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GROUP COHESIVENESS REPRESENTED THROUGH A
MULTIDIMENSIONAL ANALYSIS OF
GROUP IMPROVISATIONS

by

Rosemary Hakes

A Thesis
Submitted to the
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GROUP COHESIVENESS REPRESENTED THROUGH A MULTIDIMENSIONAL ANALYSIS OF MUSICAL IMPROVISATIONS

Rosemary Hakes, M.M.

Western Michigan University, 1996

This research examined the particular aspect of group process, group cohesiveness, through an electroacoustic analysis of group musical improvisations. The musical parameter, amplitude, was displayed and compared to independent judges' ratings of group cohesiveness. The interrater reliability for ratings of group cohesiveness vs. non-cohesiveness was very high (100%). The interrater reliability for the degree of group cohesiveness or non-cohesiveness was, given the small number of examples used, adequate (80%). The improvisations rated cohesive by the judges also matched in rank order placement. The two dimensions of the amplitude patterns that were relevant to this study were density and form. These are described in relationship to the judges' ratings. This study presents a prototype method for the analysis of group musical improvisations in music therapy. The results are considered only preliminary, but promising.

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Rosemary Hakes

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CHAPTER I

INTRODUCTION

Improvisation as a therapeutic technique has been developed by music therapists and has been effective in many different treatment arenas (Bruscia, 1987). Musical improvisation involves simultaneously creating and playing music.

In the context of this study, musical improvisation can be understood as a communication medium, much like words are the communication medium in psychotherapy (Angus & Hardtke, 1994). In comparing improvisation to the concept of "spontaneous discourse" in psychoanalysis, Lichtenstein (1993) concludes that both processes allow us to "say more than we know and to discover that additional meaning upon hearing it said" (p. 252). In a series of essays on free jazz improvisation, composer, performer and author Edwin Prévost (1995) writes:

No sound is innocent. Every utterance, rustle and nuance is pregnant with meaning. To let a sound escape unnoticed before coming to know what it represents or can do is carelessness. Each aural emission can be unlocked to show its origins and intentions. No sound is innocent (p. 33).

Music therapists have also considered musical improvisation to be an expression of subconscious thoughts and feelings (Kaser, 1993).

The focus of musical improvisation is not usually on the musical product, but rather on the process of making music in the moment.

Frederick Tims, a music therapy educator who uses music improvisation

in experiential training groups with graduate students supported (personal communication, October 14, 1996) the perception that the meanings that come from the experience of doing musical improvisations are almost exclusively described in the music therapy literature in terms of psychological theory or psychotherapy process theory.

However, in addition to process, some music therapy researchers have advocated analysis of the musical product of improvisations (Lee, 1990). Aldrige & Verney (1988), through interviews with five music therapists engaged in clinical work in two different hospitals, identified the need for a method to be developed to assess the musical improvisations of adults.

The assessment of the musical parameters of improvisations can be difficult. Bunt (1994) states:

In notating a piece of improvised music, musicians have great difficulties in agreeing on the length of the sounds and the relative loudness of the sounds and the way in which each pitch is notated. These are some of the pointers to the unique potential of music as a highly expressive art form but they also indicate profound difficulties in the understanding of its nature and the application in music therapy (p. 16).

Bunt (1994) described the type of detailed musical analyses, like those done by Collin Lee (1989, 1990), as being on "the frontier of trying to understand what is going on in the music in music therapy" and as contributing to the "internal validity of the discipline of music therapy "(p. 172).

Additionally, Aigen (1993), in an article on research methods in music therapy, concluded, "subsequent work for music therapy researchers and methodologists should focus on studying music itself and drawing the implications of such studies in creating an epistemology for music

therapy" (p. 37). Through a detailed analysis of musical improvisations used in individual music therapy, Lee (1989) concluded that the amount of time and effort involved in this type of analysis was justified and that:

Through musical analysis, greater insight may be achieved in viewing more closely the intricacies of the music therapy process. Analysis then is hopefully not a progression intended to stifle, but rather a method enabling musicians the opportunity to investigate improvised music both as a product of therapeutic growth and also as a piece of art in its own right (p. 18).

Music improvisation has also been used to study group behavior. Researchers have studied the group processes (Katz & Longden, 1983) and communication patterns (Bastien & Hostager, 1988) of jazz musicians as they rehearsed or performed. Although the purpose, structure and content of jazz improvisations and clinical musical improvisations are very different, insights regarding the interaction of the individuals engaged in improvisation were possible. Katz & Longden (1983) asked five jazz musicians to complete three specific musical tasks. They were then asked to complete a questionnaire which was designed to elicit feelings about the workings of the group. This information, along with interviews of the musicians after completing the questionnaire, were discussed by the researchers in terms of several small group theories. They concluded that jazz improvisation was a "useful tool for studying small groups" (p. 37).

Group psychotherapy, in general, is the psychological treatment of mental and emotional disorders in a group setting (American Heritage Dictionary, 1983). For the purpose of this study, group music

improvisation is presented in the context of this definition of group psychotherapy.

Although there are theoretical models of group music therapy development available (Sandness, 1991; Pavlicevic, 1995; Ansdell, 1990), qualitative research related to specific therapeutic components of group music therapy process have received little attention. One perspective on the specific therapeutic factors that make up group psychotherapy has been provided by Kaplan and Sadock (1993). They list twenty therapeutic factors involved in group psychotherapy. These factors are: abreaction, acceptance, altruism, catharsis, cohesion, consensual validation, contagion, corrective familial experience, empathy, identification, imitation, insight, inspiration, interaction, interpretation, learning, reality testing, transference, universalization, and ventilation. In relation to music therapy, Bunt (1994), noted that in group musical improvisations:

Many observers, even of one session, comment on the fact that music can quite quickly bring people together and provide a sense of group cohesion, a sense of immediate belonging. People appear to be attracted to music and will stay with it for quite some time before becoming overwhelmed or satiated. We may not need to draw attention to this verbally, as in cohesive silences that often bind people together at the end of a shared musical experience. Whether we listen to music or make music together, the very structure of organized sounds themselves provides a unique opportunity for such integration (p. 28).

Although not a qualitative approach, Bunt (1994) described his work with adults in music therapy groups in terms of the following therapeutic factors: instillation of hope, universality, imparting of information, altruism, the corrective recapitulation of the primary family group, development of socializing techniques, imitative behavior, interpersonal

learning, group cohesiveness, catharsis, and existential factors. According to Bunt (1994) these factors are based on the work of Irvin Yalom.

Further identification of specific aspects of group process, through music improvisation, is warranted. This type of research has the potential to contribute to both a greater understanding of group musical improvisation process and group process in general.

Statement of the Problem

The identification of specific aspects of group process involved in group music improvisation has received little attention in the music therapy literature. Additionally, developing a method to capture musical improvisations in a form that is accurate, meaningful and true to the complexity of the experience is important to music therapists who use musical improvisation in their work.

Purpose of the Study

The purpose of this research was to examine whether one particular aspect of group process, group cohesiveness, could be identified in the musical improvisations of a group over the course of its development and whether ratings of group cohesiveness, based on independent judges' hearing the improvisations, had correlates in a computer-based amplitude analysis of the improvisations. The research also explored a new methodology for analyzing the musical improvisations of adults in a group setting.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

Group Cohesiveness

Researchers have used different components or terms (e.g. , togetherness, esprit de corps, unification of the group, acceptance and group identification) to identify the concept of cohesiveness. In describing the factors involved in group psychotherapy, Kaplan & Sadock (1993) defined group cohesiveness as "the sense that the group is working together toward a common goal; also referred to as a sense of we-ness; believed to be the most important factor related to positive therapeutic effects" (p. 68). In a review of the literature on group cohesiveness, Bloch & Crouch (1985) conclude that group cohesiveness is first of all multidimensional. Secondly, group cohesiveness is generally positively valued, but it is "not invariably linked to productive therapy" (p. 101). They also stated that in spite of its multidimensional nature, group cohesiveness is a "well established and convenient term" (p. 100).

In a large-scale clinical study of long-term analytic inpatient groups, Tschuschke & Dies (1994) did find group cohesiveness to be associated with clinical improvement. This study used a replicated single case design and incorporated multiple measures and perspectives on both the group process and outcome. In this study they measured group cohesiveness

through a semantic differential questionnaire that was administered to each patient after every group session. Patients were seen in group therapy four times a week for five to six months. This study also included data from follow-up contacts with group members at 12 and 18 months after discharge. The patients were asked "In today's group I felt . . ." Eight of the fifteen items on the scale formed a subscale entitled "Emotional Relatedness to the Group". This scale had been used previously and was considered by Tschuschke & Dies (1994) to be a valid measure of cohesiveness for individuals in group psychotherapy. This scale evaluates the qualities of support and acceptance, identified by Bloch & Crouch (1985) as part of the concept of group cohesion.

The measurement of group cohesiveness, given its multidimensionality, is often difficult to obtain. There is variability in the group psychotherapy literature on conceptual definitions and operational measures of group cohesiveness. Bloch & Crouch (1985) state:

Cohesiveness especially is referred to in vague terms in both theoretical and clinical contributions, and a variety of different types of measurement are used in experimental work, with little check on whether these relate to one another (p. 103).

This is a likely contributor to the more recent reduction in the number of group therapy studies in which cohesiveness plays a central role (Kaplan & Sadock, 1993).

Improvisation

Music improvisation that is employed in a therapeutic setting is

frequently described in terms of the process involved in doing the improvisation (Pavlicevic, 1994) or in terms of the relationship dynamics between (among) the persons involved in the improvisation (Vanger, 1995). These descriptions are sometimes in the form of case studies. Case studies that involve improvisations are primarily analyzed in the context of: (a) psychological theory and/or (b) selected aspects of psychological theory and/or (c) psychotherapy process theory.

Mary Priestly (1975) has analyzed case studies in the context of psychoanalytic theory. In her work in improvisational music therapy she describes musical improvisation in relation to various internal processes. Some of the concepts that are described in her work are the shadow, the anima/animus, and the four functions of thinking, feeling, sensing and intuiting from Analytical Psychology theory.

Celi (1989), in a case study of music therapy with a nine year old boy, focused on a specific aspect of psychological theory, chaos and order in personality development. In this case study, the child's dissociative condition was analyzed in terms of unstructured drumming improvisations in individual music therapy.

Psychotherapy process theory is another context in which individual clinical improvisation in music therapy has been analyzed (Rogers, 1992). This researcher presents material from several case studies of both adults and children who had been sexually abused. The unstructured individual improvisations are characterized as a "mess" or as being "chaotic". The need for music therapists to pay particular attention to boundary issues in their work with clients who have been

traumatized in this way is explored in terms of the overall therapy process. Issues such as providing physical boundaries and sharing instruments are discussed in terms of safety and trust. All of these case studies involved individual musical improvisation.

In addition to the process of individual musical improvisation, group musical improvisation process has been described in two reports in the literature. First, Ansdell (1990) in formulating his theoretical perspectives on doing improvisation groups enlisted the group members themselves in contributing to the evaluation of the sessions. Based on these evaluations, he concluded that the group musical improvisation process could be compared to a "sounding-board" that amplified and reflected back to the group members what was heard so they could have the opportunity to hear themselves in a different way.

Another researcher also described a process that was evident in the improvisation groups she held with adults in a non-therapy context (Pavlicevic, 1995). She focused on the opening moments of the improvisations, including qualities of the "silence" in anticipation of playing improvisationally.

Pavlicevic also identified a pattern in the music of the group from listening to and participating in these improvisations. She described this pattern as "un-forming" (during the initial meetings of the group), "forming" (during the next meetings of the group) and then "re-forming" (in the subsequent meetings of the group). More specifically, in un-forming, "the group does not cohere towards a commonly defined musical space. The music has no boundaries or definition" (p. 365). In forming,

"the group plays within the commonly defined musical space; the beat is common to all the players" (p. 365). In re-forming, "the common pulse is well established and is implicit (rather than explicit). The group can unravel it, extend it, and have recourse to it when and if necessary. Despite the apparent looseness of form, the pulse remains central to the group music" (p. 365). Her analysis of the improvisations were based on the process she heard in the music, not on transcriptions of the music itself.

An innovative context in which group musical improvisations can be used was described by Tims (1989). He used music improvisation in training groups with music therapy students. He finds that this type of experiential training is helpful in advancing the clinical competence of students. A novel approach to research on musical improvisations was suggested by Forinash (1993). She advocates studying the musical improvisation process from the 'lived experience' view point of the music therapist. From this perspective, "issues such as the therapist's sense of facing the unknown and the accompanying feeling of vulnerability were found to be inherent in the clinical improvisation experience" (p. 72).

There exists, in addition to the process aspect of musical improvisation, the tangible creative product of musical improvisation. Streeter (1987), in an introduction to a professional music therapy journal, stated, "The therapist's love of music is the foundation for all music therapy techniques. It is this love of music which is, in the end, the gift we bring to therapeutic work" (p. 5). As musicians, performers and

composers, the nature of the musical material itself is of interest to music therapists.

Musical Analysis of Improvisation

The musical analysis of improvisations has usually been reported only in the context of individual therapy. The analyses generally consist of observations made by the therapist (Pavlicevic, 1995), observers' ratings of the improvisations (Vanger, Oerter, Otto, Schmidt, & Czogalik, 1995) or occasionally participant surveys (Ansdell, 1990).

Some of the musical and psychological aspects that have been studied in adult improvisations through rating scales include: degree of musical engagement (Pavlicevic, Trevarthen, & Duncan, 1994); therapy relationship qualities (Vanger et al. , 1995); psychological themes and motifs (Langenberg, Frommer, & Tress, 1993) and salient musical features (Bruscia, 1987).

One of the main problems in analyzing improvisation, even individual musical improvisation, is that of accurately transcribing the music from audio tape. It is through this type of effort that Lee (1989) states: "Frequent auditory reviews of a passage of clinical improvisation may provide us with greater insight into the music's structure and subsequent interactive therapeutic elements"(p. 11). Another problem associated with clinical improvisations is in choosing which passages to analyze. Lee (1989) states:

The optimal choice of improvisatory passage to be studied emanates from different variables. Essentially if the client is unable, through impairment, to construe the choice themselves,

components must be chosen subjectively and intuitively by the therapist. . . For the verbal or non-impaired client the choice of essential therapeutic musical channel may become readily ascertained as a joint selection (p. 11-12).

One of the few formal methods that have been developed to analyze therapeutic improvisations is in relation to tonality/atonality (Lee, 1990). He concluded that:

Analysis of musical content within therapeutic improvisations demonstrate that the improvised moment, however chaotic it may first appear, can have a consonant structure in exactly the same way as a pre-meditated composition . . . that music therapists and composers can be subject to the same considerations and inner relationships. . . then such analytical insights as these should be fundamental in the furtherance of music therapy (p. 11).

Another formal method, developed by Bergstrom-Nielsen (1993) for the analysis of music improvisations, involves a graphic notation system. He states, "the more improvised and the less 'traditional' in a tonal-rhythmic sense the music is, the greater the need to develop new means of description" (p. 44). In teaching graphic notation of improvisation in music therapy courses, the author further emphasized the therapist's "overt responsibility to account for what is happening in the therapeutic process" (p. 56). The development of a graphic notation system followed a prescribed path, but the systems used by students were by necessity highly idiosyncratic. Bergstrom-Nielsen (1993) conceded that, "to notate complex improvisations with conventional notation may be like attempting to eat soap with a fork: the essence escapes and the effort has no end!" (p. 56).

In another graphic based approach to music analysis, Brinkman & Mesiti (1991) stated:

A good visual representation that shows one or more aspects of a composition in a single graph of manageable size can be a useful tool in the analysis of musical data. A well-designed graphic representation displays information in a format that is intuitive and can be immediately comprehended visually (p. 1).

The graphs they used in analyzing music were done using computers and were based on the printed score. This graphic approach to musical analysis was applied to pre-existing music, not improvisations. This type of graphic would have limited direct application to clinical improvisations. The approach, however, did give the researchers a different perspective on the overall form and structure of the compositions they analyzed.

Also taking advantage of advances in computer technology, music therapy researchers have used musical instrument digital interfacing (MIDI) to study the musical improvisations of children (Miller & Orsmond, 1994). Through this technology it is possible to improvise at a keyboard and record to hard disk all events generated by the keyboard player. Records of this acoustic information can then be subject to detailed analyses. No other reports were found in the literature on the application of computer technology to analyze musical improvisations.

Amplitude

Amplitude is loudness. In describing acoustics, the physical basis of sound, the Harvard Dictionary of Music (1969) states, "The greater the amplitude the louder the sound. As the amplitude diminishes the sound fades away" (p. 8).

Computer-based systems have been developed expressly for the creation of electroacoustic compositions. Electronic music often contains

spectral changes and other timbral aspects that make traditional music notation inadequate and inappropriate. It is, for example, possible to display the amplitude of recorded improvisations and their changes over time accurately. A musical "score" or graphical representation of a single improvisation or of a series of improvisations can be generated. With the use of this technology, comparisons can then be made between improvisations. Helmuth (1996) presented an example of a multidimensional analysis of an electroacoustic composition that incorporated, along with other acoustical dimensions, an amplitude display. The multidimensional analysis also included a sonogram, phrasing and prominent pitch components. There could have also included a text line if necessary.

Ayres and Hughes (1986) in studying visual acuity and amplitude found that music and noise have different acoustical characteristics. With regard to amplitude, music has momentary peak levels, whereas noise does not. The researchers suggest the momentary peak levels of music may disrupt vestibula-ocular control by causing uncontrolled eye movements. Also studying visual acuity, response time and amplitude of music, Turner, Fernandez, & Nelson (1996) found faster motor responses related to individual comfort levels of amplitude of music. This leads the reader to conclude there is individual variability in responses to amplitude.

Summary

Musical improvisation is a form of non-verbal communication

frequently used in music therapy. It has primarily been studied in terms of the process of doing the improvisation (either within the individual [patient or therapist] or between individuals [patient/therapist or patient/patient]). These reports have usually been in the form of case studies, without standardized forms of assessment and are often influenced by the theoretical orientation and individual researchers' method of approaching improvisation in their clinical work. The product of the improvisation, which is also of interest to music therapists, is much more difficult to study due to the complexity of the medium, but has the potential to offer valuable information regarding the process of doing improvisation and the therapy process itself.

The problems in the methods currently used to notate improvisations are that (a) they can be understood only by those who know traditional music notation, (b) they are time consuming to do, (c) the graphic representations are idiosyncratic to the person doing the notation, (d) they are likely to be inaccurate and (e) they are only presented in an individual therapy context. Group improvisation involves a level of complexity that makes traditional methods of notation impossible.

However, the technology does exist that has the capability to analyze very complex acoustical information. It is possible, therefore, to borrow the existing technology, created for and used by composers of electroacoustic music, and apply it to the analysis of group improvisations in music therapy.

One aspect of acoustical information is amplitude. The pattern of amplitude of noise is different from that of music. That difference is related to 'pulsing' or 'mountainous peaks' in the intensity of the amplitude level (Ayres & Hughes, 1986). Visually and auditorally, the amplitude pattern of music has more 'form' than that of noise. Therefore, it is likely that group improvisations that are most like noise will have less 'form' and group improvisations that are most like music will have more 'form' in their amplitude patterns.

Pavlicevic (1995) identified and presented a theoretical context of form for a group music improvisation process with adults. This process is most directly related to the dimension of group cohesiveness in group psychotherapy. The concept of group cohesiveness is complex. Although there is little evidence of agreement in the literature on the components of the term or agreement on whether it is therapeutic, group cohesiveness is still considered to be a positive aspect of group process (Kaplan & Sadock, 1993).

The purpose of this research was to determine if the development of and changes in a group's degree of cohesiveness could be identified through musical improvisations and additionally to present a method for the musical analysis of group improvisations.

Statement of the Hypotheses

The research hypotheses are:

1. There will be a correlation between the independent judge's ratings of the group's cohesiveness,

2. There will be a difference in the overall amplitude patterns between improvisations as evidenced by visual assessment of graphical density and form.
3. There will be a difference in 5 second sample amplitude patterns between improvisations as evidenced by visual assessment of graphical density and form.
4. There will be a relationship between the independent judge's ratings of the group's cohesiveness and the amplitude patterns.

CHAPTER III

METHOD

Subject Material

The subject material of this study were recordings of group musical improvisations. The improvisations were created by a group of 20 students enrolled in a graduate course at Western Michigan University in the Department of Counselor Education and Counseling Psychology. The title of the course was "Group Dynamics and Procedures". The class met twice each week, three hours at a time, for eight weeks. The class was divided between a lecture portion (approximately 40 minutes) and an experiential portion (approximately 90 minutes). The lecture material was based on the course text (Corey, 1992). The experiential portion of the class served as a working model of group psychotherapy with the class instructor serving as the group therapist. There was a 20 minute break between the two portions of the class.

The improvisations were recorded at the beginning of each class. The only instructions were to "begin playing after the tape recorder was turned on". The improvisations ranged from 1.3 minutes to 3.1 minutes in length. The researcher provided an ending "signal" for the improvisations.

The musical instruments used in the improvisations were: 3 conga drums (single & set), a floor tom, bongos, a bell tree, bell chimes, a Bermise gong, a large gong, a rainstick, an ocean drum, argo bells, a tambourine, hand drums (2), a bass xylophone, alto xylophones (2), an alto metalophone, claves (2 sets), maracas (1 set), a gourd shaker, pentatonic wood blocks (1 set), a basket shaker, finger cymbals (2 sets), a vibra slap, a hanging crash cymbal, tone bars (2 contra-bass) and timpani (2).

The improvisations were recorded on normal bias tape using an Aiwa 210 portable stereo cassette recorder with a built in mic. The recorder was placed in the same location relative to the sound source for each recording and each recording was made in the same room.

Sampling Procedure

From the series total of 12 improvisations, five improvisations, that were made by the group over the eight week period of time, were chosen by the researcher to represent the beginning stage, middle stage and ending stage of the group. The exact improvisations used in the study were #1, #3, #4, #7, and #12. Random selection of which recordings to include might have misrepresented the context in which they were made. Group process does not happen randomly. Reid (1991) states:

While the stage concept cannot be taken too literally, experienced clinicians agree that groups do go through periods of life characterized by some underlying organization or emphasis. Each stage has characteristics that differentiate it from the stages before and the ones to follow (p. 61).

Judgment sampling, also referred to as purposive sampling, "involves selecting a sample which is believed to be representative of a given population. The researcher uses expert judgment to select a representative sample" (Gay, 1992, p. 139). This type of sampling has been used in other studies of musical improvisations. In one study, Vangar et al. , (1995) described their sampling procedure as:

The complete therapy consisted of 25 sessions and was considered to comprise three phases: beginning, middle and ending. A particular session was selected from each phase and the first musical improvisation in that session was isolated (p. 150).

Additionally, Langenberg et al. , (1993) used one excerpt from session # 26 that was 5 minutes, 40 seconds in length.

Measuring Instruments

A conversion of the original analog recordings using an Audio Media II card with digital I/O by Digidesign was made to facilitate the amplitude analysis. The improvisations were recorded at a sample rate of 48 khz.

The acoustic analysis of the subject material took place at the School of Music, Western Michigan University, Kalamazoo, Michigan during the Fall semester of 1996.

The analysis was done on a Macintosh IIfx computer using the software program Sound Designer II, version 2.8 (Brooks, Clementson, Currie, Isobe, Jasmin, & Richert, 1994). While the use of computer-based electroacoustic analysis methods with clinical musical improvisations is experimental, this technology has been utilized by composers in the past

(Helmuth, 1996). Of the software programs available to the researcher at the time of the study, this particular program was determined to be the most appropriate for use in this research because it had the capability to provide an overview of the entire amplitude pattern for each improvisation. Providing overviews was determined to be important because they were the population from which the 5 second samples were chosen. Additionally, the amplitude patterns of the improvisations presented in their entirety showed an accurate context for the comparisons.

A one item 6 point Likert rating scale for the degree of group cohesiveness or non-cohesiveness was developed by the researcher for use by independent judges (see Appendix A). The scale was designed to be 'forced choice' (cohesive/non-cohesive) and included 3 degrees for each choice. Researcher designed rating scales have been used in other published studies involving musical improvisations (Pavlicevic et al. , 1994; Vanger et al. , 1995).

Design

This research study is a content analysis that utilizes both a judgment study paradigm and computer-based acoustic information. This design was chosen because (a) music is a frequent subject for content analyses, (b) it allows recognition that clinical improvisations are also music, and (c) the use of independent judges in the analysis of musical improvisations has been used in the past (Langenberg et al. , 1993; Pavlicevic et al. , 1994).

The limitations of this design include: (a) lack of generalizability, (b) a non-random selection of improvisations included in the study, (c) a non-random selection of the 5 second examples of amplitude, (d) a lack of standardized measuring instruments and (e) a lack of empirical verification for the application of computer-based electroacoustic musical analysis methods to clinical improvisations.

Procedure

Part 1

The five improvisations that were selected for analysis were recorded into the computer at a sample rate of 48 khz. A hardcopy of the amplitude pattern for each entire improvisation was made. Because the length of the improvisations varied, a hardcopy of a 5 second sample of the amplitude pattern of each recording was also made. The portion that was selected from each improvisation was made by the researcher based on auditory and visual criteria. Each sample was chosen because it sounded and looked to be most representative of the entire improvisation. The amount of data that is available for analysis with this type of procedure can be overwhelming. To not lose sight of the clinical context for which this method is intended, samples that reflected a broad overview of each improvisation were selected.

Part 2

Three independent judges were asked to participate in this study.

The three criteria for selection as a judge were: (1) each had a minimum of 1 year clinical experience as a music therapist in an adult psychiatric setting, (2) each had employed musical improvisation in either individual therapy or group therapy in their clinical work and (3) each was not connected to this study in any other way.

In other studies of musical improvisation that employed independent judges, one used music composers for the musical analysis along with "independent describers, all of whom had not been trained in music therapy" (Langenberg et al. , 1993, p. 61). Another did not report who their judges were (Vanger et al. , 1995) while Pavlicevic (1994) used "randomly selected experts" (p. 93).

Music therapists with the clinical experience of doing musical improvisations with adults in a psychiatric setting were chosen because: (a) musical improvisation in a clinical setting is primarily used by music therapists and (b) the results of this study would be of most interest to music therapy clinicians who work with adults in this type of setting.

Each judge was asked to complete a brief questionnaire regarding their clinical experience. The number of years the judges worked as music therapists ranged from 3 to 12 (an average of 9 years). The number of years the judges worked in an adult psychiatric setting ranged from 1 to 12 (an average of 7.6 years). All judges used both individual and group musical improvisation in their work.

Each judge was asked to read the information and directions regarding the rating scale (see Appendix A). Any questions about the directions were answered. No further information either regarding the

group improvisations or the nature of the research was given. Two judges completed the rating scales together with the researcher and one completed the rating scales individually with the researcher. The improvisations were presented to all judges in chronological order (#1, #3, #4, #7, #12) using the same audio cassette tape player.

CHAPTER IV

RESULTS

A comparison of the overview amplitude patterns of improvisations #1, #3, #4, #7, & #12 is shown in Figure 1. A 5 second sample of each of these improvisations is shown in Figure 2.

The two specific dimensions of these figures, which are relevant to this study, are density and form. In listening to the group improvisations, density sounds like multiple instruments overlapping. Visually, density looks like the thickness in the center portion of the amplitude overview. Form, when hearing the improvisations, is most clearly defined by silence. Visually, this silence is represented by repeated groupings of momentary peaks.

Figures 1 and 2 suggest that differences in amplitude patterns of group improvisations exist. Improvisations #1 & #4 are more dense and have less form than improvisations #3, #7 or #12. The greatest difference appears to be between improvisations #1 & #12.

The interrater reliability for group cohesiveness vs. group non-cohesiveness is 1 (100%). The three judges agreed that improvisations #3, #7 & #12 were cohesive and that improvisations #1 & #4 were non-cohesive. The interrater reliability for degree of cohesiveness or non-cohesiveness was .8 (80%). The judges agreed on the degree of group cohesiveness or non-cohesiveness for improvisations #1, #3, #7, & #12.



Improvisation #1



Improvisation #3



Improvisation #4



Improvisation #7



Improvisation #12

Figure 1. Overview Amplitude Patterns.





Improvisation #1



Improvisation #3



Improvisation #4



Improvisation #7



Improvisation #12

Figure 2. Five Second Sample Amplitude Patterns.



rms.

They disagreed on the degree of group non-cohesiveness for improvisation #4.

A summary of the composite ratings on the non-cohesiveness vs. cohesiveness scale for each improvisation is shown in Table 1.

Table 1

Ratings on the Non-cohesiveness vs. Cohesiveness Scale

Improvisation	Mean	
	Scale: 1= Non-cohesive	6 = Cohesive
#1	2.33	
#3	6.0	
#4	2.66	
#7	5.0	
#12	6.0	

The rank order of each improvisation by each judge is shown in Table 2. The researcher rank ordered the responses of the judges according to the individual rating scale of each improvisation by each judge.

Those improvisations which were rated equally by a judge are underlined. All 3 judges matched for the rank order placement of improvisations #3, #7 & #12. These are the improvisations they identified as cohesive.

Table 2

Rank Order of Improvisations by Each Judge

Judge	Rank Order of Improvisations			
	Non-cohesive	to	Cohesive	
#1	1	4	7	<u>3 & 12</u>
#2	<u>1 & 4</u>		7	<u>3 & 12</u>
#3	1	4	7	<u>3 & 12</u>

The degree of non-cohesiveness or cohesiveness and the rank order of the judges' ratings are inconsistent with regard to the amplitude views in Figures 1 and 2. For example, improvisations #3 & #12 are rated as cohesive and ranked most cohesive, yet appear to be different in density and form on Figure 1 and appear to be similar in form on Figure 2.

The results of this study tend to support the research hypothesis #1: there will be a correlation between the independent judge's ratings of the group's cohesiveness.

The results of this study tend to support the research hypothesis #2: there will be a difference in the overall amplitude patterns between improvisations as evidenced by visual assessment of graphical density and form.

The results of this study tend to support the research hypothesis #3: there will be a difference in 5 second sample amplitude patterns between improvisations as evidenced by visual assessment of graphical density and form.

The results of this study do not fully tend to support the research hypothesis #4: there will be a relationship between the independent judge's ratings of the group's cohesiveness and amplitude.

CHAPTER V

DISCUSSION AND RECOMMENDATIONS

Discussion

One purpose of this study was to examine whether one particular aspect of group process, group cohesiveness, could be identified in group musical improvisations by experienced clinicians. The results of this study tend to support the notion that cohesiveness and non-cohesiveness can be heard in this group's improvisations. The interrater reliability for cohesiveness or non-cohesiveness was very high. This suggests the choice of music therapists who have clinical experience with group musical improvisations as judges for this study was appropriate. This also supports the general notion that the more like 'music' the improvisations sounded, the more agreement there was between the judges.

The interrater reliability for degree of group cohesiveness or non-cohesiveness was acceptable. The small number of improvisations chosen for analysis, coupled with a more complex task, may have contributed to the lower reliability rating between judges.

The greatest discrepancy in judging degree of cohesiveness or non-cohesiveness was for improvisation #4. This may be related to the multidimensionality of the concept 'cohesiveness' paired with the multidimensionality of music. For example, one judge, when describing

what he thought of the improvisations at the end of the testing, stated he defined 'cohesiveness' mostly in terms of rhythm, but that he also rated 'cohesiveness' in improvisation #4 in terms of dynamic level and tempo. There is a portion of improvisation #4 in which most of the group members stop playing their instruments. From a process point of view, this group 'falls apart' at that point in the improvisation. In only listening to the improvisation, the independent judge heard the group acting/sounding 'together'.

Another purpose of this study was to present a new method for analyzing group musical improvisations. On a very basic level the improvisations look like how they sound. In visually comparing both the overview and sample amplitude patterns of the improvisations, the broad similarities and differences in density and form are evident.

Another purpose of this study was to determine whether the judges' ratings of the improvisations had correlates in the amplitude analyses of the improvisations (research hypothesis #4). Although the results of this study do not fully support this hypothesis, there was a relationship between the independent judges' ratings of group cohesiveness and amplitude.

This hypothesis is most strongly supported when comparing improvisations #1 & #4, rated by the judges as being non-cohesive, with improvisations #3, #7, & #12, rated by the judges as being cohesive, to Figure 2. The broad, non-cohesive or cohesive, ratings made by the judges are visually identifiable in the form and density differences in the amplitude views.

There appears to be a relationship between the judges' ratings of non-cohesiveness or cohesiveness in a broad sense, to the amplitude views. However, there seems to be greater subjectivity involved in the comparisons of degree of non-cohesiveness or cohesiveness and of rank order of cohesiveness to the amplitude views.

Given that this study was, in part, an attempt to develop a prototype method for the analysis of group musical improvisations, these findings must be considered preliminary. The results are broadly consistent, but continued revision and 'field testing' of this method is needed.

Recommendations

Comparisons of other types of judges (i.e. group psychotherapists, music composers, music educators) in studies utilizing musical improvisations might be helpful in identifying those qualities music therapists use in analyzing improvisations.

The group improvisations in this study used percussion instruments. The use of the MIDI for translating keyboard improvisation into traditional musical notation could be expanded to drum machines. Recordings of group improvisations could be made directly to hard disk on as many tracks as there are group members. These tracks could be displayed in real time in relation to other acoustic parameters like amplitude. Using these scores along with the graphic acoustic representations might provide for a more thorough visual analysis.

One aspect of this study that could be strengthened by future research would be the application of a quantitative measure of density and

form to the amplitude views. It might be possible to use densitometric science to determine the pixel or optical density of the amplitude patterns. One computer-based imaging program is NIH Image. Image could be used to measure the area, centroid or perimeter of any researcher defined region of interest (either overview or sample excerpt). This program could perform automated particle analysis (a possible measure of the density of the amplitude patterns). This program also includes tools for measuring path lengths and angles (a possible measure of the ratios involved in the form of the amplitude patterns). NIH Image is a public domain program developed at the U.S. National Institutes of Health and is available on the Internet at <http://rsb.info.nih.gov/nih-image/>.

Another aspect of this type of analysis that needs to be addressed is in relation to sampling. There were approximately 32,000 megabytes of information that were digitized for each improvisation. The richness and detail of the computer-based amplitude analysis was exciting, but the amount of data available was overwhelming. The software program used in this study can show any facet of amplitude from detail to overview. A standardized protocol for selecting the most useful level (sample size) at which to address this data is needed.

Lastly, this amplitude study involved one group. Comparisons with future research involving single group case studies or studies with multiple groups are needed. The significance of the present research is that these comparisons are possible.

The findings of this study are promising. It seems that the computer-based electroacoustic technology, used in creating music, can be successfully applied to the analysis of clinical musical improvisations.

Another application may be in assessment. With a reliable method for musical analysis, musical improvisation has the potential to add a unique dimension to projective personality assessment techniques.

Aldrige (1993), in discussing research needs in music therapy, stated that one area of need is to "offer a schema by which musical parameters can be compared which could be used as a systematic form of assessment that is consistent and can be communicated to others" (p. 122). Given the difficulties in measuring group cohesiveness through traditional, language-based approaches, further research using musical improvisation may be helpful in broadly identifying patterns of cohesiveness in group psychotherapy.

Appendix A
Non-cohesiveness vs. Cohesiveness Scale

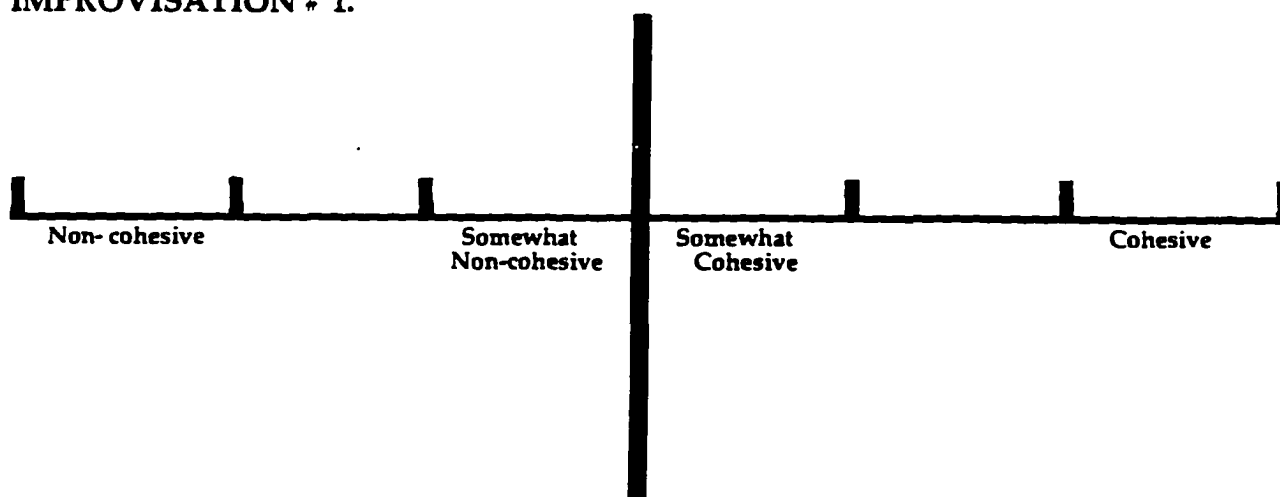
This research study is about the degree of group cohesiveness or non-cohesiveness that is evident in group musical improvisations.

You will hear 5 different recordings of group musical improvisations. Each improvisation will last approximately 3 minutes. After each improvisation is completed, please complete the rating scale below. A separate rating scale will be provided for each recording.

Decide where on the continuum the group improvisation you are listening to is best described and then check the location that best matches your decision.

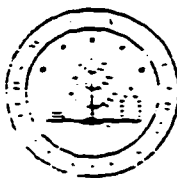
Be sure to check only one location for each improvisation. Thank you.

IMPROVISATION # 1.



Appendix B

Protocol Clearance From the Human Subjects Institutional Review Board



WESTERN MICHIGAN UNIVERSITY

To: Brian Wilson
Rosemary Hakes

From: Richard A. Wright, Chair
Human Subjects Institutional Review Board

Subject: HSIRB Project # 96-09-04

Date: September 13, 1996

A handwritten signature in black ink that reads "Richard A. Wright".

This is to inform you that your project entitled "Group Process Represented Through a Multidimensional Analysis of Musical Improvisations," has been approved under the exempt category of research. This approval is based upon your proposal as presented to the HSIRB, and you may utilize human subjects only in accord with this approved proposal.

Your project is approved for a period of one year from the above date. If you should revise any procedures relative to human subjects or materials, you must resubmit those changes for review in order to retain approval. Should any untoward incidents or unanticipated adverse reactions occur with the subjects in the process of this study, you must suspend the study and notify me immediately. The HSIRB will then determine whether or not the study may continue.

Please be reminded that all research involving human subjects must be accomplished in full accord with the policies and procedures of Western Michigan University, as well as all applicable local, state, and federal laws and regulations. Any deviation from those policies, procedures, laws or regulations may cause immediate termination of approval for this project.

Thank you for your cooperation. If you have any questions, please do not hesitate to contact me.

Project Expiration Date: September 13, 1997

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