5-31-2002

The effect of male timbre vocal modeling in falsetto and non-falsetto on the singing and pitch accuracy of second grade students

Douglas Adam Tranz
Rowan University

THE EFFECT OF MALE TIMBRE VOCAL MODELING IN FALSETTO AND NON-FALSETTO ON THE SINGING AND PITCH ACCURACY OF SECOND GRADE STUDENTS.

by
Douglas Adam Tranz

A Thesis

Submitted in partial fulfillment of the requirements of the Master of Arts in Subject Matter Teaching: Music in the Graduate Division of Rowan University
2002

Approved by _____
Professor

_____
Professor

Date Approved May 2002

ABSTRACT

Douglas Adam Tranz

The Effect of Male Timbre Vocal Modeling in Falsetto and Non-Falsetto on the Singing and Pitch Accuracy of Second Grade Students

2002

Thesis Advisor: Dr. Lili M. Levinowitz

Master of Arts: Subject Matter Music Teaching

Graduate Division of Rowan University

The purpose of this study was to examine the effect of male falsetto and non-falsetto vocal stimuli on the pitch-matching accuracy of second grade students. The investigator also investigated the following: (1) would there be a difference in pitch-matching accuracy to the two vocal stimuli based upon gender; and (2) would there be a difference in the pitch-matching accuracy of students receiving vocal modeling presented in non-falsetto.

The sample for this study included 90 students in four second-grade general music classes.

During the 12 week treatment period, students in the control and experimental groups received the same music instruction; however, the vocal stimuli for these two groups differed.

At the conclusion of the 12 week treatment period, the students' individual performances were audio taped and judged by two independent music teachers.

A Pearson correlation was calculated to determine the respective interjudge reliabilities. Two two-way ANCOVA (treatment x gender) for each rote song and melodic pattern with the pretest score held constant, were calculated on the respective data sets.

The researcher found no difference in pitch-matching accuracy based upon gender; however, a significant difference was found in favor of falsetto vocal modeling.

MINI ABSTRACT

Douglas Adam Tranz

The Effect of Male Timbre Vocal Modeling in Falsetto and Non-Falsetto on the Singing and Pitch Accuracy of Second Grade Students

2002

Thesis Advisor: Dr. Lili M. Levinowitz

Master of Arts: Subject Matter Music Teaching

Graduate Division of Rowan University

The purpose of this study was to examine the effect of male falsetto and non-falsetto vocal modeling on pitch-matching accuracy of second grade students with gender differences taken into consideration.

The researcher found no difference according to gender; however, statistical significance was found in favor of falsetto vocal modeling.

ACKNOWLEDGEMENTS

I would like to take this opportunity to extend my sincere gratitude to Dr. Levinowitz for her time and assistance. She has been a valued teacher and mentor over the years.

I would like to thank my friends and colleagues for their encouragement and support. I would like to thank my judges for their assistance.

I would also like to express a special thank you to my parents and fiancée for their love and support throughout this process.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER ONE

Introduction

Content Standard One of the National Standards for Education in the Arts states that students should be able to sing a varied repertoire of music.[1] Music educators throughout the United States agree that a major goal of instruction should be to produce elementary school children that can match pitch.[2] Influences that affect students' pitch-matching are many and research has produced conflicting results regarding the role teachers' vocal modeling plays in developing accurate singers. Since the music teacher's most convenient tool for modeling songs is through the use of their own singing instrument, it is important for music educators to examine the effect that their modeling has on the pitch-matching abilities of students in their classrooms.

Throughout the last century research has sought to analyze the affect of various stimuli on children's singing. Recent research suggests that singing is a learned complex skill that may not develop through maturation alone.[3] Research conducted during the last half of the twentieth century has shown that all children can be taught to sing, and that with the increasing number of problem singers, strategies that assist students in

---

[1] Music Educators National Conference. (1994). *National standards for arts education: Dance, music, theatre, visual arts: What every young American should know and be able to do in the arts.* Reston, VA.
[2] Small, A. R. & McCachern, F. L. (1983). The Effect of Male and Female Vocal Modeling on Pitch-Matching Accuracy of First-Grade Children. *Journal of Research in Music Education,* Vol. 31, No. 3, 227-233.
[3] Levinowitz, L. M., Barnes, P., Guerrini, S., Clement, M., D'April, P., & Morey, M. J. (1998). Measuring Singing Voice Development in the Elementary General Music Classroom. *Journal of Research in Music Education,* Vol. 46, No. 1, 35-47.

developing their singing must find their way into the music classroom.[4] In the article "...Singing in the General Music Classroom", Goetze, Cooper, & Brown identified the model children are asked to match as a factor that affects vocal accuracy of children.[5]

Several studies have been conducted on the affect of vocal modeling on the pitch accuracy of young children. One such study was conducted by Georgia Green. In it Green examined the pitch-matching accuracy of 282 elementary students in grades one through six. Students were asked to match the pitches sung by three different models-an adult female soprano, and adult male tenor, and a nine year old child's unchanged voice.[6] The results revealed that subjects were more able to match the pitches sung by the child vocal model, followed by the adult female, and then the adult male.

Research by Sims, Moore, and Kuhn produced similar findings with regard to female and male vocal models. This study compared the singing accuracy of subjects when asked to match vocal patterns to a female mezzo soprano vocal model and male baritone vocal stimuli.[7] Subjects included thirty, five year old, and thirty, six year old students from the United States and England. The subjects from England received music instruction for 20 minutes each day for five days from a male instructor. The subjects from America received music instruction once a week for 30 minutes from a female instructor. Results indicated that subjects matched pitches more accurately under the female vocal stimulus then under the male stimulus.

---

[4] Rutkowski, J. (1996). The effectiveness of individual/small group singing activities on kindergartner's use of singing voice and developmental music aptitude. *Journal of Research in Music Education*, Vol. 44, No. 4, 353-368.

[5] Goetze, M., Cooper, N., & Brown, C. (1990). Recent research on singing in the general music classroom. *Bulletin of the Council for Research in Music Education*, Vol. 104, 16-37.

[6] Green, G. A. (1990). The effect of vocal modeling on pitch-matching accuracy of elementary schoolchildren. *Journal of Research in Music Education*, Vol. 38, 225-232.

Results of the study conducted by Ann Small and Frances McCachern also indicated a female vocal model to be superior to a male vocal model; however, the difference between the two models were very slight.[8] In this study, 55 first grade students were divided randomly into three groups and received practice over a five day period with the following: (1) a female vocal model; (2) a male vocal model; & (3) no contact control. No significant differences were found between the pre- and posttest pitch-matching accuracy means of the control group and practice groups. The researchers concluded that the male vocal model did not pose a significant problem to the first grade subjects in the study.

Although not clearly defined in the journal article of the Small and McCachern research study, the octave in which the male vocal model was presented may have had an affect on the pitch-matching abilities of the elementary school children. Children may experience difficulty matching examples presented in an octave other than their own singing voice. Therefore, male music teachers should sing songs to young students within the students' vocal range by using their falsetto voice.[9]

A study conducted by Price, Yarbrough, Jones, & Moore, compared the effects of male timbre, falsetto, and sine-wave models on the pitch-matching skills of 216 inaccurate boy versus girl singers in grades kindergarten through eight.[10] The results revealed that inaccurate boy singers responded more accurately to the male vocal model

---

[7] Sims, W. L., Moore, R. S., & Kuhn, T. L. (1982). Effects of female and male vocal stimuli, tonal pattern length, and age on vocal pitch-matching abilities of young children from England and the United States. *Psychology of Music*, 104-108.

[8] Small, A. R., & McCachern, F. L. (1983). The effect of male and female vocal modeling on pitch-matching accuracy of first grade children. *Journal of Research in Music Education*, Vol. 31, 227-233.

[9] Campbell, P. S., & Scott-Kassner, C. (1995). *Music in childhood: From perschool through the elementary grades*. New York: Schirmer Books, 142-143.

in the lower octave and the girls responded more accurately to the male vocal model presented in the higher octave (falsetto).

Research into the effect of male vocal modeling in varying octaves needs to be conducted. Currently, research into the effect of male vocal modeling presented in different octaves on pitch-matching accuracy of elementary school children is very limited. The purpose of this study was to examine the effect of male falsetto and non-falsetto vocal stimuli on the pitch-matching accuracy of second grade students. The investigator also investigated the following: (1) would there be a difference in pitch-matching accuracy to the two vocal stimuli based upon gender; and (2) would there be a difference in the pitch-matching accuracy of students receiving vocal modeling presented in non-falsetto.

[10] Price, H. E., Yarbrough, C., Jones, M., & Moore, R. S., Effects of male timbre, falsetto, and sine-wave models on interval matching by inaccurate singers. *Journal of Research in Music Education*, Vol. 42, No. 4, 269-284.

CHAPTER TWO

Related Research

The research to be reviewed will be limited to those studies which relate to the effects of male vocal modeling on pitch-matching of children. The following two studies relate directly to the effects of male vocal modeling in falsetto and non falsetto.

The Price, Yarbrough, Jones, Moore Study[1]

The purpose of this study was to compare the effects of male timbre, falsetto, and sine-wave models on the pitch-matching skills of inaccurate singers in kindergarten through grade eight. The authors of this study also sought to examine the differences in pitch matching skills according to gender differences and grade level.

For this study, two different male singers with two different timbre, tenor and bass, were used for vocal modeling stimuli. These singers were recorded on audio cassette singing a descending minor third in their regular octaves and in falsetto in counterbalance order with as little vibrato as possible. The sine-wave stimuli used was presented in the same octaves as the male singers and without vibrato. This produced a total of six examples. The prerecorded audio cassette stimulus with the male singers and the sine-waves were preceded by two practice examples using a female voice.

---

[1] Price, H., Yarbrough, C., Jones, M., & Moore, R. (1994). Effects of male timbre, falsetto, and sine-wave models on interval matching by inaccurate singers. *Journal of Research in Music Education*, Vol. 42, No.4, 269-284.

The subjects for this study consisted of 216 inaccurate singers, 108 boys and 108 girls, equally distributed for each grade level. Students were identified as inaccurate singers by the music teacher of each of the public schools used in this study. The researchers corroborated that students were inaccurate singers by assessing taped performances of them singing "Happy Birthday." This resulted in producing 12 boys and 12 girls for each grade level in each of the participating schools.

Subjects' responses to the taped stimulus were recorded using an additional tape recorder. These responses were then converted into digitized sound using MacRecorder software. Using this software, the researchers looped the most stable portion of each response to create a continuous pitch for measurement. Measurement consisted of using a Korg Model AT-12 Auto Chromatic Tuner and assigning pitches from zero to +24 cents to be in tune.

The researchers "analyzed the accuracy of responses by means of a repeated measure ANOVA with two subject factors (gender, grade levels) and two within stimuli factors (high/low octave and male/sine-wave)." There were no significant differences based upon gender, grade level, or different octaves. "There was a significant difference ($p < .005$) between overall accuracy of responses to the male versus sine-wave timbres. In every instance, responses to male stimuli were more accurate then were responses to sine-waves."

Price, Yarbrough, Jones, and Moore concluded that the octave of presentation by males is a factor that influences pitch accuracy. They also suggested that music teachers need to be aware of the octave they are using for vocal modeling.

Comparison between the Price, Yarbrough, Jones, Moore study and the present study

The Price, Yarbrough, Jones, Moore study examined the effects of male timbre, falsetto, and sine-wave models on the pitch-matching skills of inaccurate singers in grades kindergarten through eight. The present study focused on the effects of natural male timbre, or non-falsetto and falsetto, on the pitch-matching accuracy of second grade students. The Price, Yarbrough, Jones, Moore study prerecorded students singing a familiar song to identify inaccurate singers to be used in their study. In the present study, all participating second grade students were included in the study. Their performance in singing a familiar song was prerecorded to classify their singing ability according to the Rote Song Rating Scale.[2]

In the Price, Yarbrough, Jones, Moore study, individual inaccurate singers' responses to the stimuli were recorded and analyzed using computer software to determine interval accuracy with +/- one cent. The present study also recorded students' responses to stimuli with two differences: (1) the investigator presented the vocal model in falsetto to the control group and in non-falsetto to the experimental group, and (2) the students' responses were recorded on audio cassette and rated by two independent music teachers using the Rote Song Rating Scale.

In the present study, the recording of individual students' responses prior to treatment were compared to the recording after treatment. Similar to the Price, Yarbrough, Jones, Moore study, the present study planned to perform a two-way

[2] Saunders, T. C. (1989). A Supervisor, A Problem, A Solution. *Music Educators Journal*, Vol. 75, issue 6, 48-51.

ANOVA to analyze for gender differences and instructional effect. In fact, because a group difference was found in the pretest pilot, a two-way ANCOVA was used.

The Small & McCachern Study[3]

The purpose of this study was to determine whether first grade students could, prior to practice, match pitch more accurately with a female vocal model than with a male vocal model. The investigators also sought to determine whether there would be a significant difference in pitch-matching accuracy between groups of first grade students after practice with a female versus a male vocal model.

Subjects consisted of 55 first grade students that attended an urban public elementary school. All first grade students were invited to take part in this study, however, only those students that supplied parental permission actually participated.

Subjects were tested individually prior to receiving treatment. Stimulus material for one pretest (Model F) consisted of three melodic fragments tape-recorded by a female vocal model. The other pretest (Model M) consisted of three different melodic fragments tape-recorded by a male vocal model. These song fragments consisted of two measures of duple meter – two quarter notes and a half note. Furthermore, these song fragments were sung by the two vocal models in three different keys (D-flat, D, and E-flat). Hand puppets were used to interact with the subjects during the pretest and posttest activities to maintain student attention. Good behavior was rewarded, not correct or incorrect singing. Subjects with perfect pitch-matching scores on both pretests (n=8) were eliminated from further participation. "Remaining subjects were randomly

[3] Small, A. R., & McCachern, F. L. (1983). The effect of male and female vocal modeling on pitch-matching accuracy of first-grade children. *Journal of Research in Music Education*, Vol. 31, No. 3, 227-233

assigned to three groups: (1) practice with female model; (2) practice with male model; and (3) no contact control." For five consecutive days, subjects in the practice groups went to two different rooms for a 30-minute session with the respective male or female vocal model where they rehearsed individually four different song fragments. Additional time each session was used for verbal repetition of new words. The posttest was conducted in a similar manner as the pretest and consisted of the same recorded melodic fragments presented in the pretest. In both the pre- and posttests, the subjects received two trials on each of the three test song fragments which resulted in 18 pitch trials per test. Subjects' responses were tape recorded and analyzed.

Results of the pre- and posttest taped responses were independently judged by ear for pitch-matching accuracy on the part of the researchers. Only one correct pitch was counted from the two trials for each song fragment. Interobserver reliability coefficients were: Model F Pretest, .95; Model M Pretest, .93; Model F Posttest, .94; Model M Posttest, .93. An ANOVA with repeated measures indicated that the type of model was effective beyond the $p<.05$ level significance. Results of a Pearson Product-Moment procedure conducted on the Model F and Model M pretests resulted in a correlation coefficient of .78 ($p<.001$). Grand Means of accuracy scores according to vocal modeling stimulus were: Model M, 4.92; Model F, 5.64.

Small & McCachern concluded that the type of vocal model had little influence on the pitch-matching accuracy of first grade students in this study. They cited that there were first graders who had little difficulty matching pitch whether the vocal model was male or female, although the female vocal model proved easier for subjects to match. They suggested that further research into the effectiveness of male and female vocal

modeling needs to be completed. They further suggested using greater numbers of subjects.

Comparison between the Small, McCachern study and the present study

The Small, McCachern study focused upon first grade students' abilities to accurately match pitch with a female and male vocal model prior to receiving individual practice with one of these models independently. The researchers tested students' pitch-matching accuracy in pre- and posttests to determine whether the female or male vocal model was superior. Results concluded the female vocal model to be slightly superior.

The present study will focus upon the effect of male falsetto and non-falsetto vocal modeling on the pitch accuracy of second grade students. Both vocal models will consist of that of researcher's singing voice in the tenor range and in falsetto, one octave higher. Instruction will take place in the normal music classroom situation. The present study will focus on the subjects responses in relation to the vocal stimulus based upon gender differences.

The present study will also provide rewards to students for good behavior, not for correct or incorrect singing.

CHAPTER THREE

Design of Study

Sample

The sample for this study included 90 students in four second-grade general music classes from diverse ethnic and social backgrounds that attended the Margaret Clifford School, located in southern New Jersey. All classes had the same instructor for music; and all classes met once a week for 40 minute sessions.

Procedures

Before the experimental period began, a letter explaining the details of the study was sent to the principal of the Margaret Clifford School requesting permission to commence the study (Appendix A). The researcher also served as the music teacher of the students of the Margaret Clifford School. The researcher kept a record of lesson plans and attendance during the experimental period. The experimental period began January 7, 2002 and continued for 12 weeks and concluded on March 25, 2002. During that time only ten music classes were taught.

Prior to the experimental period, the researcher audio taped each second-grade student in the singing of their name after the "hello song" which was accompanied by a piano and sung in the key of F major (Appendix B). Each student sang his name a cappella on the pitches sol, mi, la, sol, mi in the key of F major. This taped example served as the pretest for each student in the study.

The Rote Song Rating Scale[1] (Appendix C) was used to measure the pitch-matching accuracy of individual students' singing of the pretest selection. Two independent music teachers used this scale to judge students' abilities to match pitches. The combined ratings of the judges served as data for the pretest. An interjudge reliability was calculated using a Pearson test. Furthermore, a *t*-test was calculated to determine if the pitch matching between groups was the same.

Two second-grade classes served as the control group, and two classes served as the experimental group. These groups were assigned randomly. The four-second grade classes were divided evenly according to attendance to form a control group of approximate size to the experimental group (approximately 45 students in each group). The control group continued to receive the already existing falsetto vocal model stimulus during the treatment period, whereas, the experimental group received the non-falsetto male vocal model stimulus. Neither group received rewards for correct or incorrect singing. Individual students in both groups received rewards for good behavior in the form of a stamp placed upon one hand.

During weeks one – five, students in the control and experimental groups received the same music instruction; however, the vocal stimuli for these two groups differed. The music teacher/researcher continued to provide instruction to the control groups modeling in male falsetto, whereas, the music teacher altered his instruction to the experimental groups modeling in non-falsetto.

---

[1] Saunders, T. C. (1989). A Supervisor, A Problem, A Solution. *Music Educators Journal*, Vol. 75, issue 6, 48-51.

During week six of the treatment period, three, three note melodic patterns (Appendix D) and one criterion song (Appendix F) were introduced and rehearsed a cappella. The control and experimental groups rehearsed the melodic patterns and criterion song two times each week. Each melodic pattern included one pitch above the lift and was set in F major. The criterion song was set minor tonality.

Initially, the researcher presented the criterion song in its entirety; however, during weeks six and seven, the researcher rehearsed the lyrics separately from the melody. For weeks eight and nine, the researcher modeled each of the four phrases a cappella with lyrics and melody combined. The researcher performed each phrase two times with the students in the control and experimental groups echoing the vocal model. During weeks ten and eleven, both groups sang the criterion song in its entirety a cappella.

At the end of the 12 week period, students in the experimental and control groups were asked to sing the melodic patterns and criterion song. Students in the experimental group were asked to echo the researcher using the non-falsetto vocal model; students in the control group were asked to echo the researcher using the falsetto vocal model. Students' individual performances were audio taped. The same two independent judges used for the pretest used the Tonal Song Rating Scale[2] (Appendix E) to rate the students' performances singing the melodic patterns and the Rote Song Rating Scale (Appendix C) to rate the students' performances on the criterion song. The combined ratings of the judges on both the melodic patterns and criterion song served as data.

---

[2] Feierabend, J. (1984). The Effects of Specific Tonal Pattern Training on Singing and Aural Discrimination Abilities (Doctoral dissertation, University of Temple, 1983). *Dissertation Abstracts International*, 45, 110A.

Analysis

A Pearson correlation was calculated on the rote song rating scale to determine the respective interjudge reliabilities. Two two-way ANCOVA (treatment x gender) for each rote song and melodic pattern with the pretest score held constant, were calculated on the respective data sets.

CHAPTER FOUR

Results and Interpretations

Pretest Interjudge Reliability. The interjudge reliability for the pretest analysis using the rote song rating scale revealed a Pearson correlation of .791. For the posttests, the interjudge reliability for the pattern variable and the song variable was .813 and .706, respectively.

Pretest *t*-test on Singing Accuracy.

The *t* value for the combined ratings for the "hello song" revealed a statistically significant difference between the control and experimental groups at the onset of the experimental period, that is, the experimental group performed with better pitch accuracy than the control group. The *t* value, which can be seen in Table 1, was 3.328 ($p < .05$). Therefore an analysis of covariance was applied to the posttest data to equalize the 1.3518 mean difference between groups.

Table 1

Means, Standard Deviations, & *t*-test Summary Data for Pretest Pitch Accuracy

Group	Mean	Standard Deviation	
Experimental	7.261	1.855	
Control	5.909	1.998	
			$t_{(88)} = 3.328$*

*$p < .05$

Analysis of Covariance for Patterns.

Means, standard deviations, and ANCOVA summary data are presented in Table 2. As expected, the covariate was statistically significant. As can be seen in the summary, no statistical difference for the group by gender interaction was found. Furthermore, the researcher failed to find a statistically significant difference for gender. The main effect for group, however, was found in favor of the group that continued to receive instruction where the teacher used his falsetto as a vocal model. That mean difference was statistically significant at the .05 level of confidence.

Table 2

Means, Standard Deviations, ANCOVA Summary Table for Pattern Variable

Group	N	Gender	Mean	SD
Non	19	Girl	5.316	1.734
Falsetto	24	Boy	5.250	1.917
	43	Total	5.279	1.817
Falsetto	16	Girl	7.562	1.632
	21	Boy	7.000	1.871
	37	Total	7.243	1.770

ANCOVA Summary Table

	Sum Squares	*df*	Mean Square	F
Covariate	42.203	1	42.203	15.340*
Instruction	108.928	1	108.928	39.593*
Gender	8.436	1	8.436	.031
A x B	.792	1	.792	.288
Error	206.339	75	2.751	
Total	3391.000	80		

*$p < .05$

Analysis of Covariance for Song.

Means, standard deviations, and ANCOVA summary data are presented in Table 3. For the song variable, unlike the pattern variable, the pretest singing task used as a

covariate was not found to be statistically significant. As can be seen in the summary, no statistical difference for the group by gender interaction was found. Furthermore, the researcher failed to find a statistically significant difference for gender. The main effect for group, however, was found in favor of the group that continued to receive instruction where the teacher used his falsetto as a vocal model. That mean difference was statistically significant at the .05 level of confidence.

Table 3

Means, Standard Deviations, ANCOVA Summary Table for Song Variable

Group	N	Gender	Mean	SD
Non	19	Girl	4.737	1.968
Falsetto	24	Boy	4.292	1.732
	43	Total	4.488	1.831
Falsetto	16	Girl	5.750	2.236
	21	Boy	4.762	1.446
	37	Total	5.189	1.868

ANCOVA Summary Table

	Sum Squares	*df*	Mean Square	F
Covariate	8.554	1	8.554	2.599
Instruction	16.286	1	16.286	4.947*
Gender	6.969	1	6.969	2.117
A x B	1.224	1	1.224	.372
Error	246.898	75	3.292	
Total	2129.000	80		

*$p < .05$

Interpretation

The correlation coefficient .791 calculated on the pretest rote song can be considered practically as well as statistically significant. That is, the shared variance between judge 1 and judge 2 is more than 60 %, and considering that the rating scale was only five points it can be considered reliable. Furthermore, this reliability coefficient is

similar to the coefficient reported in the study published by T. Clarke Saunders.[1] Therefore, it is not surprising that the rating scales used for the posttest data are similarly reliable.

For both analyses it is not surprising that no statistical significance was found for gender. That is, recent research suggests that these differences emerge after third grade and may be due to social factors.[2]

For both analyses to reveal a mean difference for type of instruction supports the notion that a Type I error was not committed. At the present time, it seems that once children have been exposed to song instruction from an adult male who uses falsetto as a vocal model they should continue with this type of instruction for continued vocal growth.

[1] Saunders, T. C. (1989). A Supervisor, A Problem, A Solution. *Music Educators Journal*, Vol. 75, issue 6, 48-51.

[2] Green, G. A. (1994). Unison versus Individual Singing and Elementary Students' Vocal Pitch Accuracy. *Journal of Research in Music Education*, Vol. 42, No. 2, 105-114.

CHAPTER FIVE

Summary and Conclusions

Purpose and Problems

The purpose of this study was to examine the effect of male falsetto and non-falsetto vocal stimuli on the pitch-matching accuracy of second grade students. The problem was to investigate differences in pitch-matching accuracy to two vocal stimuli. The researcher also sought to investigate the following: (1) would there be a difference in pitch-matching accuracy to the two vocal stimuli based upon gender; and (2) would there be a difference in the pitch-matching accuracy of students receiving vocal modeling presented in non-falsetto.

Design

The sample for this study included 90 students in four second-grade general music classes. Classes were randomly assigned to the control and experimental groups, consisting of two classes in each group. Both groups consisted of at least 37 students and received musical instruction from the same music teacher during 40 minute music classes. The music teacher in this study also served as the researcher.

Prior to the start of the treatment period, the researcher audio taped each second-grade student in the singing of their name on the pitches sol, mi, la, sol, mi in the key of F major. Two independent music teachers used the Rote Song Rating Scale (Appendix C)

to judge the students' ability to match pitches. This served as the pretest. Reliability was calculated using a Pearson test.

During the 12 week treatment period, students in the control and experimental groups received the same music instruction; however, the vocal stimuli for these two groups differed. The music teacher/researcher continued to provide instruction to the control groups modeling in male falsetto, whereas, the music teacher altered his instruction to the experimental groups modeling in non-falsetto.

During week six of the treatment period, three, three note melodic patterns (Appendix D) and one criterion song (Appendix F) were introduced and rehearsed a cappella. The melodic patterns and song were rehearsed an equal number of times by the experimental and control groups. Each of the melodic patterns included one pitch above the lift and each pattern was set in the key of F major.

The criterion song was set in minor tonality. The melody and lyrics were rehearsed separately during weeks six and seven, then combined during weeks eight and nine. During weeks ten and eleven of the treatment period, the experimental and control groups performed the entire criterion song a cappella.

At the conclusion of the 12 week treatment period, students were asked to echo the three melodic patterns and criterion song sung by the researcher. The researcher modeled in falsetto to the students in the control groups and in non-falsetto to the students in the experimental groups. The students' individual performances were audio taped and judged by the same two independent music teachers used for the pretest. The Rote Song Rating Scale was used to rate students' performances on the criterion song.

The Tonal Pattern Rating Scale (Appendix E) was used to rate students' performances on the three melodic patterns.

The data were collected and two two-way ANCOVA were calculated on the data because a *t*-test performed on the pretest revealed a statisically significant difference between the two groups.

Results

The pretest reliability was .791, and the posttest reliabilities were similarly .813 and .706 for the pattern variable and the song variable, respectively. For both analyses, the interaction and the gender main effect were not statistically significant. Conversely, for both analyses the instruction main effect was found to be statistically significant in favor of the continued falsetto instruction.

Conclusions

Based on the data acquired from the present study, it may be concluded that instruction provided by a male vocal model should be using the falsetto voice continuously throughout an academic year when in the second grade music classroom.

APPENDIX A

Douglas A. Tranz
38 B Aspen Hill
Deptford, NJ 08096
(856) 845-1735

December 14, 2001

Dear Mrs. Gaffney,

I am writing to you to request permission to conduct the research for my Master's Thesis in your school. Specifically, I would like permission to work with the four second grade classes. This will involve providing instruction using male falsetto (singing in the range of children's singing voices) to two of the classes and non-falsetto to the other two classes. All students will be audio taped prior to beginning the start of the study and again after the ten week study period. Instruction for all classes will be the same with the exception of the use of falsetto and non-falsetto. If you have any further questions, please feel free to contact me. I would like to thank you in advance for your consideration.

Sincerely,

Douglas Tranz

APPENDIX B

Hello Song


We're girls and boys to - ge - ther to -
ge - ther, to - ge - ther. We're girls and boys to -
ge - ther are we. My name is___ ___ ___
— ___

APPENDIX C

ROTE SONG
RATING SCALE

The student's performance of the song:

1. Did not include the use of the singing voice.

2. Included the use of the singing voice and a general sense of melodic direction.

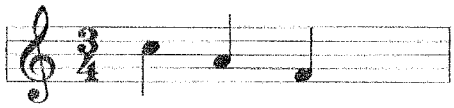
3. Included the maintenance of a pitch center and general sense of melodic direction.

4. Was nearly accurate but included a minimum of imprecise pitches.

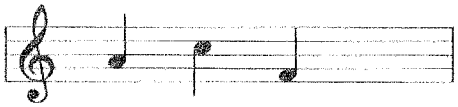
5. Was accurately sung with precise pitch.

APPENDIX D

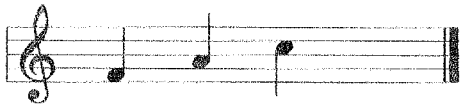
MELODIC PATTERNS



Pattern # 1 begins above the "lift".



Pattern # 2 leaps across the "lift" and leaps downward.



Pattern # 3 continuously ascends above the "lift".

APPENDIX E

TONAL PATTERN RATING SCALE

The student's performance of the tonal pattern:

1. Was not recognizable.

2. Contained melodic direction but excluded any accurate pitches.

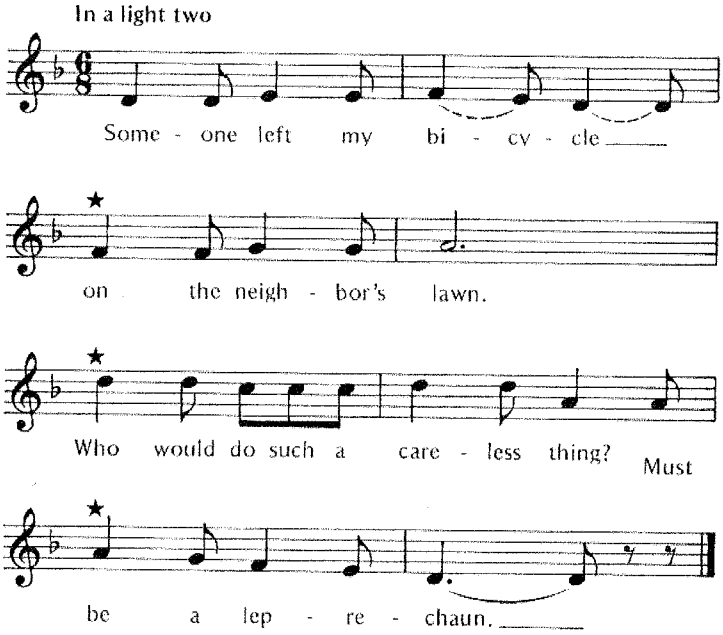
3. Contained appropriate melodic direction and included some (at least one) accurate pitches.

4. Was nearly accurate but lacked precise intonation.

5. Was accurate and included precise pitch.

APPENDIX F

Must Be A Leprechaun



BIBLIOGRAPHY

Apfelstadt, H. (1984). Effects of melodic perception instruction on pitch discrimination and vocal accuracy of kindergarten children, *Journal of Research in Music Education*, Vol. 31, No. 1, 15-24.

Campbell, P. S., & Scott-Kassner, C. (1995). *Music in childhood: From preschool through the elementary grades*. New York: Schirmer Books, 142-143.

Feierabend, J. (1984). The Effects of Specific Tonal Pattern Training on Singing and Aural Discrimination Abilities (Doctoral dissertation, University of Temple, 1983). *Dissertation Abstracts International*, 45, 110A.

Flowers, P. J., Dunne-Sousa, D. (1988). Pitch pattern accuracy, tonality, and vocal range in preschool children's singing. *Journal of Research in Music Education*, Vol. 38, No. 2, 102-114.

Geringer, J. M. (1983). The relationship of pitch-matching and pitch discrimination abilities of preschool and fourth-grade students. *Journal of Reseach in Music Education*, Vol. 31, 93-99.

Goetze, M., Cooper, N., & Brown, C. (1990). Recent research on singing in the general music classroom. *Bulletin of the Council for Research in Music Education*, Vol. 104, 16-37.

Levinowitz, L. M., Barnes, P., Guerrini, S., Clement, M., D'April, P., & Morey, M. J. (1998). *Journal of Research in Music Education*, Vol. 46, No. 1, 35-47.

Green, G. A. (1990). The effect of vocal modeling on pitch-matching accuracy of elementary schoolchildren. *Journal of Research in Music Education*, Vol. 38, 225-232.

Green, G. A. (1994). Unison versus Individual Singing and Elementary Students' Vocal Pitch Accuracy. *Journal of Research in Music Education*, Vol. 42, No. 2, 10-114.

Pedersen, D. M., & Pedersen, N. O. (1970). The relationship between pitch recognition and vocal pitch production in sixth grade students. *Journal of Research in Music Education*, Vol. 18, No. 3, 265-272.

Petzold, R. G. (1969). Auditory perception by children. *Journal of Research in Music Education*, Vol. 17, 82-87.

Price, H. E., Yarbrough, C., Jones, M., & Moore, R. S., (1994). Effects of male timbre, falsetto, and sine-wave models on interval matching by inaccurate singers. *Journal of Research in Music Education*, Vol. 42, No. 4, 269-284.

Rutkowski, J. (1996). The effectiveness of individual/small group singing activities on kindergartner's use of singing voice and developmental music aptitude. *Journal of Research in Music Education*, Vol. 44, No. 4, 353-368.

Saunders, T. C. (1989). A Supervisor, A Problem, A Solution. *Music Educators Journal*, Vol. 75, issue 6, 48-51.

Sims, W. L., Moore, R. S., & Kuhn, T. L. (1982). Effects of female and male vocal stimuli, tonal pattern length, and age on vocal pitch-matching abilities of young children from England and the United States. *Psychology of Music*, 104-108.

Small, A. R., & McCachern, F. L. (1983). The effect of male and female vocal modeling on pitch-matching accuracy of first grade children. *Journal of Research in Music Education*, Vol. 31, 227-233.