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The Effect of Tonal Pattern Training on the Aural Perception, Reading Recognition, and Melodic Sight-Reading Achievement of First-Year Instrumental Music Students

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This study investigated the relationship of tonal pattern instruction to tonal concept development and performance achievement of beginning instrumentalists. The problem was to compare a course of study emphasizing tonal concept development with another emphasizing technical skill development. Forty-eight subjects were randomly assigned to the experimental group or the control group. Experimental group content included tonal patterns taught through harmonization and vocalization. Control group content included a set of symbols and range of pitches taught from notation. Students received 14 weekly 30-minute lessons. A one-factor design was employed. The independent variable was teaching content. The dependent variables were posttest mean scores from Iowa Tests of Musical Literacy and an investigator-constructed sight reading test. Analysis of covariance was used. The experimental group scored significantly higher ($p < .001$) on aural identification of major and minor tonalities and significantly higher ($p < .0001$) in melodic sight-reading achievement. No significant difference occurred between groups in reading recognition ($p > .05$).

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The Effect of Tonal Pattern Training on the Aural Perception, Reading Recognition, and Melodic Sight-reading Achievement of First-Year Instrumental Music Students

Music educators and investigators generally agree that music students must possess a well-developed sense of tonality in order to be accomplished at reading music (Heffernan, 1968; Krumhansl, 1979; Leonhard & House, 1959; MacKnight, 1973; Schleuter, 1984). Sense of tonality involves aural perception, which has been described as the ability to aurally perceive the relationship of tones within a harmonic framework (Gordon, 1971). For this

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reason the perception of tonal patterns is more efficient for music reading comprehension than is the perception of individual pitches (Attneave & Olson, 1971; Cuddy, 1971, 1982; Deutsch, 1969, 1970, 1972; MacKnight, 1973). The aural perception of tonal patterns is accomplished through audiation. The term *audiation*, as defined by Gordon (1980), describes one's ability to derive musical meaning through mentally hearing music by means of recall, musical composition, or viewing musical notation (notational audiation). Investigators believe that audiation provides a source of feedback that helps music readers detect their own errors as well as improve sight-reading skills (Bean, 1939; Bergan, 1967). It is also believed that audiation can best be developed through singing experiences (Mursell, 1927; Mursell and Glenn, 1938). In research studies in instrumental music there is support for the use of vocalization as an aid to improving the sight-reading skills of instrumentalists. That is, by singing the same music that is to be played on an instrument, the student's skills are improved and reinforced (Colwell, 1963; Leonhard & House, 1959; McGarry, 1967; Mursell, 1934). There is also some evidence that a conceptual approach to teaching that uses harmonic experiences will develop the sense of tonality, which in turn should improve sight-reading skills (Hale, 1976). In light of this information it appears that tonal concept development involves the building of a tonal pattern vocabulary through aural perception, emphasis on improving the ability to aurally perceive tonal relationship within harmonic frameworks, and the improvement of audiation skills.

Investigators in the field of instrumental music believe that instrumental music students must be guided in conceiving sound through the ear. Emphasis must be placed on the relationship of sound with musical symbol and physical action rather than emphasizing symbol with physical action alone. (Mainwaring, 1951). They support the need to associate aural imagery with notation and the need to build an aural vocabulary of tonal patterns before introducing notation (Watson, 1954). Ultimately it is believed that a major goal is the development of instrumentalists who read well at sight.

In practice, instrumental music does not reflect the philosophies and theories described in the literature. Generally, instrumental music in its present state emphasizes the development of showmanship (Thomas, 1966) and the mechanical aspects of playing (Hoffer, 1969; Kress, 1981; Mursell, 1948). Conceptual development is de-emphasized (Thomas, 1966). This is, most apparent in a survey of method books (Kress, 1981; Schleuter, 1984; Texter, 1975). While there is a need to emphasize both major and minor modes in grades four, five, and six when many students begin instrumental music instruction, this is not reflected in method book literature. Most method books follow an atomistic note-identification approach in which pitches are isolated and notationally presented one at a time as opposed to the tonal pattern approach. Little effort is made to present pitches within a tonal pattern framework. There are few studies that deal directly with the relationship of tonal concept development to the performance of beginning instrumental music students within a realistic classroom situation. The paradox that exists between educational philosophy and pedagogical practice in instrumental music demonstrates a need for further research.

PURPOSE AND PROBLEM

The purpose of this study was the investigation of the relationship of tonal pattern instruction using harmonization and vocalization to tonal concept development and the performance achievement of beginning wind instrumentalists. Investigation was limited to melodic music sight-reading achievement, the aural perception of tonal patterns in major and minor modes and the reading recognition of major and minor tonal patterns that were simultaneously aurally and visually perceived.

The specific problem of the study was to compare two courses of study. One emphasized tonal concept development by using tonal patterns as content with harmonization and vocalization as teaching techniques. The other course of study did not use an organized, specific set of tonal patterns and did not include the techniques of vocalization and harmonization, but instead used a single-note identification approach consisting of a set of musical symbols and a range of pitches taught from notation and emphasizing technical skill development.

DESIGN AND METHODOLOGY

A one-factor design with one independent and three dependent variables was employed. The independent variable was teaching content in conjunction with specific teaching techniques. The teaching content in the experimental group included an organized, specific set of tonal patterns that were taught through techniques of vocalization and harmonization. The teaching content in the control group did not include an organized, specific set of identified tonal patterns and the training did not include the techniques of vocalization and harmonization. Instead, the control group content consisted of a set of musical symbols and a range of music notes taught from notation and emphasizing technical skill development.

The three dependent variables included:

1. *Iowa Tests of Musical Literacy (ITML) Level 2, Tonal Aural Perception* (pretest-posttest). (Gordon, 1970)
2. *Iowa Tests of Musical Literacy (ITML) Level 2, Tonal Reading Recognition* (pretest-posttest).
3. *Melodic Sight-reading Achievement Test (MSRAT)* (posttest only). (Researcher-constructed)

Null Hypotheses

1. There will be no significant difference between posttest melodic sight-reading achievement mean scores of the experimental and control groups on the *MSRAT*.
2. There will be no significant difference between posttest mean scores of the experimental and control groups on the *Tonal Aural Perception* subtest of the *ITML Level 2*.
3. There will be no significant difference between posttest mean scores of the experimental and control groups on the *Tonal Reading Recognition* subtest of the *ITML Level 2*.

A packaged FORTRAN program titled NYMBULA was used to perform the analysis. NYMBULA is a multivariate analysis of variance (MANOVA) program with a multivariate analysis of covariance (MANCOVA) procedure as a subroutine. The three covariates were the *ITML T1* pretest, the *ITML T2* pretest, and the *Musical Aptitude Profile (MAP) Tonal Imagery* subtest (Gordon, 1965). In the statistical analysis, the *MAP* scores served to control for the possible effects of varying musical aptitude levels of students in the two groups. The three dependent variables were the *ITML T1* posttest, the *ITML T2* posttest and the *MSRAT*. The level of significance chosen was $p < .05$.

PROCEDURES

The student population from which the subject sample was drawn was part of a school system of 2119 students in twelve grades including kindergarten and was representative of a middle-class socioeconomic group. This Ohio school system was typical for its size in Ohio with regard to music offerings.

The subjects were 48 fifth- and sixth-grade students currently studying brass or woodwind instruments in three elementary schools in the same school system. The students in each of the three schools were randomly assigned to homogeneous instrumental classes. These classes were then randomly assigned to either the experimental group or the control group in each school. Pretesting utilized *ITML T1*, *ITML T2* and *MAP Tonal Imagery*. All lessons were taught by the researcher and included one 30-minute class lesson per week for 14 successive weeks.

Several steps were taken in order to control experimenter bias and thereby avoid contamination. All knowledge of music aptitude and music achievement of individual students was kept from the researcher until after the instruction period. In addition, the regular instrumental music teacher randomly observed and critiqued lessons taught by the researcher. This served as a control mechanism to insure the researcher met the requirements for each group as outlined in the proposal.

The content taught to the experimental group classes included a set of 10 major-key and 10 minor-key tonal patterns (Table 1). Instructional procedures in each class session included a 10-minute warm-up in which tonal material was presented aurally and then notationally. Activities involved the performance of long tones, scales and arpeggios using harmonization and vocalization with syllables, and recognition of major and minor patterns through vocalization and playing with harmonization. The 15-minute session covering the assigned lesson from the text involved the isolation and vocalization of tonal patterns from the exercises, the performance of the exercises vocally, with instruments, or in combination, and using harmonization. The final five minutes of each lesson included the recognition of familiar tonal patterns within new exercises and the presentation of new fingerings through their use with familiar tonal patterns, and proceeding from playing activities at the aural level to music reading activities.

The same text was used with the control group, but the set of tonal patterns was omitted. During the 10-minute warm-up all tonal material was presented notationally from the text. Long tones, scales, and arpeggios were played from

Table 1
Tonal Patterns

<hr/>		
	<i>Major</i>	
do-mi-sol		do-sol-la-sol
do-re-do		mi-sol-do
do-re-mi-fa		re-do-ti-do
do-re-mi		re-mi-re-do
fa-mi-re-do		mi-re-do
	<i>Minor</i>	
la-do-mi		la-mi-fa-mi
la-ti-la		do-mi-la
la-ti-do-re		ti-la-si-la
la-ti-do		ti-do-ti-la
re-do-ti-la		do-ti-la
<hr/>		

notation without harmonization or vocalization. Recognition of major and minor tunes was made through the use of definitions and descriptors. The 15-minute assigned lesson portion consisted of the performance of each exercise in the order presented in the text without vocalization and with harmonization activities limited to the part-writing presented in the book. The introduction of new material lesson segment consisted of the presentation of new notes and other musical symbols by looking at notation, fingering and playing concurrently.

Since the teaching procedures presented in this investigation can be applied using any method book, the researcher used the book required throughout the school system in which the study was being implemented, *Alfred's Basic Band Method* (1977). This method book was found to be a widely used text that was representative of the types of method books in current use in instrumental music education.

Instruction in both groups was not limited to tonal concept development since weekly lessons involved all aspects of learning to play and read music. In other areas, such as rhythm, articulation, and dynamics, care was taken to follow the same procedures in both groups. Tests included in posttesting were *ITML T1*, *ITML 2*, and *MSRAT*.

RESULTS

A complete set of data was obtained from 40 of the original 48 subjects. Pretest and posttest means and standard deviations are shown in Table 2. A summary of the multivariate analysis of covariance results for the testing of the total mean vectors of the experimental and control groups appears in Table 3.

The total mean vector of the experimental group was significantly higher ($p < .0001$) than that of the control group. The results of the univariate analysis of each dependent variable indicated that there was a significant difference ($p < .0001$) in the posttest melodic sight-reading achievement mean scores of the groups with the experimental group scoring significantly higher. There was a significant difference ($p < .001$) between mean scores of

Table 2
Summary of Pretest and Posttest Means and Standard Divisions

	Pretest		Posttest	
	M	SD	M	SD
Experimental Group:				
MAP	44.83	8.99		
ITML T1	47.22	7.60	56.50	6.49
ITML T2	51.50	9.36	55.89	6.59
MSRAT			128.11	20.08
Control Group:				
MAP	43.41	5.47		
ITML T1	48.55	6.29	46.82	7.58
ITML T2	47.32	9.22	50.55	7.08
MSRAT			90.55	22.63

the groups on the *ITML T1* suggesting that the experimental group was better able than the control group after instruction to aurally identify major and minor tonalities. Results of the analysis of posttest mean scores on the *ITML T2* indicated that differences between the groups were not significant ($p < .09$). While both groups improved from pretest to posttest on the ability to correctly compare aurally perceived tonal patterns with visually perceived tonal patterns, improvement cannot be attributed to the treatment given to any one specific group.

Some indications concerning the true differential effects between the groups may be obtained from correlations among the variables for each group. Correlations of pretest to posttest measures for the groups considered separately are summarized for comparison in Table 4.

The use of ANCOVA accounted for initial differences between and within the groups on various test scores, particularly with relation to the pretest results. A comparison of the relationships among the various test scores for the two groups permits some comparison of the changes in skills that occurred during the experiment.

Within the control group there was no significant difference between the relationship of *MAP*, which indicated tonal music aptitude, to pretest and posttest measures of music achievement. Within the experimental group however, there was a sizable change when the relationship of *MAP* to posttest *ITML T1* ($r = .29$) was compared with the significant relationship of *MAP* to posttest *ITML T1* ($r = .64$). Since both of these tests involve aural skills, there was an indication that the treatment received by the experimental group promoted the application of the students tonal music aptitude to improve aural skills as measured by the achievement test. In contrast, this situation was not apparent within the control group.

The relationship of posttest *ITML T1* to *MSRAT* was not significant at the

Table 3

Summary Table of MANCOVA for the Testing of Total Mean Vectors of Groups E and C

F ratio for Multivariate Test of Equality of Mean Vectors = 12.17 $df = 3,33$ $p < .0001$			
Source	df	Univariate F ratio	p less than
ITML T1	1,35	12.29	.0013
ITML T2	1,35	3.08	.0879
MSRAT	1,35	29.56	.0001

.05 level in either the control group ($r = -.01$) or the experimental group ($r = .40$). However, the correlation coefficient of .40 in the experimental group was significant at the .10 level indicating a stronger tendency for experimental group students to relate the aural skills exhibited in *ITML T1* to sight-reading skills as demonstrated in *MSRAT*. It appeared that the training procedure involving tonal patterns taught through a combination of vocalization and harmonization activities tended to improve aural-visual perception skills.

The correlation between *MSRAT* and posttest *ITML T2* was not significant for both groups. However, there was some differences between the groups in terms of these correlations and pretest *ITML T2* when correlated with *MSRAT*. Whereas the relationship in the control group between pretest *ITML T2* and posttest *ITML T2* to *MSRAT* remained essentially unchanged, the same relationship for the experimental group dropped in the posttest to a nonsignificant correlation. In other words, in the experimental group the relationship between sight-reading as measured by *MSRAT* and reading recognition as measured by *ITML T2* appeared to become weaker as a result of experimental procedures. This suggests that the aural training employed in the experimental group caused some difference in this relationship. It has been shown that the experimental group demonstrated a stronger relationship between *MSRAT* and *ITML T1* (*ITML T1* relying on aural skill development), but demonstrated a weaker relationship between *MSRAT* and *ITML T2* (*ITML T2* drawing strongly on visual skill development in addition to aural skills). This could mean that the experimental group was in a period of transition where the association between aural and visual sensory modes was undergoing a change. A stronger association between aural and tonal relationships may have been developing and thus effecting a change in the proportion of dependence on aural perception versus visual perception.

CONCLUSIONS

1. Results indicated that instruction using tonal pattern content presented to students through the use of harmonization and vocalization activities

Table 4
Summary of Correlations of Pretest and Posttest Measures for Groups E and C

	Group C	Group E
MAP - ITML T1 Pre	.07	.29
MAP - ITML T2 Pre	.20	.76*
MAP - ITML T1 Post	.11	.64*
MAP - ITML T2 Post	.12	.83*
MAP - MSRAT	-.17	.20
ITML T2 Pre - ITML T1 Post	.09	.63*
ITML T2 Pre - ITML T2 Post	.69*	.86*
ITML T2 Pre - MSRAT	.37	.52*
ITML T1 Post - ITML T2 Post	.20	.67*
ITML T1 Post - MSRAT	-.01	.40
ITML T1 Post - MSRAT	.36	.33
TML T1 Pre - ITML T2 Pre	.44*	.34
ITML T1 Pre - ITML T1 Post	-.11	.24
ITML T1 Pre - ITML T2 Post	.22	.32
ITML T1 Pre - MSRAT	.33	.16

* $p < .05$

improved the melodic sight-reading skills of beginning band students significantly more than a traditional method in which notes are individually identified directly from notation and without harmonization and vocalization activities. While technical skill development was not a direct concern of this study and was not measured, emphasizing a tonal conceptual approach in the instruction of beginning instrumental music students did not delay the development of technical skills as demonstrated by improved melodic sight-reading skills and by observations made by the researcher. Further research investigating the relationship of technical skill development to tonal pattern instruction is necessary before a conclusion can be drawn in this matter.

2. A program of instruction in which students experience major and minor tonalities through singing, playing, listening, and comparing major and minor patterns separately and within the context of a song leads to a higher level of conceptual understanding than the use of definitions and descriptors to teach the difference between major and minor. Considering the random and minimal use of minor mode song material in beginning band methods, it appears that common practice in teaching beginning band students is in direct opposition to the research findings of this study.

3. It appeared that both the teaching procedures used with the experimental and control groups promoted improvement in the ability to correctly compare tonal patterns aurally perceived with tonal patterns visually perceived. While the difference between the groups was not significant, a study of the correlations between pretest and posttest measures demonstrated that students in the experimental group were developing sense

of tonality and imagery skills and were thereby shifting from dependence on visual perception skills toward a more balanced combination of aural-visual perception skills. This shift in sensory skills may have contributed to the significantly higher measure of sight-reading skills by the experimental group as compared with the control group.

4. A study of the correlations between music aptitude and music achievement in perception of modes demonstrated that instruction involving tonal pattern content in combination with vocalization and harmonization activities is a more efficient means of developing certain inherent tonal abilities of students and thus translating aptitude into achievement.

RECOMMENDATIONS

1. The fact that significant results favoring the tonal pattern content approach to teaching were obtained with a small sample within a fourteen week lesson program warrants further consideration and replication using a larger sample size and a longer course of study.

2. There is a need for more research into the application of a sequential learning program in which the development of aural skills is emphasized before progressing to reading skills in beginning band students.

3. There is a need for further research to isolate the diverse aspects of the understanding of tonal concepts to provide more complete information about the learning process.

4. A method book for beginning instrumental music instruction should be developed that has as its core a tonal pattern approach to learning to read music yet provides the necessary training in rhythm reading and technical skill development.

5. Instrumental music teachers and college students preparing for teaching careers need to understand that tonal concept development is essential in the training of young instrumentalists and need to guide students in this development through the use of structured sequential learning activities that employ tonal pattern content, harmonization and vocalization.

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