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Vocalization and Its Effect on the Intonation of a Beginning Instrumentalist

by

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ABSTRACT

The purpose of this study was to examine the effect of singing on the intonation performance of beginning instrumental music students. Sixty-seven grade six band students who attended the same school in Springbank, Alberta, participated in the research project. One intact class served as the control group, and two intact classes were combined to form the experimental group. The experimental group had singing activities incorporated into the instrumental lessons; these activities occurred daily and lasted approximately three minutes. The control group, which was offered the same instrumental lesson, did no singing.

There were 2 pretests: two subsections of the Musical Aptitude Profile and a musical background questionnaire designed by the investigator. After four months of treatment, all subjects were taped. The performances were evaluated by music teachers using an experimenter-developed likert scale.

Initially, statistically significant differences were found between the experimental group and the control group after treatment, $F(1,64) = 4.38$, $p = .040$. However, analysis of the subjects' musical backgrounds revealed that students who had taken private singing lessons had skewed the results. All students who had studied voice lessons privately in both the experimental and the control groups were rated consistently higher in intonation by the adjudicators than those who had not had voice lessons. When these subjects were dropped from the analysis, no statistically significant difference between the groups was found.

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CHAPTER I INTRODUCTION

Beginning bands are notorious for the out of tune sounds they produce. Much of this can be attributed to the fact that the students are novice instrumentalists, and that their technical and musical skills are not yet developed. While these skills can only be fully developed and refined through practice, experience, and time, perhaps they could be facilitated more effectively by the use of teaching techniques commonly associated with other music education areas.

According to many music educators, researchers, conductors, and composers, singing is a very important part of an education in music. Research shows that one of the benefits of regular singing in the music classroom is that it improves a person's musical understanding and aural awareness, or the ability to inner hear. Since the ability to inner hear, or to internalize the sound of music is strongly associated with the ability to play in tune, it is possible that beginning instrumentalists who frequently and accurately sing in class will play with better intonation than those who do not sing in class. Perhaps the instrumentalist who sings will sound better. As there is limited formal research in this area, the major purpose of this study is to investigate the effects of singing on the intonation of beginning instrumentalists.

Zoltán Kodály, the renowned Hungarian composer, ethnomusicologist, and music educator, states that singing must be an integral part of any complete education in music. He proposes that all music learning should begin with the child's own natural instrument, the voice, and that students can begin to learn to internalize music through singing. According to Kodály, a student whose music education is based on singing will

develop an ability to inner hear so well that he or she can, by reading music, internalize it, or has the ability to 'reproduce the score' of a piece of music after he or she listens to it. Kodály states that even the most talented artist can never overcome the disadvantages of a music education without singing, and therefore, it is of utmost importance that the student have a strong background in singing, regardless of the instrument that the child chooses later in life (Kodály, 1947). "To teach a child an instrument without first giving him preparatory training and without developing singing, reading, and dictating to the highest level along with playing is to build upon the sand." (Kodály, 1947, p. 196).

Emile Jacques-Dalcroze, another well known theoretician and teacher, also stresses the importance of singing as the basis for any music education. Like Kodály, Jacques-Dalcroze suggests that inner hearing can be developed, and a child's sense of intonation and tonality can be best taught or enhanced through singing. Jacques-Dalcroze found evidence in his studies that perfect pitch could be acquired if singing instruction begins early enough and before the child begins study of instrument (Choksy, Abramson, Gillespie, and Woods, 1986, p. 120).

Robert Schumann, in the preface of Album for the Young, summarizes the skills that a 'true musician' should possess, as well as the things that a future musician should do and feel in order to be successful. He states that one should sing from written music, regardless of one's voice, in order to sharpen the ear. He also suggests that musicians should sing in choirs as often as possible, singing the middle parts, in order to become a better musician. These suggestions are for everyone who studies music, regardless of the instrument studied (Schumann, as cited in Burton, 1988).

Edwin Gordon, a music researcher and educator who has received much attention during the last twenty-five years for his research into the psychology of music, is another advocate of singing in the music classroom. Audiation, which is a cornerstone of Gordon's approach to music education, is defined as the process which takes place when one "hears and comprehends music for which the sound is no longer or may have never been physically present" (Gordon, 1993, p. 3). This is the same phenomenon referred to by Kodály and his colleagues as inner hearing. According to Gordon, in order for a student to be able to audiate a melody, he or she must be able to sing it, because when a student is engaged in tonal audiation, he or she is subconsciously singing silently (Gordon, 1993, p. 39). Gordon believes that an instrument cannot audiate, only its player can, and an instrument is simply an extension of the person who uses it. He states that those who take instrumental instruction without the development of singing skills, can become little more than mechanical artisans while those whose instrumental instruction includes the development of singing as instrumental readiness may become artists (Gordon, 1993, p. 41).

Many other educators and researchers have made comments on the necessity of singing in an instrumental music setting. Both Edwin Goldman (1934) and his son Richard Goldman (1962) state that vocalization, in the form of solfege, should occupy a small amount of rehearsal time of any band rehearsal. Righter (1942) and Kinyon (1982) encourage the practice of band members singing four-part, slow moving music (chorales) on a neutral syllable in order to establish a relationship between instrumental and vocal styles, and to improve intonation.

According to Burton (1988), during the 1960s and 1970s, many music pedagogues made effective vocalization applications in instrumental settings. As well, many people who wrote band methodologies and texts during these decades often include singing activities that teach various performance skills, including Holz and Jacobi (1966), Besson (1969), Colwell (1969), Weerts (1972), and Edelson (1972).

The use of singing is an integral part of the learning process in most elementary general music classes. However, it is seldom used in elementary band classes (Davis, 1981, p. 1). It is possible that some of the obstacles that educators face in beginning band settings might be overcome through singing. For example, an instrumentalist who utilizes singing when rehearsing is able to practice instrumental music essentials, such as breath support, phrasing, tone, sense of pitch, and intonation without the hindrance of the instrument. In beginning band classes these aspects are often overlooked, as the scheduled time for band classes is often insufficient. Energy in beginning instrumental programs is usually focused on how to produce a sound, how to hold the instrument, and how to correctly finger the notes. Through singing, the beginning band student could be given an opportunity to practice musical elements other than those that are purely mechanical. The learning of musicianship skills would not be impeded by the lack of technical mastery of the instrument.

When comparing the inner hearing abilities of string players to wind players, Stecklin and Aliferis say, "Tones are not made by pressing valves, or covering holes; rather every shade of intonation is controlled by the sensitivity the string performer's ear has on the placement of his fingers" (Stecklin and Aliferis, 1957, p. 3). With regard to

singing, Kohut explains that singers are their own instruments, and since they have no mechanical means through which to produce pitches, they have to rely, and continually develop, their aural acuity in order to sing accurately (Kohut, 1973, p. 31).

Unfortunately, the same things cannot be said for many wind instrumentalists. The player expects to produce the desired pitch simply by using the correct fingering, and for the most part, the need for internalizing the sound of the note is not necessary in order to produce it (Elliott, 1972, p. 121). No musician questions the extreme importance of a well trained ear. Singing, when used properly, can help facilitate the development of aural skills. The individual who is singing is actually the instrument, and therefore, must have a mental concept of the sound in order to produce it accurately.

In conclusion, there are several points that underlie the previous discussion:

- 1) Many people in the music education realm believe that singing is an important element of any education in music.
- 2) Singing helps to develop inner hearing.
- 3) Inner hearing is a key component to improve tone quality and intonation.
- 4) The ability to internalize desired sounds is a crucial skill for a musician to possess.

STATEMENT OF THE PROBLEM

Topic: Vocalization and the Beginning Instrumentalist

Problem: Does instrumental instruction that incorporates singing activities improve the intonation of beginning instrumentalists?

Null Hypothesis: Instrumental instruction that incorporates singing activities does not improve the intonation of beginning instrumentalists.

VARIABLES

Independent Variable: The use of vocalization activities in the classroom

Dependent Variable: The intonation of individual performance made by the subject

DEFINITIONS

Structured Singing Activities: Singing activities that were led by the teacher. They consisted of singable selections from the method book, or from other sources.

Students sang using solfa, scale degree numbers, to a neutral syllable, or the words if it was a song with a text.

Vocalization: The process of singing.

Sense of Pitch: The ability to discern slight differences in tones.

Intonation: The process of playing an instrument with a pitch that matches an external frame of reference.

Play-Sing-Play: The process by which a student plays a piece of music, then sings the piece of music, and then plays the piece of music again.

Matching Pitch: The identical reproduction of a given pitch.

LIMITATIONS OF THE STUDY

This study has several limitations. They include:

- 1) The study is limited to beginning instrumentalists, and therefore results may not be generalized to students who are at other levels of their instrumental study.
- 2) The experiment involves students from the Calgary area only.
- 3) The experimental treatment is limited to four months, during the second term of the school year.
- 4) Only three minutes of vocalization is to be included in each 43 minute lesson.
- 5) The subjects are limited to three classes of beginning band students in grade six, and have an age range of eleven to twelve.
- 6) The male subjects in this study all have unchanged voices.

CHAPTER II REVIEW THE LITERATURE

SENSE OF PITCH: A LEARNED OR INNATE ABILITY ?

Is the ability to discern differences in pitch something that, through training, can be improved? In the past, this question has received much attention. Some feel that the ability to perceive correct tuning is innate, and to play or sing in-tune is a gift with which a person is born. Others feel that the perception of and the performance of correct intonation is an ability that can be developed through instruction. Although much of the literature addressing this topic is quite dated, some of it will be presented.

Perhaps one of the greatest proponents of the idea that intonation is innate is Carl Seashore, a man who has written a great deal about the psychology of music education, and who, in 1938, developed the first edition of a musical ability test battery which is still in use today (Seashore, Lewis, and Saetviet, 1960). Seashore feels the ability to discern differences in pitch is an inherited ability. "If we take one hundred parents and compare them with one hundred of their children from eight to twelve years of age, the children will do fully as well as parents in pitch discrimination" (Seashore, 1919, p. 59).

He also states that training cannot improve this ability. "The sensitiveness of the ear to pitch differences cannot be improved appreciably by practice" (Seashore, 1919, p. 59). Much of his work stems from the research of Smith (1914) who has said, "Training in pitch discrimination is not like the acquisition of skills, as in learning to read or to hear overtones" (Smith, 1914, p. 101).

Another noted scholar in the field of music psychology, James Mursell, takes a different position. He feels that by examining the many internal and external factors that

need to be considered when discussing pitch discrimination, it is a skill that can be improved. "Clearly certain factors in the act of pitch discrimination can be improved by training, and so much is universally admitted" (Mursell, 1937, p. 73).

More recent reports seem to support Mursell's position. Martin and Ward (1961) and Sergeant (1973) feel that the ability to discriminate differences in pitch is an ability that can be learned.

DIFFICULTIES IN TESTING INTONATION

When devising a study examining intonation, one of the first issues to be addressed is the system of reference that will be used. Throughout the course of music history, many systems of intonation have evolved, but four main systems seem to have stood the test of time; the equally-tempered, the just (diatonic), the mean tone, and the Pythagorean systems of tuning (Kohut, 1973, p. 63). In the forthcoming discussion, these systems will be briefly examined.

The Pythagorean system dates back to sixth century BC (Grout, 1988, p. 6). The philosopher, Pythagoras, is credited with discovering the existence of numerical relationships between the basic intervals of music. One major flaw with this system is that the Pythagorean 3rd is quite sharp (Kohut, 1973, p. 63). Because of the sharp 3rd, this system of tuning is not appropriate when performing harmonic music.

A system which evolved to accommodate this problem is the mean-tone system of tuning, which was the prevalent system of the Renaissance period. This standard is based on a 5th that is slightly smaller than the perfect 5th, and is a fairly satisfactory method of judging tuning when only one or two sharps or flats are being utilized. It does, however,

pose many problems when a musical selection becomes more chromatic (Stolba, 1990, p. 269).

Yet another solution to the problem of developing a satisfactory tuning system came with the development of the equally-tempered system. This system divides the octave into twelve equidistant semitones, and is the tuning standard for fixed pitch instruments and the Strobocorr, a tuner that provides a visual reference. While it is perhaps the most prevalent tuning system, it too has received criticism because it distorts every interval except the octave (Kohut, 1973, p. 63).

The last tuning system to be examined is the just intonation system, and this system is derived from the harmonic series, or 'the chord of nature'. Using the harmonic series to judge tuning seems to rectify the flaws of the Pythagorean and mean tone systems as it has both a pure 5th and a pure 3rd (Mason, 1960, p. 31). It does, however, pose problems in that there are two possibilities for a whole step (Kohut, 1973, p. 63).

Although the equally-tempered system seems to be the most common system in the studies examining intonation, the author believes that the debate concerning which system is most appropriate will never be adequately solved. All systems have favourable points and inherent flaws, and different instrument groups seem to favour different systems. Stauffer (1954), although a proponent of the equally-tempered system, seems to resolve the debate by saying, "The ear is, and always must be, the final authority on problem intonation" (Stauffer, 1954, p. 17).

There are other problems which confound the issue of testing intonation. Although it is beyond the scope of this paper to examine these issues in depth, a brief

overview of some of the many factors that cloud the issue of achieving perfect intonation is appropriate.

Inherent acoustical problems of an instrument are always a concern when discussing tuning. All instruments have 'bad notes', and it is the responsibility of the teacher and the instrumentalist to be not only aware of these notes, but know how to compensate for them (Pottle, 1970, p. 6).

In a perfect world, all instrumental music students would have the highest quality instruments, and these instruments would be in the best working condition.

Unfortunately, this is most often not the case, especially in beginning instrumental ensembles. Even so, instrument quality and condition are key factors in intonation (McAdow, 1952, p. 14).

The selection and the condition of reeds and mouthpieces is also crucial to an instrumentalist's tuning. Again, it is the responsibility of the teacher, student, and instrument salesperson to do all that is possible to insure that this issue does not hinder intonation performance.

Changes in dynamics affect intonation. To further complicate the issue, the tuning tendencies of the different types of instruments are not consistent when changing dynamics. For example, as trumpets and clarinets crescendo, trumpets tend to play sharp, and clarinets tend to play flat (Kohut, 1973, p. 90).

Student physiology, a variable which is virtually impossible to control, affects intonation. Things such as braces, mouth occlusion, and size of student relative to the instrument that he or she plays can hinder intonation performance (Weisner, Balbach, and Wilson, 1973).

Even temperature affects intonation (Colwell and Goolsby, 1992, p. 103). For example, if the performance hall is too cold, the instruments will sound flat. Also, as the performer continues to play, the pitch of his or her instrument rises (Decarbo and Fiese, 1989). Considering that pitch is in a constant state of fluctuation, that there are fixed-pitch instruments in every band, and that there are a host of other factors influencing tuning, it is a wonder that accurate intonation is ever achieved!

However, instrumental ensembles can and do play with accurate intonation. If an agreement of pitch center weren't reached, the sound that an ensemble makes would be unclear and muddy (Palmer, 1958, p. 38). Yet, everyone has heard at least one ensemble that has performed with a clear, brilliant sound. This can only be achieved through a consensus of pitch. Such consensus of pitch can happen only through listening; the director must listen to the various voices in the group and the group as a whole, and each member must listen to himself or herself, as well as to other members of the ensemble. As stated by Stauffer (1954), the ears are the only judge.

Perhaps Frederick Fennell, renowned educator and conductor, summarizes the solution to problem intonation best by the 'rule signs' found in his rehearsal hall. There are only two: the first rule is 'No Smoking', and the second rule is 'Listen!' (Colwell and Goolsby, 1992, p. 102).

Many studies investigating tuning or tuning tendencies use complicated methods and sophisticated devices to measure precise deviations in tuning. This approach seems to be somewhat artificial, as no one listens in this manner. The previously mentioned studies support the proposition that a trained musician is the best judge of intonation.

STUDIES EXAMINING METHODS OF IMPROVING INTONATION

Although there are several studies investigating methods to improve intonation, the research available is quite limited, especially when considering the magnitude of the problem of accurate tuning. Perhaps this is because it is so difficult to control the confounding variables that arise when trying to test intonation. This paper will first present some studies that deal with testing methods not involving the voice which are believed to improve intonation. Finally, the research specifically investigating the effect of singing on intonation will be discussed.

Non-Vocal Methods of Improving Intonation

When two notes are not perfectly in tune, one can hear pulses in the tone if the two notes are sounded at the same time. These pulses are commonly referred to as beats, which sound like “a swelling and a diminishing in volume of a sound (which is produced) when two similar, but not identical frequencies are sounded simultaneously” (Palmer, 1958, p. 38). The process of eliminating these beats has long been used by physicists and piano tuners as a tuning procedure, but has not been often used (effectively) by music educators (Miles, 1972, p. 496). As a result, Miles tested whether this method of teaching intonation could be used by beginning instrumentalists to improve their pitch accuracy. One hundred eighteen instrumental music students who had completed one term of a first year instrumental music program were initially given instruction about the ‘beat phenomena’. After instruction, the researcher attempted to show the subjects how to hear the beats, and how to eliminate them by using an Intonation Trainer (a device which can produce two frequencies simultaneously and which can be manually adjusted

to make the frequencies the same or different). Students were allowed to experiment with this process by trying to match pitches with the Intonation Trainer.

Five sessions followed the initial demonstration. The first session involved a review of the previous lesson, and then the investigator demonstrated how to match pitches with the training device. In the second session, subjects, playing their instruments, attempted to match pitches the investigator played on a clarinet by eliminating the beats. Subjects tried to match pitches produced by other students in third session. In the fourth session, subjects played 3rds and 5ths with the investigator, again trying to eliminate the beats. The final session involved the tuning of a major triad by eliminating the beats: three subjects, on their instruments, simultaneously sounded notes of a major triad, and it was considered perfect when there were no beats present in the sound.

The subjects' performances during each session were scored by the investigator, and the Guttman technique, a method used to analyze qualitative data, was used to evaluate the scores. Results from the analysis showed that all participating students could recognize beats, and that all students at some point of the experimental time could tune a unison free of beats. Seventy-five of the students received perfect scores for all conditions.

The intentional mistuning and informing the student of the direction of the mistuning was a teaching technique tested by Yarbrough, Karrick, and Morrison (1995). The researchers worked with elementary, middle school and junior high students (N=197) in either their first, second, third or fourth year of study. They wished to discover whether the teaching technique affected the performance and perception of intonation of

young instrumentalists. Students were asked to complete two tasks. The first required students to adjust the pitch control knob of a variable pitch keyboard in order to match the pitch of a recorded stimulus (this tested the perception of intonation). The second test required subjects to make tuning adjustments by changing the length of their instrument until they felt that the pitch they were producing matched a recorded stimulus (this tested the performance of intonation). Group 1 was told that they would probably be sharp as compared to the stimulus, Group 2 was told that they would probably be flat, and Group 3, the control group, was given no direction. The only significant variable that affected results was the number of years that each student studied. There was consistent improvement in both intonation perception and intonation performance from the first year to the fourth year, $F(3,188) = 5.33, p < .05$.

Graves (1963), working with fifty-four high school band students, compared three practiced techniques to improve intonation: aural discrimination, visual discrimination, and a technique he called 'conventional'. The aural method required students to play to an organ sounding the same notes, and they were asked to describe the direction of their note as compared to the organ's note. They were then asked to eliminate the beats. The visual component relied on the eye to improve intonation. Subjects were required to use a Strobococonn to check intonation, and were asked to make adjustments based on the machine's readings. Finally, the conventional method involved providing students with knowledge of music theory. Information about scale and chord structure was also given, and instrument tendencies were explained. By using this knowledge, the teacher and the student identified differences in pitch, without the use of aural or visual aids. Graves noted that all were effective in improving intonation, but that no method was superior.

Another study examining the use of verbal feedback as a way of improving intonation was undertaken by Geringer (1978). Through the participation of ninety-six undergraduate and graduate students, he investigated the performance and perception of scalar patterns for accurate intonation. The subjects, who were either keyboard instrumentalists, vocalists, wind instrumentalists, or string instrumentalists, were placed in one of four experimental conditions, which involved performing a designated scale pattern. After each subject played, he or she was given differential feedback about the performance. Some subjects were given the opportunity to play the exercise again, while other subjects were able to listen to their recordings, and were asked to adjust the intonation of the taped performance by using a variable speed tape recorder. Results showed that intonation during performance was less accurate than the perceived intonation of the performance. Subjects also tended to perform sharp, which supports the literature. Verbal feedback did not reduce sharpness in performance.

The use of directional scalar methodology and reinforcement to improve vocal intonation was the focus of a study completed by Madsen, Wolfe, and Madsen (1964). Grade six music students (N=144) in vocal music classes at one school participated in the study. Students were pretested singing two scales, and then participated in one of four treatment conditions. The first group practiced singing ascending scalar patterns, the second sang descending scalar patterns, the third group sang a combination of ascending and descending patterns, and the fourth group, which only sang songs, served as the control. The experimental groups also received reinforcement: pennies for on-task vocal performances.

The findings of the study showed that all the singing groups were significantly better than the control group ($P < .01$). Providing reinforcement did not significantly improve intonation performance.

Vocal Methods of Improving Intonation

Perhaps the most frequently quoted research in the area vocalization and beginning band students is that of Elliott (1972). Working with six intact heterogeneous band classes (in terms of size, extra-curricular musical activities, and academic achievement), he examined how vocalization affected the sense of pitch of beginning instrumentalists. The classes were taught by their band teacher, who taught the classes as usual throughout the research time (38 weeks). However, the experimental groups were asked to vocalize previously determined pitches and exercises found in their text, First Division Band Method (Parts I and II), in addition to their usual class work.

Posttesting for this study first involved the completion of two sections of the Seashore Measures of Musical Talents, the pitch discrimination and tonal imagery sections. Students also completed a specially designed test which measured their ability to match notated music with music that is aurally perceived. Finally, subjects completed a portion of the Kwalwasser-Ruch Test of Musical Accomplishment which tested their ability to translate notated music into sounds.

Several conclusions were drawn. First, regular participation in band class resulted in improved pitch discrimination and tonal memory abilities. Also, regular singing during the band class significantly affected students' sense of pitch. Private piano study

had a significant effect on students' ability to match musical sounds with notation.

Finally, participation in extra-curricular vocal activities did not affect results.

Elliot was concerned with the effect of vocalization on the sense of pitch of beginning band students. He defined sense of pitch as the ability to:

- 1) discern slight differences in the pitches of tones sounded consecutively.
- 2) recall, correctly after a brief short interval, short melodic passages.
- 3) mentally convert sounds perceived aurally into musical notation.
- 4) mentally convert musical notation into musical sounds (Elliott, p. 122).

He did not specifically investigate whether vocalization affected students' ability to play with accurate intonation.

The effect that vocalization had on the intonation of university wind performers was the focus of Smith's research (1984). Ninety-four undergraduate and graduate musicians participated in the study which had a primary focus of investigating vocalization's effect on tuning, and secondary focuses of the effects of gender and instrumental groupings on intonation. The subjects were not randomly selected, but were chosen because they performed in either the Symphonic Band or the Wind Ensemble at Florida State University.

The experiment involved two playing conditions: 1) the subject played an arpeggiated exercise and 2) the subject was given the opportunity to vocalize an arpeggiated exercise for 30 seconds, and was then asked to play the exercise ('sing/play'). All subjects were required to perform two exercises in each condition. Because of this, there was no need to establish an experimental group and a control group- the subjects served as their own control. It is interesting to note that unlike other

studies investigating vocalization (Davis ,1981; Elliott 1972; McGarry ,1967; Schlacks, 1981), the subjects received no preparatory performance instruction that incorporated regular singing activities into regular playing exercises.

To evaluate the performances of the subjects, the researcher used a pitch extractor. This is a sophisticated device that is able to convert live or recorded analogue information into digital information. It is able to simplify complex waveforms so that the relative intensity and fundamental frequency can be determined (Smith, 1984, p. 19). By using this device, Smith was able to analyze logarithmically the cent deviation of each note of each performance (using the equally-tempered system as reference). No significant differences were noted between the performances that were made in the 'sing/play' condition and the 'play' condition.

McGarry (1967) investigated the effectiveness of using vocalization techniques to improve several instrumental music performance skills. Performance skills were defined as "rhythmic accuracy, technical accuracy, observation of expression marks, regularity of tempo, and slurring" (McGarry, 1967, p. 2). Seventy-four junior high students (grades seven to nine) were randomly assigned to one of two groups, an experimental group or a control group. These students were further divided into groups of like instruments.

The students, who were taught by the investigator, were involved in the study for fourteen weeks, and the implementation of the study took place during the students' weekly instrumental music class. Materials for the classes were taken from Form B of the Watkins-Farnum Performance Scale. The classes were taught identically, except that the experimental classes had vocalization activities incorporated into each lesson.

After analyzing the differences between each subject's pretest (Form A of the Watkins-Farnum Performance Scale) and posttest (Form B of the Watkins-Farnum Performance Scale), it was determined that there were no significant differences between groups, and that vocalization did not improve the prescribed instrumental performance skills. Significant results were noted, however, with students whose scores fell into the lowest quartile. These were, for the most part, students who did not take private lessons on their instruments. McGarry, therefore, concluded that while in general, vocalization did not improve performance skills of junior high instrumentalists, it was effective in the development of performance skills of those students that were below average.

"The Effects of Structured Singing Activities and Self-Evaluation Practice on Elementary Band Students Instrumental Music Performance, Melodic Tonal Imagery, Self-Evaluation and Attitude" was a study completed by Davis (1981). Davis investigated, among other things, how structured singing activities affected several instrumental performance skills. He defined structured singing activities as "individual and group activities in which subjects were engaged in sight singing and rote singing exercises through the use of numbers, including scales, scale patterns, intervals and assigned selections in the First Division Band Method" (Davis, 1981, p. 9). Performance elements considered included note accuracy, breathing, phrasing, tone quality, rhythm, tempo, articulation, dynamics, and intonation (Davis, p. 11).

The fifth and sixth grade band students from three elementary schools participated in the project. The total number of intact classes involved was six; four were taught by the investigator, and two were taught by a colleague. Only subjects from these classes that completed both the pretest and the posttest were included in the study. Within each

school, subjects were randomly assigned to either the experimental group or the control group. Experimental group students were involved in either structured singing activities only, self-evaluation practices only, or a combination of structured singing activities and self-evaluation practices. The three control groups were taught by their band instructor, but no prescribed lesson plans were given.

After the nineteen-week experimental time had elapsed, the students completed a number of posttests, including the Tonal Imagery portion of the Musical Aptitude Profile, and an attitude questionnaire developed by the investigator. The subjects also had to play, sing, and sightread selections (both on their instruments and vocally), and these performances were taped and evaluated by a panel of music teachers.

Many results were obtained. The findings pertinent to the present study were that that structured singing activities were shown to be an effective way to teach instrumental performance skills, particularly during the first year of instruction. It is interesting to note that Davis did not describe the criteria that the evaluators used to judge the taped performances, nor did he specifically examine the intonation of each performance, although he described it as an instrumental performance element that was to be examined.

The effect of vocalization on the pitch accuracy of high school band students was the focus of a study completed by Schlacks (1981). He defined pitch accuracy as the ability of an individual to play the second note of an interval correctly according to the equally-temperament system, ascending or descending (Schlacks, 1981, p. 6).

One hundred thirty-six high school band students from four different schools participated in the study. Each of the four schools had one band class involved in the study. One group vocalized and played intervals on their instruments, the second group

sang the intervals, the third group played the intervals on their instruments, and the fourth group, the control group, continued with its normal rehearsal procedures. Each class was taught by its regular music teacher, who followed his own program. The three experimental groups, however, spent five to six minutes per class on an interval training program that was developed by the investigator.

After a treatment period of one month, three posttests were administered, two standardized tests and an interval performance test, developed by the author. The interval performance test required each subject to play ten intervals that were randomly selected. These performances were recorded, and then were analyzed through the use of a Stoboconn.

Three results that relate to the present study were reported. It was found that the group that only sang the intervals performed them with more accuracy than the control group, but the results were not statistically significant. The group that played the intervals on their instruments also had better scores on the interval performance test, but again, these results were not statistically significant. Finally, the group that sang and played the intervals on their instruments performed better than the control group, and although this group showed the highest gains than any other group, the results again were not statistically significant.

CONCLUSION

The existing literature examining methods of improving intonation is limited. There are even fewer studies examining the effect of vocalization on intonation, and those which exists are statistically inconclusive. This is quite surprising, as many noted

scholars from various music fields believe that vocalization is an effective means to improve intonation.

The research completed by Elliott (1972) is the most frequently referred to study in the discussion of singing and its effect on the tuning of beginning instrumentalists. His methodology is sound, and his findings have important implications for the beginning instrumental music teachers. However, he has been misquoted, as some believe he specifically investigated whether singing improves intonation (Chevallard, 1982; Smith, 1981). He did not.

One study examined in the literature review raises much concern. Davis (1981) completed a study which, in the investigator's opinion, lacked focus and clarity. He attempted to answer many questions, and again in this researcher's opinion, did not describe his methodology precisely. He specifically said that he was investigating the effect of structured singing activities on intonation, but he did not test this. Radocy (1984) echoed this criticism, expressing that Davis' methodology was weak, and his definitions of terms were unclear.

Because of the lack of conclusive, empirical research examining the effect of vocalization on the intonation of beginning instrumentalists, there is a need for further study.

CHAPTER III THE DEVELOPMENT OF THE STUDY

NEED FOR FURTHER STUDY

The beginning band experience is an important component of most public school programs in music. The enthusiasm that children initially exhibit towards studying an instrument is often overwhelming. It is up to music educators to nurture, channel, and capitalize on this excitement. If the music teacher is successful, a student's desire to study music formally will exist long after the introductory year, and the student may love and value music for the rest of his or her life.

In this researcher's opinion, there needs to be more formal investigation of pedagogical practices in instrumental music instruction. Band teachers know of many instruction techniques to use when teaching instrumental music. However, there has not been much formal research investigating many of these basic teaching tools. Teachers need proven strategies in order to provide their students with educationally sound experiences and opportunities.

"Intonation, or the ability to perform in-tune is consistently one of the primary concerns in musical evaluation of both ensemble and solo performances" (Yarbrough, Karrick, and Morrison, 1995, p. 234). There is a need to formally examine ways to improve intonation (McGarry, 1967; Davis, 1981; Ngo, 1985), and to develop strategies and techniques to develop and refine a student's ability to play in-tune. This experiment proposes to investigate the technique of vocalization, and to determine whether the process of vocalization in an instrumental music class affects intonation.

DESCRIPTION OF THE SAMPLE

The sample of subjects used in this study consisted of grade six band students who were in their first year of instruction in instrumental music. All students attended the same school, and were taught by the same music teacher prior to the investigation. During the study, all of the students were instructed primarily by the investigator.

The students came from three intact music classes (N=93). Class 1 had a total of forty-three students (forty-one wind players and two percussion players), Class 2 had a total of twenty-nine students (twenty-seven wind players and two percussion players), and Class 3 consisted of twenty-one students (twenty wind players and one percussionist). Percussionists were excluded from the study as the instruments that they were playing in class were fixed pitch (they did not need to be tuned). Thirty-three students from Class 1 submitted permission slips, seventeen from Class 2, and seventeen from Class 3. As a result, the total number of students involved in the investigation was sixty-seven (N=67).

On the advice of Dr. Alice Boberg, Professor of Educational Psychology, University of Calgary, the two smaller classes were combined to form one group (these two classes were taught individually, but were combined to increase the statistical power), and the largest class was considered as one group. Random assignment determined the larger class to be the control group (N=33), and the combined group (N=34) to be the experimental group.

One student from the experimental group was omitted from the study. He or she could not match pitch, as determined by the investigator, nor could the subject sing the

test song in tune. As a result, the experimental and the control group each had 33 subjects.

QUASI-EXPERIMENTAL DESIGN

The experimental design used for this study was a pretest-posttest, and involved the following treatments:

EXPERIMENTAL GROUP: 1) play the music

2) sing the music

3) play the music

CONTROL GROUP: 1) play the music

2) play the music

3) play the music

The investigation involved intact groups: three instrumental music classes. While the designation of control group versus experimental group was determined through random assignment, it was impossible to assign each subject to a group through random assignment as subjects were members of intact grade six band classes.

Two pretests were administered. The students were first asked to complete the Musical Background Questionnaire, which was developed by the investigator (see Appendix D). This test was designed to assess each student's experience in music prior to his or her involvement in the study.

The Musical Aptitude Profile (Gordon, 1965) was the second pretest administered. Students were required to complete the Melodic Imagery and Tonal Imagery sections of this evaluation tool. This test was given to determine if there were any significant differences in musical aptitude among the three classes. For grade six music students, it has a reliability coefficient of .92 (Gordon, 1965, p. 50).

After a four-month treatment period, the students were tape recorded, and their performances were judged by music teachers, all of whom were accomplished musicians and had extensive experience in working with beginning band students. The teachers were asked to evaluate each subject's intonation by using the Individual Intonation Evaluation Form, developed by the investigator (see Appendix H).

PROCEDURE

Teaching Procedure

The purpose of this research project was to determine if regular, structured singing activities affected the intonation of beginning instrumental music students. Specifically, the concept 'play-sing-play' was tested. Each day, a singable band selection from the class method book or another source, such as Lois Choksy's Kodály Method or Zoltán Kodály's 333 Reading Exercises, was selected to be played on instruments, and to be sung.

Two groups comprised this study: an experimental group and a control group. The only manipulated variable was singing. Therefore, lessons for both groups were identical, except that the experimental groups had approximately three minutes of singing incorporated into instrumental lessons (see The Singing Activity).

The majority of the classes were taught by the investigator. On two occasions, when the investigator was engaged in individual testing, the regular band teacher taught the classes. As previously mentioned, the lesson plans for the experimental group and the control group were virtually identical, the only exception being that the experimental group sang for a total of three minutes per day in every class, while the control group played during that three minute segment of each lesson. Both groups followed the same warm-up procedures, worked on the same material from the same method book, played the same repertoire, and were exposed to the same supplemental material. The same amount of time was also spent on each activity in each class. The only difference was that when the classes were involved in the experimental activity, the control group played the song one more time while the experimental sang the second performance. Approximately three minutes was devoted to the singing activity during each class period (see Appendix E).

The study was implemented during the second term of the school year and was of approximately four months duration, from January 6, 1997, to May 7, 1997. The school operated on a 5 day rotating schedule, so, if for some reason there was no school on a particular day, the schedule carried over to the next day. This was especially convenient for the purposes of this study, as all three classes had the same number of lessons (forty-four lessons in total).

After the treatment was implemented, each student was asked to perform a piece selected by the investigator (see Appendix F), and the performance was recorded. The recordings were then evaluated by three people knowledgeable about instrumental music: one adjudicator was a flautist who had been teaching instrumental music to beginners for

eight years, another adjudicator was a horn player who had been teaching instrumental music for nine years , and the final adjudicator was a saxophonist who had been teaching music for twenty-four years.

Recording Procedure

The recording of the subjects took approximately two weeks, and five students were recorded each day. At this point the regular music teacher had resumed instruction of the classes, however, the researcher was responsible for the warm-up for each class. The warm-up was essentially the same, consisting of scale work, rhythm pattern work, and playing of the test piece (both in unison and in canon).

The Experimental Group

Before the song that was prepared for recording was actually recorded, each subject was required to tune to a Bb Concert. He or she was asked to listen to the Bb that the investigator played on her horn. The note given was always checked with the tuner and played in the register in which the subject tuned, except for subjects that played the tuba: their note was played an octave higher. After listening, the subject was asked to play the Bb. The subject was again asked to listen to the investigator's Bb, this time played in the student's vocal range, and was asked to sing the pitch on the neutral syllable, 'lu'. Finally, the first part of the procedure was repeated, and the subject was asked to judge if he or she was either sharp, flat, or in-tune with the investigator. After the judgment was made, the subject's note was checked with the tuner, and any necessary adjustments were made so that the Bb registered in-tune on the tuner.

The subject was then asked to play the test piece “Chairs to Mend”. After the piece was played, the subject was asked to sing the song (the starting pitch was given to the subject by the investigator). The subject played the song once more, and this performance was recorded.

The Control Group

Members of the control group also tuned to a Bb Concert. Each subject was asked to listen to the Bb that the investigator first played (which was also checked with the tuner and played in an appropriate range), and was asked to play the Bb with the investigator. This process was repeated two more times, and after the third repetition the subject was asked to judge whether the note was sharp, flat, or in-tune with the investigator’s note. The subject’s note was checked with the tuner, and the subject made adjustments until the note registered in-tune on the tuner.

Once the subject was in tune, according to the tuner, he or she was asked to play the test song. The subject played it two more times: three times in total. The third playing was recorded.

EQUIPMENT USED

- a Tuning Fork (A=440 Hz)
- a Korg Tuner
- a Peavy Microphone
- a Shure M268 Mixer
- a Techniques RFB28R Stereo Cassette Deck

EVALUATION OF RECORDINGS

Once all the subjects had been recorded, the tapes were listened to by the three adjudicators. They met in a classroom at the University of Calgary, where they listened to the tapes. The playback devices were a Sony TC RX606ES Cassette Deck and a Sony GX 49ES Amplifier.

The evaluators were given booklets that had an evaluation sheet for each subject (see Appendix H). They were then given instructions by the investigator (see Appendix G). Once the instructions had been given, and any questions were answered, the evaluators listened to the tape in its entirety, and were asked to rate each performance on a scale of one to five. The investigator stopped the tape after each individual performance, and started it again after she received a signal from each person that he or she was ready to continue.

After a short break, the tape was played again, and each adjudicator was asked to check his or her decisions about the performances heard. At no time was the tape stopped during the second playing.

As mentioned in Chapter 2, many of the studies investigating intonation use complicated methods and sophisticated technical equipment to evaluate tuning. In the investigator's opinion, no one actually listens to music in such an artificial matter. As a result, the perceptions of trained musicians, who are also beginning instrumental music specialists, will be the only sources used to evaluate intonation.

CONTROLS

Procedure Controls

There were many sources of possible contamination in this study. In order to minimize the effects of contaminants, several controls were instituted.

All the subjects who participated in the study were from the same school. It is hoped that this reduced possible influence from several external factors, including room environment, socioeconomic status (the students all came from the same affluent area), administrative support of the music program, and previous instruction in instrumental music (all the students were taught by the same music teacher prior to the involvement of the researcher in their musical training).

The subjects were also in the same grade level, with an age range of eleven to twelve years. Any extreme effect of age contamination was therefore controlled.

Once the study began, all the students were taught by the investigator. Each group received the same lessons which utilized the same material and teaching strategies. This was done in an effort to eliminate the effect of differences in style of instruction.

Students who were unable to match pitch were considered another possible source of contamination. The investigator tested each student's pitch matching abilities, first by demonstrating what is meant by 'pitch matching,' and then by checking each student's ability to match pitch. This was done by asking each subject to sing a pitch that was sung to them, and then to sing a pitch that was played on a horn. While several of the students could not match pitch, only one of these students submitted a parental consent form. Although this subject participated in the final recording procedure, and the performance

was evaluated by the adjudicators, his or her scores were eventually dropped from the statistical analysis as the subject could neither sing the song accurately nor match pitch.

The classes were periodically observed by visitors, and were constantly observed by the music teacher. All people were asked to check whether appropriate groups were receiving appropriate treatment, and that the instruction was the same with the exception of the singing activity. This may have reduced possible treatment contamination.

Home practice was another factor that may have affected results. Based on the recommendation of the class teacher, practice records were not required to be filled out, as they had not been successful in the past. However, students were consistently asked to practice a minimum of fifteen minutes each day.

Recording Controls

The recording procedures potentially could have altered the results of the study. Several controls were instituted in order to lessen their impact on the results.

Prior to the recordings, the investigator met with a technician to determine how best to record the subjects. The recording process, the equipment used, and the recording levels were based upon his recommendations.

All the recordings were made by the same tape recorder (a Techniques RFB28R Stereo Cassette Deck), the same mixer (a Shure M268), and the same microphone (a Peavy Microphone). Although several tapes were used, they were the same type of tape (Maxell XL II). Also, the recording levels, the placement of the microphone, and the position of the student in relation to the microphone were always the same. The

recordings were always made in the same room (the school's infirmary), and temperature was controlled by a central temperature monitoring system.

On each day that the subjects were recorded, all machinery was checked to insure that it was in good working order and that the levels were correctly set. The tuner was checked with a tuning fork ($A=440$ Hz) to make sure that it was working properly. The investigator then played an 'A' that registered in tune on the tuner, and recorded it. Finally, the recorded 'A' was checked with the tuner.

Evaluation Controls

The playback equipment that the evaluators used could have been another source of contamination. As a result, all the evaluators were asked to meet at the same location, and only one playback device was used. The playback system, which was a high-quality sound system used for music history classes the University of Calgary, was checked to make sure that it was in good working order.

THE SINGING ACTIVITY: "Chairs to Mend"

The song, "Chairs to Mend" (see Appendix F), was selected as the test piece for the study. This song has largely a descending melodic line with a range of a fifth, and consists of simple rhythms. The song poses few singing problems for students at this stage of their music studies. It was transposed into the key of Bb Concert, a key with which beginning instrumentalists are quite comfortable (the notes are diatonic to Bb Concert), and the rhythms did not pose any tonguing problems. The song, as written, concludes with a V (low)- I cadence, but due to the vocal and instrument range

limitations of singing and playing the song in Bb, the song was performed, vocally and instrumentally, using a V (high) cadence.

“Chairs to Mend” was taught to the students by rote; they were not given any written music. When teaching the song, the investigator used scale degree numbers, as this was the method to which the students were accustomed. Seven of the total number of lessons involved the playing of the test piece.

STATISTICAL EVALUATION

Specific information concerning the analysis of the data can be found in Chapter 4. The investigator received consultation from Ms. Gesela Engeles, a statistician at the University of Calgary. The computer program SPSS (Version 7.5) was used to calculate and to organize the information. The alpha level employed for all statistical analysis was .05.

CHAPTER IV PRESENTATION AND ANALYSIS OF DATA

PRETEST INFORMATION

Two pretests were administered for this study. Portions of the Musical Aptitude Profile were completed by the subjects to determine if there were significant differences in aptitude from group to group. Each subject was also asked to complete The Musical Background Questionnaire, developed by the author, which was intended to provide information about any previous musical background that might impact the results of the study.

All subjects completed the Tonal Imagery and Rhythmic Imagery sections of the Musical Aptitude Profile, developed by Edwin Gordon. Previous testing has shown that, with grade six students, the reliability coefficient for this test is .92 (Gordon, 1965, p. 50).

Preliminary examination of the standard score totals revealed little difference between mean scores of each of the three groups. Group 1 (N=17) had a mean score of 212.35, with a standard deviation of 22.60, Group 2 (N=17) had a mean score of 213.29, with a standard deviation of 18.94, and Group 3 (N=33) had a mean score of 216.15, with a standard deviation of 20.58. (see Table 1).

Table 1 Standard Test Score Results

Class 1	Mean	212.3529
	N	17
	Std. Deviation	22.5996
Class 2	Mean	213.2941
	N	17
	Std. Deviation	18.9366
Class 3	Mean	216.1515
	N	33
	Std. Deviation	20.5778
Total	Mean	214.4627
	N	67
	Std. Deviation	20.4690

To determine if there were statistically significant differences between the groups, test scores were subjected to a one-way analysis of variance. Table 2 indicates that there was no significant difference, $F(2,64) = .23$, $p = .80$.

Table 2 ANOVA Standard Test Scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	193.003	2	96.501	.225	.799
Within Groups	27459.654	64	429.507		
Total	27625.675	66			

POSTTEST INFORMATION

The posttest involved three raters evaluating each performance in terms of the intonation. Rater 1 evaluated the three classes as follows; Class 1(N=17) had a mean of 3.35, and a standard deviation of 1.22, Class 2(N=17) had a mean of 3.53, with a standard deviation of 1.23, and Class 3 (N=33) had a mean of 2.76, and a standard deviation of

1.12 (see Table 3). An analysis of variance showed no significant differences between the 3 groups, $F(2,64) = 2.94$, $p = .06$ (see Table 4). The evaluations provided by Rater 1 did not indicate any differences in intonation of the test song as performed by the three classes.

Table 3 Rater 1 Evaluation

Class 1	Mean	3.3529
	N	17
	Std. Deviation	1.2217
Class 2	Mean	3.5294
	N	17
	Std. Deviation	1.2307
Class 3	Mean	2.7576
	N	33
	Std. Deviation	1.1189
Total	Mean	3.1045
	N	67
	Std. Deviation	1.2077

Table 4 ANOVA Rater 1 Evaluation

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.090	2	4.045	2.936	.060
Within Groups	88.178	64	1.378		
Total	96.269	66			

Rater 2's total evaluation of the 3 groups resulted in a mean of 2.94 with a standard deviation of 1.37. Group 1 received an average rating of 3.06, with a standard deviation of 1.43, while Group 2 received an average rating of 3.18, with a standard

deviation of 1.38. Group 3 had a mean of 2.76 and a standard deviation of 1.35 (see Table 5). Again, no statistically significant results were obtained when an ANOVA was performed on this information, $F(2, 64) = .60$, $p = .55$ (see Table 6). Rater 2 found no intonational differences between the three classes.

Table 5 Rater 2 Evaluation

Class 1	Mean	3.0588
	N	17
	Std. Deviation	1.4349
Class 2	Mean	3.1765
	N	17
	Std. Deviation	1.3800
Class 3	Mean	2.7576
	N	33
	Std. Deviation	1.3470
Total	Mean	2.9403
	N	67
	Std. Deviation	1.3694

Table 6 ANOVA Rater 2 Evaluation

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.289	2	1.144	.603	.550
Within Groups	121.472	64	1.898		
Total	123.761	66			

The total mean score of Rater 3's evaluation was 3.02, with a standard deviation of 1.15. Group 1 received an average rating of 3.21, with a standard deviation of 1.20, while Group 2 had a mean of 3.35, with a standard deviation of 1.18. Group 3 had an average rating of 2.76, and a standard deviation of 1.08 (see Table 7). Again, no

statistically significant results were obtained when an ANOVA was performed on this information, $F(2, 64) = .384$, $p = .68$ (see Table 8). Rater 3's evaluations did not indicate a difference amongst the three classes.

Table 7 Rater 3 Evaluation

Class 1	Mean	3.2059
	N	17
	Std. Deviation	1.1997
Class 2	Mean	3.3529
	N	17
	Std. Deviation	1.1827
Class 3	Mean	2.7576
	N	33
	Std. Deviation	1.0834
Total	Mean	3.0224
	N	67
	Std. Deviation	1.1528

Table 8 ANOVA Rater 3 Evaluation

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.767	2	.384	.384	.683
Within Groups	63.889	64	.998		
Total	64.656	66			

As previously mentioned, there were 2 experimental groups and one control group. Each experimental group had 17 subjects in it, and the control group had 33 subjects. Because, after initial evaluation, there were no significant differences found

between the experimental groups, they were combined to increase the power of the statistical analysis (see Tables 9 and 10).

Table 9 Standard Score Totals with 2 Groups

Group 1	Mean	212.8235
	N	34
	Std. Deviation	20.5360
Group 2	Mean	216.1515
	N	33
	Std. Deviation	20.5778
Total	Mean	214.4627
	N	67
	Std. Deviation	20.4690

Table 10 ANOVA Standard Score Totals with 2 Groups

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	185.473	1	185.473	.439	.510
Within Groups	27467.184	65	422.572		
Total	27652.657	66			

A Spearman test for correlation was used to compare the relationship of the 3 raters mean scores (see Table 11). Between Rater 1 and Rater 3 the correlation coefficient was .335, and between Rater 2 and Rater 3 it was .530. Although there was

correlation amongst all three raters, the highest correlation was between Rater 1 and Rater 2, with a correlation coefficient of .597. On the advice Ms. Gesela Engeles, a statistician at the University of Calgary, who based her recommendation on common statistical conventions and accepted practice, one rater was dropped so that the highest possible reliability could be achieved. Because the correlation between Rater 1 and Rater 2 was the greatest, it was decided to drop the scores of Rater 3. The resulting reliability coefficient if this rater was excluded was .75 (see Table 12 and 13).

Table 11 Rater Correlation Coefficient

	Rater 1	Rater 2	Rater 3
Rater 1	1.000	.597	.335
Rater 2	.597	1.000	.530
Rater 3	.335	.530	1.000

Table 12 Reliability Analysis

	Mean	Minimum	Maximum	Range	Min/Max	Variance
Item Means	3.1692	2.9403	3.4627	.5224	1.177	.0714
Item Variance	1.4378	.9796	1.8752	.8955	1.9141	.2008

N= 67

Table 13 Item-total Statistics

	Scale Mean had if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
Rater 1	6.4030	4.2745	.5654	.3612	.6643
Rater 2	6.5672	3.2795	.6859	.4709	.5130
Rater 3	6.0448	5.3161	.4954	.2766	.7458

For analysis purposes, a new rater was created, and this rater's scores were the average of Rater 1 and Rater 2's scores for each subject. At this point, the subject that was unable to match pitch was dropped from the study. This 'new rater' found the experimental group to have a test score mean of 3.33, and a standard deviation of 1.15. The control group had a mean of 2.76, and a standard deviation of 1.08. An ANOVA showed a significant difference, $F(1,64) = 4.38$, $p = .04$. (see Table 14 and Table 15). As previously mentioned, there was no significant difference found between the two groups prior to the singing treatment. Since, after treatment, the only difference between experimental group and the control group was that the experimental group had singing activities included in the regular lessons, it could initially be concluded that singing had a statistically significant effect in improving the intonation of these beginning band students.

Table 14 New Rater Evaluation

Group 1	Mean	3.3333
	N	33
	Std. Deviation	1.1502
Group 2	Mean	2.7576
	N	33
	Std. Deviation	1.0834
Total	Mean	3.0455
	N	66
	Std. Deviation	1.1460

Table 15 ANOVA New Rater Evaluation

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.470	1	5.470	4.382	.040
Within Groups	79.894	64	1.248		
Total	85.364	65			

Information about the musical background of the students, obtained prior to the implementation of the study, was examined to see if there were other factors that might have affected the results of the study (see Appendix D). Areas of particular interest included private instruction on band instrument, lessons on other instruments, singing

lessons, and any other extracurricular musical activities in which a subject might have been involved.

One area of interest was whether or not the subject had any previous keyboard instruction. A question was designed to assess a subject's background with keyboard instruction. No significant results were obtained, $F(1,65) = .12$, $p = .74$, $F(1,65) = 1.00$, $p = .32$ (see Tables 16, 17, 18, and 19). It may be concluded that there was no correlation between previous keyboard instruction and subjects' intonation performance.

Table 16 Q1a Keyboard

	Mean	N	Standard Deviation
YES	2.9412	17	1.2360
NO	3.0500	50	1.1350
Total	3.0224	67	1.1528

Table 17 ANOVA Q1a Keyboard

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.150	1	.15	.112	.739
Within Groups	87.566	65	1.347		
Total	87.716	66			

Table 18 Q1b Keyboard

	Mean	N	Standard Deviation
YES	2.8750	32	1.2247
NO	3.1571	35	1.0831
Total	3.0224	67	1.1528

Table 19 ANOVA Q1b Keyboard

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.331	1	1.331	1.001	.321
Within Groups	86.386	65	1.329		
Total	87.716	66			

Subjects were then asked if they were taking private lessons on the instrument that they were studying in band class. Although some subjects were receiving private instruction, again, no significant results were found, $F(1,65) = .39$, $p = .53$ (see Tables 20 and 21). This could be due to the fact that the majority of students were not receiving private instruction. Only four of the sixty-seven subjects reported such study.

Table 20 Q2 Private Lessons on Band Instrument

	Mean	N	Standard Deviation
YES	3.3750	4	1.1087
NO	3.000	63	1.1605
Total	3.0224	67	1.1528

Table 21 ANOVA Q2 Private Lessons on Band Instrument

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.529	1	.529	.394	.532
Within Groups	87.187	65	1.341		
Total	87.716	66			

Whether or not the subjects played their instruments in an ensemble was also relevant to the study. More than half the students did participate in ensembles, but again there appeared to be no correlation between this experience and intonation, $F(1,65) = 3.15$, $p = .081$ (see Tables 22 and 23).

Table 22 Q3 Playing in an Ensemble

	Mean	N	Standard Deviation
YES	3.2308	39	.9790
NO	2.7321	28	1.3228
Total	3.0024	67	1.1528

Table 23 ANOVA Q3 Playing in an Ensemble

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.052	1	4.052	3.148	.081
Within Groups	83.664	65	1.287		
Total	87.716	66			

Some of the subjects played an instrument other than their band instrument or a keyboard instrument. This, too, was analyzed to see whether it affected the raters' evaluations of intonation. Subjects were asked if they had ever studied an instrument other than their band instrument or a keyboard instrument . Eleven had, but once again, there appeared to be no correlation with intonation as measured by the raters, $F(1,65) = .005$, $p = .94$ (see Tables 24 and 25).

Table 24 Q4 An Additional Instrument

	Mean	N	Standard Deviation
YES	3.0455	11	1.1501
NO	3.0179	56	1.1637
Total	3.0224	67	1.1528

Table 25 ANOVA Q4 Playing an Additional Instrument

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.002E-03	1	7.002E-03	.005	.943
Within Groups	87.709	65	1.349		
Total	87.716	66			

The students' public school music training was also pertinent to the study. Subjects were asked if their elementary music teacher was a music specialist or a generalist. There appeared to be no relationship between elementary music experiences and intonation, $F(1, 65) = .85$, $p = .36$ (see Tables 26 and 27).

Table 26 Classification of Music Teacher

	Mean	N	Standard Deviation
Specialist	2.9746	59	1.0884
Generalist	3.3750	8	1.5980
Total	3.0224	67	1.1528

Table 27 ANOVA Classification of Music Teacher

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.130	1	1.130	.848	.361
Within Groups	86.587	65	1.332		
Total	87.716	66			

Several questions on the questionnaire were aimed at finding out the subjects' experiences in singing. They were asked if they were presently singing in, or had ever sung in a school choir . Although several students had at some point been in a school choir, singing in a school choir had no significant impact on instrumental intonation performance, $F(1,65) = .50$, $p = .48$, $F(1,65) = .006$, $p = .94$) (see Tables 28, 29, 30, and 31).

Table 28 Q6a Singing in a School Choir

	Mean	N	Standard Deviation
YES	2.7500	8	1.2817
NO	3.0593	59	1.1413
Total	3.0224	67	1.1528

Table 29 ANOVA Q6a Singing in a School Choir

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.674	1	.674	.503	.481
Within Groups	87.042	65	1.339		
Total	87.716	66			

Table 30 Q6b Singing in a School Choir

	Mean	N	Standard Deviation
YES	3.0278	64	1.1386
NO	3.000	13	1.2583
Total	3.0224	67	1.1528

Table 31 ANOVA Q6b Singing in a School Choir

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.085E-03	1	8.085E-03	.006	.939
Within Groups	87.708	65	1.349		
Total	87.716	66			

Experience in singing in a choir outside of school was also investigated. Whether or not a subject was presently, or had ever participated in choir outside of school had no effect on the findings of the study, $F(1,65) = .18$, $p = .28$, $F(1,65) = .044$, $p = .83$ (see Tables 32, 33, 34, and 35).

Table 32 Q7a Singing in a Different Type of Choir

	Mean	N	Standard Deviation
YES	3.4375	8	1.3212
NO	2.9661	59	1.1290
Total	3.0224	67	1.1528

Table 33 ANOVA Q7a Singing in a Different Type of Choir

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.565	1	1.565	1.181	.281
Within Groups	86.151	65	1.325		
Total	87.716	66			

Table 34 Q7b Singing in a Different Type of Choir

	Mean	N	Standard Deviation
YES	2.9583	12	1.0967
NO	3.0364	55	1.1740
Total	3.0224	67	1.1528

Table 35 ANOVA Q7b Singing in a Different Type of Choir

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.998E-22	1	5.99E-02	.044	.834
Within Groups	87.656	65	1.349		
Total	87.716	66			

Students were also asked whether they were taking, or in the past had taken singing lessons privately. A surprisingly large number (fourteen) were presently taking or had taken private voice lessons. In comparing the individual scores of all the students

with a history of voice lessons in both experimental and control groups, these students consistently received high ratings. Significant differences were noted with those students, $F(1,65) = 5.48$, $p = .022$. There appeared to be a clear correlation between voice instruction and the perception of instrumental intonation by the adjudicators.

Table 36 Singing Lessons

	Mean	N	Standard Deviation
YES	3.6429	14	.8419
NO	2.8585	53	1.1742
Total	.0224	67	1.1528

Table 37 ANOVA SINGING LESSONS

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.813	1	6.813	5.474	.022
Within Groups	80.903	65	1.245		
Total	87.716	66			

In order to determine whether indeed the experimental treatment had any effect, it was necessary to remove the scores of some of the students. There were four voice study students in the control group, and ten in the experimental group. In order to have the same number of subjects who had taken singing lessons in each of the groups, six subjects from the experimental group were, through random selection, dropped for this series of statistical analysis. When these six subjects were dropped from the study, no

significant differences existed between the two groups, $F(1,58) = 2.58$, $p = .12$ (see Tables 38 and 39).

Table 38 Rater Evaluations if Six Subjects are Dropped

	Mean	Std.deviation	N
Group 1	3.2222	1.1630	27
Group 2	2.7576	1.0834	33
Total	2.9667	1.1345	60

Table 39 ANOVA Rater Evaluations if Six Subjects are Dropped

	Sum of Squares	df	Mean	F	Sig.
Between Groups	3.206	1	3.206	2.557	.115
Within Groups	72.727	58	1.254		
Total	75.933	59			

All the subjects that had taken singing lessons were then dropped from the study. This resulted in an experimental group that had 29 subjects, and a control group that had 23 subjects. Again, when these subjects were dropped, there were no significant differences found between these groups, $F(1,50) = 1.53$, $p = .22$ (see Tables 40 and 41.). Clearly, the subjects that had taken private voice lessons had impacted the initial findings.

Table 40 Rater Evaluation if All Subjects with Singing Lesson Experience are Dropped

	Mean	Std. deviation	N
Group 1	3.1087	1.2243	23
Group 2	2.7069	1.1142	29
Total	2.8846	1.1699	52

Table 41 ANOVA Rater Evaluations if All Subjects with Singing Lesson Experience are Dropped

	Sum of Squares	df	Mean	F	Sig.
Between Groups	2.071	1	2.071	1.529	.222
Within Groups	67.737	50	1.355		
Total	69.808	51			

SYNOPSIS

In the first instance, a statistically significant difference was found between experimental (singing) and control (non-singing) groups. Intonation was judged to be better in the singing groups.

Extraneous musical experiences such as keyboard instruction, instruction on other instruments and singing in choirs appeared to have no impact on intonation. Voice instruction, on the other hand, clearly had an impact. There was a statistically significant relationship between voice study and intonation.

CHAPTER V CONCLUSION

SUMMARY

This study investigated whether a beginning instrumental program that incorporates regular structured singing activities improves the intonation performance of the beginning band student. The review of the literature indicates that there are many experts in various music fields who believe that singing does improve a person's tuning. It also shows that there is not much quantitative research examining this question, and much of that which does exist is inconclusive.

An experiment was designed to empirically test if singing improves the intonation of beginning band students. For a treatment period of four months, the investigator taught three grade six instrumental music classes in Springbank, Alberta. The three classes were quite different in size; the largest class had forty-three students, the smallest had twenty-one students, and the other class twenty-nine students. The two smaller classes were combined to form one group (for statistic purposes only; due to scheduling conflicts the classes were taught individually). Through random assignment, it was determined that the two smaller classes would serve as the experimental group, and the larger class would be the control group. Sixty-seven students submitted parental consent forms (33 experimental, 34 control).

As pretest measures, two tests were administered. The first was comprised of the Tonal Imagery and Rhythmic Imagery subsections of the Musical Aptitude Profile, a standardized test developed by Gordon (1965). This test was given to ensure that there were no differences between the classes in terms of musical understanding. The second test, the Musical Background Questionnaire, was an author-designed instrument, created

to assess the prior music background of the students. Each subject's ability to match pitch also seemed pertinent to the study, and this ability was tested after approximately a month of instruction.

Students were taught by the investigator, and all the classes were offered virtually identical lessons. However, there was one activity in each lesson that involved different participation, and the type of instruction given depended on whether the experimental or the control group was involved. This activity was the "Structured Singing Activity". Subjects in the experimental group were required to sing the activity, through the use of numbers or words if it were a song with text, in addition to performing it on their instrument. The framework usually followed the 'play-sing-play' pattern, where the subjects played the selection on their instruments, then sang the song, and then played the song again. Subjects in the control group did not sing, but instead, played the song three times. Although the experimental group sang and the control group did not, it is important to note both groups were involved in the activity for the same amount of time (approximately three minutes), and completed the same number of repetitions; the control group had instrumental repetitions, and the experimental group had vocal and instrumental repetitions.

After the treatment period, the subjects were asked to record the song "Chairs to Mend", individually, on their own instruments. The recording process was similar to the instruction process in that experimental group students played, sang, and then played, and control group students only played. After a standardized warm-up, tuning, and performing procedure, each subject recorded the song.

Once all the performances were recorded, a panel of three skilled instrumental

music teachers was asked to evaluate each performance in terms of intonation. After being read instructions, each adjudicator rated each individual performance on a scale of 1 to 5, where 1 meant that the subject played with poor intonation, and 5 meant that the subject played with excellent intonation. The evaluators relied on their aural skills to make the determinations.

These results, along with the data derived from the Musical Background Questionnaire, were statistically analyzed. After treatment, significant differences were found between the two groups, $F(1,64) = 4.38$, $p = .040$. The singing group had a pattern of better intonation than the non-singing group. Once the musical background of the subjects was analyzed, however, it was discovered that subjects who had taken singing lessons had skewed the results.

DISCUSSION

Evaluation of the pretest showed that there were no significant differences between the groups, $F(2,64) = .23$, $p = .80$. After the posttest results were analyzed, a comparison of the means of the raters showed that they evaluated the experimental group higher than the control group (experimental group mean = 3.33, control group mean = 2.76). An analysis of variance showed that result was significant, $F(1,64) = 4.38$, $p = .040$. One would be led to conclude that an instrumental program that incorporates singing into instruction is significantly effective in improving the intonation of beginning instrumentalists.

Upon examination of the information obtained from the musical background questionnaire, it was found that the evaluators rated those who had taken singing lessons

significantly higher, $F(1,65) = 5.47$, $p = .022$. Several statistics were completed to determine how these subjects influenced the study.

First of all, there was an unequal distribution of subjects who had taken singing lessons. Ten subjects in the experimental group had had private voice instruction, as compared to only four in the control group. In order to balance the number of people who had singing experience, six of the subjects, through random assignment, were dropped from the analysis. An analysis of variance determined that there was no significant difference between the two groups if these subjects were dropped, $F(1,58) = 2.58$, $p = .12$. The six subjects had impacted the results.

It was also of interest to the investigator to understand, in general, how people who had had singing lessons affected the results. As a result, all fourteen subjects were dropped from the study. Again, no significant difference between the two groups was found, $F(1,50) = 1.53$, $p = .22$. This further supports the notion that students who had taken singing lessons skewed the results.

The data showed that although there was a significant difference found between the experimental group and the control group, these results were dependent on subjects who had received private instruction in voice. This would lead one to believe that it was private instruction in singing that caused the significant differences in the groups, and not the experimental treatment. Therefore, it must be concluded that private voice instruction did affect the intonation of beginning band students, and that the investigation of singing within band periods did not.

It is the opinion of the investigator that the fact that the trained singers skewed the results further supports the notion that singing does improve intonation. Their musical

background was deeply rooted in singing, and they had studied singing with a person trained in vocal coaching on an individual basis. Even though the sample size was quite small, students who had received individual training in singing were able to influence the results.

Singing for three minutes per day is not enough time to develop the skills necessary to internalize sound, and hence, play with improved intonation. However, it is the opinion of the author that if much more energy was focused on singing in an instrumental classroom, the students would play with better tuning. The students who had received individualized attention in voice instruction, in the form of private voice lessons, were consistently rated high by the adjudicators. One must therefore deduce that if a person has a music background rich in singing, then he or she will have the necessary skills in place to play an instrumental music with accurate intonation.

These findings suggest that singing is an effective means to better the intonation of beginning band students. If a band program were to incorporate a rigorous voice training component, then the tuning of the players might well be improved. It also appears likely that if band students were studying voice privately, they would play their instruments with more accurate intonation.

IMPLICATIONS FOR FURTHER RESEARCH

The researcher recommends that further research be completed in the area of singing and instrumental intonation.

Perhaps the most important finding of this study is the effect of private voice instruction on intonation. It would be interesting to compare the instrumental intonation

of a group of non-singers with a group who had taken private voice lessons. The results show that the only significant background influence was private instruction in singing. It would be important to investigate whether one group who has studied singing privately, with a properly trained instructor, performs with significantly better intonation than a group that has had no singing experience.

Another approach this study would be to compare posttest results of a class whose members had studied both vocal music and instrumental music in school, with a class that just studied instrumental music.

It would also be of benefit to copy this investigation, but to provide more time for singing during the band class. The present study could be expanded to examine the effects of singing on the intonation of students at more advanced stages of their musical learning. It would also be interesting to replicate this study, but to extend the treatment period, and/or increase the sample size.

Another interesting adaptation would be to replicate the experimental design in other locations in Canada. Other provinces, notably Newfoundland, Quebec, and Nova Scotia, have deeper histories of music traditions than Alberta, so it would be interesting to see if working with students who have traditions strongly rooted in vocal music affect the results.

Finally, it might be of value to compare the intonation of students who were involved in an instrumental program whose foundations were based on a singing approach, such as program developed by Sarah Drew and Lynn Blenkin (1997) entitled Kodály for Band, with a more traditional band program. It would be interesting to see which program is more effective in instilling proper intonation practices.

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APPENDIX A
ETHICS LETTERS



1997-01-27

Ms Susan Coveyduck
Department of Music

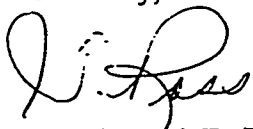
Dear Susan,

The Music Education Area and the Graduate Studies Committee have both considered your thesis proposal, *Vocalization and its Effect on a Beginning Instrumentalist's Intonation*. I am happy to tell you that your proposal has been approved.

In addition, the Department of Music Ethics Committee met on Tuesday, January 21 to consider the ethical implications regarding your research; in particular, Appendix A2, p. 27 "Consent Form". I am pleased to inform you that the Ethics Committee has approved your proposal and will be forwarding it to The University of Calgary Joint Ethics Committee for formal approval.

Congratulations on the approval of your proposal, and all best wishes for a speedy completion of your thesis.

Sincerely,


for: Dr. Kenneth DeLong
Graduate Coordinator

cc. Dr. Jeremy Brown, Supervisor
Joint Ethics Committee (The University of Calgary)

APPENDIX B
INFORMATION LETTERS

Apt.243 Olympus Hall
3374 24th Ave. N.W.
Calgary, AB
T2N 4V7
November 23, 1996

Attention: Mr. John Watson
Springbank Middle School

Dear Mr. Watson,

I am presently in my second year of a Master of Music Degree, in School Music at the University of Calgary, under the supervision of Dr. Jeremy Brown. Part of my degree requirement is that I write a research thesis. I am writing to you to ask for your help in the implementation of the research design for this thesis.

I wish to study the effect of vocalization on a beginning instrumentalist's intonation performance. For the second term of the school year (January to April), some of the students involved in the study will have singing activities incorporated into their instrumental music classes. The activities will take the following form; the student plays the piece of music- the student sings the piece of music- the student plays the piece of music. The music that the classes will play will be taken from the method book, from beginning band chorales, from their repertoire, and from supplemental material. Choices of the items to vocalized will be based on the their 'singability' (i.e. they will encompass appropriate ranges with intervals that can be sung easily), and they will be performed at slow tempos to allow the subject to concentrate on vocal and instrumental sound.

All of your beginning instrumental students involved in the study will initially be asked to complete a questionnaire which will provide information about their previous musical backgrounds, and will be required to complete two portions of the Musical Aptitude Profile (Gordon, 1965), which should indicate their level of musical understanding (this is a standardized evaluation tool which consists of two tests designed to assess the students' tonal and rhythmic understanding; I will administer these tests). At the end of the experimental treatment, your students will be asked to play a test piece, and each performance will be tape recorded. These tapes will be evaluated by instrumental music teachers, who will rate the intonation of each performance.

At no time will this study risk any student's physical, sociological, or psychological well being. Also, each subjects anonymity will be guaranteed at all times, as the questionnaires, tests, and tapes will be destroyed, and students will be identified by numbers. I have enclosed a copy of the parental consent form which outlines student involvement for you to view.

If you agree to allow this investigation to take place in one of your beginning band classes, it will be necessary for me to teach the entire class. While you would be more than welcome to participate in/attend any or all of the classes, the teaching of the classes would be my responsibility. This may help to ensure that the results of the study are not due to other factors. I will also need your help in developing lessons specific to your class, and will be asking for your comments, suggestions, and criticisms about all aspects of the study.

While I am unable to provide you with monetary remuneration for your contributions to this investigation, I am very eager to be involved in your program in any

way possible. I am a graduate of Mount Allison University (Sackville, N.B.), where I received both a Bachelor of Music and a Bachelor of Education. While my area of concentration, both at the undergraduate and graduate level, is instrumental music, I have had training and experience in elementary and choral music, and with children who have special needs. I am also a horn player, I have taken private lessons on all the woodwind instruments, and I have taught Brass Techniques at U of C.

Thank you so much for your time and consideration! If you have any questions or comments about this project, or have any suggestions on how to make it more successful, please feel free to contact me at any time. I can be reached at 220-1136 (home), 220-5376 (university), or at 506-384-4359 (collect, after December 11th). You may also contact Dr. Brown or Prof. Choksy, Head of the Department of Music, by calling the university number listed above.

Once again, thank you. I look forward to hearing from you soon.

Sincerely yours,

Susan Coveyduck
Graduate Student
University of Calgary

ATTACHED: Letter to Principal
Letter to Parents/Guardians

Apt 243 Olympus Hall
3374 24th Ave N.W.
Calgary, AB,
T2N 4V7
December 01, 1996

Attention: Mr. Larry Sorensen
Springbank Middle School

Dear Mr. Sorensen,

I am presently in my second year of a Master of Music Degree, in School Music at the University of Calgary, under the supervision of Dr. Jeremy Brown . Part of my degree requirement is that I write a research thesis. I have contacted Mr. John Watson, who has agreed to help with the implementation of my study, pending your approval.

I wish to study the effect of vocalization on a beginning instrumentalist's intonation performance, or in other words, to see if singing the music first helps a beginning instrumentalist play better in tune. The study will be incorporated into the Grade 6 regular instrumental music classes, and the activities that the students will be asked to do will supplement the material that is being prepared in band class. Whether or not the students in your school will be part of the experimental group, which will sing in class, or the control group, which will do no singing, will be determined by random assignment.

All of the music students in your school that are to be involved in the study will initially be asked to complete a questionnaire describing their previous musical background, and will also be required to take the Musical Aptitude Profile (Gordon, 1965), which should indicate their level of musical understanding (this is a standardized evaluation tool which consists of two portions examining a student's tonal and rhythmic understanding; I will administer these tests). At the end of the experimental treatment, all of the students will be asked to play a test piece, and this performance will be recorded. These tapes will be evaluated by instrumental music teachers, who will rate the intonation of each performance.

At no time will this study risk any student's physical, sociological, or psychological well being. Your students and your school, however, may be contributing to further advancements in instrumental music methodology. Also, each child's anonymity will be guaranteed, as the questionnaires, tests, and tapes will be destroyed, and students will be identified by numbers. I have enclosed a copy of the parental consent form which outlines student involvement for you to view.

The students in the 'test classes' will be taught primarily by me, in order to ensure that all the students involved in the study are receiving the same instruction. Mr. Watson, however, will continue to be fully involved in the musical education of the students. Also, colleagues of mine from the university will be periodically observing me teach, however, you will be notified in advance when they are expected to visit your school.

Thank you so much for your time and consideration! If you have any questions or comments about this project, please feel free to contact me at any time. I may be reached at 220-1136 (home), 220-5376 (university), or at 506-384-4359 (collect, after December 11th). You may also contact Dr. Brown or Prof. Choksy, Head of the Department of Music, by calling the university number given above.

Once again, thank you. I look forward to hearing from you soon.

Sincerely,

Susan Coveyduck
Graduate Student
University of Calgary

ATTACHED: Parents/Guardians information letter and consent form.

Apt. 204
1932 11th Ave., SW
Calgary, AB
T3C 0N8
April 21, 1997

Dear Parents/Guardians,

I am writing this letter to ask your permission to include your son/daughter in a band study which will take place the beginning of May. This study will examine the effect of vocalization on a beginning instrumentalist's intonation performance, or in other words, how singing affects a student's tuning.

This investigation has been undertaken to meet the requirements for a Master of Music Degree. I am a graduate student in School Music at the University of Calgary, and, along with Mr. Watson, have been working with the Grade 6 students at Springbank Middle School since January.

I have been implementing singing activities in some of the classes, and these activities have supplemented the material that the students have been working on during their regular class time. In order to evaluate the effectiveness of the singing activities, all the students will be recorded, and these taped performances will be assessed by other music teachers.

Participation in this study is completely voluntary, and your son's/daughter's anonymity will be completely guaranteed, as all tests and recordings will be destroyed, and each student will be identified by number only. Whether your child participates in the study will in no way affect his/her music grade or standing in the music program. There are no physical, sociological, or psychological risks involved in this investigation. Your son's/daughter's musical ability and understanding, however, may be enhanced through his/her participation. Also the knowledge to be gained from this study could contribute to the improvement to the field of music education.

Thank you in advance for your consideration. If you have any questions or require further information, please feel free to contact me at your convenience. I can be reached at 245-5044 (home), or 220-5376 (university). My supervisor, Dr. Jeremy Brown, may be also be reached at 220-5376.

Sincerely yours,

Susan Coveyduck
B.Mus., B.Ed
Graduate Student
University of Calgary

APPENDIX C

CONSENT FORM

This consent form, a copy of which has been given to you, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your child's participation will involve. If you would like detail about something mentioned here, or information not included here, please ask. Please take the time to read this form carefully and to understand any accompanying information.

The investigator will, as appropriate, explain to your child the research and his or her involvement, and will seek his or her ongoing cooperation throughout the project.

Your signature on this form indicates that you have understood to your satisfaction the information regarding your child's participation in the research project and agree to allow you child to participate as a subject. In no way does this waive your child's legal rights nor release the investigators, sponsors, or involved institutions from their legal and professional responsibilities. Your son or daughter is free to withdraw from the study at any time. Your child's continued participation should be as informed as your initial consent, so you and your son or daughter should feel free to ask for clarification or for new information throughout his or her participation. If you have further questions concerning matters related to this research, please contact:

SUSAN COVEYDUCK 245-5044 (home)
DR. JEREMY BROWN, SUPERVISOR 220-5376

If you have any questions concerning your participation in this project, you may also contact the Office of the Vice-President (Research) and ask for Karen McDermid, 220-3381.

I, the undersigned, consent____/do not consent____(please check one) to have my child_____(name of child) participate in the experimental study "Vocalization and It's Effect on a Beginning Instrumentalist's Intonation".

 Parent/Guardian

 Date

(Two copies of the consent form are enclosed. Please sign both forms and keep one of them for your records. The other should be given to your child to return to the school.)

APPENDIX D

MUSICAL BACKGROUND QUESTIONNAIRE

NAME: _____ BAND INSTRUMENT _____
 AGE: _____ GRADE: _____ HOMEROOM CLASS _____

Please answer the following questions by circling the appropriate answer.

- 1a Do you take piano/keyboard lessons? YES NO
- 1b Have you ever taken piano/keyboard lessons? YES NO
- 1c If you answered YES to either 1a or 1b, for how long? 6 months or less 7-12 months
 1-2 years 2-3 years
 3-4 years 4-5 years
 5-6 years 6-7 years
- 2a Do you take private lessons on the instrument that you play in band? YES NO
- 2b If you answered YES to 2a, for how long? 6 months or less 7-12 months
 1-2 years 2-3 years
 3-4 years 4-5 years
 5-6 years 6-7 years
- 3a Do you play your band instrument in an ensemble outside of band class? YES NO
- 3b If you answered YES to 3a, for how long? 6 months or less 7-12 months
 1-2 years 2-3 years
 3-4 years 4-5 years
 5-6 years 6-7 years
- 3c What kind of ensemble do you play in? _____
- 4a Do you take private lessons for another musical instrument? YES NO
- 4b Have you ever taken lessons on another musical instrument? YES NO
- 4c If you answered YES to either 4a or 4b, for how long 6 months or less 7-12 months
 1-2 years 2-3 years
 3-4 years 4-5 years
 5-6 years 6-7 years
- 4d Please name the other instrument that you (have) study (studied). _____

5a Do you take singing lessons? YES NO

5b Have you ever taken singing lessons? YES NO

5c If you answered YES to 5a or 5b, for how long?

6 months or less	7-12 months
1-2 years	2-3 years
3-4 years	4-5 years
5-6 years	6-7 years

6a Do you sing in a school choir? YES NO

6b Have you ever sung in a school choir? YES NO

6c If you answered YES to either 6a or 6b, for how long?

6 months or less	7-12 months
1-2 years	2-3 years
3-4 years	4-5 years
5-6 years	6-7 years

7a Do you sing in a choir outside of school (ex. church)? YES NO

7b Have you ever sung in a choir outside of school? YES NO

7c If you answered YES to 7a or 7b, for how long?

6 months or less	7-12 months
1-2 years	2-3 years
3-4 years	4-5 years
5-6 years	6-7 years

8 When you were in elementary school, did you have music classes taught by a music specialist or by your classroom teacher? (circle the kind of teacher)

9a Have you ever attended a music camp? YES NO

9b If you answered yes to 9a, please describe the camp below (i.e. type of camp, activities in which you participated, length of camp, number of camps that you attended).

If you would like to add more information about your previous musical background, or would like to describe any other musical ensembles in which you play, please do so below.

APPENDIX E

SAMPLE LESSON PLAN

WARM UP:

- 1) Play Bb concert scale, one whole note on each pitch, ascending and descending, and a mezzo-forte dynamic.
- 2) Play Bb concert scale, two half notes on each pitch, watching instructor for dynamic changes.
- 3) Play Bb concert scale, but this time play in 3 part canon (Row 1= Voice 1, Row 2 = Voice 2, Row 3 = Voice 3).
- 4) Using Bb concert scale notes, play the rhythm card game (Instructor has a set of rhythm cards; each card has a four beat rhythm. The students must play one rhythm. Once student is on beat four, the instructor changes the card. Without skipping a beat, the class must play the next note of the scale and the next rhythm pattern.).
- 5) General tuning. Tune to the instructor's Bb concert (played on a horn and checked with a tuner). Individual sections are then given an opportunity to tune, and to make adjustments with their instruments.
- 6) Play Bb concert, sustained. Watch instructor for indication to bend note upwards, or downwards, or to play 'normally' (This is an exercise where the instructor's hands indicate pitch: hands parallel to the floor, with fingers joined means 'play the pitch in tune', hands and fingers pointed upwards means 'play the pitch sharp', hands and fingers pointed downwards means 'play the pitch flat').

SINGING ACTIVITY:

#3 from 333 Reading Exercises (students have been taught exercise by rote in a previous lesson)

Experimental Group:

- 1) Play the song, on instruments, from memory.
- 2) Sing the song, from memory, using scale degree numbers. Repeat, with a reminder of posture.
- 3) Ask boys to sing all the 'I's and the girls to sing all the 'II's. Switch roles.

- 4) Ask brass and percussion to sing all the 'ta's and the woodwinds to sing all the 'ti-ti's.
Switch roles.
- 5) Sing the song once more, using scale degree numbers.
- 6) Play on instruments.

Control Group:

- 1) Play the song, on instruments, from memory.
- 2) Repeat the song two more times, reminding students of posture, etc.
- 3) Ask boys to play all the 'I's and the girls to play all the 'II's. Switch roles.
- 4) Ask brass and percussion to play all the 'ta's and the woodwinds to play all the 'ti-ti's.
Switch roles.
- 5) Play the song on instruments two times.

FROM METHOD BOOK (Standard of Excellence):

- 1) **#92.** Check to make sure that the new note is being played appropriately with correct fingering (Concert E).
- 2) **#95- Just by Accident.** Chromatic exercise using Concert E and Concert Eb. Check notes. Watch slurring, and 3/4 meter.
- 3) **# 93- Aura Lee.** Again, make sure that new note is being used. Aim for four bar phrases. Who made this song popular?
- 4) **# 97- Sailor's Song.** Watch for articulation and phrasing. Ask about the 'road map' when a second ending is involved. Allow 4 students to play the solo part.
- 5) **#98- Go For Excellence! "This Old Man".** Play as a class. Spot check by asking three individuals to play. Ask for some feedback about performances (One thing you liked...one thing that could be improved upon).
- 6) **Regal March.** Rehearse (if time). Watch specifically for:
 - balance (don't cover up the low brass)
 - articulation (especially slurs and accents)
 - ends of phrases (don't end the dotted half note too soon)

APPENDIX F
CHAIRS TO MEND



Taken from The Kodaly Context (1981), by Lois Choksy

APPENDIX G

INSTRUCTION FORM

The purpose of this study is to see if singing improves the intonation performance of beginning band students.

The performances that you are about to hear were made by Grade 6 band students in their first year of instruction. Some of the students had singing activities incorporated into their regular music lessons; the activities occurred daily and were relevant to the music being played in the class. Other students did no singing. The classes in which all students participated were virtually identical; the only difference was the singing activity. The classes which did no singing had a playing activity substituted for the singing activity.

On the taping day, all students participated in the same warm-up, and were given the opportunity to individually tune. After the tuning process, each student was asked to play, on their instruments, the song “Chairs to Mend”, which was recorded. The song was pitched in a key that was both familiar to the students, and that could be easily sung. “Chairs to Mend” sounds like this (investigator plays it for the panel).

Your job today is to rate the intonation of each student’s performance by using the scale provided. It is a 1 to 5 scale, where 1 means ‘played with poor intonation’, and 5 means ‘played with excellent intonation’. You will be asked to listen to the tape in its entirety twice. The first time you are asked to judge the intonation of each performance, and to circle the appropriate number on the Intonation Evaluation Form. During the second playing of the tape, you are asked to ‘check your answers’.

Some of the things to guide your responses might be the ‘centeredness’ of the tone, the interval relationships, or your overall sense of the intonation of the performance. Please do not allow things such as performance of rhythm, articulation, phrasing, etc. to bias your decision.

Thank you in advance for agreeing to evaluate these tapes. ANY QUESTIONS?

APPENDIX H
INTONATION EVALUATION FORM

Student ID Number_____ **Instrument**_____

PLEASE RATE THE INTONATION OF THE PERFORMANCE THAT YOU JUST
HEARD.

1
played with
poor intonation

2

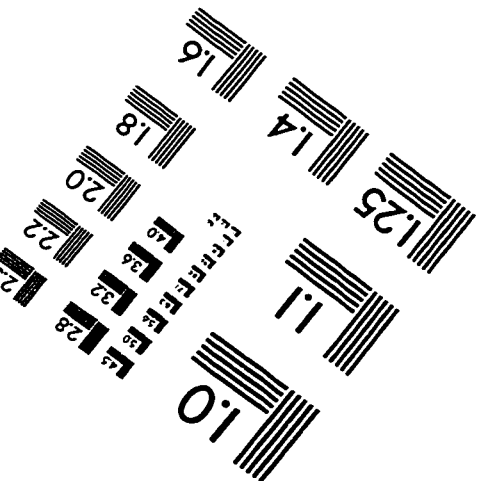
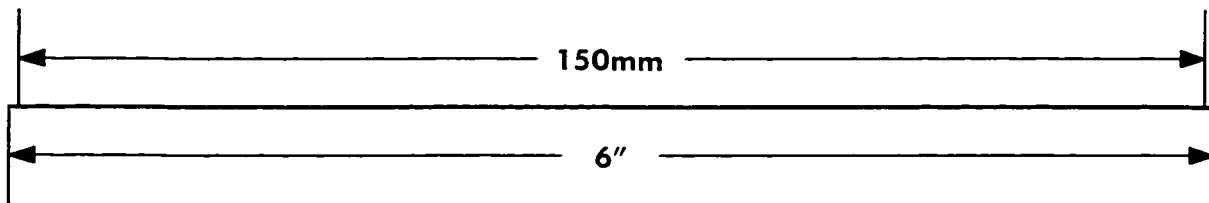
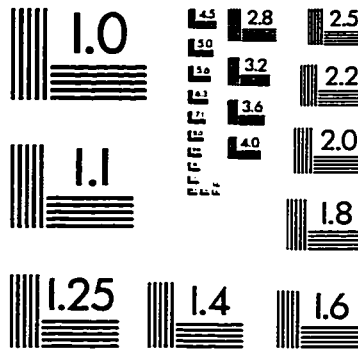
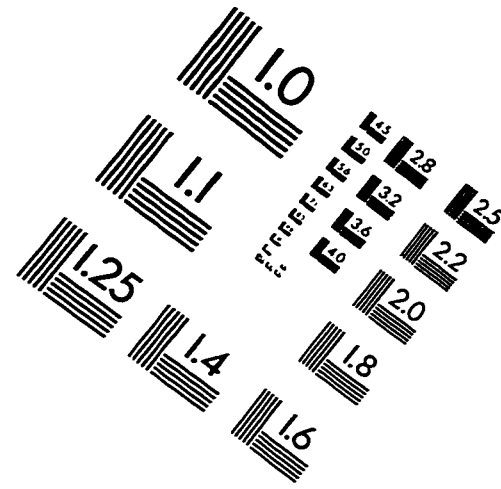
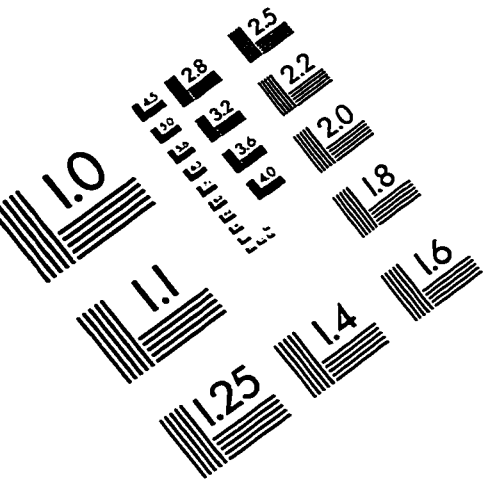
3
average

4

5
played with
excellent intonation

ADDITIONAL COMMENTS:

IMAGE EVALUATION TEST TARGET (QA-3)



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Fax: 716/288-5989

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