (Neutral) should be given for an average use of the technique or when they use the technique some of the time, and ignore it at others. A '2' (Disagree) would be appropriate when they exhibit little use of the technique. A '1' (Strongly Disagree) should be given when they display little or no use of the technique at all. More specific instructions for responding to some of the individual items follows. Do NOT consider the quality of the ensemble or recording, only the soloist. Also, do NOT consider the difficulty of the tune or tempo in your responses.

I generally attempted to use tunes of which most jazz musicians and educators are aware. I provided lead sheets or included the melody on the provided tape if I had any doubts.

The following scale should be used for the descriptive and evaluative items:

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Not Applicable
A	B	C	D	E	*J
1	2	3	4	5 .....	*10

Indicate N.A. if you feel this item does not apply to this performance. The N.A. response should be used sparingly.

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Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Not Applicable
1	2	3	4	5 .....	*10

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## Descriptive Improvisation Measurement Instrument (DIMI)

### *1. Demonstrates control in selecting tones that correspond with the sounding chord*

You should simply document the manifestation of playing notes that work with the sounding chord. A '5' should be given when the player demonstrates command over the selection of notes. If they display mere capability, a '4' should be given. A '1' should be given when the player rarely plays notes that work with the chord.

### *2. Incorporates space in a convincing manner*

If the player uses space effectively in the development of the solo it should receive a '5'. If the solo contains enough space to allow the listener to breathe, circle a '4'. A '3' or '2' should be given for more limited use of space. A '1' should be given when space is only used to take quick breaths.

### *3. Skillfully emphasizes altered, extended tones in relation to the sounding chord*

Does the player have control of the use of altered tones (sharp/flat ninths or sharp elevenths, etc.) and extended tones (natural ninths, or thirteenth, etc.)? If he exhibits control, give a '5'. If she use them without real control, give a '4' or a '3'. For little use of these - '2'. No use of alterations or extensions - '1'.

### *4. Alludes to the original melody(ies) of the tune*

Some tunes have more than one melody, such as a new melody written to a standard set of chord changes. In those cases, account for references to either. The reference can be obvious or subtle. A '5' should be given when the melody is effectively weaved into the improvisation, a '4' should be given for a more obvious or superficial allusion. If there is very slight reference to the melody, respond with a '2', if none respond with '1'.

### *5. Uses arpeggiated ideas*

Is there use of arpeggiated ideas that outline a chord, or is the solo primarily made up of scale patterns? Your response does not need to take into account the percentage of arpeggiation, but just that it occurs. It should take into account the correctness of the arpeggio, i.e. a major arpeggio played when a minor chord is designated would receive a lower rating ('3' or '4' instead of '5'). If few arpeggios - '2'. No arpeggios - '1'.

### *6. Moves with fluency "inside" and "outside" the tonality*

Only those showing real fluency should receive a '5'. Some inexperienced players can move "outside", but have difficulty getting back in and should receive a '4' or '3'. Others end up outside accidentally, and should receive a '2'. If don't attempt this, they should receive a '1'.

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Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5 .....	Not Applicable *10
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*7. Develops motives and melodies*

Does the soloist take a short germ of an idea or a melodic phrase (not necessarily from the tune) and use and develop that ('4' or '5')? Developmental techniques include sequence, transposition, augmentation, and diminution. If there is very little use of development, respond with '1'. If there is repetition, but little actual development, respond with '2' or '3'.

*8. Plays phrases and melodies with extended length*

If phrases are consistently long, respond with a '5'. If they are short and choppy they should receive a '1'.

*9. Moves toward goals and climaxes*

This would include the ending to the solo in addition to the intermediate goals and climaxes along the way.

*10. Corresponds with the eighth note division in the rhythm section*

This refers to whether the soloist is playing swing or straight eighth notes and whether this subdivision 'lines up' with the rhythm section. If it swings, but is closer to equal subdivision (as in an up tempo tune), it should still match. This item does not refer to sense of steady time. A '5' should be given for close correspondence, a '1' should be for no correspondence (for example- swing when the rhythm section is playing latin).

*11. Exhibits inventiveness*

'5' - A High Degree of using original material or original reworking of derived material. '1' - Extremely low inventiveness.

*12. Vibrato is appropriate to the stylistic context*

Certain styles of vibrato are appropriate or inappropriate depending on the stylistic context, whether bop, cool, or fusion. The vibrato generally should be varied and used with discretion. Appropriate to the style - '5'. Totally inappropriate - '1'.

*13. There is communication between the soloist and other musicians.*

High degree of communication - '5'. No communication - '1'.

*14. Effectively exploits tension and release*

*15. Exhibits emotional conviction*

This, of course, may manifest itself in different ways. A lyrical player can still exhibit emotional conviction, as can an exciting, fiery player. One of these should receive a '4' or '5'. If there is very little or

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Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Not Applicable
1	2	3	4	5 .....	*10

---

This, of course, may manifest itself in different ways. A lyrical player can still exhibit emotional conviction, as can an exciting, fiery player. One of these should receive a '4' or '5'. If there is very little or no conviction, respond with a '1'.

*16. Exhibits control over the timing of events of the solo*

This includes important phrases, climaxes, and quotes. Is the soloist in total command of these elements ('5') or do they seem to be inserted in a random, haphazard way ('1')?

*17. Tone and timbral manipulation are appropriate to the style*

Certain tones and timbres are appropriate in be-bop. Others are appropriate in fusion and other styles. Respond according to the context of the solo. Mature, appropriate use of devices such as scoops, shakes, or doits should be given a higher score, while immature uses should detract from the score.

*18. Articulation is consistent with the style*

In a swing style, the articulation should be legato most of the time. Within a rock rhythmic feel, more staccato can be appropriate. Appropriate use of accents at important times (first, last notes of a phrase, at the high note of a phrase, changes of direction, after skips) and on upbeats should be considered part of this. Players receiving a '4' or '5' should incorporate *both* note length and accent components. If they only incorporate one of these components, they should receive a '3'. If there is little appropriate articulation - '2'. If there is hardly any correct articulation - '1'.

*19. Melody contains variety*

This refers to the soloists' improvised melody, not the original melody of the tune. Does the soloist use melodic variety ('5' or '4'), or does the melodic material all sound the same ('2' or '1')?

*20. Exhibits use of stylistically appropriate jazz vocabulary*

By using commonly used patterns and quotes, chromatic ornamentations (in be-bop), arpeggiation, and scale usage, the player demonstrates the use of the jazz vocabulary. The context of the tune is again important. For instance, a blues or pentatonic scale is effective in some tune types and inappropriate in others.

*21. Phrases contain melodic contours*

Is there a mature concept to the shape of the melodic line ('5' or '4'), or do the lines seem to wander up or down randomly ('2' or '1')?

*22. Moves with fluency through chord progressions*

The emphasis is on skill in moving *through* a series of chord progressions. This can be different from playing 'correct' or colorful notes on isolated chords. Progressions include the common types such as II-V7-I's, cycles, and turnarounds, as well as more unusual root movements. If a player is fluent through the

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Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Not Applicable
1	2	3	4	5 .....	*10

---

progressions, they should receive a '4' or '5'. A player who starts every chord on the root is not moving through chord progressions, but instead is addressing each individual chord and should receive a '2' or '1' response.

### *23. Makes good use of rhythmic development and variation*

Some young players tend to start every phrase with the same rhythm, or only play constant eighth notes. Variety is especially needed at slower tempos. Strongly varied and developed solos should receive a '5', excessively repetitious solos should receive an '1' response.

### *24. Effectively incorporates "guide tones", or voice leading*

This would include resolutions of thirds and sevenths of chords, and any other graceful connections between chords using common tones and stepwise resolutions. A player making subtle connections should get an '5', more obvious, superficial connections weaved into the improvised solo should receive a '4'. Again, a player who tends to start every chord on the root should receive a '2' or '1' response here.

### *25. Uses a wide variety of articulations*

Is there variety in note length and accent ('5' or '4') or is it all the same ('2' or '1')?

### *26. Solo has momentum.*

Does the solo move forward ('5' or '4') or does it lack a sense of direction ('2' or '1')?

### *27. Is able to play with a sense of steady time*

Some players 'lay back' or 'play on top' of the beat but still exhibit a sense of steady time ('4' or '5'). Other players have trouble maintaining steady time through phrases, either falling back, rushing ahead or simply 'floating' the time, failing to define it. These instances should receive '2' or '1' responses. Of course, those who simply play impeccable, steady time should also receive a '5' response.

### *28. Solo has a sense of spontaneity.*

While you can't accurately determine actual spontaneity, does it *seem* spontaneous? If the solo has a fresh, spontaneous sense, respond with '5'. If it seems extremely deliberate, rehearsed and planned - '1'.

### *29. Demonstrates an ability to solve problems and make adjustments*

Does the soloist show an ability to respond and recover from problems such as personal mistakes and rhythm section mistakes. The best players can make mistakes into brilliant moments by incorporating and developing the mistake ('5'). If player merely recovers and makes an adjustment, they should receive a '4' response. If they constantly stumble with no recovery - '1'. If no problems are evident, indicate an NA.

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### ***Balance Items***

The emphasis in this section is on *the balance* between two extremes. A separate rating scale is provided for each item.

#### ***30. Maintains balance between diatonic movement and skips***

Mostly diatonic (Scale steps)	Somewhat more diatonic	Balanced	Somewhat more skips	Mostly skips
1	2	3	4	5

#### ***31. Sustains balance between predictability and non-predictability***

Jerry Coker advocates that successful solos incorporate a balance between when the listener can predict about half of the material and is surprised by the other half. This might not occur as an exact 50/50 split. The emphasis on this item is on the balance between the two extremes.

Very predictable	Somewhat predictable	Balanced	Somewhat un-predictable	Very un-predictable
1	2	3	4	5

#### ***32. The use of quotes and commonly used patterns are balanced with individual material.***

If you believe that the player to which you are listening is an innovator and helped to create the vocabulary (quotes, commonly used patterns), respond to the historical context in which they existed. Did they balance their own material with the commonly used patterns of their time?

Most all quotes and patterns	Somewhat more quotes and patterns	Balanced	Somewhat more individual patterns	Most all individual patterns
1	2	3	4	5

#### ***33. Effectively balances rhythmic repetition and rhythmic variety***

Very repetitious	Somewhat repetitious	Balanced	Somewhat more variety	Much more variety
1	2	3	4	5

1. Displays control in selecting tones that correspond with the sounding chord.
  2. Incorporates space in a convincing manner
  3. Skillfully emphasizes altered, extended harmonies in relation to the sounding chord.
  4. Alludes to the original melody(ies) of the tune.
  5. Uses arpeggiated ideas.
  6. Moves with fluency inside and outside the tonality.
  7. Develops motives and melodies
  8. Plays phrases and melodies with extended length
  9. Moves toward goals and climaxes
  10. Corresponds with the eighth note division in the rhythm section
  11. Exhibits inventiveness
  12. Vibrato is appropriate to the stylistic context
  13. There is communication between the soloist and other musicians.
  14. Effectively exploits tension and release.
  15. Exhibits emotional conviction.
  16. Exhibits control over the timing of events of the solo.
  17. Tone and timbral manipulation are appropriate to the style.
  18. Articulation is consistent with the style.
  19. Melody contains variety.
  20. Exhibits use of stylistically appropriate jazz vocabulary.
  21. Phrases contain melodic contours.
  22. Moves with fluency through chord progressions.
  23. Makes good use of rhythmic development and variation.
  24. Effectively incorporates "guide tones", or voice leading.
  25. Uses a wide variety of articulations.
  26. Solo has momentum.
  27. Is able to play with a sense of steady time.
  28. Solo has a sense of spontaneity.
  29. Demonstrates an ability to solve problems and make adjustments.
  30. Maintains balance between diatonic movement and skips.
  31. Sustains balance between predictability and non-predictability.
  32. Use of quotes and commonly used patterns are balanced with individual material.
  33. Effectively balances rhythmic repetition and rhythmic variety.
-

APPENDIX C  
LETTER SENT TO JUDGES



June 12, 1991

Charles D. Tumlinson  
Director of Jazz Studies  
Washburn University  
Topeka, KS 66621

Shelton Berg  
3801 Downing Circle  
Deer Park, TX 77563

Dear Shelly:

Thank you again for agreeing to help with my dissertation. Enclosed are the three tapes that contain all of the performances that you will listen to and respond with the Descriptive/Evaluative Improvisation Measurement Instrument, also enclosed. Please respond on the computerized scanning sheets that I also provided. Do read the instructions carefully. When you are finished, please return the answer sheets to one of the following addresses. You may keep the tapes for your own use. Please return to the following address.

Chuck Tumlinson  
3819 SW Sena Dr.  
Topeka, KS 66604

If you have any questions, you can call me at (817) 565-5730 or leave a message at (913) 271-5841. I will be in touch with you soon to confirm that you received the material and that everything everything is clear. I might suggest that you complete this for the first three solos to make sure you are comfortable with the process before I call. Note that many of solos contain some lead in material (either the previous solo or the head to the tune) to help establish the form. Again, thank you very much for your assistance with this.

Sincerely,

Chuck Tumlinson

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APPENDIX D  
CORRELATION MATRICES DERIVED FROM FACTOR ANALYSES

## CORRELATION MATRIX FOR ALL SUBJECTS:

	ITEM 1	ITEM 2	ITEM 3	ITEM 4	ITEM 5	ITEM 6	ITEM 7
ITEM 1	1.00000						
ITEM 2	.75663	1.00000					
ITEM 3	.74548	.68739	1.00000				
ITEM 4	.53957	.64918	.53901	1.00000			
ITEM 5	.81769	.73992	.69944	.58096	1.00000		
ITEM 6	.38253	.31143	.70387	.31400	.35939	1.00000	
ITEM 7	.81591	.73992	.78751	.52929	.77610	.50346	1.00000
ITEM 8	.67793	.47705	.67663	.30140	.69922	.49485	.70410
ITEM 9	.76833	.71081	.79502	.48220	.71163	.52701	.82896
ITEM 10	.77905	.68849	.68053	.49081	.75189	.44206	.75981
ITEM 11	.84572	.78981	.82255	.58193	.77466	.52234	.85551
ITEM 12	.82586	.77322	.73992	.54223	.74155	.40093	.74387
ITEM 13	.71797	.74244	.71932	.58938	.67063	.48696	.76651
ITEM 14	.82039	.84304	.79899	.65047	.76539	.49994	.85131
ITEM 15	.70862	.54638	.70861	.40683	.65452	.49010	.74203
ITEM 16	.87349	.81721	.78452	.57667	.78576	.43648	.84363
ITEM 17	.78866	.76394	.70471	.51555	.71106	.38799	.72090
ITEM 18	.82490	.75388	.73812	.53946	.76234	.46457	.77971
ITEM 19	.79779	.80152	.81577	.58660	.79190	.51338	.84576
ITEM 20	.88332	.75727	.77508	.53764	.82941	.46236	.84696
ITEM 21	.87601	.79555	.79110	.58020	.82803	.43882	.85331
ITEM 22	.94701	.78686	.76367	.59361	.83804	.40801	.82312
ITEM 23	.82541	.78278	.77057	.58753	.77802	.47395	.86519
ITEM 24	.88745	.74056	.61831	.51434	.79881	.25901	.74567
ITEM 25	.66267	.64364	.73666	.47816	.64530	.55895	.72629
ITEM 26	.80098	.66509	.78613	.47533	.71076	.55211	.82520
ITEM 27	.81780	.69654	.73153	.53716	.74182	.46327	.78824
ITEM 28	.78982	.77963	.79703	.58087	.78928	.52951	.85747
ITEM 30	.77205	.62553	.65424	.40970	.79677	.35535	.71992
ITEM 33	.63910	.57434	.59419	.26467	.62371	.28469	.66429

	ITEM 8	ITEM 9	ITEM 10	ITEM 11	ITEM 12	ITEM 13	ITEM 14
ITEM 8	1.00000						
ITEM 9	.76219	1.00000					
ITEM 10	.73760	.79901	1.00000				
ITEM 11	.73033	.83676	.78015	1.00000			
ITEM 12	.60881	.76679	.77552	.80483	1.00000		
ITEM 13	.54808	.72980	.69700	.78101	.75017	1.00000	
ITEM 14	.66614	.81006	.76887	.88639	.79625	.80633	1.00000
ITEM 15	.73660	.82637	.69675	.79223	.63788	.66098	.68213
ITEM 16	.66780	.83749	.80678	.87770	.83092	.80332	.90380
ITEM 17	.58965	.74527	.77916	.76873	.91891	.76411	.80676
ITEM 18	.68473	.75682	.80869	.83914	.86835	.74152	.82943
ITEM 19	.69010	.81754	.71802	.90864	.76380	.74796	.88532
ITEM 20	.75364	.80062	.80094	.87525	.80736	.71952	.85314
ITEM 21	.71778	.79160	.77799	.89870	.79161	.74486	.88885
ITEM 22	.68429	.76893	.79293	.86404	.81226	.74140	.85214
ITEM 23	.70120	.83331	.74833	.88717	.80139	.77617	.88026

	ITEM 8	ITEM 9	ITEM 10	ITEM 11	ITEM 12	ITEM 13	ITEM 14
ITEM 24	.63240	.66921	.71996	.78072	.75199	.63128	.76304
ITEM 25	.65925	.77045	.66773	.76639	.75240	.62774	.74495
ITEM 26	.79031	.88814	.77122	.87708	.74934	.73078	.81553
ITEM 27	.74492	.81719	.91603	.81634	.80554	.74658	.80784
ITEM 28	.69959	.85203	.72663	.90916	.74321	.79192	.85831
ITEM 30	.70111	.71436	.74552	.70983	.69828	.58544	.70033
ITEM 33	.60227	.66465	.58430	.70977	.60602	.61543	.68535

	ITEM 15	ITEM 16	ITEM 17	ITEM 18	ITEM 19	ITEM 20	ITEM 21
ITEM 15	1.00000						
ITEM 16	.76478	1.00000					
ITEM 17	.64304	.84638	1.00000				
ITEM 18	.71621	.86087	.91013	1.00000			
ITEM 19	.70941	.85376	.74338	.78474	1.00000		
ITEM 20	.74500	.87256	.80161	.86643	.84914	1.00000	
ITEM 21	.69595	.86572	.76424	.81980	.90027	.91047	1.00000
ITEM 22	.70283	.85780	.77522	.82514	.81953	.89580	.91189
ITEM 23	.73047	.88850	.75448	.79090	.88315	.84514	.85718
ITEM 24	.59536	.77842	.70834	.76488	.77253	.85773	.86273
ITEM 25	.73337	.76150	.74174	.76069	.77218	.74391	.71245
ITEM 26	.87922	.86237	.74742	.82536	.81921	.85931	.82366
ITEM 27	.73992	.84884	.83205	.85337	.75166	.81770	.82023
ITEM 28	.78345	.83317	.72409	.76882	.89901	.81238	.85196
ITEM 30	.64320	.76318	.65658	.70433	.73759	.81595	.80800
ITEM 33	.60015	.68744	.61883	.65410	.71318	.69786	.67870

	ITEM 22	ITEM 23	ITEM 24	ITEM 25	ITEM 26	ITEM 27	ITEM 28
ITEM 22	1.00000						
ITEM 23	.83157	1.00000					
ITEM 24	.89541	.76766	1.00000				
ITEM 25	.68608	.79090	.62212	1.00000			
ITEM 26	.81049	.84127	.72312	.80781	1.00000		
ITEM 27	.82699	.79245	.72791	.71212	.83362	1.00000	
ITEM 28	.83811	.85835	.73450	.78439	.86091	.77662	1.00000
ITEM 30	.77044	.72010	.74433	.62172	.70682	.72399	.68241
ITEM 33	.63985	.70133	.60056	.57197	.65542	.62090	.67859

	ITEM 30	ITEM 33
ITEM 30	1.00000	
ITEM 33	.66226	1.00000

## CORRELATION MATRIX FOR STUDENT SUBJECTS:

	ITEM 1	ITEM 2	ITEM 3	ITEM 4	ITEM 5	ITEM 6	ITEM 7
ITEM 1	1.00000						
ITEM 2	.63221	1.00000					
ITEM 3	.82752	.60018	1.00000				
ITEM 4	.35909	.33504	.37799	1.00000			
ITEM 5	.71983	.44318	.64945	.38060	1.00000		
ITEM 6	.63587	.34332	.79353	.19215	.56730	1.00000	
ITEM 7	.76452	.53357	.79209	.22142	.65250	.69369	1.00000
ITEM 8	.59361	.27460	.66967	.14831	.62897	.73848	.65971
ITEM 9	.73526	.55956	.81879	.26816	.63669	.73996	.79821
ITEM 10	.64947	.47545	.65629	.24566	.64436	.62521	.69035
ITEM 11	.80226	.53104	.83836	.26553	.59206	.78086	.78733
ITEM 12	.72159	.60835	.69924	.34409	.59737	.54763	.59747
ITEM 13	.66103	.56580	.64614	.33660	.44411	.66007	.60681
ITEM 14	.82677	.71000	.79762	.35505	.62237	.68450	.77049
ITEM 15	.65188	.37856	.71837	.18237	.59530	.71749	.70475
ITEM 16	.85612	.64914	.76953	.32503	.65417	.68447	.77450
ITEM 17	.62900	.57133	.63648	.31887	.53841	.52373	.51359
ITEM 18	.74230	.53035	.74939	.37195	.68351	.72824	.67918
ITEM 19	.79845	.57933	.80908	.23946	.69691	.74932	.79816
ITEM 20	.79647	.54787	.79049	.35034	.72472	.75680	.82854
ITEM 21	.82498	.61178	.80721	.29271	.68703	.68226	.80061
ITEM 22	.92642	.59981	.82816	.37142	.70553	.68801	.76013
ITEM 23	.76150	.58796	.75185	.30232	.57824	.67714	.79277
ITEM 24	.85132	.64626	.70386	.34282	.69514	.57725	.72786
ITEM 25	.65395	.52311	.77510	.18182	.62466	.74721	.70196
ITEM 26	.74151	.45306	.77811	.26260	.60310	.79280	.79310
ITEM 27	.73175	.52152	.72294	.31243	.63684	.64224	.70139
ITEM 28	.76695	.50498	.81510	.20041	.66575	.74691	.80519
ITEM 30	.67343	.47721	.64298	.25116	.75961	.60243	.66835
ITEM 32	.71623	.56212	.71449	.28922	.60753	.61834	.73864
ITEM 33	.63862	.46287	.64289	.06816	.52717	.60689	.61171

	ITEM 8	ITEM 9	ITEM 10	ITEM 11	ITEM 12	ITEM 13	ITEM 14
ITEM 8	1.00000						
ITEM 9	.79168	1.00000					
ITEM 10	.71384	.73017	1.00000				
ITEM 11	.70264	.78652	.64363	1.00000			
ITEM 12	.46617	.66249	.66984	.59618	1.00000		
ITEM 13	.43165	.61930	.54577	.68847	.67451	1.00000	
ITEM 14	.59061	.72731	.66557	.81302	.65963	.71746	1.00000
ITEM 15	.75167	.82290	.61873	.81007	.50572	.56421	.60341
ITEM 16	.58119	.76051	.72110	.82491	.68038	.69411	.87304
ITEM 17	.42452	.61933	.68687	.54978	.84243	.68617	.68067
ITEM 18	.62378	.68937	.74844	.75119	.73937	.64528	.74699
ITEM 19	.69871	.76895	.62301	.86365	.58706	.64909	.84587
ITEM 20	.70319	.78340	.71426	.81147	.62756	.67617	.81100
ITEM 21	.66172	.73439	.67235	.82730	.60752	.62123	.85388
ITEM 22	.60716	.72137	.65939	.79675	.67131	.66890	.82616

	ITEM 8	ITEM 9	ITEM 10	ITEM 11	ITEM 12	ITEM 13	ITEM 14
ITEM 23	.60984	.71935	.59146	.83186	.60977	.69381	.80877
ITEM 24	.58685	.66841	.60169	.72945	.63904	.63799	.80767
ITEM 25	.73362	.79504	.71138	.72528	.69791	.61521	.66988
ITEM 26	.77561	.84754	.66100	.84743	.54278	.63908	.73848
ITEM 27	.68573	.75802	.87725	.69099	.66253	.63034	.70908
ITEM 28	.73049	.80924	.61502	.87499	.57764	.65579	.75392
ITEM 30	.65100	.67267	.66259	.61320	.61463	.43308	.65676
ITEM 32	.66294	.79442	.63549	.72777	.60324	.55915	.75302
ITEM 33	.58172	.63683	.50437	.74911	.55533	.59770	.66316

	ITEM 15	ITEM 16	ITEM 17	ITEM 18	ITEM 19	ITEM 20	ITEM 21
ITEM 15	1.00000						
ITEM 16	.69557	1.00000					
ITEM 17	.50787	.70254	1.00000				
ITEM 18	.67345	.76340	.80300	1.00000			
ITEM 19	.68750	.79336	.55773	.72174	1.00000		
ITEM 20	.74001	.79476	.61830	.79865	.81253	1.00000	
ITEM 21	.64468	.81760	.58376	.76514	.86404	.88483	1.00000
ITEM 22	.64212	.80236	.61068	.76687	.79173	.83229	.86274
ITEM 23	.67118	.81639	.51696	.63444	.85340	.76650	.77930
ITEM 24	.54483	.73526	.55857	.72022	.80794	.81323	.83954
ITEM 25	.76961	.69971	.68913	.75797	.70534	.73550	.65416
ITEM 26	.87357	.78806	.56241	.76741	.76424	.83912	.77252
ITEM 27	.66434	.77402	.76593	.81219	.67173	.72927	.72926
ITEM 28	.78407	.74401	.56227	.73997	.84748	.78134	.75694
ITEM 30	.57089	.70629	.52116	.64884	.72565	.76568	.77663
ITEM 32	.65161	.72225	.55738	.68084	.76861	.76522	.79992
ITEM 33	.63150	.66245	.52398	.60089	.78652	.65547	.67599

	ITEM 22	ITEM 23	ITEM 24	ITEM 25	ITEM 26	ITEM 27	ITEM 28
ITEM 22	1.00000						
ITEM 23	.73786	1.00000					
ITEM 24	.86650	.73127	1.00000				
ITEM 25	.68056	.66914	.63462	1.00000			
ITEM 26	.77064	.74488	.68281	.79679	1.00000		
ITEM 27	.74226	.64252	.64468	.73025	.75178	1.00000	
ITEM 28	.79189	.78096	.71425	.80539	.84694	.71771	1.00000
ITEM 30	.66992	.66406	.66533	.64340	.62920	.65239	.57736
ITEM 32	.75482	.68310	.76674	.65490	.75379	.70129	.72349
ITEM 33	.65200	.75414	.62719	.64484	.66737	.62806	.72654

	ITEM 30	ITEM 32	ITEM 33
ITEM 30	1.00000		
ITEM 32	.73221	1.00000	
ITEM 33	.62827	.68643	1.00000

## CORRELATION MATRIX FOR PROFESSIONAL SUBJECTS:

	ITEM 1	ITEM 2	ITEM 3	ITEM 4	ITEM 5	ITEM 6	ITEM 7
ITEM 1	1.00000						
ITEM 2	.59211	1.00000					
ITEM 3	.36627	.50384	1.00000				
ITEM 4	.35456	.58509	.39496	1.00000			
ITEM 5	.69843	.62120	.47392	.41320	1.00000		
ITEM 6	.08300	.18001	.68091	.27822	.12875	1.00000	
ITEM 7	.62144	.68112	.57708	.50614	.66290	.33668	1.00000
ITEM 8	.48547	.22868	.43819	.02543	.55181	.24844	.47124
ITEM 9	.45936	.55130	.56304	.30850	.43622	.35435	.62787
ITEM 10	.68605	.56720	.40561	.36530	.59209	.24088	.54847
ITEM 11	.71294	.79642	.64750	.56357	.70802	.31814	.78879
ITEM 12	.74878	.66231	.55243	.37578	.57830	.22244	.64256
ITEM 13	.39967	.55165	.54166	.47701	.45764	.34917	.69454
ITEM 14	.54290	.74006	.62109	.62347	.57326	.37087	.77869
ITEM 15	.46283	.35716	.45833	.32693	.42434	.25257	.50246
ITEM 16	.65826	.73397	.59212	.46658	.59985	.20226	.70473
ITEM 17	.72964	.66917	.50517	.32399	.53248	.20517	.67347
ITEM 18	.67680	.64183	.46144	.32164	.51778	.23054	.61914
ITEM 19	.56134	.78670	.66995	.58776	.66004	.32557	.75293
ITEM 20	.83302	.64178	.52638	.33518	.71444	.19440	.63556
ITEM 21	.78838	.73608	.58262	.52837	.77338	.20482	.75270
ITEM 22	.90009	.68244	.45046	.47601	.76180	.12781	.66805
ITEM 23	.62809	.60779	.57575	.47796	.63576	.33072	.79536
ITEM 24	.83874	.58353	.22396	.33775	.70598	-.08990	.51464
ITEM 25	.29775	.37149	.49147	.35347	.29296	.42711	.48139
ITEM 26	.60394	.52064	.59671	.30715	.49477	.36533	.62453
ITEM 27	.68393	.52560	.47398	.42303	.54290	.28240	.63026
ITEM 28	.56720	.77536	.60443	.60446	.67801	.36262	.78073
ITEM 30	.69367	.47970	.36085	.18887	.70175	.00286	.45652
ITEM 32	.56450	.33760	.03945	.13421	.47946	-.23999	.29679
ITEM 33	.27408	.36110	.22812	.02314	.42862	-.10678	.42917

	ITEM 8	ITEM 9	ITEM 10	ITEM 11	ITEM 12	ITEM 13	ITEM 14
ITEM 8	1.00000						
ITEM 9	.44209	1.00000					
ITEM 10	.51355	.64168	1.00000				
ITEM 11	.54193	.71879	.72413	1.00000			
ITEM 12	.47284	.63431	.66194	.83301	1.00000		
ITEM 13	.28740	.53800	.52605	.62909	.53167	1.00000	
ITEM 14	.46991	.67678	.61193	.83753	.68616	.62679	1.00000
ITEM 15	.39897	.62280	.51675	.59151	.53603	.51821	.51117
ITEM 16	.43710	.70020	.64819	.80598	.81274	.63305	.78407
ITEM 17	.45563	.59758	.63411	.77613	.91870	.55362	.69393
ITEM 18	.46838	.50327	.63874	.75095	.86410	.49580	.67250
ITEM 19	.42758	.69277	.54296	.86669	.71021	.57417	.80459
ITEM 20	.59623	.50598	.65254	.80603	.79395	.36099	.67657
ITEM 21	.55735	.61445	.66481	.87076	.76859	.57184	.79059
ITEM 22	.49826	.50199	.71637	.77998	.74309	.46364	.65764

	ITEM 8	ITEM 9	ITEM 10	ITEM 11	ITEM 12	ITEM 13	ITEM 14
ITEM 23	.56703	.77159	.61313	.82282	.75067	.51756	.75472
ITEM 24	.41465	.32386	.60368	.63217	.63678	.25663	.47390
ITEM 25	.30622	.51385	.28135	.58734	.56657	.25621	.54183
ITEM 26	.59461	.80070	.66229	.78780	.76767	.52768	.69755
ITEM 27	.58926	.64773	.86859	.78365	.77789	.57721	.68435
ITEM 28	.40633	.75662	.57805	.85333	.65145	.70064	.80820
ITEM 30	.49611	.41294	.61106	.58703	.53337	.36900	.44069
ITEM 32	.15740	.09733	.37797	.30836	.30399	.10420	.21275
ITEM 33	.31651	.38238	.32438	.41595	.34081	.31413	.45009

	ITEM 15	ITEM 16	ITEM 17	ITEM 18	ITEM 19	ITEM 20	ITEM 21
ITEM 15	1.00000						
ITEM 16	.64287	1.00000					
ITEM 17	.52618	.83045	1.00000				
ITEM 18	.48242	.76091	.93411	1.00000			
ITEM 19	.51420	.77636	.68232	.60950	1.00000		
ITEM 20	.43267	.74489	.77888	.74706	.72353	1.00000	
ITEM 21	.49598	.74900	.70556	.65084	.83750	.82872	1.00000
ITEM 22	.49483	.67712	.67866	.63117	.64367	.81863	.86112
ITEM 23	.58733	.75810	.68088	.63692	.79566	.67674	.76053
ITEM 24	.33287	.59180	.58978	.57162	.53465	.77949	.75988
ITEM 25	.50509	.55889	.53602	.50668	.63010	.46756	.48980
ITEM 26	.75696	.78666	.72004	.67454	.71524	.67778	.68998
ITEM 27	.59700	.71873	.70333	.70070	.58297	.67580	.72999
ITEM 28	.63887	.75285	.60590	.52366	.85380	.62106	.80105
ITEM 30	.36067	.54972	.50574	.43931	.52367	.70091	.68596
ITEM 32	.24863	.30711	.31975	.31961	.24082	.47665	.44559
ITEM 33	.12772	.40477	.41132	.40812	.40101	.47409	.40986

	ITEM 22	ITEM 23	ITEM 24	ITEM 25	ITEM 26	ITEM 27	ITEM 28
ITEM 22	1.00000						
ITEM 23	.66285	1.00000					
ITEM 24	.83519	.55830	1.00000				
ITEM 25	.34523	.68322	.29402	1.00000			
ITEM 26	.60642	.78541	.50482	.65211	1.00000		
ITEM 27	.70614	.69760	.56330	.38748	.74372	1.00000	
ITEM 28	.70156	.78147	.51499	.56598	.74187	.60203	1.00000
ITEM 30	.70814	.48900	.67849	.24660	.48436	.50738	.55604
ITEM 32	.53395	.19193	.64503	.06643	.22680	.28281	.27806
ITEM 33	.27994	.37028	.27229	.17063	.28707	.22182	.36337

	ITEM 30	ITEM 32	ITEM 33
ITEM 30	1.00000		
ITEM 32	.44820	1.00000	
ITEM 33	.41481	.27454	1.00000



APPENDIX E

INITIAL AND FINAL STATISTICS OF THE FACTOR ANALYSES  
INCLUDING COMMUNALITIES, EIGENVALUES,  
PERCENTAGE OF VARIABILITY, AND  
CUMULATIVE PERCENTAGE OF VARIABILITY

INITIAL STATISTICS:  
ALL SUBJECTS

COMMUNALITIES FOR  
THE VARIABLES

INITIAL STATISTICS:

VARIABLE	COMMUNALITY	FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT
ITEM 1	.93596	1	22.35428	74.5	74.5
ITEM 2	.83655	2	1.27493	4.2	78.8
ITEM 3	.85411	3	1.03845	3.5	82.2
ITEM 4	.63165	4	.70276	2.3	84.6
ITEM 5	.84200	5	.63065	2.1	86.7
ITEM 6	.69003	6	.49569	1.7	88.3
ITEM 7	.85016	7	.41461	1.4	89.7
ITEM 8	.79339	8	.36771	1.2	90.9
ITEM 9	.89243	9	.28737	1.0	91.9
ITEM 10	.88799	10	.27058	.9	92.8
ITEM 11	.93440	11	.23478	.8	93.6
ITEM 12	.90772	12	.21411	.7	94.3
ITEM 13	.79325	13	.19142	.6	94.9
ITEM 14	.91847	14	.18247	.6	95.5
ITEM 15	.84005	15	.17016	.6	96.1
ITEM 16	.92984	16	.14843	.5	96.6
ITEM 17	.93266	17	.13492	.4	97.0
ITEM 18	.91191	18	.12710	.4	97.5
ITEM 19	.91943	19	.11176	.4	97.8
ITEM 20	.92001	20	.09529	.3	98.2
ITEM 21	.93672	21	.08641	.3	98.4
ITEM 22	.94738	22	.08113	.3	98.7
ITEM 23	.89751	23	.06952	.2	98.9
ITEM 24	.88072	24	.06407	.2	99.2
ITEM 25	.80682	25	.05470	.2	99.3
ITEM 26	.92883	26	.05135	.2	99.5
ITEM 27	.91617	27	.04600	.2	99.7
ITEM 28	.92480	28	.03720	.1	99.8
ITEM 30	.80362	29	.03352	.1	99.9
ITEM 33	.69224	30	.02862	.1	100.0

## FINAL STATISTICS ALL SUBJECTS

COMMUNALITIES FOR  
THE VARIABLESEIGENVALUES, PERCENT OF  
VARIATION AND CUMULATIVE PERCENTAGE  
ACCOUNTED FOR BY VARIABLES

FINAL STATISTICS:

VARIABLE	COMMUNALITY	FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT
ITEM 1	.88156	1	22.16991	73.9	73.9
ITEM 2	.84178	2	1.00577	3.4	77.3
ITEM 3	.81038	3	.74121	2.5	79.7
ITEM 4	.52480				
ITEM 5	.77249				
ITEM 6	.53114				
ITEM 7	.81732				
ITEM 8	.79528				
ITEM 9	.84717				
ITEM 10	.75226				
ITEM 11	.89661				
ITEM 12	.78553				
ITEM 13	.73309				
ITEM 14	.89871				
ITEM 15	.75914				
ITEM 16	.88975				
ITEM 17	.75574				
ITEM 18	.81598				
ITEM 19	.85288				
ITEM 20	.90124				
ITEM 21	.89187				
ITEM 22	.89760				
ITEM 23	.85375				
ITEM 24	.84798				
ITEM 25	.71725				
ITEM 26	.89974				
ITEM 27	.80591				
ITEM 28	.85878				
ITEM 30	.73842				
ITEM 33	.54276				

## INITIAL STATISTICS STUDENT SUBJECTS

COMMUNALITIES FOR  
THE VARIABLESEIGENVALUES, PERCENT OF  
VARIATION AND CUMULATIVE PERCENTAGE  
ACCOUNTED FOR BY VARIABLES

VARIABLE	COMMUNALITY	FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT
ITEM 1	.95191	1	21.26098	68.6	68.6
ITEM 2	.70610	2	1.60485	5.2	73.8
ITEM 3	.91785	3	1.18454	3.8	77.6
ITEM 4	.64635	4	.97468	3.1	80.7
ITEM 5	.82440	5	.84096	2.7	83.4
ITEM 6	.89426	6	.53986	1.7	85.2
ITEM 7	.85563	7	.50883	1.6	86.8
ITEM 8	.86437	8	.46080	1.5	88.3
ITEM 9	.90500	9	.40303	1.3	89.6
ITEM 10	.90918	10	.37597	1.2	90.8
ITEM 11	.93307	11	.32885	1.1	91.9
ITEM 12	.90944	12	.32065	1.0	92.9
ITEM 13	.79606	13	.31204	1.0	93.9
ITEM 14	.90065	14	.25233	.8	94.7
ITEM 15	.88000	15	.21807	.7	95.4
ITEM 16	.92359	16	.21205	.7	96.1
ITEM 17	.92585	17	.18077	.6	96.7
ITEM 18	.90294	18	.15189	.5	97.2
ITEM 19	.93141	19	.12305	.4	97.6
ITEM 20	.91983	20	.11902	.4	98.0
ITEM 21	.93614	21	.10208	.3	98.3
ITEM 22	.93611	22	.08854	.3	98.6
ITEM 23	.87454	23	.08201	.3	98.9
ITEM 24	.90520	24	.06980	.2	99.1
ITEM 25	.88009	25	.06234	.2	99.3
ITEM 26	.92176	26	.05161	.2	99.5
ITEM 27	.93399	27	.04834	.2	99.6
ITEM 28	.93312	28	.04366	.1	99.7
ITEM 30	.86231	29	.03513	.1	99.9
ITEM 32	.82674	30	.02818	.1	100.0
ITEM 33	.81587	31	.01510	.0	100.0

## FINAL STATISTICS      STUDENT SUBJECTS

COMMUNALITIES FOR  
THE VARIABLESEIGENVALUES, PERCENT OF  
VARIATION AND CUMULATIVE PERCENTAGE  
ACCOUNTED FOR BY VARIABLES

VARIABLE	COMMUNALITY	FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT
ITEM 1	.85772	1	21.07519	68.0	68.0
ITEM 2	.58756	2	1.34726	4.3	72.3
ITEM 3	.82059	3	1.01453	3.3	75.
ITEM 4	.33384	4	.73046	2.4	78.0
ITEM 5	.69705	5	.47209	1.5	79.5
ITEM 6	.73569				
ITEM 7	.76608				
ITEM 8	.82754				
ITEM 9	.81831				
ITEM 10	.76503				
ITEM 11	.90060				
ITEM 12	.77520				
ITEM 13	.70910				
ITEM 14	.86346				
ITEM 15	.80394				
ITEM 16	.82079				
ITEM 17	.94161				
ITEM 18	.81143				
ITEM 19	.89912				
ITEM 20	.85803				
ITEM 21	.87987				
ITEM 22	.86562				
ITEM 23	.81065				
ITEM 24	.82240				
ITEM 25	.80015				
ITEM 26	.89629				
ITEM 27	.80087				
ITEM 28	.85283				
ITEM 30	.81842				
ITEM 32	.72393				
ITEM 33	.77580				

## PROFESSIONAL SUBJECTS

## INITIAL STATISTICS:

COMMUNALITIES FOR  
THE VARIABLES

## INITIAL STATISTICS:

EIGENVALUES, PERCENT OF  
VARIATION AND CUMULATIVE PERCENTAGE  
ACCOUNTED FOR BY VARIABLES

VARIABLE	COMMUNALITY	FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT
ITEM 1	.92429	1	17.95459	57.9	57.9
ITEM 2	.87820	2	2.73465	8.8	66.7
ITEM 3	.85698	3	1.50064	4.8	71.6
ITEM 4	.73378	4	1.16767	3.8	75.3
ITEM 5	.80912	5	1.11259	3.6	78.9
ITEM 6	.85353	6	.98056	3.2	82.1
ITEM 7	.86399	7	.90394	2.9	85.0
ITEM 8	.72925	8	.63609	2.1	87.1
ITEM 9	.86348	9	.52122	1.7	88.7
ITEM 10	.91054	10	.48904	1.6	90.3
ITEM 11	.94309	11	.39204	1.3	91.6
ITEM 12	.94317	12	.36103	1.2	92.8
ITEM 13	.82639	13	.27736	.9	93.6
ITEM 14	.88058	14	.27173	.9	94.5
ITEM 15	.75401	15	.24231	.8	95.3
ITEM 16	.90165	16	.20418	.7	96.0
ITEM 17	.95961	17	.17302	.6	96.5
ITEM 18	.93274	18	.15236	.5	97.0
ITEM 19	.91711	19	.14643	.5	97.5
ITEM 20	.92865	20	.12818	.4	97.9
ITEM 21	.93741	21	.10699	.3	98.2
ITEM 22	.93288	22	.10289	.3	98.6
ITEM 23	.90313	23	.07983	.3	98.8
ITEM 24	.87481	24	.07627	.2	99.1
ITEM 25	.79707	25	.07053	.2	99.3
ITEM 26	.90839	26	.05947	.2	99.5
ITEM 27	.93313	27	.04553	.1	99.6
ITEM 28	.95643	28	.03784	.1	99.8
ITEM 30	.75612	29	.02901	.1	99.9
ITEM 32	.64024	30	.02494	.1	99.9
ITEM 33	.71794	31	.01706	.1	100.0

## FINAL STATISTICS      PROFESSIONAL SUBJECTS

COMMUNALITIES FOR  
THE VARIABLESEIGENVALUES, PERCENT OF  
VARIATION AND CUMULATIVE PERCENTAGE  
ACCOUNTED FOR BY VARIABLES

## FINAL STATISTICS:

VARIABLE	COMMUNALITY	FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT
ITEM 1	.87934	1	17.74312	57.2	57.2
ITEM 2	.79874	2	2.40589	7.8	65.0
ITEM 3	.61142	3	1.24833	4.0	69.0
ITEM 4	.69947	4	.90193	2.9	71.9
ITEM 5	.76465	5	.87734	2.8	74.8
ITEM 6	.49947				
ITEM 7	.73152				
ITEM 8	.62324				
ITEM 9	.69025				
ITEM 10	.64852				
ITEM 11	.91065				
ITEM 12	.89355				
ITEM 13	.50655				
ITEM 14	.81551				
ITEM 15	.50188				
ITEM 16	.82091				
ITEM 17	.95003				
ITEM 18	.85837				
ITEM 19	.84795				
ITEM 20	.82758				
ITEM 21	.88936				
ITEM 22	.91163				
ITEM 23	.78212				
ITEM 24	.86431				
ITEM 25	.46810				
ITEM 26	.85826				
ITEM 27	.76339				
ITEM 28	.88874				
ITEM 30	.66304				
ITEM 32	.47703				
ITEM 33	.73101				

APPENDIX F

UNROTATED FACTOR MATRICES FROM THE  
COMBINED, STUDENT, AND PROFESSIONAL FACTOR ANALYSES



## ALL SUBJECTS

## UNROTATED FACTOR MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3
ITEM 11	.94325	.05325	.06360
ITEM 16	.94032	-.06310	.03951
ITEM 20	.93663	-.06253	-.14160
ITEM 21	.93536	-.11994	-.05095
ITEM 14	.92854	-.06476	.17980
ITEM 22	.92442	-.19149	-.07985
ITEM 23	.92117	.00658	.07177
ITEM 19	.91771	.01604	.10215
ITEM 28	.91363	.10026	.11838
ITEM 26	.91195	.25026	-.07388
ITEM 1	.90989	-.19006	-.13247
ITEM 7	.90205	.05641	.02100
ITEM 18	.90156	-.05547	-.00965
ITEM 27	.89362	.02296	-.08261
ITEM 9	.89342	.22043	-.01951
ITEM 12	.87436	-.13521	.05235
ITEM 17	.85880	-.12053	.06051
ITEM 10	.85682	-.00015	-.13459
ITEM 5	.85637	-.16241	-.11285
ITEM 3	.85313	.22553	.17801
ITEM 24	.84293	-.31585	-.19413
ITEM 2	.83168	-.29728	.24842
ITEM 13	.82427	-.01320	.23127
ITEM 25	.81647	.20779	.08629
ITEM 30	.80810	-.06864	-.28404
ITEM 15	.80800	.30739	-.10856
ITEM 8	.77689	.29235	-.32596
ITEM 33	.72263	.02109	-.14188
ITEM 4	.60494	-.19975	.34489
ITEM 6	.52492	.45691	.21643

## STUDENT SUBJECTS

## UNROTATED FACTOR MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
ITEM 20	.91203	-.03730	-.06248	.11334	.08993
ITEM 19	.90127	-.10731	-.23493	-.01925	-.14053
ITEM 11	.90125	-.17662	-.12805	-.19413	.05544
ITEM 21	.90057	.02466	-.21941	.14029	-.02025
ITEM 16	.89456	.11964	-.05664	-.05398	-.01047
ITEM 22	.89442	.11541	-.17066	.06002	.13994
ITEM 3	.89243	-.00645	-.01664	-.07271	.13619
ITEM 14	.89094	.16936	-.18682	-.07805	-.00327
ITEM 1	.88921	.15906	-.17153	.04166	.10280
ITEM 26	.88644	-.27404	.06818	-.08445	.15375
ITEM 28	.88315	-.21902	-.03703	-.15060	.02922
ITEM 9	.87995	-.16076	.13106	-.00903	.02984
ITEM 7	.86127	-.11588	-.09553	.02760	.03121
ITEM 18	.86080	.13973	.21162	.02226	.07521
ITEM 23	.85200	-.04381	-.23095	-.14318	-.09480
ITEM 27	.84362	.08169	.27779	.07113	-.01658
ITEM 24	.84335	.16065	-.26314	.12603	.01528
ITEM 25	.83815	-.11605	.27110	-.08150	-.06364
ITEM 32	.83320	-.03144	-.08652	.11719	-.08654
ITEM 6	.80399	-.24443	.10869	-.10600	.08062
ITEM 15	.80005	-.34634	.15933	-.09975	.09255
ITEM 10	.78876	.05114	.32594	.18150	-.03305
ITEM 30	.77969	-.00706	-.02063	.39841	-.22649
ITEM 8	.76597	-.40967	.19436	.18771	.00172
ITEM 33	.76102	-.13619	-.11120	-.15439	-.37669
ITEM 12	.75835	.37235	.22028	-.05122	-.10158
ITEM 5	.75681	.04615	.02304	.34674	.03750
ITEM 13	.74551	.19517	.01228	-.33737	.03553
ITEM 17	.73528	.44367	.41031	-.14853	-.11709
ITEM 2	.64378	.37269	-.15279	-.08766	-.05633
ITEM 4	.34232	.32684	-.03494	.09453	.31571

## PROFESSIONAL SUBJECTS

## UNROTATED FACTOR MATRIX:

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5
ITEM 11	.94845	.08207	.06281	.01474	-.01376
ITEM 21	.91507	-.13622	.15437	-.02455	.09495
ITEM 16	.88283	.07327	-.04786	.09086	-.16004
ITEM 12	.87645	-.03140	-.22121	-.00079	-.27470
ITEM 19	.86531	.19499	.21581	.11949	.01779
ITEM 28	.86392	.22145	.27668	.01806	.12828
ITEM 23	.85983	.18120	-.04980	.01350	.08553
ITEM 20	.85935	-.27686	-.09930	.04837	.01553
ITEM 22	.85313	-.34566	.11152	-.22517	.03434
ITEM 14	.85266	.22547	.15356	.11324	-.03519
ITEM 17	.85146	-.04091	-.25450	.14033	-.37271
ITEM 26	.83804	.21179	-.31773	-.07720	.06459
ITEM 7	.82343	.12745	.15806	.09646	.05435
ITEM 27	.81566	.00116	-.21906	-.22317	-.01727
ITEM 1	.80511	-.43100	-.05065	-.20214	-.04433
ITEM 18	.80085	-.05475	-.26248	.11561	-.36298
ITEM 2	.78294	-.00630	.35985	.11359	-.20813
ITEM 10	.76836	-.12608	-.13655	-.14217	.05824
ITEM 5	.76312	-.27430	.19172	.01859	.26450
ITEM 9	.74442	.30865	-.13682	.07712	.12711
ITEM 24	.71745	-.56567	.07823	-.14933	-.03431
ITEM 30	.66665	-.38458	-.00122	.02973	.26426
ITEM 3	.65319	.39988	.00859	-.03279	.15397
ITEM 13	.64805	.25845	.13488	.03998	.00051
ITEM 15	.64033	.19200	-.16313	-.16053	.05118
ITEM 8	.58667	-.05817	-.35462	-.00735	.38713
ITEM 25	.58112	.33697	-.10975	-.00389	-.06923
ITEM 4	.53184	.21919	.53043	-.22866	-.18690
ITEM 6	.31505	.57924	-.05509	-.21279	.12801
ITEM 32	.39390	-.55725	.10372	-.02053	-.01289
ITEM 33	.44255	-.16415	-.01094	.69580	.15479

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