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A NATURALISTIC INVESTIGATION OF FACTORS INFLUENCING PREFERENCES FOR SOUNDS AND SOUND SOURCES IN SELECTED STUDENTS AGED 9 TO 15

by

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A NATURALISTIC INVESTIGATION OF FACTORS INFLUENCING PREFERENCES FOR SOUNDS AND SOUND SOURCES IN SELECTED STUDENTS AGED 9 TO 15

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June 5, 1990
(date)

ABSTRACT

This study has investigated factors affecting the development of a musical aesthetic in students ages nine to fifteen years of age. In particular, the investigator examined the influences of the students' ages and previous musical experience, measured in terms of formal musical training, on their indentification of and preferences for sounds and combinations of sounds they considered to be "musical" or pleasing to their ears.

The subjects of this investigation — six males and six females — ere selected through a sample of convenience and were divided into four groups according to their ages and previous musical training. Six of the subjects were aged nine to ten years; the other six were from fourteen to fifteen years of age. Three from each age level had had no musical training while the other three had from five to ten years of formal musical training.

A "naturalistic" methodology rather than a formal, scientific approach was adopted for this investigation because of the nature of the problem being examined. A variety of data-gathering approaches were employed — including direct observation of subjects, open-ended interviews, and tape-recording of musical compositions created by the subjects — in order to obtain the children's responses to a wide variety of sound stimuli, as produced and chosen by each individual subject.

Age and musical training were both found to be significant factors in determining the development of a musical aesthetic in the subjects investigated in this study.

DEDICATION

To Rick, Jessica, Zoe and Zachary for their support and infinite patience through all the panics about lost computer files, my frustrations of re-writing, and endless times of leaving me alone so I could write.

To Bob Walker for his academic direction, infectious enthusiasm and consistent ability to give constructive criticism.

To my editor for his endurance, friendship and sense of humour in the face of all odds.

To the loving memory of my father, who taught me that anything is possible.

TABLE OF CONTENTS

LIST OF FIGURES

PREFACE

The setting is: September, 1970, Vancouver East, a large elementary school, one grade seven class. This class of thirty-eight students ranges in age from thirteen to sixteen, and in maturity from child to near-adult. Coming into the room, most find seats at desks, but some of the oldest saunter to the wide window ledges, where they perch, or, alternately, open the windows and lean out, three stories up. The students watch me, the music teacher, for reactions, adding that "we got rid of two music teachers last spring alone", implying that I am soon to follow. Talking among themselves and moving around the room, they refuse to respond to any of my attempts at teaching them music.

This scene repeats itself twice a week for two months. I refuse to yell or punish, but repeat that I am waiting for them to be ready to learn. They spend their time in my room talking, and leaning out the windows, glancing at me periodically, uncertainty in their eyes.

Slowly, in month three, students stop by my desk, and we begin to talk about my love of music, about their feelings about school in general and music class in particular, about their ideas about music outside of school. When they talk, they are interested and animated, and I listen. They begin bringing recordings of the music they like, and I find them knowledgeable about instruments, groups, styles, text and presentation modes. We begin studying music by talking, listening, illustrating and mimicking the styles and groups that they like. Music class is now a success, because we have begun at the only possible place, **WHERE THEY ARE, NOW**, in terms of experience and knowledge.

My experience with this class influenced the development of my teaching style and philosophy, and launched me on the quest which has resulted in this thesis.

INTRODUCTION

The idea for this study evolved over many years work in teaching music to students ranging in age from pre-school to adult. While teaching musical skills and concepts, I have always been most interested in the student's individual expression and creative output, rather than their greater or lesser approximation of skill perfection or regurgitation of stylistic or historical information. To stimulate student learning, I used artwork, literature, and other cultural forms along with quality compositions for listening and analysis. Through these catalysts, some original, aesthetically pleasing musical creations were developed.

The vehicles for expressing sounds, patterns, and moods, included traditional school instruments — recorders, ukuleles, guitars, drums, rhythm instruments; Orff instruments — xylophones, glockenspiels, metalophones, kettle drums; 'junk' sound sources for 'found' sounds; and most recently, synthesizers. Students were given the freedom to combine sounds, include visual aids, or add movement, and then, were given time to experiment with and improve upon the art forms chose to create original, aesthetically pleasing musical experiences. Varèse expressed this same philosophy in his essay "The Liberation of Sound", stating that "the very basis of creative work is experimentation, bold experimentation...." (Chase, 1966, p.189).

Watching student creations evolve, this researcher was always intrigued to see which students chose which sounds and sound sources when creating examples of their own musical expression. They were definitely comfortable with certain media: some only wanted to use the piano; some searched for sounds sources with which they could make music sounding like a 'real orchestra'; some only wanted a wide variety of different kinds of drums; and some loved the pieces of miscellaneous 'junk' culled from kitchen and garage implements.

There was also a wide range of differences in the choices made when musical creations were being formalized and finalized. Why and how did these students, who, over the years, had come from a variety of ethnic and economic backgrounds, were of varying ages, and had widely differing amounts of formal musical training, make these aesthetic choices? Which children made similar choices? Why? This researcher was curious to learn more about the factors influencing the musical aesthetic decisions necessary for students to solve the basic problem of what to call "music" and what to call "noise", as well as the more complex problems involved in ordering several timbres to create textures and harmonies.

Searching the literature, studies were found which investigated a variety of possible influences on the development of musical preferences. Marple (1968) and Nozol (1966) use age as a possible influence; Hargreaves (1984), Hargreaves and Castell (1986), and Radocy (1980) use familiarity with repetition; Greer, Dorow and Randall (1974), Boyle, Hosterman, and Ramsey (1981), and R. Walker (1984) examine personality and cultural factors; Marple (1968) and Boyle (1981) explore peer pressure as a possible influence; while Kelly (1961) and Getz (1966) see formal musical training as a determining factor.

All the above-named researchers employed a format which involved listening to and labelling pre-selected samples of existing music as either "liked" or "disliked". The samples were all segments of recognizable pieces of music, which meant they were acceptable samples of musical endeavour. In order to be "recognized", something has had to be experienced enough times to be familiar, and only "acceptable" experiences will be repeated. Cultural norms largely determine what is acceptable in music as in other areas of society. These norms determine such things as instrument and timbral choices, musical style and structure, rhythmic and melodic patterns, and subject material for texts.

Culture and society have influenced music from the onset of our Western tradition. Western music theory and practice have their roots in ancient Greek philosophy: beauty in the arts (aesthetics) stemmed not from the senses but from intellectual reasoning. This system of reasoning was based on the logic of mathematics and musical structure followed from this. According to Pythagorian theory, the "perfect" intervals are the fourth, fifth and octave, and so these were the main intervals used to structure music. According to Barbera (1980), the writings of Plato and Aristotle influenced the development of proportional theory which eventually led to the formulation of the musical scale as we now know it. During the Middle Ages, the influence of Christianity was strongly felt in musical form as well as subject: the notion of the Trinity was introduced into music in the form of triple meter rhythms. During this period, according to *The Oxford History of Music* (Wooldridge, 1973) the Trinity represented perfection and these rhythms, therefore, were the only ones permitted.

Perfection is an important word in the evolution of the Western musical tradition; striving for this ideal has always been the driving force in western musical practice. This quest is illustrated by the restructuring of keyboard tuning according to the theory of equal temperament, for which Bach wrote the forty-eight *Preludes* and *Fugues*. Composers of the time believed that it was necessary to have the space between each interval mathematically equal in order to create a "perfect" scale. Various solutions were suggested for the mathematical problem of dividing the octave into twelve equal parts. Most recently, the computer has enabled musicians to understand and achieve even more precise frequency alignments.

Similarly, perfection was also aimed for in terms of harmony. The ideas of "consonance" and "dissonance" traditionally involved intervals which "belonged" or "did not belong" to a specific tonal ordering. Although considered "acceptable" now, Bach, Beethoven, Chopin, Debussy and Stravinsky were among those composers

whose works violated contemporary rules of consonance and were consequently considered unacceptable to the listeners of their time.

Walker (1987, p.56) states that, by tracing the development of Western musical tradition, as well as those of other cultures, it becomes evident that "...the development of musical perceptions and cognition...is based entirely upon cultural norms and culturally transmitted beliefs about music, and about the 'correctness' or 'appropriateness' of musical sounds." Research into other cultures, including North American Indian, Inuit, Balanese and Javanese, by Walker (1985; 1986; 1987) and theories put forward by Terhardt (1974) and Divenyi (1979), among others, support the view that culture affects and determines musical practice in that each of these cultures has different "acceptable" standards and norms for musical elements and structures.

It was assumed by some researchers, then, that any decisions concerning sound preferences using recognizable musical samples would result in culturally biased choices. Therefore, in an attempt to provide musical examples that were not culturally "framed", thereby avoiding any cultural, contextual biases, Hargreaves and Castell (1986) provided sound samples that were statistical approximations of musical sound made electronically. Subjects were asked to include "buzzes" or noises, as well as recognizable musical samples in their listings of preferences. Although the attempt to provide culturally-free samples for choice opened up the possibility of freer individual aesthetic decision-making, the actual sounds provided by the experimenters were rejected by the subjects who "...perceived [them] as strange and perhaps unmusical" (Hargreaves and Castell, 1986, p.7).

It was the wish of this researcher to provide subjects participating in the study with sounds that were not bound by cultural context but which would still be usable within a musical structure. It was determined that a possible way of proving a culturally free sound context would be to allow the subjects to create own sounds and

to choose preferred sounds from all of the possibilities they had created. This researcher was unable to locate any studies where the subjects had created their own sounds to use as samples for choice but Paynter (1969) did provide subjects with a physical environment in which they could use a variety of sound sources to create a wide range of sounds. It was decided, therefore, to design this study in such a way as to provide an environment of open choice for the creation of sound samples from which the final preferred sounds would be chosen.

Of equal interest to this researcher was the subsequent use subjects might make of these sounds. For example, how might these "musical" sounds be utilized within a larger organizational structure also considered to be musical? What parameters would an individual use to create an aesthetically pleasing musical experience if the raw material (sounds) to be used in the construction were not part of an already established cultural context? These questions arise because music, as we know it, is the organization of "musical" sounds into a contextual framework named a "composition". The parameters used in construction of compositions depends, as previously discussed, on cultural norms, which are cognitively understood and aesthetically utilized by the composer.

This researcher wondered what would happen if subjects were given the opportunity to create or choose sounds without contextual constraints based on learned societal norms and then were asked to put them in a context of their own which would result in a musical composition. Would the resulting compositions follow the structures of the current "acceptable" musical aesthetic or would they be different? If they were different, how would they differ from music as we know it? What factors would influence the students as they went about selecting sounds, timbres or structures for their compositions? This researcher wanted to see if answers could be found to some of these questions; therefore part of the study included an opportunity for students to create a musical composition of their own design.

In choosing the format for the design of this study, there were two possible approaches: scientific and naturalistic. The format of a naturalistic investigation was chosen for reasons outlined and explained by Guba (1981, p.81). "In the area of social/behaviourial inquiry, ...the assumptions of a Naturalistic paradigm have greater validity. Discrete variables and their relationships [tools specific to investigations based on the scientific model], do not seem to be sufficient to deal with the complex interactions and patterns of human behaviour." A naturalistic paradigm, on the other hand, "...is an investigative mode aimed at understanding 'actualities, social realities, and human perceptions untainted by the obtrusiveness of formal measurement or preconceived questions.... Naturalistic investigations attempt to present "slice-of-life" episodes documented through natural language and represent as closely as possible how people feel, what they know and what their concerns, beliefs, perceptions and understandings are" (Wolf and Tymitz, 1976-77, p.6, quoted in Guba, 1981, p.78).

The design structure of a naturalistic investigation is emergent, one that "...emerges as the investigation proceeds; moreover, it is in constant flux as new information is gained and new insights are achieved" (Guba, 1981, p.73). The data gathered in a naturalistic investigation are utilized in the following ways: collection and analysis take place both during and after sessions with subjects called "inquiry" sessions at which an "inquirer" (the researcher) observes and gathers data, and qualitative methods of evaluation, for the purpose of discovery, are used to assess the data.

The study which forms the basis for this paper, then, is primarily structured on the model of a naturalistic investigation. Generally, it is an inquiry into aesthetic responses to sound, in which children's open-ended responses to a wide variety of sound stimuli, produced and chosen by each individual subject, are investigated.

No study lies totally within one paradigm, however, and Guba (1981, p.81) cites Willems and Raush (1969) as stating that "pure" forms of inquiry are rare and that

"most inquiries combine these [scientific and naturalistic] approaches in one way or another." For this study, two elements of a scientific investigation were employed: the experimental setting was controlled by limiting the number and type of sound sources available to the subjects and by using closed rooms where no unforeseen interruptions could interfere with the experiment; and by the prior design of some of the questions used in the inquiry sessions.

A search of the literature showed that *age* (Marple, 1968; Leblanc 1979; among others) and *formal musical training* (Getz 1966; Bradley, 1971; Crawford 1973, quoted in May, 1985, among others) were key factors in musical preference when using predetermined recognizable samples. This researcher was interested in seeing whether either or both would be factors contributing to musical preferences within the context of a study which allowed more open-ended choices of musical samples. She also sought to determine whether or not these two factors would influence the final choice of sounds and their organization when participants were asked to organize their chosen sounds into a musical composition. Therefore, this study was designed to include an exploration of the possible effects of age and formal musical training on the subjects' individual responses to, and preferences for, various sound samples.

Age and formal musical training became two experimental variables in the identification of subjects used in this inquiry. Subjects were selected from volunteers through a sample of convenience. Untrained subjects were selected from students in two elementary schools and one secondary school where the researcher felt comfortable asking teachers to permit her to explain the study to students and to ask interested students to volunteer to participate. The researcher then spoke to the parents of those who volunteered, seeking their permission for their children to take part in the study and to be transported to and from the inquiry setting by her. Potential trained subjects were identified through personal contact with a mother whose children were enroled in the Suzuki Music Program at the Vancouver School

of Music. Each of the trained music students, and her/his parents, was spoken to individually and given the same information about the study and transportation arrangements as the untrained group. Final selection of subjects was based on both student interest and parental permission, as well as a matching of the children's schedules with the availability of the facilities in the Faculty of Education at Simon Fraser University which were used for the study.

Criteria for selection of subjects included both age — either between 9 and 10 years, or between 14 and 15 years — and amount of formal music training — either less than one year in any method, taken to indicate no formal training, or consistent Suzuki training from age 3-4 up to the time of the study, classified as musically trained. Subjects were grouped into four groups of three, based on both age and degree of musical training: Group I, aged 9 to 10 years with no formal musical training; Group II, aged 9 to 10 years with musical training in the Suzuki method; Group III, aged 14 to 15 years with no formal musical training; Group IV, aged 14 to 15 years with musical training in the Suzuki method.

The study took place between February and June, 1987. During this time all participants completed all sessions at Simon Fraser University in Burnaby, B.C. Two self-contained rooms were provided in the Education Department Complex. Each subject utilized the materials in the rooms while participating individually and independently in tasks outlined below, and more fully explained in various other parts of this paper:

1. explore any/all possible sounds you can create with any/all sound sources in each room, as time permits.
2. answer questions asked by the researcher regarding your own personal opinions about sounds and sound sources discovered (see the Experiment section for specific questions).
3. from sounds you called 'musical', choose a maximum of 10 from any sound sources

to be combined into what you determine to be a 'musical' example.

4. create a composition ('musical' example), using the sounds you chose above.
5. based on your thoughts and feelings about your composition, discuss with the researcher your aesthetic evaluation of the outcomes of the composition in terms of 'musicality'.

Observations recorded during these inquiry sessions were grouped and analyzed. The results are detailed in the body of this thesis.

SUBJECTS

Subjects participating in this study form a sample of convenience drawn from student volunteers from School District 44 (North Vancouver, B.C.), and the Vancouver Academy of Music. Final selection of subjects was based on these two criteria: age, and formal music training, as explained in the Introduction. Based on these criteria, subjects were then placed in one of the four groups listed below (See Table 1).

Table 1. Subjects, by Age and Level of Training.

GROUP	AGE	TRAINING	GENDER
I	9-10	none	2 female 1 male
II	9-10	minimum 5 years	2 female 1 male
III	14-15	none	2 female 1 male
IV	14-15	minimum 10 years	3 male

The choice of 9-10 year-olds as one age group was based on Piaget's theory that by that age children's cognitive development is advanced enough to begin to think in concrete terms, which is taken to include the understanding of conceptual learning operations such as the simple concept of differentiating between sounds considered to be musical and those considered to be unmusical. According to Pflederer-Zimmerman (1970, p.49), "Music learning begins with the perception of music". Young children experience music via sensory perception, selecting and making judgements about the material heard long before they are intellectually mature enough to organize clear and complete thoughts, (conceptualize), about the same music. Piaget, cited in Pflederer-Zimmerman (1970, p.49), calls the development of the ability to

conceptualize 'conservation', "...which refers to an individual's ability to retain the invariant qualities of a particular stimulus when the stimulus field has been changed". When the child is mature enough to think conceptually, perceptions stored as memories can be used in various configurations and contexts: in logical relationships, in reversibility, and in the original construct.

The 14-15 year olds were chosen to see to what extent, if any, preferences concerning what is thought to be 'musical' is affected by exposure to rock music and common influences of the teen years such as peer pressure.

Formal music training was defined for purposes of this study as participation, for a minimum of five years for the younger subjects, and ten years for the older subjects, in either: 1) a specific method of private or group instruction on an instrument or voice, or; 2) formal instruction in a pedagogical method such as Suzuki, Orff, Kodaly, etc. Subjects considered to have no formal music training were those with up to one year only, of any training mentioned above. Subjects considered to have formal music training in this study were Suzuki trained from the age of 3 or 4 up to the time of this study. The Suzuki method was chosen because of its rigorous and comprehensive strategies for teaching performance skills and concepts of musical form and structure.

With two exceptions, all subjects were Canadian born and educated. One subject with musical training was a recent immigrant from China, but fluent in English. The socio-economic status of all subjects was middle-class suburban. Gender groupings were not determined by the researcher, since gender was not to be used as a factor in this study. Hargreaves, Messerschmidt, and Rubert (1980) report that from the 1930s on, research concerning the factors which influence musical preferences has included the following five broad categories: personal characteristics, such as age, socio-economic status, musical talent, intellect, musical experience and musical training; personality factors, such as extroversion or introversion; the effects of familiarity and repetition of musical samples; the effects of prestige and propaganda,

such as what a listener thinks a specific composer is like personally might reflect that listener's reaction to his/her music: the influence of broader social determinants, such as subcultural influences that affect choices of adolescent listeners.

Gender is not listed as a separate category, nor is it included in the specific possible influences within any category. This information, plus the fact that the researcher's own search of the literature also found no specific reference to gender as a possible factor in determining musical preference, produced the decision to exclude gender groupings as significant in this particular study.

With one exception, the male in Group III, all subjects knew at least one other participant, through either school or music classes. Subjects who knew each other were not necessarily in the same group in the study, with the exception of Group IV, where all males knew each other from music classes. The fact that subjects knew each other previous to participating in this study was useful in creating a positive, relaxed attitude and atmosphere for each person. The researcher knew only two of the younger subjects personally previous to the onset of the inquiry, and none of the subjects were familiar with the physical setting of the study.

Since attitude was of primary importance in subjects' willingness to participate initially as well as their willingness to take risks necessary in using new sound sources, using familiar sound sources in new ways, and creating and manipulating sounds in a new environment, it was essential that the atmosphere for the study be one that was relaxed and non-threatening.

Even though each subject participated in the specific, structured activities individually, all participants, with one exception, came to the sessions with a friend. In the one exception, a member of Group III, the subject had been a student of the researcher's husband, and felt comfortable chatting with the researcher in the car to and from the sessions.

Subjects talking to each other were interested in and supportive of their friends' experiences in the study. The researcher feels the significance of subjects knowing each others was that they encouraged each other. Some peer pressure was noted with Group IV members. One member was very adamant about adding another session to further edit his composition, and the researcher felt that the other group member that had more time available decided to also further edit his because of his friend's comments, and that left on his own, would probably have been content to leave his own composition as it was.

On the whole, the subjects were relaxed, interested and creative throughout the sessions. They were all eager to be chosen for the study, and expressed their pleasure at being given the opportunity to experiment with all the different sound sources.

METHODOLOGY

Introduction

In studies investigating such topics as aesthetic preferences, collection and evaluation of data is best done by qualitative research procedures. Two methods are available for structuring these procedures, the Artistic approach and the Scientific model. Eisner (1981, pp.5-9) explains the ten differences between the two approaches:

1) *forms of representation*: the scientific approach uses literal language, and formal statements which express empirically referenced quantitative relationships; the artistic approach uses 'language' from visual, auditory and discursive modes, and meanings are expressed in figurative forms.
2) *criteria for appraisal*: the scientific approach demands that conclusions are supported by evidence, and seeks validity and reliability; the artistic approach seeks credibility and illumination, with validity the result of the individual's personal vision.
3) *points of focus*: the scientific approach focuses on manifest behaviour; the artistic approach focuses on experience itself and the meaning the actions of the subjects might have for others
4) *nature of generalization*: the scientific approach uses the nomothetic approach, considers large samples important, and seeks trends from that large, general sample; the artistic approach uses the particular and applies the data to the general, believing that the general is found in the particular.
5) *degree of license allowed*: the scientific approach allows for no degree of license; the artistic approach accepts and values biases that help emphasize or make more valid, the points to be made.

6) *role of form*: the scientific approach values the standardization of the six part form (identification of the problem, review of the literature, report of the treatment, discussion of results, projection of possible future implications); the artistic approach values form and content equally, and finds standardization of form sometimes counterproductive.

7) *interest in prediction and control*: the scientific approach seeks to control and anticipate the future when possible; the artistic approach only produces naturalistic-like generalizations, but does not seek to formally control or predict outcomes.

8) *sources of data*: the scientific approach uses standardized measurements; the artistic approach uses the investigator himself as the major instrument.

9) *basis of knowing*: the scientific approach uses data from cognitive centre only; the artistic approach uses data from both cognitive and affective centres.

10) *ultimate aims*: the scientific approach seeks to discover truth; the artistic approach seeks to create meaning.

This study lends itself to the Artistic approach, which is also referred to as 'naturalistic'. The naturalistic paradigm used has characteristics which include: a discovery purpose, use of the researcher/inquirer as the instrument, and qualitative techniques for evaluation. The elements of this study which fit these characteristics are discussed below. Because the nature of the study was to elicit and understand individual aesthetic preferences for sounds that were 'musical', it was impossible to know beforehand all the directions that the experimentation and comments by the subjects would take. The researcher felt, therefore, that it would be unwise to place constraints on the inquiry by specifying all parameters of the study beforehand, hence, the emergent style of the discovery purpose.

Gathering information for the study necessitated both observation and interviewing. The researcher took 'field notes' (hand-recorded observations), while subjects participated in sessions, notating actions as well as comments and questions. At specific intervals, (after each exploratory session and after the final taping of the composition), structured interviews took place, where the researcher asked specific pre-determined questions and recorded the answers either by hand or on the tape recorder, following Guba's (1981, p.64) procedures for structured interviews, which is: "one in which the investigator defines the problems and the questions [and looks for] answers within the bounds set by his own presuppositions, hypotheses and hunches."

An unstructured, exploratory interview took place after the final taping of each composition, to assess the individual's reactions to his/her own composition, and participation in the study generally. "The format is nonstandardized, and the interviewer does not seek normative responses" (Guba, 1981, p.56). The interviewee was allowed to introduce his/her own notions of what was relevant, because "...the unstructured interview is concerned with the...individual's viewpoint..." (Guba, 1981, p.64).

The researcher as instrument is defined by Guba (1981, p.50) when he states, "...the potential of the human being as instrument [of naturalistic evaluations]...is imbedded in the ability of human beings to be observers, categorizers, processors (on both proportional and tacit levels), of many forms of data: verbal, nonverbal, environmental, social and contextual." More specifically, Miles (1978), as quoted in Guba (1981, p.47) has stated, "...the good naturalistic inquirer might be one who is sensitive - open to a wide variety of stimuli and completely aware that the variety exists; who is a problem finder and a pattern creator; who is a reconstructor of realities; who is trustworthy, who can engage in bias-free observation, and who has patience, ...and control enough to watch rather than intervene."

The setting for the study was two self-contained rooms filled with various sound sources pre-determined by the researcher. Each participant in this study was taken into each room in turn and invited to select freely from the sound sources available and explore the possibilities for making individual, non-contextual sounds with the chosen sound sources. During this experimentation process, the researcher observed and hand-recorded all actions, comments and questions of the subject. Questions about the relationship of sounds explored and the individual's perception of what is 'musical' were then asked of each subject.

From the range of sounds explored, the subject was instructed to choose those he/she felt to be 'musical'. All comments and actions made by the subject during this time of aesthetic judgement were hand-recorded by the researcher. The subject was then instructed to review those sounds designated as 'musical', and choose a maximum of ten for storage in the memory of a Roland S-50 digital sampler. These sounds were labelled as 'final sounds' to be used later in a musical composition. This composition was to be created by combining and synthesizing the stored sounds into a musical structure based on each subject's own musical aesthetic preferences for such things as: the relation of the sounds to each other, the form or structure to be used, the total length of the composition, etc. Final compositions were then recorded on tape. A discussion with the researcher about the processes of selection, experimentation and composition, also taped, ended each subject's participation in the study.

Based on observed data, discussions with subjects, and subjective judgements based on the researcher's experience in the field, relevant material was culled for interpretation and analysis.

It was assumed that the researcher, by virtue of her extensive background teaching children music as well as other curriculum areas, would fulfil the aforementioned criteria sufficiently well to be considered a good naturalistic inquirer.

Data collected were qualitative. For example, samples ranged from the choice of a specific sound or sound source to individual decisions as to which sounds were considered 'noise', or, individual unsolicited comments about specific sounds or sound sources, or expressions of what made each subject's composition 'musical', etc. These data do not lend themselves easily to quantitative approaches of analysis, as the goal is to create 'meaning' rather than to discover basic laws of nature.

Experimental Design

Hypothesis: That children's perception of what is musical will vary with age and formal music training.

It was expected that both factors would have some influence on subjects' choices — for example: age as an influencing factor might manifest itself through subjects' recognition and/or enjoyment of certain sounds and sound sources and styles, which would be apparent through choices and uses of sounds and sound sources in their compositions; comfort levels with tasks set subjects during the sessions of the study; facility of language to express feelings about sounds and/or sound sources; choices for sound or sound source preferences made based on what would considered 'cool' (peer influences). Training as an influencing factor might manifest itself through subjects' recognition or enjoyment of specific forms, structures, styles, sounds and sound sources, as manifested in the compositions created. Trained subjects might, for example, choose sounds and forms reflecting their classical, traditional, musical training rather than sounds and forms reflecting the current styles of Rock, Pop, Country, and other popular forms.

THE EXPERIMENT

Development of the Design Structure and Setting

This study was designed on a naturalistic model for reasons discussed previously in the Introduction and Methodology sections. Because the inquiry sought to determine individual preferences, the laboratory setting of self-contained rooms was chosen as being the best way to prevent peer or outsider influence during the sessions involving the processes of experimentation, selection, practice and recording. Although subjects could share ideas and feelings about various aspects of the sessions outside the setting of the study, it was felt that preventing any exchange of opinions, skills and/or reasons for preferences of any kind, would help ensure independent, individual decisions by all participants in this inquiry.

Sound sources made available were basically those already utilized by the Music Education students in University courses. The researcher checked the inventory to ensure that a variety of sound sources, including traditional school instruments, 'junk', exotic sound sources, and electronic sound sources, were provided, to give subjects a wide range of possibilities for experimentation and choice of sounds.

Following the naturalistic design format, both interviews and observation techniques were used to extract data about preferences. The researcher used both previously determined questions and procedures, and utilized the emergent design approach inherent in a naturalistic paradigm.

Pre-determined elements were: the setting; sound sources available for the subjects throughout the study; purposes of each session; procedures of experimentation, processes for selection, saving, and recording of chosen sounds, and interviewing and observation as data gathering tools; the decision to hand record physical and verbal actions of participants; questions to be asked in the formal interview sessions.

The emergent design was a determining factor in the researcher's decisions to allow for, and include as relevant and important, the subjects' unsolicited and unstructured comments during sessions and to utilize data gathered via observation as important, in addition to the original questions generated for formal interviews.

Experimental Procedures

Each volunteer subject was involved in three sessions, each approximately one hour long.

Session 1 involved:

1) experimenting with sounds on a variety of acoustic sound sources — instruments traditionally found in school and/or orchestras, such as drums, cymbals, and recorders; non-traditional sources, such as chimes made out of nails strung on a piece of wood, and metal containers used as drums; various rhythm instruments of the type used in kindergartens; exotic instruments, such as the Kalimba from Africa, and the Shofar, from the Middle East; and 'junk' items, such as pieces of metal, rubber tubing, pipes and sticks. Also available for experimentation sessions were electronic sound sources — two analog synthesizers. (For a complete list of available sound sources, see Appendix 1)
2) classifying, in discussion with the researcher, the different sounds made;
3) choosing sounds designated as 'musical' to be used in a musical composition;
4) storing those sounds into a Roland S-50 digital sampler by using sampling techniques.

Session 2 involved:

1) reviewing the sounds banked in the S-50 and deciding whether to keep or change them;
2) placing final sounds in suitable places on the sampler keyboard in order to assign the timbre and pitch desired;

3) creating sound combinations and patterns to form groupings and sections for their compositions;

4) practising the sections in preparation for recording the composition.

Session 3 involved:

1) final practising and recording (audio taping) of the composition;

2) listening to the taped composition and editing or adding to it;

3) final recording;

4) final listening and approval to keep as is without further additions or changes;

5) interview with the researcher about the composition and the previous sessions.

The study was originally designed so that the subjects would be involved in three sessions, each on a separate day. In actuality, for some subjects, all sessions took place consecutively on the same day, usually due to a time constraint, occurring because of the necessity of matching up subject's schedules with the availability of the rooms at the University. With the exception of two subjects, (the first two scheduled), all participants combined sessions 2 and 3 because of interest and enthusiasm — they did not want to leave once they had placed the sounds into the sampler. In two instances, (both Group IV members), subjects came back on another day to further edit and practice before the final taping.

Specific Descriptions of Sessions:

Session 1:

Subject and researcher entered a room which contained the acoustic sound sources listed in Appendix 1. While the researcher observed and took handwritten notes, the subject freely chose sound sources and experimented with the possible sounds from each. Subjects were told they could use the sounds and sources in any ways they wished: they could combine several at once, play one with a part or piece of another, spend much, little, none or all the time they wished with any sound source, move and/or arrange any sound sources in any part of the room.

As each subject experimented with the objects, the researcher observed wrote down the following:

1. all sound sources chosen by the subject;
2. the various ways the subject found to produce the sounds made with each sound source;
3. the amount of time spent with each specific sound source used;
4. whether or not the subject went back to a specific sound source and if so, how many times;
5. questions asked or comments made by subjects.

At the end of twenty-five minutes, the subject was asked the following questions, and the answers were written down by the researcher:

1. Which sounds did you like most, and why?
2. Which sounds did you like the least, and why?
3. Which sounds do you consider to be musical,and why?
4. Which sounds do you consider to be most like noise, and why?

Subject and researcher then entered another self-contained room in which were the following sound sources: Electronic Roland S-50 digital sampler, Roland 60 synthesizer, and Roland JX8P synthesizer. The following basic functions of the two synthesizers were demonstrated to the subject: turning the synthesizers on/off; calling up stored sounds; and, volume control. The more complex functions and uses available for competent keyboard musicians were not demonstrated, as this study was designed to utilize the synthesizers in terms of the assortment of unusual sounds readily available in the banked memory of each instrument.

Each subject was invited to experiment with the synthesizers while the researcher took notes of sounds used, manipulations, questions asked and comments made. At the end of twenty-five minutes the subject was asked the following questions, and the answers were written down by the researcher:

1. Which sounds did you like the most and why?
2. Which sounds did you like the least and why?
3. Which sounds do you consider to be musical, and why?
4. Which sounds do you consider to most like noise, and why?
5. Do you have any comments you would like to make about the machines in terms of sounds available, ease of use, enjoyment, etc.

The subject was then instructed to choose any ten sounds from any sound sources to use in a music composition. The researcher wrote down the chosen sounds and their sound sources.

Session 2:

The following functions of the Roland S-50 sampler were demonstrated to the subject: on/off and volume controls; sound bender wheel; recording, edit, and saving functions; timbre and pitch changes available across the keyboard. Due to time constraints and lack of subjects' previous experience with these machines, other, more complex functions such as: envelope controls, looping, and modulations were not demonstrated. However, for the purposes of this study, the researcher feels that the variety available in original banked sounds in each instrument together with simple manipulations possible with timbre and pitch of those sounds once they were placed on the sampler keyboard, plus the ability to perform several sounds at once, provided ample opportunity for creatively combining and manipulating sounds which could result in final compositions that would be of aesthetic interest and quality. The subject and the researcher reviewed the sounds chosen in session 1 and the subject made a final decision on sounds to be used in the composition. The subject and the researcher then recorded the chosen sounds with an external hand microphone — the researcher held the microphone and worked the appropriate function keys of the sampler while the subject performed the sound to be recorded. The sounds were then saved in the Roland S-50 sampler memory. The maximum number of sounds

available for storage in the S-50's software version 1, is ten, and so that was the maximum number of sounds the subject could choose for the composition.

The subject then decided on the keyboard placement of the saved sounds. If time permitted, the subject completed the session with practice time in order to create patterns and develop the composition.

Session 3:

The subject spent as much time as desired practising and developing the sounds into a composition. Most subjects were concerned about remembering what they had created long enough to replay it for recording, so the researcher suggested to all subjects that the recording take place in segments. The subject as composer could choose to connect the sections so the final tape would sound like one continuous composition, or, each segment could be a delineated section. Individual subjects chose to do different things, but all recorded in segments. The subjects were encouraged to create as many segments as they wished, and the final length of the composition was determined by each subject in this manner. The final lengths varied greatly — the shortest was 21 seconds and the longest was 228 seconds.

After the composition was recorded, the subject listened to it and was given the opportunity to edit it by changing, adding, or deleting any part. Some subjects chose to listen to each segment before proceeding, but most were more concerned with keeping a sense of the whole and did not want to stop to listen until the whole composition was recorded. After the editing process, the work was listened to again. Once the composition was declared satisfactory by the subject/composer, the following questions were asked by the researcher, and the answers were recorded on the same tape, directly following the composition.

1. What did you like best about your composition?
2. What did you do to make it 'musical'?
3. If you had more time, would you add or change anything in your composition?

4. Do you have anything to add or any comments to make about your participation in any part of this study?

The subject was then thanked for his/her participation in the study, and the sessions came to an end.

The researcher found that the creation of a composition utilizing the sounds determined to be 'musical' was valuable in evaluating and analyzing the possible effects age and formal training on preferences for specific sounds. Compositions created reflected the individual's personal aesthetic relating to their own notion of what constituted 'musical' sounds as indicated by the following: the types of sounds chosen; the manipulations of those sounds; the organizations of the sounds into patterns and structures considered to approximate acceptable musical compositions.

Data Gathering:

The resulting data from both the pre-determined and emergent responses formed the criteria for investigation and analysis in this study. A statement designed to elicit each response follows below, placed in a category based on whether the item was pre-determined or emergent. The following items were pre-determined by the researcher before the onset of the inquiry:

A. Interview Items After Experimentation Sessions

1. Which sounds do you like the best, and why?
2. Which sounds do you like the least, and why?
3. Which sounds do you consider to be musical, and why?
4. Which sounds do you consider to be most like noise, and why?

B. Interview Items at the End of all Sessions

1. What were your reasons for choosing the final sounds you did?
2. Would you change or add anything to your composition if you had more time, and if so, what?
3. What do you like most about your composition?

4. What do you like least about your composition?
5. What makes your composition 'musical'?
6. What structure, theme, form or other parameters, if any, did you use to organize your selected sounds into your composition?
7. Is there anything final you would like to say about anything to do with your participation in this study?

C. Unsolicited Responses

1. unsolicited questions during experimentation sessions
2. unsolicited comments during experimentation sessions
3. unsolicited questions during selection, practice, polish and recording sessions
4. unsolicited comments during selection, practice, polish and recording sessions

D. Tabulations

1. total number and description of sound sources chosen for placement into the memory of the Roland S-50 sampler to be used for the composition
2 number and description of the manipulative functions used by each subject from those functions demonstrated as available on the S-50 sampler
3. total length of each subject's final composition
4. amount of time allotted for experimentation sessions with both acoustic and electronic sound sources

The following items emerged as the study progressed and were considered to be important to the outcome of this inquiry.

1. the first acoustic sound source chosen for experimentation
2. acoustic sound sources played in combination during the session
3. acoustic sound source(s) used most during the experimentation session
4. acoustic sound source(s) not used during the experimentation session
5. total number of different acoustic sound sources used during the experimentation session

Data obtained regarding all the items listed above were arranged into nineteen separate categories which will be subsequently referred to as 'factors'. These factors are listed below, numbered from 1 to 19. In the order listed, the responses by subjects to these factors are summarized and interpreted in the Results section of this study.

1. first acoustic sound source used during the experimentation session;
2. acoustic sound sources used in combination during the experimentation session;
3. acoustic sound source used most during the experimentation session;
4. acoustic sound source(s) not used during the experimentation session;
5. total number of different acoustic sound sources used during the experimentation session;
6. unsolicited comments made by subjects during the experimentation sessions with acoustic and/or electronic sound sources;
7. unsolicited questions asked by subjects during the experimentation sessions with acoustic and/or electronic sound sources;
8. acoustic and/or electronic sounds liked best, and why;
9. acoustic and/or electronic sounds liked least, and why;
10. acoustic and/or electronic sounds seen as 'musical', and why;
11. acoustic and/or electronic sounds considered 'noise', and why;
12. total number and descriptions of sounds chosen by each subject to be placed into the memory of the Roland S-50 sampler, and reasons for those choices;
13. manipulative possibilities from the following choices used for mani-pulating the sounds saved in the S-50 sampler: register change; envelope bending; volume changes; durational choices for individual sounds;
14. comments on personal parameters used when choosing both preferred sounds and determining the organizational schemes for the final composition;
15. subject's choices, if any, for additions or changes to the final composition if more time were available;

16. subject's explanation of what he/she liked or did not like about the final composition;
17. subject's explanation of what made his/her final composition 'musical';
18. final comments by subjects on any phase of his/her participation in the study; and
19. tabulation of the total length of each final composition

Chronological Stages of the Study

Subjects in this study were involved in a series of tasks divided into the eight stages enumerated below. While subjects were involved in their tasks, the researcher wrote down her observations of their actions, questions/comments, and body langauge. Subjects were also told to expect the researcher/observer to write occasionally, and were informed that the material written consisted of observations of their behaviour and not judgements or evaluations of any kind. Subjects were told that they could move the sound sources around the room, and could ask for help from the researcher to reach or move anything if required. Subjects were also told that they could ask questions or make comments to the researcher but that she would not instigate any communication. All unsolicited questions and comments made by the subjects during the inquiry sessions are found in the Results section, below, and are specifically enumerated in Appendices II and III respectively.

Stage 1: Experimenting with acoustic sound sources

Subjects spent between three and four-and-three-quarter hours each on a series of tasks over three sessions. Each participant worked alone, with no verbal or non-verbal intervention. Each subject was placed in a closed room with a variety of acoustic sound sources, (see Appendix 1), and invited to:

a) experiment with any/all/some of the materials in the room in any way to make any sounds desired. The subject was invited to make comments to or ask questions of the researcher who was present, observing, during this time;

b) spend as much or as little time as desired on any sound source;

c) move anything around in the room and ask for help if something could not be reached.(Some materials were stored on high, deep shelves).

Subjects were advised that

a) there were no statements or responses of any kind that would considered 'right' or 'wrong';

b. any questions posed by the subject would be answered, but all conversation must be instigated by the subject.

Subjects were allowed a total of twenty-five minutes for this part of the study. Some said they were finished earlier, and when told they had more time, chose to continue experimentation until given a one-minute warning. Others occupied themselves without stopping until 'time' was called. Some subjects in the latter category were content to stop when 'time' was called, and others expressed reluctance at having to stop. The younger subjects preferred the acoustic room the most. All subjects who experimented with the 'junk' sound sources went to them after time was spent on the more familiar looking items. Subjects seemed to like the sounds they could create with the 'junk', and two , one from Group I and one from Group II, used those sounds in the final choices for compositional purposes. One participant, in Group IV, asked for a specific traditional orchestral instrument not readily noticeable in the room.

Stage 2: Experimenting with digital synthesizers

Next, experimentation continued for a total of twenty minutes in another closed room. Each subject was shown the synthesizer room and invited to experiment with the machines. The following basic operations of the Roland 60 synthesizer and the Roland JX8P digital synthesizer were demonstrated: turning on and off, accessing all pre-programmed sounds, volume and frequency adjusters, and envelope generators. Subjects were encouraged to ask questions and make any comments while

experimenting with the synthesizers (see Appendix 3 for subjects' unsolicited questions during experimentation sessions). Subjects in Groups I and II did not approach the synthesizers readily. They preferred the acoustic room, and seemed intimidated by the machines. However, once shown how to use the machines, all members displayed interest and ability in using the synthesizers and sampler. Members of Groups III and IV were familiar with the electronic machines and were eager to use them, with little or no help (see Appendix 2 for subjects' unsolicited comments during experimentation sessions).

Stage 3: Questioning subjects concerning preferences

Each subject next was asked the following questions concerning their sound preferences in regards to acoustic sound sources. (The time involved was approximately ten minutes).

a) Which sounds did you like and why?

b) Which sounds did you dislike and why?

c) Which sounds do you consider to be 'musical' and why?

d) Which sounds do you consider to be 'noise' and why?

Specific individual responses follow as part of Results, part I, 7, 8, 9, 10.

Groups III and IV experimented with the synthesizers, and specific responses to the same questions concerning the synthesized sounds are included in 7-10 as well.

Stage 4: Choosing sounds which were considered 'musical'

Subjects were then asked to choose a maximum of ten sounds which they could create from any of the available sound sources discovered during the experimentation time. No time constraints for this part of the study were imposed, and subjects took between twenty and fifty minutes to make their choices.

Stage 5: Storing chosen sounds on disk

Subjects were then instructed to load their chosen sounds into the Roland 50 digital sampler. The sounds were recorded using the direct microphone of the sampler

while the subject performed the sound in his/her preferred way. When all sounds were loaded on disk in the sampler, the subject was given the opportunity to place each sound anywhere on the keyboard of the sampler. As placement on the keyboard determined both pitch and tempo, subjects usually chose to place a sound at various points on the keyboard to allow for a variety of effects from one sound. For example, a note from the soprano recorder placed in the higher registers of the sampler produced a short, high blast of squeaky sound, whereas the same note placed in the lower registers of the sampler produced a low, drawn-out foghorn-type of sound. In this way, subjects were able to get a variety of effects from one sound. This procedure took approximately forty-five minutes per participant.

Stage 6: Composing with chosen sounds

The subjects were next asked to become composers and create a musical composition organized according to their own private parameters. The subjects were left alone to create and practice their compositions with no time constraints. This process took between twenty-five and one-hundred twenty minutes.

Stage 7: Recording compositions on audio-tape

When subjects were satisfied with their compositions, they were recorded on audio tape as they were performed. All subjects recorded compositions in sections, as there was no attempt to have the compositions written down in any particular notational format. The durations of separate sections as well as time of total compositions varied according to the memory capacities and individual preferences of the subjects. The general time span for recording each composition was approximately twenty-five minutes, and final compositions were between twenty-one and two-hundred-twenty-eight seconds in length.

Stage 8: Final questioning of subjects

Each recorded composition was listened to and edited by the composer until it was declared satisfactory. The investigation and the subject's participation ended with a

discussion involving questions of, and comments by, each participant.

The questions asked were:

1) What do you think of your composition?

2) Would you change anything?

3) If you had more time, would you add anything to your composition?

Comments made by the subjects included:

1) Parameters used to create the composition

2) Satisfaction level of the final composition

3) Assorted unsolicited comments

Final audio-taped discussions took approximately five minutes with each subject.

RESULTS

The data used as the basis for analysis in this study consist of the responses (gathered by the researcher/observer) to each of the eighteen factors by all of the subjects involved in the inquiry. The data are first enumerated in Part I, below, and then discussed analytically in Part II, which follows.

Inventory of Responses by Subjects During the Various Sessions of this Study:

1. First acoustic sound source chosen by each subject for experimentation

The younger group having no musical training (Group 1), all chose sound sources whose primary functions were percussive. The younger group with extensive musical training (Group II), all chose instruments capable of producing a tune. The older group with no musical training (Group III), all chose sound sources whose primary functions were percussive. The older group with extensive musical training (Group IV), was the only group not unanimous in its choice — one chose a sound source whose primary function was percussive; one chose a sound source whose primary function was chordal; and one chose a sound source from the percussive 'junk' pile.

2. Acoustic sources played in combination to create mixed timbres or rhythms

Group I: Members all combined sound sources. All used sound sources whose primary functions were percussive, and all used some type of drum. Two members used two sound sources at the same time, and one used three.

Group II: Two members combined sound sources, both using two at a time. The third member used only one sound source at a time.

Group III: Two members chose not to combine sound sources, but used one at a time. The third member used between two and four different sound sources simultaneously in four different combinations, with some sort of drum in every combination.

Group IV: Two members combined sound sources, using from two to four simultaneously. Their sound sources primarily functioned as percussion, and both used some sort of drum in their combinations. The third member of the group did not combine sound sources.

3. Sound source with which subject spent the most time

Group I: One member chose an acoustic sound source whose primary function was melodic — the Orff metallophone. The second chose an acoustic sound source which was mainly chordal in function — the autoharp. The third spent time with sound sources from two acoustic groups: a variety of drums, which are percussive, and an Orff bass metallophone, which is primarily melodic.

Group II: Two members chose acoustic sound sources whose primary functions were melodic — recorders. The third chose an acoustic percussive sound source — an Orff kettle drum.

Group III: Two members chose acoustic sound sources whose primary functions were percussive — drums, while the third chose an acoustic sound source primarily chordal in function — a stringbox.

Group IV: Two members spent most time with the synthesizers, while the third chose an acoustic sound source whose primary function was percussive — the tone blocks on a stand.

4. Sound sources not used during the experimentation sessions.

The following lists are compilations of all members of each group. Although some members used items listed below, at least one group member did not. Items that were used by none of the group are specially noted.

Group I: shofar; soprano and bass recorders; 'junk' pieces except for nail chimes and large steel drum; xylophones; metalophones; stringbox; glockenspiels; guitar; cow bell; maracas; large cymbals; tone blocks on a stand; autoharp; baritone ukulele; African shaker; African finger piano; single tone blocks on a stand; Orff kettle drum.

The following were not used by any group members: synthesizers; alto and tenor recorders; banana pod shaker.

Group II: 'junk' pieces; African shaker; African finger piano; cowbell; soprano, alto, tenor, bass recorders; all drums; all bells; all cymbals; banana pod shaker; rhythm sticks; stringbox; glockenspiels; metalophones; maracas; guitar; tone blocks on a stand.

The following were not used by any group members: synthesizers; African finger piano; African shaker; shofar; cowbell.

Group III: African finger piano; soprano and tenor recorders; maracas; rhythm sticks; tone blocks on a stand; guitar; cowbell; wrist bells; finger cymbals; steel drums and other 'junk' pieces; bamboo wind chimes; autoharp; tone blocks on a stand; banana pod shaker; stringbox; cymbals.

The following were not used by any group members: shofar; bamboo wind chimes; baritone ukulele; alto and bass recorders.

Group IV: soprano, alto and bass recorders; tone blocks on a stand; baritone ukulele; autoharp; hand, wrist bells; finger cymbals and small hand cymbals; metallophone; maracas; African finger piano; rhythm sticks; bongo drums; small hand, large bass, and conga drums; glockenspiel; xylophone; 'junk' pieces.

The following were not used by any group members: shofar; guitar; baritone ukulele; cowbell; tenor recorder; tone, hand and wrist bells; African shaker.

5. Total number of different acoustic sound sources used during the experimentation sessions.

Group I: Members used 17, 21, and 29 different sound sources.

Group II: Members used 8, 16, and 21 different sound sources.

Group III: Members used 16, 17, and 25 different sound sources.

Group IV: Members used 13, 15, and 21 different sound sources.

6. **Unsolicited questions by subjects during experimentation sessions.**

Group I: Two members asked what the bamboo African shaker was; one asked how to play the Orff kettle drums ("...with hands or sticks?"); two asked for sound sources not seen — one asked for 'spoons', and one for brass instruments; one asked why drums with the same head size had different sounds; all asked how to use the shofar and what it was called.

Group II: Members had no questions.

Group III: Members asked "What is this?" of the following: autoharp, tone blocks on a stand, African bamboo shaker, and the stringbox.

Group IV: Members had a variety of questions: "Are all these musical instruments?" was asked of the pieces of metal 'junk'; specific things were asked for twice — "Do you have any snares?" and, "Do you have a gong for this?"; one member wanted to know what kind of stick was used to play the steel drums.

7. **Unsolicited comments made by subjects during experimentation sessions.**

Group I: One member commented, using the shofar, "I've used these before [no sound] I don't think it works"; crashing the large cymbal one member said, "Wooh! How'd you stand it!...I hate that sound!" One, playing the 'junk' steel drum, said, "I like this sound. It's the kind of music I like...I don't know what I like about it, I just do." One member thought the banana pod shaker was "neat", playing the tone blocks on a stand was "fun". This same member took a metal horse-shoe, placed it on the floor and hit it with a metal stick. There was a sound but no reverberation. Then, the subject held the horse-shoe with the stick and hit it with another stick. This time the sound rang out, and the comment was, "Look what I made — it vibrates!" One member liked the stringbox because it sounded "like a harp".

Group II: One member said, "I like this thing", when playing the tone blocks on a stand; This same member took the bass recorder and said, " I want to play one

of these' bazzoons' when I grow up...awesome!", and did not use the 'junk' pieces because, "They don't look like they would make sounds, they look like wrecked cars." While playing the large cymbals, one member said nothing out loud, but had a huge smile on her face each time she crashed them together. One member played the tone blocks on a stand in rhythm patterns and said, "That's more like noise".

Group III: Members had comments at the synthesizers: "Hey! I like this!", "Wow! What a sound!"

Group IV: Two members had commented that the autoharp was out of tune, and comments about the synthesizers were: "Synthesizers are incredible!" All group members commented on the wide range of sounds possible on the one instrument.

8. **Sounds liked best created with acoustic and/or electronic sound sources during the experimentation sessions, and why**

Group I: One member preferred the autoharp and the drum hit with a mallet because of the "high sounds", the African shaker because of the "rattling sounds", the tone blocks on a stand because "the sounds are sharp and wake you up", hitting a bicycle part and a xylophone simultaneously with a piece of metal because "I like the combination of low and high sounds", and the cymbals because "they are loud!" One member preferred a big metal oil drum because "I like this sound — I don't know why, I just do", drums because "I like the tone", tone blocks on a stand because "I like hollow sounds", and the baritone ukulele because "I like the way it feels to play". One member preferred the stringbox because "it vibrates, it has kind of a high nice sound", the metalophones — "these", because "they can go higher and lower when you want them to", and drums because "they sound full and can make low sounds and I like that too."

Group II: One member preferred the bass recorder because "I like low sounds", drums because "they vibrate and I like the repetition of the sound," and

"all...sounds, but those two the best". One preferred the xylophone because "it's unusual — it's wood and doesn't echo", kettle drums and bongos because of the "difference between sounds, but they blend well", the tone blocks on a stand because "they are comfortable to play, I like the different pitches, and the 'thunk' — I think they're neat", the small cymbals because "they're comfortable to hold, and I like the echoing sound", and the autoharp because "sounds blend and are soft". Another preferred the autoharp because "it has a ring to the bottom strings — like a guitar", and the bass recorder because "it has a nice, deep sound".

Group III: One member preferred all the larger drums because "I like the mellow guys better — I like low sounds". One member preferred the glockenspiels and metalophones because "they make so many different sounds, they're hit with different things,...they sort of chime, they're different, not something you hear everyday" and the stringbox because "it sounds like something you hear in a different country, with ancient or African music — it's quiet and I like it", drums because "they're fun to hit and they all make different noise", and cymbals because "they all make a different noise". One preferred the stringbox because "it makes 'cute' sounds — it sounds old,...it looks cute, sounds spooky...I like the high pitch of it", the large hand drum because " it has a hollow sound", and the xylophone ("those wooden guys there") because "they sound like they're from Africa, they're different". The synthesized sounds of the tom-tom and the bomb were favourites, and generally, all unusual or non-traditional sounds were preferred. Also enjoyed was the bending of the sounds with the envelope lever.

Group IV: One member preferred drums because "I like all drums; I like African drumming because it's different, but I like all drumming", and a curved piece of pipe because "it sounds great". One preferred Orff instruments and the autoharp "if they're in tune", and "anything that makes minor sounds or unusual sounds". Another preferred drums, bongos, and tone blocks on a stand because "they ring

— if you listen carefully, they ring — sounds 'gotta' ring, they can't sound dead. I like rhythm instruments because something about them makes you move — you can't have music without rhythm, you feel the drum beat and it makes you feel different", the stringbox and wind chimes because "they remind me of my family — you hear them a lot in China". Synthesized sounds preferred were: breaking glass; whoosh; 'space' sounds like low vibrations; traditional organ sounds bent with the envelope lever. All members of this group specifically mentioned that they liked the synthesizers best of all, but of the acoustic sound sources, the ones mentioned above were their favourites.

9. **Sounds least liked created with acoustic and/or electronic sound sources during the experimentation sessions, and why.**

Group I: One member did not like the baritone ukulele because "I don't like the pitches it makes". One member did not like the bass recorder because "the sound is too low and it's hard to play", the African bongo drum because "the sound is boring", and the xylophone because "it's too high — I don't like the tone". One member liked all the sounds created — "I can't think of any I don't like".

Group II: One member disliked the big cymbal because "it was too loud". Another did not like the woodblock because "it has no tone", the large cymbals because "they're too heavy...they sound neat; if they could be small and have a big sound it would be good". One disliked the ukulele because "it doesn't sound right, it doesn't sound tuned".

Group III: One member did not like the bell because"it's too loud, it hurts my ears". The two other members of this group did not find any sounds they did not like. One said "not really any", and the other said "none I really hated — they all come in useful, they all have a part in a song".

Group IV: One member did not like a mallet on a bleach bottle because " it sounds kind of dead — it doesn't ring, doesn't have any special sound", a mallet

on corrugated metal because "it shakes me up — I can't hear it but it's like fingers on a blackboard — I can feel it — there's an extra sound there, like white noise kind of — it doesn't fit the shape of normal sounds — it's jagged". One member did not like the autoharp because "it's not in tune", and the xylophone because "it's not exciting — there's only a very little variety of tone". One member did not like the autoharp because "it's out of tune". One member commented that the synthesized sounds were fun to play with and "...nice, but artificial...I like natural sounds".

10. Acoustic and/or electronic sounds created during the inquiry sessions which were considered to be musical, and why.

Group I: One member considered drums and the tone blocks on a stand to be musical. "That's hard [to tell why they were musical] — I don't know, I just like them". One considered the autoharp musical because "it has a good sound, like the piano...a pretty sound"; the tone blocks on a stand because "they make different sounds that go good with other stuff like the autoharp and drums"; and the cymbals because "they're loud, and go good with a lot of other things". One considered drums to be musical because "they're fun to play, the different sizes all come out different — the bigger ones sound lower, the smaller ones sound higher"; the metalophone because "you can change the sounds any time...make a whole bunch of sounds on one instrument"; and the stringbox because "it vibrates, it's high, nice".

Group II: One member considered bells to be musical "when they fit into a song — like about Santa", and the autoharp, xylophone, drums, guitar, tone blocks and cymbals because "they all go with other instruments". One member considered the treble recorder to be musical because "it makes soft sounds and I like them", the autoharp because "when you strum it vibrates and makes sounds like a harp", the baritone ukulele because " I like minor sounds, they're more interesting", the

bass xylophone because "it makes low sounds and the tone hangs on and I like that", and the drum "sort of — I don't know, the vibration makes it musical, but if you hit it on the edge it's sort of screechy". One member considered the guitar to be musical because "it has low sounds that 'ring'".

Group III: One member considered drums to be musical because "they're almost in every song and I like the sound of them", Orff instruments because " I like the sounds", and the African wood box because "you can make lots of sounds on one instrument". One member considered the xylophone and the stringbox to be musical because "you can change the notes". One member considered the bass drum, the large standing drum and the cymbals to be musical because "I'm fascinated with drum sounds" (during experimentation the cymbals were used as if part of a drum set).

Group IV: One member considered "anything that makes real tones and you enjoy" to be musical. "I like hand clapping — body sounds are neat, there's something about them everyone likes — you can do them yourself — I like that, they're natural sounds. Two members considered "something with a melody line " to be musical. One said that synthesized sounds "without melody, without something to grasp onto..." would not be musical, but with a melody line, would be; one considered the autoharp to be musical, and said that percussion generally, would be musical — "it depends how you use it, it needs pitch to be musical. But, if I was writing the composition, I personally wouldn't use any of these sounds — I'd write for 'normal' things — piano, cello, they're my favourites".

11. Acoustic and/or electronic sounds created during the experimentation sessions which were considered to be noise.

Group I: One member considered tone blocks on a stand to be noise because "you just can't make very good music with them — they don't vibrate when they're hit, the stay just the same — not high and not low...but I like them, you just can't

make music with them", rhythm instruments because " they can't make music by themselves — I like them when they go with something else, alone they just clash, they're not full". One member found it "hard to say" what made noise. "I guess cymbals, because they don't exactly have different tunes, they just have one — bang — they cover up other sounds", and the bass drum because "like the cymbal it's loud and can cover up other noises". One member considered the autoharp to be noise because "there's a whole bunch of sounds at the same time, it wouldn't fit in a band", and the bass drum because " it's too loud, too low".

Group II: One member considered drums, Kindergarten hand shakers, tone blocks bells , and the guitar when it is just strummed to be noise because " they can just be noisy and the sounds are always the same". One member considered cymbals to be noise "when the metal was banged hard". One member considered "high squeaks on the recorder" noise, the large drum " if you stop the vibrating with your knee it makes a flat sound", the tone blocks on a stand because "that's more like noise", cymbals, bongos and metal pieces "if you stop the sound and there's no ring. Cars make noise I don't like, but the drum noise is okay".

Group III: One member considered the banana pod shaker to be noise because "it didn't really sound like music, it sounds like shaking something in a jar — it doesn't really chime, it's not pretty". One member considered a drum to be noise because " there's no change in it, it's just the same — boom, boom — can't go up and down". One member considered the 'junk' metal pieces to make noise because "too high — you couldn't use these, but if you had a guitar, the sounds could be as high as you want".

Group IV: Two members considered anything that can't change pitch to be noise. One said, "this metal pipe is noise — the steel drum isn't because you can change the tone — also the tone blocks — percussion is music, but not the 'junk' pieces". The other said, " This hubcap does not make music — I call it banging or hitting,

there's no melody line. Junk sounds don't appeal to me, they don't sound musical to me." One member thought synthesized sounds were artificial sounds, and if they were not in a musical context such as within a melody or story line, then the sounds would be noise."

12. **Total number and description of sounds chosen by subjects for placement into the memory of the Roland S-50 Digital Sampler, and the reasons for the choices made.**

Group I: Members all chose natural sounds from a variety of sound sources whose primary function was either melodic, percussive or traditional. One member used a sound source made from 'junk', but the resulting sounds as well as the visual and functional aspects of the source really put it into the percussive category (it was a series of nails suspended on strings from a bar to make a wind chime). One member chose six sounds total, one chose eight sounds total, and one chose ten sounds total.

Group II: Members all chose natural sounds from a variety of sounds sources whose primary function was either rhythmic, melodic, percussive or traditional. One member in this group chose a 'junk' source to make sound, but, as in the Group I situation, the visual, functional and aural functions of the source put it into the percussive category (it was a large tin made into an approximation of a steel drum). Two members chose ten sounds total and one chose eight sounds total.

Group III: Members all chose sounds from both natural and electronic sound sources. Sounds from natural sound sources were from those whose primary function was either melodic or percussive. Sounds from electronic sources were both traditional acoustic synthesized sounds, (e.g. strings and church bells), and non-traditional acoustic and computer sounds (e.g. bubbles and wave gura). Two members chose six sounds and one chose eight.

Group IV: Members were not unanimous in their choice of sound sources. One member chose sounds from both natural and electronic sound sources. Sounds from natural sound sources were drum sounds. Sounds from electronic sound sources were non-traditional acoustic and computer sounds (e.g. vibration and whoosh). Two members chose only synthesized electronic sounds. Sounds chosen were both traditional acoustic synthesized sounds (e.g. organ chords, organ reverberation and organ buzz), and non-traditional sounds (e.g. wind and whoosh). One member chose three sounds total, one member chose four sounds total and one member chose seven sounds total.

Some subjects from all groups said they chose their sounds because they "sounded nice together", and would fit either the mood or timbre which framed the theme. Some subjects from all groups said they wanted to make sounds like something else, "like the wind", "like a Rock and Roll song I've heard", "like the beginning of a story about war" (See Appendix 4 for the specific sounds chosen).

13. Manipulations possible from the following choices that were used for changing sounds previously saved in the S-50 digital sampler: register change, pitch bending, volume changes, durational choices for individual sounds.

Subjects were given a demonstration of each of the following techniques on the S-50 sampler. They were instructed to use some, all or none of them, at their own discretion, when constructing their compositions.

a) *register change*: After instructions and a demonstration, subjects were encouraged to use each chosen sound any number of times and in a variety of placements on the sampler keyboard.

b) *pitch bending*: After instructions and a demonstration, subjects were encouraged to use this manipulation as they chose.

c) *volume/amplitude change*: After instructions and a demonstration, subjects were encouraged to use this manipulation as they chose.

d) *durational change*: After instructions and a demonstration of two possible durations, (0.8 and 1.2 seconds), subjects were encouraged to chose a duration for each of their sounds depending on the effect that was wanted for each sound in the composition to be created.

Although the original intent was to have the subjects choose and place their sounds into the sampler in one session and then return another day to manipulate and structure the sounds into a composition, this procedure was changed as the subjects got very involved and enjoyed the process so much none wanted to stop until finished.

Group I: A variety of registers was used by all members of this group. Two group members also chose to vary the durations of the individual sounds. One group member placed the chosen sounds in patterns of tens, alternating white key, black key, and moving from the low to the high end of the keyboard.

Group II: A variety of registers was used by all members of this group. Two members also chose to vary the durations of the individual sounds. One group member worked with the sounds for a long time, and toward the end of the session became silly, hitting each key several times, forgetting that once the entry number of a specific sound was changed, the sound would also be different. Another group member changed the position of several sounds on the keyboard before structuring the composition because, "I didn't like them all the way I had them before".

Group III: A variety of registers and durations were used by all members of this group. Two members also chose to vary volume and manipulate the pitch.

Group IV: Manipulation of register, duration and pitch were used by all members of this group. Variations in volume were used by two group members.

14. Comments on personal parameters used when choosing preferred sounds and organizational schemes for constructing the final composition.

The comments which follow are judgements made from a combination of listening to the final aural tapes of the compositions and noting the comments made by the participants.

Groups I and III: Both groups tended to think of a theme for the whole composition. There was no large 'form', but each section utilized some traditional musical devices like repetition of both rhythmic and melodic patterns, and a continuity of mood. Timbre was also an important consideration, and sounds or patterns were chosen because the subject liked them, they were pleasant, or they "sounded good together".

Groups II and IV: There were similarities of approach by these two groups as well. A theme was used for the whole composition, with timbre and mood important components to suggest the theme. There was awareness of tempo, dynamics, rhythmic and melodic repetition patterns, and individual and group timbre. There were also the following differences in the approaches taken within each group: Group II was concerned with the flow of the piece, and the structure used to hold sections together was most often mood, or sounds used for effects to enhance the theme chosen. No large traditional form was attempted, and in one case the group member said, "I made it up as I went along". Group IV was the only group to express disappointment in the final product -- all members wanted the compositions to be "more polished" and "say more". These subjects were more aware of traditional elements in composition than any of the other groups. Members of Group IV used mood, rhythmic and melodic repetition, sections and a general theme in much the same way as the other groups, but with greater sophistication.

15. Subjects' comments about what they liked about the final sounds chosen within the context of the final composition.

Group I: "I like that; it's nice...lots of sounds and they're all vibrating...they all blend together, they sound good together and have a nice rhythm"; "I like it! [the composition] I like the rattles...the sounds..." He liked the combination of the high and low sounds played together; "It's interesting...hard to say what I like about it...I like the sounds I chose — the way I put the sounds together on the keyboard...it's pretty." She thought it was "neat" to place the same sound at both the high and low ends of the keyboard and then play them at the same time to hear the changes to the pitch and tempo.

Group II: "It's good [the composition]...but, the chords sort of smudge it — they don't sound exactly good all together...I like it." She elected to leave all the sounds in and add more to her composition; one member liked the specific patterns he created with the individual sounds: scales, rhythms, the combination of high and low sounds together; "I like Rock and Roll; I wanted to see if I could make sounds like Rock and Roll — like loud crashing sounds or a guitar." She liked the cymbal, drum and guitar sounds individually and within her composition.

Group III: "I'm pretty happy with it...I don't know about the end, but I think the rest is pretty good"; "I like the beginning best — the sounds go together well".

Group IV: "This is fun! This is fun!...I don't have a synthesizer myself and I love playing this. One thing that makes live music good is that it isn't perfect — there's a bit of that person in it...with electronics, it's right on, like perfect...and with the synthesizer you can do so many more things [than on one instrument], and create new sounds..."; "I like the artificial sounds, although I don't like calling them that — I like cello and all that but whenever I have the chance to, I like different sounds, but I don't like really radical stuff like glass breaking and all

this." He liked both the traditional and electronic sounds he chose to use in his composition, but particularly enjoyed the opportunity to be able to manipulate those chosen sounds using the synthesizer: "I like the whole thing, but the beginning with the wind sounds is the best."

16. Comments by subjects on any changes or additions they would make to the final composition if more time were available.

Groups I and III: Members were satisfied with their compositions and would not change or add anything if they had more time.

Group II: Members would make changes but were generally satisfied with the results — two members would add more "unusual sounds", and all said they would take out sounds that really did not go well with each other. They were surprised at the amount of time it took to create a satisfactory product — one member said, "I didn't realize it would take so long to put together such a short [twenty-one seconds] piece!"

Group IV: Members all felt they needed more time to put together a "polished" piece — one member said, "I've got it — it's crude, very crude. Don't take this as an example of what I usually play — it's not polished." Another member said, "...this really was experimental — you have to do this three or four times to really know that you're doing...it would help to write it down, too."

All participants commented that they greatly enjoyed all the sessions and had fun using all the sound sources and the synthesizers, and creating their composition. For members of groups I, II and III, this was their first opportunity to do this kind of activity.

17. Subject's comments about what he/she did to make the final composition 'musical'.

Group I: "I looked for sounds that go together, that have a nice rhythm"; "The way sounds go together, if they're pretty...or if they make new sounds — it's interesting"; "I don't know"

Group II: "I thought of a story to connect the sounds"; I'm not sure"; "I tried to make it sound like Rock and Roll".

Group III: "I looked for a theme — sounds to fit into an idea"; "Sounds that all fit together...I don't know"; "A theme, make it sound like something — like a war song".

Group IV: "You need real instrument sounds within a context, sounds that fit together and sound good"; "it has a tune, and background sounds fit in".

18. **Tabulation of the total length of time of each final composition in seconds.**

Group I:	80; 220; 228
Group II:	54; 122; 200
Group III:	21; 55; 88
Group IV:	26; 80; 135

Discussion of Gathered Data Based on Ideas from Current Research and Observations of Subjects

The original intent of this study was to analyze collected data in terms of the possible influences of age and formal music training on musical preferences of children. These two components were chosen because of hunches the researcher had developed through years of teaching classroom music and giving private piano lessons. Reading the available literature showed that these were, indeed, foci for other researchers working in this area, but that there were also other items that could be important considerations in making musical choices. As this study progressed, this researcher became aware of the possible influences of musical style, familiarity of a particular sample, and complexity level of the combinations of sounds. Therefore, where relevant to the analysis of the gathered data, comments on the influence of style, familiarity and complexity will be mentioned, in addition to the original two descriptors of age and formal music training.

All data gathered through observation of and conversations with subjects are enumerated and described under eighteen separate descriptor headings in Part I of this Results section (above). This section of the Results consists of discussion of those data, presented in the same format.

1. First acoustic sound source chosen by each subject for experimentation:

All subjects went first to sound sources that were familiar. Each subject walked into the room provided and looked around at all the choices with which to make sounds. Familiarity with the chosen sound source was assumed by the manner in which the subject approached the sound source — no one seemed uncertain as to how to make it sound, and no one asked what that particular sound source was.

All subjects from Groups I and III (no training), chose percussive sound sources. Percussive sound sources are easy to make sound with — there is little previous technical knowledge necessary; their looks and sounds are very common in the music of today; and they are used to create rhythm, which is one of the most basic musical elements and one which, according to Paynter (1969), children seem to create naturally, without training. In addition to familiarity being a factor in choice for these subjects, training can be added as an influence, as all untrained subjects chose sound sources which require no formal training to make sound.

Group II members (younger subjects with training), all chose melodic sound sources. They all clearly enjoyed playing the melody instruments, and this could reflect their understanding of, and pleasure in, playing their instruments of training.

Group IV members (older subjects with training), were the only group not unanimous in their choice of sound source category. Two chose a percussive and one chose a melodic/chordal sound source. None of the sound sources required expertise or knowledge past basic elementary classroom music experience to play, so neither age nor training appear to be influences for this group.

Generally, it would appear that preferences for the first sound source chosen was determined by familiarity, based on each person's experience with and exposure to musical sound makers. This concurs with research done by Greer, Dorow and Randall (1974), among others. It seemed likely that older subjects with musical training would choose more complicated or sophisticated sound sources, but this did not occur. Younger subjects with training were most influenced by their training, and also, the reverse seemed to hold — lack of training resulted in sound source choices requiring no expertise to play. For all subjects, it seemed that familiarity and enjoyment in playing were paramount in selection.

2. Acoustic sound sources played in combination during the experimental sessions.

All subjects who used sound sources in combination used some sort of drum in setting up the sound group. Physically, the drums (and other percussive sound sources) were placed similar to the drum/rhythm section of a Rock and Roll band. In using the drums, subjects all played a variety of rhythm patterns repeatedly, similar to the use of percussion rhythms in Rock and Roll songs.

Research by LeBlanc (1979), Nozol (1966), and May (1985), not surprisingly, found that the style of music most often preferred by children by the age of nine years, is Pop/Rock. In addition to choosing this music themselves when deciding what to listen to, they hear it often, unsolicited, on television, and piped into public places, such as shopping malls. The repeated exposure creates familiarity, and familiarity often leads, according to Hargreaves and Castell (1986) among others, to preference for that particular music. Therefore, when sound sources were combined, it can be concluded that style and familiarity were factors contributing to a subject's choice as to which sound sources were utilized in combination.

3. Sound source with which the subject spent the most time during the experimentation session.

Both age and training affected choices for some subjects in regards to this descriptor. Non-trained subjects from both Groups I and III spent most time with sound sources that required little expertise, although some previous knowledge of the specific sound source was necessary. For example, neither the metalophone nor the autoharp, each used by a Group I member, takes great skill to play, but some understanding of how to use it is required. Since most elementary schools use these instruments in their classroom music programs, it was expected that most children with no formal training would still know how to use them.

Two subjects from Group II chose a sound source that required skill and previous training — the recorder. Although some classroom music programs teach recorder, none of the younger subjects in this study had been taught the recorder in school. So, it was assumed that the use of this instrument was the result of information and/or skills about how the instrument functioned, acquired through formal music training.

Two Group IV members spent most time with the synthesizers, and clearly preferred them to any other available sound source. The preference for this sound source in both cases was the result of both age and training: age, as an influence was reflected in the fact that they had been exposed to the machines in school — no younger subjects had access to synthesizers; training as an influence was reflected in the facts that both subjects had keyboard experience and could play the synthesizers; both were familiar with the variety of sounds available in the machine's memory; both were intrigued with the ability of one sound source to approximate the timbres of many traditional instruments and other kinds of sounds; both were aware of the range of possibilities for composition, utilizing one instrument to write/perform for many. These two subjects could understand the range of possibilities of the synthesizer in relation to the traditional orchestral instruments. They also possessed the level of

vocabulary necessary to articulate observations concerning the capabilities of the electronic instrument versus the traditional instruments. The ability to do these processes successfully reflects the influence of both age and training.

4. Sound source(s) not used during the experimentation sessions

Choices for this descriptor were primarily age influenced. Specifically, no members of Groups I or II chose to experiment with synthesizers , and no members of Groups II or IV chose to experiment with guitars or baritone ukuleles. Based on subjects' body language and comments, it was surmised that the younger children, having had neither previous exposure to, nor experience with, synthesizers, rejected them initially due to uncertainty and nervousness. Interestingly, at another session where whole classes were brought to the same setting to experiment with various sound sources under similar circumstances, there was no nervousness displayed. It is surmised, therefore, that although the uncertainty to approach the synthesizers came from lack of previous experience, part of that nervousness came from being alone in the room and from being closely observed.

Older subjects, although having had no previous experience with synthesizers, had had exposure to them in school and were at least familiar with what they looked like and had vague notions of what they could do. All members of Groups III and IV approached the synthesizers readily and enjoyed experimenting with the sounds they could create.

Guitars and baritone ukuleles were used by the members of Groups I and II. They were familiar with these instruments and enjoyed the sounds made by strumming the strings. None of the subjects picked out individual notes, but used the instruments in a chordal fashion. Both guitars and baritone ukuleles are commonly used in elementary classroom music, so it was assumed that the members of both Groups III and IV had had exposure to, and experience with, these sound sources, but chose not to use them out of disinterest. Although they are instruments commonly

used in Pop/Rock music (particularly the guitar), these were basic, acoustic instruments, and had none of the amplification or variety of timbres available in the arrangements heard on recordings. They could also have been of no interest because they had no intrigue as either new or unusual sound sources.

Generally, sound sources not used were either those felt to be intimidating, or those felt to be boring. Research in the available literature deals with the idea of optimal familiarity. This concept is mentioned in relation to a specific piece of music, but perhaps a correlation could be made here in relation to sound sources. Based on the 'inverted U' function of complexity, researchers including Hargreaves (1986) and Getz (1966), say that if music is too complicated or too simple, it will not be liked. Also, repetition of a piece of music creates familiarity, which encourages enjoyment, and then, preference. In the case of the synthesizers being familiar and appearing to be intimidating, it could be surmised that the subjects felt them to be too complicated, and therefore, not preferred. In the case of the guitars and baritone ukuleles not being used, it could be surmised that these instruments had not enough interest, or complexity, and were, then, below the level necessary for interest to be piqued and preference to be able to be developed.

5. Total number of different acoustic sound sources used during the experimentation sessions

All subjects experimented leisurely with a varied number of sound sources during the twenty-five minutes allotted for experimentation. All but one tried out a variety of sound sources and seemed to enjoy the opportunity to experiment with creating a wide variety of sounds with those sources. One spent much of the time with one sound source, resulting in a low total for the number of different sound sources used. She spent a lot of time with a sound source already familiar, and one she enjoyed playing very much.

All subjects experimented with a variety of sound sources across the variety of types available — all tried sound sources that were percussive, melodic, 'junk', exotic, and chordal. In regard to this descriptor, there appeared to be no influence of age, training, complexity or style for any subjects, and in only one instance did familiarity play a part (as stated above — the one subject who spent a lot of time with one familiar sound source).

6. Unsolicited questions asked by subjects during the experimentation sessions

Lack of training played a definite part in questions asked by members of both Groups I and III. Their questions were directly related to lack of knowledge about names of specific sound sources with which they were not familiar, and lack of understanding of the relationship of the sound created to the size/shape of the sound source.

Age as a factor of preference was added to training where Groups II and IV were concerned. Group II members asked no questions. They were familiar with most sound sources in the room and where not, as with the assorted 'junk' pieces, were content to experiment uninhibitedly. Group IV members requested correct mallets for specific sound sources - "What kind of stick do I need for this steel drum?", and also asked for a specific kind of drum not noticed in the room (snares). Their sophistication was evident in this question — "Are all these [pieces of 'junk'] musical instruments?" They enjoyed making sounds with them, but were aware of, and able to articulate, the fact that these items were not traditionally classified as 'instruments'.

7. Unsolicited comments made by subjects during the experimentation sessions

Comments made by subjects were generally recognition responses to a known sound source, or a sound produced and liked. In two instances, comments were influenced by previous training: one Group II member picked up an autoharp and

after strumming it once, put it down with a grimace. Nothing was said out loud, but this action/facial expression was interpreted as knowledge that the instrument was out of tune and undesirable aesthetically; and one Group IV member picked up the same instrument and after strumming it once, also put it down, saying, "This autoharp is out of tune". Perhaps age was an influence in this response as well as training, as the Group IV member, the older, verbalized his criticism with accurate vocabulary, and also showed no reluctance to speak out. Although not verified with the Group II member, uncertainty of vocabulary and/or timidity to speak out, both of which relate to age, might have been reasons the body language response did not include verbalization.

8. Sounds liked best created with acoustic and/or electronic sound sources during the experimentation sessions, and why.

All subjects liked sound sources that could play a melody. Tunes are part of musical experience from the cradle, and sensitivity to a recognizable melody as aesthetically pleasant, regardless of the level of complexity, seems to be part of everyone's experience. Obviously, a more complex melody would require training and the sophistication and experience of age as well, but in creating melodies during the experimentation sessions, all melodies were relatively simple. There was no attempt to create complicated musical examples, only to play and experiment with the sound sources. So it was not unexpected that pitch was an element associated with creating pleasing sounds, for members of all groups.

The next most often mentioned aspect of what made a sound pleasant was timbre. Members of all groups used descriptive words like: 'blend', 'full sound', and 'mellow', all of which reflect the effect of timbre on sounds. It was expected that rhythm would be one of the most commonly mentioned descriptors in sound preference, because traditionally, rhythm is a most basic musical element. The fact that timbre was more commonly mentioned than rhythm was perhaps a reflection of the awareness of the

immense variation in sounds and sound sources a listener's ears take in within the immediate environment. Rhythm in specific patterns was important in choice for trained, older subjects. They either approximated the rhythms of known songs, which also indicates that familiarity was an influence of preference, or created their own, concentrating on articulating specific patterns that they thought up. The fact that younger groups did not consider rhythms in specific patterns as important, makes a case for age being a determining factor in this instance.

Age was also a factor of influence concerning subjects' preference for the synthesizer as a sound source. Only members of Groups III and IV chose to experiment with this medium before the instruction which was given to all subjects as part of this study. Sounds preferred for experimentation by these groups were those that were non-traditional, or unusual This was also true of Groups I and II. It was surmised that the reason for this was the fact that unusual sounds, like 'breaking glass' or 'bomb' were new, and being so inaccessible normally, were a great source of delight. Once all subjects were given instruction and experimentation time on the synthesizers, they were free to include the electronic sounds in their compositions.

When time came to create their compositions, however, all members of Groups III and IV only used those unusual sounds for special effects, like a wind sound. All other sounds used were those which approximated traditional instruments. It might be argued that the less previous training, the more uninhibited the subjects might be to use the non-traditional sounds available. Actually, however, all subjects, both trained and untrained and of both age groups, used the same number of non-traditional, synthesized sounds in their final compositions, (five total within each group), and in regard to the electronic sounds, preferences of both trained and untrained subjects seemed to be similar in terms of what is considered 'acceptable' as music.

9. Sounds least liked created with acoustic and/or electronic sound sources during the experimentation sessions, and why

Training was a notable influence of preference for the two subjects, one each from Groups II and IV, who mentioned that the autoharp was out of tune, and showed that the resulting sounds were unpleasant (see descriptor #4 for details). Training was also possibly a factor for two untrained subjects, one each from Groups I and II, who said that they liked all the sounds that they created. Perhaps their lack of training resulted in a lack of expectations for what sounds 'should' be pleasing.

As individual sounds produced were not complicated, complexity did not have an effect on choices. Style was also not applicable, as sounds were non-contextual and except for any individual's personal ideas on connecting a certain sound with a certain style (like the bamboo wind chimes with the Chinese music of one subject's childhood), they did not fit into a specific style. Therefore, sounds would not be identified, accepted, or rejected by a subject based on the criterion of stylistic structure and context.

In only one instance, a Group IV member who mentioned 'white noise', was age a possible factor of preference. It is assumed that exposure to this term and understanding of what it is would only occur through study of secondary school Science or independent reading on sound and sound transmission sources.

Generally, all subjects disliked sounds that were vague in terms of either pitch or timbre: for example, the subjects referred to sounds that had "no tone", "doesn't ring", or that were "boring". Subjects in all groups clearly articulated their personal aesthetic tasted in specific sounds, and, with the exception of the subject who mentioned 'white noise', all terms used to describe disliked sounds were within the grasp of normal, untrained, unsophisticated children.

10. Acoustic and/or electronic sound sources created during the experimental sessions which were considered to be 'musical', and why

All members of all groups thought different sounds were musical, and although there was some overlap, there was no pattern. When stating the reasons for choices made, subjects in all four groups mentioned pitch as a factor: if a subject thought a sound had a specific pitch and the pitch was pleasant, it was mentioned as a musical sound; subjects in Groups I, II and III mentioned that sound sources having a variety of pitches were musical to them.

Training had some influence on the vocabulary used to explain choices: members of Groups II and IV used specific words and/or musical terms to describe their reasons for choices made: for example, such terms as "melody line"; "pitch"; "has sounds that 'ring'"; "vibration"; "minor sounds". Groups I and III members also used specific words to tell of their reasons for choices, but the only musical term used was "vibrate". The other words used were clear in meaning but were not from musical vocabulary. For example: "this one can make a whole bunch of sounds"; "the cymbals' sounds...go good with a lot of other things"; "you can change the notes"; "these sounds are in almost every song".

Members of both untrained groups also said that one of the reasons for preferring certain sounds was that "I like it". This demonstrates a lack of vocabulary available to accurately express reasons for choices, and reflects an unsophisticated aesthetic sensibility.

Synthesized sounds considered to be musical were either those which replicate traditional musical sounds, or those that could be thought of as musical because they fir into a theme, melody, or created a special effect. This outlook on the part of all the subjects is probably a reflection of previous aural experience, and represents the aesthetic of the individual. Although we hear much synthesized sound in Rock/Pop music arrangements, it is primarily used within a traditional tonal and form

structure, or, as a special effect. In terms of modern Art music, most people the ages of the subjects participating in this study hear more traditional, tonal music, than 'New Age' or less traditional 'modern' music. For example, one member of Group IV said, "I'll listen to new sounds, I won't reject sounds because they're new...I'll give you my honest opinion, I prefer a melody line. Some, like Shostakovitch, I don't like — it means nothing. Dvorak, I like".

11. Acoustic and/or electronic sounds created during the experimentation sessions which were considered to be 'noise', and why

Members of all groups mentioned some of the same sound sources when describing sounds they considered to be unmusical. Often repeated were: tone blocks, 'junk', metal pieces, drums, and cymbals. All groups consistently referred to the idea of changing pitch as the determining factor for deciding if a sound was 'music' or 'noise' by such statements as the following: "...the sounds are always the same"; "There's no change, it can't go up and down"; "They don't exactly have different tunes, they just have one"; "You can't change the pitch...there's no melody". The only subjects to actually use the term 'melody' were in Group IV. This might have been a function of both age and training, because training alone would have probably resulted in members of Group II also using the word, as it is a term learned early in musical training.

In terms of synthesized sound, members of Groups III and IV felt that the non-traditional sounds like 'breaking glass' or 'wave gura', played out of context, were 'noise'. Sounds like these can be likened to the 'statistical approximations' used by Hargreaves and Castell (1986, p.7). They state that there is a "...decrease in the liking with age for statistical approximations to music...[this is]...because it is with increasing age that subjects realize that statistical approximations to music differ from unfamiliar real music; it is increasingly perceived as strange and perhaps, unmusical."

Another element mentioned by subjects when comparing their sounds to 'real' music, was lack of timbre: for example, "...high squeaks on the recorder..." were considered 'noise', and so were sounds that did not vibrate. Therefore, individual sounds that lacked some sort of melody or instrument-like timbre were perceived as 'noise', and rejected by all subjects regardless of age or training.

12. Total number and description of sounds chosen by subjects to be saved for placement in the memory of the Roland S-50 digital sampler memory, and reasons for the choices made

Members from Groups I and II all chose acoustic sounds as final choices. They utilized both traditional percussion and melodic sounds and unusual sounds made from the 'junk' pieces. All younger subjects seemed to enjoy both traditional and unusual types of sounds, but preferred to make them on acoustic sound sources instead of the synthesizers. It was surmised that because their previous background at school, in lessons (where appropriate), and at home, did not include exposure to electronic sound sources, familiarity and age were both deciding factors in choosing acoustic sound sources with which to create their final sounds. Familiarity and style were felt to be factors in choice where the unusual sounds were chosen, because Rock/Pop music, television, and movie music all use unusual sounds for effects, and all subjects are exposed to those media.

All members from Groups III and IV experimented with the synthesizers, but none of them had been provided with any previous experience in electronic sound sources. Group IV members seemed to grasp the range of possibilities available with the synthesizers for creating and combining sounds, perhaps due to their greater depth of musical knowledge in terms of how sounds are created and used in combination in compositions, as well as use of a keyboard. This training plus their age possibly sparked their interest as to the possibilities of these machines for both performance and composition.

In terms of sounds chosen, Group II members chose sounds that were both acoustic and electronic, and Group IV members chose only electronic sounds. The electronic sounds chosen by both groups were imitations of traditional, acoustic sounds (strings, church bells, organ), except where a special effect ('bomb', 'wind') was desired. According to the student composers, these special effect sounds were used for mood enhancement.

It was not expected that the synthesized sounds chosen would be approximations of traditional instruments. As previously mentioned, studies such as those by Nozol (1966) and Bradley (1972) have shown that teenagers prefer to listen to Rock/Pop style music. It was expected that teenagers in this study would follow this pattern and would choose to utilize sounds from this type of music, many of which are synthesized, in their compositions.

Since Group III members did not have the musical sophistication (due to lack of training), it was expected that they might not know how to create or utilize these sounds, and would, therefore, use these kinds of sounds for special effects only. But it was supposed that the Group IV members who were trained and older, would wish to experiment with the 'new' sounds in their compositions. Instead, their training, which was all traditional and classically based, seemed to guide them into using traditional sounds in traditional structures. Their chosen sounds and resulting compositions were, therefore, very much influenced by their formal music training.

13. Manipulative possibilities used for changing sounds previously saved in the S-50 sampler: register change, envelope bending, volume changes, durational choices for individual sounds

Of the four possibilities for altering sounds sampled, all subjects used three in a similar fashion. The use of volume, duration and register placement seemed to depend on individual aesthetic preferences relating to the intent of each composition, and, where technical limitations were involved, on common sense.

Subjects used the volume control mainly to add to the volume of the actual sound when acoustic sounds were being placed into the sampler memory. This procedure involved the use of an external microphone and speaker which were of average quality. It was sometimes a problem getting a loud enough sound from certain sound sources, and one subject rejected a proposed final sound because the volume of that sound when played back from the sampler was very low, and did not fit well with the other chosen sounds (an aesthetic judgement on the part of the composer). Most subjects did, in fact, decide on their final sounds in part due to how well they perceived the sounds 'went together', which was taken to mean the relationship between timbres as well as the clarity of individual sounds based on whether or not one sound covered up another.

For sound duration, all subjects chose either 0.8 or 1.2 seconds. By experimentation, it was found that segments of sound less than .8 second long usually did not include the total sound played and was rejected by the student composer. Most sounds struck with a single attack and allowed to fade naturally, died away after 1.2 seconds, leaving the rest of the sample as silence. Since this effect was not intended as part of any sample by any of the composers, a time longer than 1.2 seconds was rejected. Once the sound was placed on specific keys and again saved into the sampler's memory, subjects experimented further with duration by: lifting their finger off the sampler key before the total sound had played completely, thereby cutting off the full saved sample; and, striking the same key again as soon as a sound was finished, creating almost a continuous sounding of that particular sample. All subject composers enjoyed the freedom to manipulate their sounds in these ways, and the variety of effects this manipulation technique created.

Register placement was the most carefully thought out parameter by all subjects. Everyone enjoyed playing around with the sounds at the different frequencies, and found it useful to have the keyboard displayed on the screen, with a stroke over each

key that had a sound placed on it. Each student composer had a specific, different idea about where to place each sound, according to the idea for the composition's theme. For Groups I, II and III, each sound sample was numbered, and each corresponding key holding that sound was labelled with that number. This was done for the subjects by the researcher conducting this study because the subjects found it difficult to remember where each of the four to ten sounds had been placed up and down the keyboard, and the sampler program had no visual aid for this procedure. Group IV members were the only ones who did not choose to use this clue for visual recall of sound placement.

The fourth device for manipulating the sounds was envelope bending, and age was a factor in its use. All subjects liked to use the lever which caused a chosen sound to wobble, resulting in a 'waahh' effect, but only members of Groups III and IV used this device in their compositions. Because the bender lever has to be manipulated 'live' while the performer is also physically playing the sound that is being 'bent', some degree of manual dexterity is necessary. Also necessary is the intellectual ability to think through both the complexity of sound that will result as well as ways in which to use that sound.

The construction of the individual compositions, including the uses of available manipulative devices, was a function of both age and training. In listening to the compositions, one hears different uses for sounds chosen in terms of combining timbres and the kinds of structures used to frame the total composition. The most noticeable differences in terms of the complexity of timbre and form, are in the compositions created by the members of Group IV. The most complicated composition was created by a subject who used a tape recorder to make 'tracks' to overlay sounds. He recorded two tracks on a tape and played a third part 'live' for the final recording.

14. Comments on personal parameters used when choosing the preferred sound(s) and organizational schemes for construct the final composition

Parameters used to construct individual compositions varied depending on age and training. Training was reflected in choices for the large structure for the composition and the textures created by the timbres of the chosen sounds.

Untrained groups used mood to connect segments of their work into a whole. Mood is an uncomplicated musical phenomenon, but one that requires some aesthetic development. Most untrained subjects used certain sounds and recurring melodic or rhythmic patterns which were simple but clearly repetitive, to create the mood of their piece. All subjects, regardless of age or training, expressed the idea that a piece of music must have something to unify all the musical 'bits', or it could not be an acceptable composition. Untrained subjects did not articulate this thought directly, but it was inferred by the recurring mention of 'mood' or 'theme' as an important element in construction of the compositions. The choices for blending timbres (creating texture), or creating specific melodic or rhythmic patterns all seemed to reflect the subject's efforts to develop the mood or theme decided upon as the unifying thread.

Age can be considered a factor as well in terms of the desire expressed by the older subjects for 'polishing' the composition in terms of both performance and structure, and by their attempts at more complex and sophisticated combinations of sounds.

15. Subject's comments about he/she liked about sounds chosen within the context of the composition

Sounds chosen by subjects for use in their compositions were sounds that were individually aesthetically pleasing. Most subjects used the timbres of the sounds as clues to help them develop the theme or mood of the composition and put the chosen sounds into a musical context. As explained previously in this paper, subjects in this study had, up to now, dealt with sounds out of context, and were now directed to put

individual sounds into a musical context — a composition. All subjects based their choices about sounds or their compositions on how sounds went together with each other, and how well they reflected the composer's intent concerning mood or theme.

Group I members had the most comments to make, and were the most enthusiastic about accepting both the sounds chosen and the resulting compositions. They really seemed to enjoy the timbral differences of the individual sounds and the effects created by blending them.

Group II members also had much to say, and liked most of what the created.

Group III members enjoyed the sounds and the results of the manipulations with those sounds. They were less vocal in their discussions about how they felt about the sounds and compositions, and more tentative in their acceptance of their achievement. It is possible that they felt that they should be more critical of the final product, but did not know what to criticize or how to articulate that criticism.

Group IV members were the most articulate in their expressions of what they liked and why, and were also the most critical of their own work. Members liked most of their specific sounds, but did not really discuss the individual timbres. What they did talk about a lot was the pleasure they derived from manipulating the sounds, combining them and creating new sounds with the synthesizer. The process was a most positive experience, even though the end product was criticized.

It appears, then, that both age and training were factors in subjects' reaction. Younger subjects were eager to talk about their positive feelings about their work, whereas the older subjects balanced their 'likes' with criticisms, either by overt statements, or by omission. Training was a factor in the ability to articulate the aspects of the sounds/composition enjoyed. Acceptance of both sounds and final compositions seemed, also, to be a function of familiarity for all except Group I, and compositions were designed to mimic styles, story-lines or textures well known to the subject-composer. It is surmised that this was so because subjects in these groups had

either the training (previous knowledge) or age (sophistication) to be able to reproduce, musically, what was in their thoughts.

16. Comments by subjects on any changes or additions they would make to the final composition if more time were available

Training and age seemed to be factors in subjects' comments about how, or if, they would change or add to their compositions if it were possible.

Members of Group I were pleased and somewhat surprised that they could 'compose' a piece of music, and were happy to leave it as it was.

Group II members were also generally satisfied, buy might practice some more before the final recording in order for the performance to sound more precise. Training was evident by their awareness of the relationship between practising and performance.

Two members of Group III would have added more to their compositions if they had had more time. One liked the sounds she had so far, as well as the way they sounded together, and the other mentioned that the amount of time needed to create a worthy piece of music was far longer than he had anticipated. The third member of this group was the only one of Groups I, II or III to say that a specific final sound was disliked. She said that the "...bubble sound was stupid...it doesn't fit" - all her other sounds were recognizeable instrumetal sounds, and the timbre of the bubbles was out of place in the context of her piece. The recognition of the time element as well as the critical awareness of the texture created both indicate the influence of maturity (age factor).

Group IV members all extended the awareness of time and balance of textures further in their expressed preferences for changing and adding parts and sounds. They wanted to create more exacting, developed pieces, where segments were linked smoothly and where musical material communicated the composer's intent in terms of mood and feeling. They were all prepared to spend the extra time necessary to

increase the complexity and length of the compositions. They were also concerned that the current compositions, if left as they were, would be considered the best they could produce as finished pieces, when in fact they all felt that they were capable of producing something 'better'. They also mentioned practice time as an important feature in making the final recording sound technically polished. Their concerns were verbally expressed in clear language with concise musical terms, and their understanding of musical structures and the formations of musical works as 'whole', was evident.

17. Subject's comments about what he/she did to make the final composition 'musical'

Generally, members of all groups looked for combinations of sounds that were aesthetically pleasing, and equated that subjective choice with the term 'musical'. Some subjects used the words "sound(s) like", intimating that they wanted their compositions to resemble an event or musical type, or tell a story. At least one member each of Groups I, II and III, could not articulate what they were trying to do. Group IV members were the most specific in their explanations and in their plans. Their criteria for musicality were, interestingly, all based on such traditional definitions as: "It has to have a tune"; "you need real instrument sounds within a context"; "background sounds fit in...".

Aesthetic choice has many parameters. Age and training as influencing factors were reflected in articulation of individual choices and reasons for choices. Particularly for those subjects in Group IVl, complexity of compositional techniques, organizational structures and vocabulary to express ideas, were all clearly evident. Age as peer influence was not a limitation in terms of listening or performing practices of individuals. Subjects were working alone, and had only to concern themselves with their own definitions and beliefs in terms of what made musical sense. Familiarity with an instrument, compositional style, specific piece or music,

or rhythmic or melodic patterns, was possibly an influencing factor as well, in individual aesthetic choices. It was noted that there were individual differences in terms of execution of the 'problem' set all subjects — to create a musical structure (composition) using specific chosen sounds — based on previous training, age and personal experiences, but it was also evident that each subject had a personal musical aesthetic which was expressed with equal interest, vigor, and delight by all.

18. Tabulation of total length of time of each final composition in this study

Composition lengths for all subjects ranged between twenty-one and two-hundred and eight seconds. It might be expected that age and training would affect the lengths of compositions in that the longer compositions would be produced by older and/or better trained subjects. Age and training did seem to affect a subject's attention span and facility on the keyboard, thereby permitting older and more experienced subjects more concentration over a longer time, plus more productive practicing and polishing time. However, it was also noted that age and training produced the opposite effect as well: some older and/or trained subjects created some of the shorter compositions due in part to the desire to produce a polished, tight structure with the exact textures intended in the subject-composer's mind. Understanding the amount of time needed for this, they limited the length of the composition in favor of polishing.

With the exception of the longest composition by a Group IV member, the compositions that were the longest, generally, were created by the younger subjects, making separate sections in which the sounds were used in different rhythmic and melodic patterns, and in various timbral combinations. They seemed to think peripherally about musical elements and structures, and got involved in the fun of playing with the sounds. Age could have been considered a factor in the freedom they showed in exercising their creativity based on the process as the primary goal rather than the finished product.

CONCLUSIONS

Part I: Summary of Outcomes of this Study

Originally, this study was designed as an attempt to determine whether or not age and formal music training would be factors influencing individual musical preferences. As the study progressed, it seemed relevant to include degree of complexity, style and familiarity (recognition of specific music), as possible influences. The findings of this study confirmed that all of these factors are, to some extent and under certain circumstances, influences on the aesthetic musical preferences of children such as those involved in this study.

The factors which seemed to be the most influential were age and training. Each affected choices for specific sounds and musical structures individually as well as in combination with the other.

Some of the ways in which age was a factor were as follows:

- Older subjects were better able to articulate their aesthetic reactions and judgements. They had a wider vocabulary generally, and could more accurately explain their feelings and reasons for choices.
- Older subjects were aware that there are 'acceptable' standards for musical compositions, and even when they could not meet those standards through lack of training or time, they expressed awareness and concern about their perception of where their own efforts placed on the continuum of 'acceptability'.
- Older subjects had been exposed to a wider variety of 'new' sounds, and were prepared to experiment with and enjoy creating and manipulating synthetic sounds.

Previous training was a factor in choices in the following ways:

- Subjects with a background in formal music had an understanding of, and vocabulary for, musical terms and structures at a level exceeding that of untrained subjects.
- Trained subjects expressed awareness and understanding of musical terms and structure in words and demonstrated that knowledge when composing.
- Subjects with training were also concerned about meeting compositional and performance standards comparable to their level of training.

Age and training in combination were factors in aesthetic preferences in the following ways:

- Older subjects with training, by their own comments, were the most concerned that their products (compositions) would reflect their level of expertise, both in compositional strategies and performance techniques.
- Older subjects with training understood and articulated the complexities of sound relationships involving timbre, melodic patterns and rhythms in the most detail and at the most intricate level.
- Older subjects with training performed on a keyboard with the greatest ability and facility.

Style, familiarity and complexity were also influential in determining preferences, but to lesser degrees and generally in combination with each other or one of the prime factors (age, training).

For example:

- Familiarity and style were influencing factors in choices of many subjects who, either through overt statements, or choices of individual sounds or imitation of musical patterns or devices, showed their comfort with and understanding and enjoyment of, the sounds of Rock and Roll.

- Familiarity was linked with age and complexity in factors influencing choices of sound sources. Younger subjects chose acoustic sound sources and their sounds, whereas older subjects chose synthetic sounds. Also, the inverted U theory of complexity relating to preferences was evident in older subjects' reactions against using the acoustic sounds, particularly the 'classroom' type, for their preferred sounds. They were felt to be "boring" (i.e. uninteresting and uncomplicated), whereas the synthesized sounds were thought to be exciting and intriguing. Likewise, the younger subjects rejected the synthesizer (initially) as a sound source (which automatically rejected its sounds), because it was unknown and perceived as being too complicated.

All subjects, regardless of age, training, familiarity or experiences with certain styles or levels of complexity, created compositions within traditional structural boundaries using sounds that were recognizable as to source. Any 'weird' sounds (bomb, breaking glass) were considered 'special effects' noises. Since each subject worked alone creating his/her composition based on individual parameters, it is interesting to speculate on the aesthetic judgements that bound all the creations together through their tonal, timbral and form structures.

In conclusion: The influences of age, training, style, complexity and familiarity manifested differently among the four groups of subjects in terms of: articulation ability, initial interest in new sound sources or sounds, willingness to risk experimenting with new sound sources, and the lack of interest in a specific sound source.

Sounds and organizational structures finally chosen for compositional purposes were, interestingly, similar across all four groups. The combining of timbres, repetition of melodic or rhythmic patterns, decision to use a tonal system, and uses of both the conventional and unconventional sounds, were all grounded in the acceptable values of the traditional music system. However, the enjoyment displayed

by the subjects of 'new' and unconventional sounds and the excitement over synthesizers and unconventional sound sources, leads to speculation that with more exposure these sounds and sources will become familiar, gain value as 'acceptable' musical examples, and find their way into student compositions exhibiting styles and structures that are different from those of this investigation.

Part II: Implications for Music Education

The subjects in this study participated over a relatively short period of time, and although some knowledge gain in terms of listening, selection and problem solving skills was noted, it would be difficult to see a full range of development in these areas. However, their enthusiasm and commitment, which exceeded this researcher's expectations, suggested that they all would be willing to spend more time experimenting, editing and polishing their sounds. If this would have been possible, one could surmise that development of the learning outcomes mentioned above would definitely occur.

This assumption was addressed by Paynter (1969). His experiment involved young children in a classroom setting who were offered a wide choice of sound sources for experimentation with and creation of sounds in a non-structured setting. Over the period of one year, he observed that they refined:

1) their choice of sound sources, moving from drums only to a wide range of instruments;
2) their use of dynamics, moving from always playing loudly to a variety of volumes;
3) their use of sounds, moving from random choice to patterning.

The freedom which allowed the process of experimentation and development of 'reasoning with sound', helped build the foundation for a literacy base in music education.

The research reported in this thesis suggests that the synthesizer is a tool with fascinating implications for music education. Its value lies in its immediacy and accessibility to children who wish to become involved in making music through performance and composition, but who have little formal training in these areas. Because the machine can reproduce the technique and specific sounds programmed in by the student composer, previous time-consuming training in the performance and notation practices no longer impedes the creative, aesthetic abilities waiting to be unleashed in all students. Subjects in this study found the machines easy to use, and quickly accessed some of the basic creative functions. Comments were all positive: "Synths are incredible!", "Wow!". One subject's friend asked if she could come up to the university and spend some time with the synthesizers even though she was not part of the investigation, because "You don't have to have any talent to play the synth...it's neat and fun, ...anybody can play it".

The use of synthesizers and other unconventional sound sources like water, pieces of paper, metal, wood, and the body, become the means to access the essential "direct contact with the raw elements of sounds in situations where these elements can be freely manipulated in order to generate an understanding of the intrinsic properties of sound and their various configurations", (Walker 1984, p.80), and results in aesthetic music making which combines both creativity and literacy.

Traditional music education used judgements based on historical music for its goals and objectives. These judgements reflected two central beliefs:

1) that music existed within certain finite, specific structures built upon certain rules of harmony, tonality and form;
2) that what children need to know about music can be learned by teaching them techniques for performance skill acquisition through practice of 'accepted' styles and forms, and recognition of certain pieces of music.

Students were expected to imitate, obey, and participate in skill based activities. Teachers were required to take total responsibility for the input to and outcome of, all educational goals of the music program.

This traditional outlook on the teaching of classroom music in schools is not compatible with judgements made today for the music education of the future. Walker (1984, p.29) says that "In trying to establish aesthetic values in music today there is a natural tendency to start with these judgements on historical music. The problem for the music educator concerns the wisdom of applying historical value judgements to contemporary music."

This researcher believes that music education for the future must concern itself with combining literacy with aesthetic development, rather than indoctrination and training procedures. This will necessitate changes in:

1. the philosophical focus
2. the structure for learning
3. the tools of expression
4. the teacher's role

Philosophically, the focus of successful music education will be to help students develop their own aesthetic in regard to music as an art form. Aesthetic education involves, according to Maxine Greene (1971, p.40), "...arousing our students as well as ourselves, to the great, unsettled questions, to the need to choose...to be passive and unthinking, to refuse to confront the mystery of art, is to resist...the possibility of an aesthetic experience."

In teaching in the creative arts, of which music is one, we are helping students to develop aesthetic awareness, as we request active participation of students through sensuous responses to the experiences we provide for them. It is important, according to Ross (1978, pp.64-65), for teachers of the arts to "...educate the sensuous responses of children: help them look and see, listen and hear, touch and feel....Sensation is the

basis of aesthetic experience...this awareness is perception [and] perception is a creative act...it is a formative act [involving] intellectual action - action that converts information into meaning." This idea that perception (sensation awareness) and cognition (intellectual action) are "indivisibly intertwined..." (Arnheim, 1969, p.v), is in opposition to the traditional psychological view which divides perception involving the senses from cognitive functions. Argued by Arnheim and restated by Eisner (1981), is the theory that the term 'cognition', which includes the mental operations of receiving, storing and processing of information, must be broadened to include perception. "No thought processes seem to exist that cannot be found to operate, at least in principle, in perception." (Arnheim, 1969, p.4)

The general music class must provide opportunities for perception, thinking and creativity. Such a class should be, according to Walker (1984, p.47), "...concerned with musical structures, with musical manipulation of sound, with developing an understanding of the ways in which composers have organized and structured sound into meaningful statements." In order to achieve these learning outcomes, strategies for teaching music in the future must focus on creativity. Maslow (1965, p. 2) believed that "...there is universal creativeness common to us all", and it is this creativity, not the unusual genius or talent occurring in a very few, that is referred to here.

What is advocated here is not new. Meyer-Denkmann (1977 English translation, p.77) summarized up in Walker (1984, p.3), says that "Music awareness is much more likely to develop if...the child is 'encouraged to make music of his own'",. The teacher can provide this encouragement by creating an atmosphere which, according to Torrence (1969, p.43), will "...facilitate creative behaviour and motivate learning by creating a learning experience that is open and/or incomplete so that the child has room to insert his/her own ideas". In order to be a facilitator, a teacher must be sensitive to the needs and current abilities of the students.

Assuming this new role, the teacher sets up a learning situation as a problem-solving process where he/she assists the students in finding solutions which are musically articulate, literate, creative, and aesthetically pleasing. Structuring the music curriculum in this way aligns this art form with other curriculum areas such as Mathematics, Social Science and Science, where problem-solving is a recognized emphasis. This helps to make Music more understandable to those educators outside the immediate subject area as well as to provide a link which interrelates music more easily with other curriculum areas. Ross (1978, pp.63-64) suggests that teachers might use the following foci when structuring their lessons:

1. teachers will help students "...master the raw materials of self-expression...", which is, according to Varèse, Schafer, Cage, Walker, Meyer-Denkmann, and others — 'sound'.
2. teachers will introduce students to "...works of art that they will be able to identify with, believe in, and make their own".
3. teachers will "...teach particular skills [and] pass on information to the class as a whole".
4. teachers will emphasize "...individual work — on discovering the specific needs of each child and matching that child with opportunities carefully tailored to suit his or her temperament, mood and skills".

In order to 'master the raw materials' of music — sound, in order to find works to 'identify with and...make their own', in order to teach the necessary skills and tailor work to fit the child's needs, the teacher must utilize all the sounds and sound sources available via the resources of our time. This requires the use of sound sources that are traditional as well as unconventional and electronic, and sounds that are traditional as well as manipulated and 'new'. By using all available aural stimuli, we can expand our experience and our thinking about how to 'make music', in ways educators and composers such as Schafer, Cage, Paynter, Dennis and Walker have

done and tried to communicate to others in the field. Their approach to music and music teaching, labelled 'experimental' by some, is viable and current, and does not exclude rigor or substance, as the name may suggest. Walker (1984, p.79) calls this approach "...a form of reasoning with sound where the auditory senses play a central role as the sensory instrument of reasoning", thereby combining the senses with the intellect. As sound is the medium of music, it is a most apt description of the learning process in this particular curriculum area.

Reasoning with sound involves a variety of cognitive processes. Some of these are: creative and critical thinking, problem solving, prioritizing, analysis, selection and evaluation, and development of listening skills. These same processes are learning outcomes which many teachers feel are important for their students to reach in all curriculum areas. Familiarity with the findings of this investigation might provide teachers with some means to create an environment and structure within which students can access some of these higher order thinking skills.

To achieve this end will be a great challenge, as the following observation made in January, 1989, of a grade three music class in the American Midwest illustrates.

Teacher: "I'm going to teach you our new school song, which we just wrote. We're very excited about it. The tune is 'Oh, Suzanna'".

Class: (spontaneous groans)

Teacher: (ignores their response, sings the chorus and then teaches them by rote, with the words on the blackboard for reference)
"Now, each grade has a verse (two lines), and I'm going to teach you yours". (teaches them the verse, and sings the whole song through with them several times, encouraging them to 'sing with enthusiasm')

As an observer of that class, this researcher wanted to ask this teacher:

1. Who is the "we" who wrote this?
2. Why did you choose that melody?
3. Why did you not react to the students' dislike of the melody choice?
4. Why did the students have no input in the creation of their school song?
5. Why did you expect them to be enthusiastic about this song?

Unfortunately, as soon as that class was over another came in, and there was no opportunity to ask these questions.

It is the belief of this researcher that teaching in the manner of this teacher does not produce musically literate, inquisitive or aesthetically aware students. In order to meet the future needs of our children, we must restructure our expectations of both teachers and the students they teach, in order to provide the means, through ideas, processes and technology, to access the vast possibilities for learning in this field. Bob Dylan warned us twenty-five years ago, but we are just now hearing, that "...the times they are a'changin'..."

Part III: Implications for Further Research

In researching and writing this thesis, the following avenues for further investigation became evident.

1. It would be useful to conduct a similar study having the same parameters but with a larger sample of subjects with a broader ethno-cultural base.
2. Several parents of the subjects participating in this study commented on the possibility of conducting a similar study with adults. They mentioned their own backgrounds and preferences for both sounds and sound sources, and posed the question of whether or not the difference in generation would be an influencing factor. It would be an intriguing idea to repeat the study using a sample of adults, both trained and untrained, and then compare the results of that study with this one to see if similar patterns occurred. Results might show different

preferences in the areas of style and sound sources, and the degree of peer influence might differ as well.

3. Technology, including all forms of transmission and amplification devices, has been a major instrument of change in the area of 'sound'. From "My First Walkman" for toddlers, to miniature wristwatch televisions for adults, individual choice of sound listened to at any given moment is a reality.

   In other recent generations, children were exposed to concerts, usually involving 'classical' music, because they were taken to hear them 'live' by their parents. At home, the radio, record player and/or television was monitored by the parents, as there was usually only one, and listening/ watching was a family affair. Now, everyone has his or her own radio, at least, with many children having their own tape/record players and even televisions, with no outside monitoring occurring by adults. The result is that children listen to what is popular with their peers, and often, this is not the same exposure that would have been available from the parent generation. It would be interesting to compare the influence of peers as opposed to family in regards to the type of sounds that are considered 'musical'. It is assumed that the musical values of a culture change from generation to generation, and the sounds considered 'musical' by one generation are not necessarily the same as the subsequent one.

   Related to this, and perhaps because of the technological advances providing widely accessible, varied sounds to individuals at will, it would be interesting to see if the range of musical experiences and preferences end up being 'narrower' due to the ability of each individual to avoid styles he thinks he does not want to hear, with no outside monitoring influences forced on his choices.

4. Context, in relation to the decisions about what is 'musical' when an individual makes choices based on his/her own aesthetic judgement of non-contextual sounds, is an area needing further investigation. It appears that the same factors

influence choices both for preferred sounds in non-contextual situations (isolated sounds) and contextual situations (within a compositional structure), but further studies are needed in order to make definite statements concerning the relationship between context and sound preference.

5. An extension of this study, to allow subjects to work with their sounds in more complexity, depth and length of composition, would involve the visual aid of notation. Instead of the musical structure of the composition and combinations of sounds being limited by memory capacity or aural skills of the individual subject, sounds and pattern groupings could be written down and utilized with more variety. These visual representations would appear as graphics or pictorial images created by the subject/ composer, as traditional notation is inappropriate for both untrained subjects and those utilizing synthesized sounds or sounds from unconventional sound sources. The fact that visual representation of aural communication has never been sufficient has been recognized by musicians and music educators, but also, by respected researchers outside the immediate field. Arnheim (1969) and Piaget and Inhelder (1971, p.380, quoted in Walker, 1981), argue that "there is a vast field which language cannot describe", and that "the collective sign system, or language, does not fulfil the requirements of the semiotic function" (Piaget and Inhelder, 1971, p. 7, quoted in Walker, 1981). In musical notation, attempts have been made to expand and change the system of visual representation to better fit the sounds of today by formulating graphic symbols to represent sounds. Although graphic notation is unstandardized as yet, it is a "useful tool of expression" (Walker, 1984, p.80), and more attention must be paid to this mode of visual musical communications within the classroom setting.
6. The interviews conducted for this study revealed the difficulty many subjects had with expressing musical ideas in words. There is a great potential for future

research into the acquisition of musical vocabularies by young people. If this study were to be replicated, the researcher would first pre-test subjects on their musical vocabularies. Two key areas of vocabulary development with respect to the development of a musical aesthetic are:

a. language to express the basic elements of music, the vocabulary of the artform itself; and

b. a range of adjectives to effectively describe or express the timbres of individual sounds — e.g. raspy, scratchy, hollow, flat, jingly, etc. — created or discovered by the subjects

I believe that both the insights I have gained and the questions that have arisen during this investigation can provide other researchers with exciting and valuable opportunities for future investigations in the area of sound preferences in music.

Appendices

Appendix I: Sound Sources

The following sound sources were provided for the experimentation sessions:

Winds

recorders: soprano, alto, tenor, bass

shofar

pieces of metal and plastic pipe

Strings

guitar

baritone ukulele

stringbox

autoharp

Percussion

drums: bass, hand, bongo. conga, Orff kettle, steel

rhythm sticks

tone blocks on a stand

single tone blocks on a stand

hand, wrist and cow bells

church bells

finger cymbals

hand cymbals - various sizes

Orff instruments:

assorted S.A.T.B. xylophones, metalophones, glockenspiels

maracas and other shakers

banana-pod shaker

assorted pieces of wood and metal

wind chimes

woodblocks

African finger piano

Electronic

Roland S-50 digital sampler

Roland 60 synthesizer

Roland JX8P synthesizer

Appendix 2: Subjects' unsolicited comments during experimentation sessions.

Group I:

"This [stringbox] is like a harp" [smiling and enjoying playing it]; "Look what I made — it vibrates!" [metal horse shoe and metal rod hit together]; "Ooeey! Neat! That's fun!" [Two times with acoustic sound sources]; "I made two sounds just by going like this [sawing motion on a bike wheel];

"That's all I can find" [after 20 minutes in the acoustic room]; "It's neat to use the sampler".

Group II:

"I like this thing" [red tone blocks]; "these don't look like sounds, they look like wrecked cars" ['junk'];"I love these!" [huge cymbals]; "I want to play one when I grow up...awesome!" [bass recorder]; "autoharp is a new instrument to me"; "that's more like noise" [red tone blocks]; no comment, but has huge grin on her face when she hits the large cymbals hard; "It was neat to use this machine" [sampler].

Group III:

"That's [stringbox] neat! It sounds like a piano the way they [plucked strings] go up and down [referring to pitch changes]; "It's loud!" [hits glockenspiel hard with mallet]; "hmmm, looks like a big tree pod" [African banana pod shaker]; "Ooh!" [drumstick on large cymbal]; "This is what I like — drums"; "I wish I knew how to play these things [steel and regular drums] [implying playing them the correct way];"Do you know what this is?" [autoharp]; "This is neat" [strums the autoharp strings after being shown how]; "I've never played this before" [xylophone]; "I saw a drummer use things like this once" [bamboo shakers hitting each other and the conga drum]; "Is this [small steel drum] like that?" [large steel drum]; "Hey, this is good!" [hits small steel drum with a soft mallet]; "I like the mellow guys better" [hits metallophone, then xylophone][Why?] "I don't know...maybe 'cause it's deeper — the music I listen to is lower and I don't like squeaky things"; [sets up drum

group] "Hey, I can play these"; "This is deeper" [points to Orff kettle drum next to hand drum and plays both]; "I like these" [bass and kettle drums]; "Wow, this is neat!" [using the sampler]; "Hey, I like these" [sounds on the synthesizer]' "Wow, what a sound!".

Group IV:

"I've done Orff before...it all looks familiar, I've done it all before"; "...funny how nails can be used for an instrument too" [playing nail chime]; "Oh, this is a bassoon.. oh, no it's not...do you know what it is? I've never seen one before" [bass recorder]; "That's all there is...well, if you want to get really specific...[it seemed that initially he was looking for categories of instruments in the acoustic room. After this comment, he went and looked again, trying individual sound sources and not concentrating on types]." It could be the beginning of something...couldn't use it as it is — maybe put a reed in it or holes" [a piece of curved pipe]; "I'd take those big cymbals and — but it would hurt your ears" ['It's okay']. [takes a stick and hits them louder and louder.."How's that?! Hey, I'm a pro.!"; "I haven't played this in so long...I won't try to pick it up again" [soprano recorder]; "Synths are incredible!"; "This [stringbox] isn't in tune"; "I don't really like this sound, it's hollow, not rich and warm like a violin" [recorder]; [talking about the piece of curved pipe with a quizzical expression on his face — as if it's sort of weird and he does not know quite what to do with it] "it's great"; "I like all the African drumming stuff — especially when it's done properly by people who know how...it's different and I like different sounds"; "Out of tune, eh?" [autoharp]; "I don't know what these are for" [two wooden dowels]; "I used to have one of these as a baby" [kindergarten hand rattle]; "Oh, the alto" [recorder]; "I haven't seen one of these things for a very long time" [soprano recorder]; "This thing's out of tune" [stringbox]; "Isn't that cool?" [trying out all the weird and wonderful sounds on the synthesizer]..

Appendix 3: Subjects' unsolicited questions during experimentation sessions

Group I:

"Why do these both sound different when the tops are the same?" [two bongos with same head size but different body/neck length]; "Are these played with sticks or hands?" [Orff kettle drums]; "Is this supposed to be a horn?" [shofar]; "How do you do this?" [African shaker and autoharp]; "Can you get me that?" [too high on the shelf]; "Do I use these?" [mallets]; "What else can I do?" [asked two times]; "Wooh! How'd you stand it!" [large cymbal crash]; "What's this?" [African shaker]; "What's wrong? I've used one of these before...I don't think it works..." [shofar]; "Do you have any brass instruments?";

Group II:

No questions

Group III:

"What are these?" [red tone blocks]; "What do you do with this?" [African shaker]; "Do you know what this is?" [autoharp]; "Is this the same thing [as the autoharp]? " [stringbox]; "Is this [small steel drum] like that?" [large steel drum].

Group IV:

"What can this be used for?" [bike wheel]; "Have you got any snares in here?"; "Any glocks here in one piece?"; "What do they play these with?" [steel drums]; "Do you want me to use every instrument?"

Appendix 4: Inventory of specific sounds chosen by all subjects for use in the final composition

Group I:

1. oil drum, red tone blocks, stringbox, baritone ukulele, bass recorder, bells and maracas together
2. red tone blocks, nail chimes, autoharp (used twice for two different sounds), bass recorder, bongo drum hit with mallet and nails
3. Orff kettle drums (used twice for two different sounds), stringbox, red tone blocks, cymbals, maracas, ' junk' metal drum, metallophone

Group II:

1. red tone blocks, bass recorder (used three times for three different sounds), bongo drum hit with a mallet, metallophone (used twice for two different sounds), autoharp, guitar
2. xylophone hit with drumsticks, cymbal, guitar, red tone blocks, kettle drums, alto recorder (used twice for two different sounds), 'junk' pieces
3. Orff kettle drum hit with drumsticks, guitar, 'junk' pieces, metallophone hit with drumstick, bass recorder, cymbals, bass drum hit with fluffy mallets, red tone blocks, guitar, baritone ukulele

Group III:

1. JX-8P synthesizer sounds — bubbles, low strings, wind chimes, wave gura; stringbox, Orff kettle drum
2. JX-8P synthesizer sounds — timbales, bubbles, fat fifth (bent), poly-bass; stringbox, xylophone
3. JX-8P synthesizer sounds — church bell, resonator bells, bass, bubbles, toms, 'cello; cymbals hit with mallet, bass drum

Group IV:

1. Roland 60 synthesizer sounds — wind, whoosh/swish, organ chords
2. Roland 60 synthesizer sounds — whoosh, swoosh, vibration, long whoosh; drums
3. Roland 60 synthesizer sounds — organ chord, organ buzz, organ chord reverberation, organ triad

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