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The role of structured practice and modeling on improving the performance accuracy of high school instrumentalists.

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THE ROLE OF STRUCTURED PRACTICE AND MODELING ON IMPROVING THE PERFORMANCE ACCURACY OF HIGH SCHOOL INSTRUMENTALISTS

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by

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University of Nebraska at Omaha, 2001

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The purpose of this study was to compare the effectiveness of structured practice and modeling techniques in increasing high school student's performance accuracy. Subjects in this study were 49 ninth through twelfth grade instrumental music students from a high school in the Omaha Public School District. Of the 49 students, 12 students had been participating in private lessons for at least nine months. Students were equally assigned to one of three groups consisting of (1) Modeling (2) Structured Practice and (3) Control. The students were pretested by performing an etude while being audiotaped. Subjects had two, ten-minute practice sessions on two consecutive days. Following the practice, students performed the etude again as a posttest while being taped. Three judges listened to the pretest and posttest tapes and recorded the number of errors for each performance.

The results of the study indicated that the treatments had no significant effect on improving the accuracy of high school instrumentalists. Participating in private lessons also was not a significant factor in improving performance accuracy.

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Chapter I

INTRODUCTION

At the most basic level, learning to play a musical instrument can be thought of as acquiring and developing a motor skill. Gagne (1959) describes motor skills "as a sequence of habitual responses the order of which is partially or wholly determined by sensory feedback from preceding responses"(p. 38). More simply put, motor skills are movements that are dependent on practice and experience for their execution (Schmidt 1988). The act of walking (lifting one leg providing sensory feedback to both legs and causing the other leg to move in response) is one example of a motor skill.

Gagne (1988) provides a theory of motor learning that can be applied to music practice. In his learning theory, each task must be learned thoroughly and in sequence. In musical performance, a beginning brass musician must develop muscle control to create an embouchure before being able to create a sound. To learn a motor skill Gagne states that the speed must be appropriate to learning each task and feedback is necessary for the skill to be fully understood. When

musicians begin work on a new piece of music they often begin slowly and gradually increase the tempo of the piece while seeking the opinion of a teacher. Repetition of the motor skill or response-sequence with reinforcement is necessary to realize improvement in motor skills. Finally, Gagne emphasizes repetition must be sufficient and of such quality to enable retention. Private lesson instructors often relate the importance of regular, focused practice while providing feedback in the lesson.

Teachers agree upon the importance of student practice outside of the ensemble rehearsal for improving the musical ability of the student. Practice is crucial to musical skill acquisition and many studies have examined the most effective way to practice. Most research has focused on the effectiveness of modeling, structured or guided practice and mental practice.

Modeling is one of the most common forms of skill acquisition or practice. The idea of apprenticeship is based on the belief that observing master craftsmen is necessary to thoroughly learn a skill. In music both aural and visual modeling play a central role in the teaching methodology of Shinichi Suzuki (1969). Suzuki's

Talent Education is predicated on the belief that people are products of their environment. This acculturation process begins in infancy where children learn important constructs such as language through imitation. In early infancy recorded music becomes a part of the child's environment and children begin playing the violin at age three. They learn the violin by rote just as they acquire language. Special recordings accompany the students and serve as models in developing tone, technique, and musicality.

The use of modeling has been examined in many different musical settings. Sang (1987) compared a teacher's ability to model musical skills to the pupil's musical performance ability. Dickey (1992) studied the effectiveness of teacher modeling on middle school band rehearsals. Green (1990) and Harvey, Garwood and Palencia (1987) examined different vocal modeling techniques on pitch matching accuracy. Levinowitz and Scheetz (1999) investigated group and individual echoing on third grade students. Fortney (1990) found that using modeling benefited upper elementary instrumental student in individual practice. Rosenthal (1984), (1988) added modeling to mental practice and found that graduate and

upper level undergraduate students benefited from incorporating both techniques.

Guided or structured practice is the process of the teacher identifying the activities necessary to help the student maximize practice. Research in the psychomotor field has confirmed the importance of structure (Gallagher, Thomas, 1984), (Shea, Cole, 1991) in the learning of a psychomotor skill. Gilbert (1980) considered age as a factor in structuring motor music skill development. Schlueter (1988, 1997) has compiled a number of suggestions tied to research that use aspects of Gagne and others (DeRoche, 1987) to create a structure to student practice. Barry (1990) found the structure of practice to be important in correcting performance errors. Establishing a structure also implies that musicians can design a routine whereby optimum time is spent on each musical aspect in order to maximize the performers learning (Ericsson, 1993). Schleuter (1996) examined effective practice structure and identified areas for improving student performance taken from research in Chapter 6 of The Crane Symposium (1988). These areas included:

- Goal setting: Productive student practicing is achieved through developing clear goals that are attainable and appropriate for the learner.
- Sequencing: Once the learning tasks are determined, careful attention should be given to placing them in prerequisite order.
- Repetition: Teachers need to stress the importance of quality and quantity of repetition.
- Tempo: Students should practice at slower tempi and gradually increase speed to develop rapid technique. Motor skills and music performance are interdependent, are related to rhythmic response and to performance skill techniques. There is evidence that when slowing tempi for practice, it is best not to slow to the point where the location of the underlying tempo beats is altered.

The concept of mentally practicing or cognitive rehearsal of a skill without physical activity has been the subject of research in physical education and sports psychology Weinberg (1996) and was brought to the forefront in the book The Inner Game of Music (Green and Gallwey, 1986).

Ross (1985) examined the effectiveness of mental practice techniques on college trombonists and synthesized many of the exercises found in The Inner Game of Music (Green and Gallwey 1986) to provide an example of mental practice (1987). Ross provides suggestions to help the performer relax, set the tempo and imagine the embouchure without actually making any sounds. After mentally practicing the piece a few times, the performer was instructed to play it with the instrument. When mentally practicing the performer focused on the cognitive aspects of the music missed in the initial performance. These cognitive aspects could range from dynamic nuances to interpretation and phrasing. Tone quality, breathing or any of the myriads of technical considerations were not a problem when mentally practicing. Ross emphasized the importance of combining mental and physical rehearsal during practice to improve concentration and technique (1987).

Green and Gallwey (1986) reiterated Schleuter's idea of goal setting as integral to success in music performance. They also discuss the need for musicians to develop positive mental images in order to achieve a high level of success. Mental practice is a four-part process

that can increase awareness of the skills and abilities of the performer. The first step is visual awareness or recalling the outward appearance when a person plays with confidence. Secondly, sound awareness allows the performer to recall how the music sounds when it is performed well. The third step is an awareness of feelings both kinesthetic (eg. fingering or vocal placement) and remembering the emotions music elicits as well as releasing tension points in the body. The final step is understanding awareness which is remembering successful physical and mental practice. The result of the awareness inventory creates trust in the abilities of the performer.

Need for the study

Research has shown the value of structuring musical practice. The use of mental practice and imagery as well as the importance of modeling has been shown to increase practice effectiveness. The studies reviewed included elementary and college students in modeling and mental practice. While high school students were the subjects of the study by Barry (1990), practice structure was the only variable examined. The difficulty in determining whether subjects actually mentally practice a piece in

research presents problems in effectively observing this phenomenon. A comparison of modeling and structured or guided practice in increasing high school instrumentalist's performance accuracy has not been examined. Research is needed to determine the effectiveness of these techniques with high school musicians.

Purpose of the study

The purpose of this study will be to compare the effectiveness of structured practice and modeling techniques in increasing high school student's performance accuracy. For the purpose of this study the areas of technique will include:

- Correct Pitch – Pitch is the playing of the correct note. For the purpose of this study, intonation will not be a consideration.
- Correct Rhythm - In order to have correct rhythm, note values will be consistent with a metronome starting the piece on both pretest and posttest recordings.

Chapter II

REVIEW OF LITERATURE

Research in Practice Structure

Gallagher and Thomas (1984) examined the structure of practice in a psychomotor skill. 120 subjects were randomly assigned in age groups consisting of 5, 7, 11 and 19-year-old students. At each of the four age levels, three rehearsal groups were used: mature, child-like and subject determined. The child-like strategy forced the subjects to practice location for each of the eight movements presented one at a time. The mature strategy group practiced each new position presented with two previously presented positions. The subject determined strategy group allowed subjects to choose their own methods of rehearsal as a control group. Significant ANOVAs support the hypothesis that quality of rehearsal is important and a mature or active strategy facilitated performance while the child-like or passive strategy hindered performance when compared to self-determined or mature strategy. This study supports the effects of quality of rehearsal being more important than quantity.

Research studies in motor learning have advocated the use of "augmented information feedback" (Swinnen, 1996 p. 39), which refers to extrinsic feedback provided to a learner. This type of feedback supplements the information that is naturally available to the learner. Two types have been used in research: knowledge of results (KR) and knowledge of performance (KP). KR refers to verbalizing extrinsic information about performance outcome, where KP is information about the action pattern underlying the movement outcome (Swinnen, 1996). Early research found that subjects failed to improve on a line drawing task unless they were informed about their performance (Thorndick, 1931). Usually these information sources are provided after the motor task is completed, however augmented information can be provided during the movement.

Barry (1992) examined practice structure by comparing teacher-designed practice, student designed practice and free practice on technical accuracy. 84 high school students attending summer music camps at Florida State University were randomly assigned to one of three different practice groups: (a) teacher-designed practice in which subjects used practice procedures

recommended by music instructors, (b) student-designed practice in which subjects developed their own structured practice method and (c) free practice in which subjects practiced in their usual manner. The same experimental etude was used for both pre- and posttest data collection. Subjects in all groups were assigned to an individual practice room for two fifteen-minute practice sessions one day apart. The differences between pretest and posttest scores for pitch, rhythm, general technical accuracy and general musical effect were calculated for each subject. The resulting gain scores were analyzed via the Kruskal Wallis One-Way Analysis of Variance (p3). Significant differences ($N = 61$, $p < .05$) were observed among the three groups for the number of individual pitch errors recorded and for the technical rating (p5). Similar differences were observed between each of the three groups in the scores for rhythmic accuracy. The results of this study suggest that subjects using a structured approach to practice were able to correct more performance errors than those subjects not using a specific method were.

Research in Modeling

Research has found that modeling can be effective in the middle school instrumental classroom. In a study by Dickey, (1991), 128 seventh and eighth grade band students were taught in classes using either verbal or modeling strategies. This study found that ear to hand skills and kinesthetic response skills increased from pretest to posttest when teacher-student modeling was used in the classroom.

In the area of individual practice, Rosenthal (1984), Fortney (1992), and Rosenthal, Wilson, Evans and Greenwalt (1988) have investigated modeling as an aspect of practice technique. In the case of Fortney and Rosenthal et al., mental practice was also included as a variable to be tested.

Rosenthal investigated the effects of various modeling techniques on the accuracy of instrumentalists' musical performance (1984). In the study, 44 graduate and upper level undergraduate brass or woodwind music majors enrolled at Vandercook College of Music were randomly assigned to one of four treatments. The four treatments were (a) guided model, a combined verbal and aural example of a relatively complex musical selection;

(b) model only, and aural example only; (c) guide only, a verbal explanation and (d) practice only. A C. Kopprasch etude (1939) was selected because it fulfilled the criteria of being obscure, within the range of all instruments and of appropriate difficulty level.

A professional violinist (selected so that no instrument was favored) made a recording of the etude. A verbal guide was prepared that directed the listeners' attention to the tempo and style of the piece, rhythmic interpretations, phrasing and dynamic markings. Using the script and the recording of the etude, three tapes were prepared. The guide-only tape model consisted of an integration of the script with relevant performed illustrations from the original musical selection, followed by the entire selection played through completely. The model-only tape consisted of three performances of the etude. The guide-only tape consisted of the verbal script alone with pauses after each main point. The pause was equivalent to the length of time that the actual performance was played on the guided model so those subjects could mentally rehearse the selection if they desired.

The subjects were assigned to a practice room with a microphone, amplifier, speakers, and cassette recorder. Each person in the three experimental conditions was asked to listen to the recording corresponding to their assigned group. After listening, each subject was given 3 minutes to practice the piece. If the subject was assigned to the practice only group, he or she was asked to practice the etude for 10 minutes. After the practice period, the experimenter returned and asked the subject to play the etude once without stopping, turned on a recording tape, announced an identification number, left the room and returned to turn off the tape when completed.

Dependant variables were frequency of measures played with correct notes, rhythm, tempo, dynamics and phrasing/articulation. Two independent observers evaluated 20% of the tapes, with an overall agreement of .87. Agreement for each variable was calculated by determining the number of agreements divided by agreements plus disagreements. Each measure was evaluated to determine if it was correct or incorrect for each dependent variable.

Significant differences were found among groups in the performance of notes, rhythms, tempo and dynamics. Dunn's Multiple Comparison was used to compare the mean of the ranks attained by subjects in each variable. Subjects in the model-only group on all variables consistently attained the highest scores. Scores by students in the guide-only and practice-only groups were considerably lower than the other two groups; subjects in practice-only performed better than guide-only on notes and rhythms, but subjects in guide-only did better in practice-only in dynamics and tempo.

Fortney (1992) examined the effectiveness of modeling and silent analysis on the performance ability of advanced elementary instrumentalists. The term advanced was defined in this study as students who were in their second year of instruction. Forty sixth grade band students were randomly assigned to one of four practice conditions (modeling, silent analysis, free practice or control) and asked to perform a composition after a brief practice session. The modeling group was asked to listen to a tape recording of the etude with the printed music available and after a period of two minutes study and review, to perform the etude. In silent

analysis, subjects were asked to mentally rehearse the etude for two minutes and then perform the etude. Free practice participants practiced the etude for two minutes then performed the etude and control group subjects practiced an unrelated etude then sight read the etude used by the three experimental groups.

The etude selected for the study was from 24 Arban Klose Concone Studies for Band Instruments. The tape recording of the etude used with the modeling group was a recording of a violin performance major. Each student was asked to sight-read the etude for the pre-test. The research assistant then read instructions according to the treatment group in which the subject was randomly assigned. Modeling subjects were told to look at the music while listening to the recording. Students were then asked to perform the piece. Silent analysis participants were told to look at the musical example and study it for two minutes. They were instructed to imagine playing the piece and when the time had passed, perform the piece. Free practice students were instructed to look at the example and practice continuously for 2 minutes. The students then performed the etude. The control group was given two minutes to

practice the music and performed the etude. The assistant kept track of the two minutes with a stopwatch, turned on the tape recorder, announced the identification number, played four beats on a metronome and turned off the machine at the completion of the subject's performance.

Scoring was accomplished by awarding one point for each accurately played measure (i.e. correct pitch, rhythm and articulation). A graduate student not involved in the study scored 10 performances. An inter-judge correlation coefficient of r= .98. was obtained (Fortney p.4). The modeling group recorded the largest gain score from pretest to posttest. The results regarding silent analysis did not prove to be significant from either free practice or the control group, which contradicts the findings of Ross (1985). This contradiction could be due to the age differences of the subjects. "Children that are in concrete operations (approximately age 7 to 11) can master problems in a concrete and logical way, but are not capable of abstract thought...Silent analysis is an abstract process." (p. 5).

Modeling, silent analysis free practice and singing were examined in a study done by Rosenthal, Wilson, Evans and Greenwalt (1988). 60 graduate and upper-level undergraduate brass or woodwind music majors attending Vandercook University were randomly assigned to one of the five treatments:

1. Modeling - The subjects listened to a recording of a violin performing the piece on the music stand. The subjects were then asked to play the piece to the best of their ability.
2. Singing - Participants were instructed to learn the piece presented by singing on any syllable. A keyboard was provided to find pitches. After 3 minutes the students were asked to play the piece to the best of their ability.
3. Silent Analysis - Students in this group were instructed to study the music silently for 3 minutes. The subjects were then asked to play the piece to the best of their ability.
4. Free Practice - The subjects were to take three minutes and practice the entire time on the music given to them. The subjects were then asked to play the piece to the best of their ability.

5. Control - The subjects were given three minutes to practice unrelated music. The subjects were then asked to play the experimental piece to the best of their ability.

Upon returning, the experimenter asked the subject to play through the etude one time to warm up his or her instrument. Then, the experimenter turned on the audiotape, announced an identification number and played six beats on the metronome. The experimenter then left the room, returning at the end of the subject's performance.

A trained musician listened to all tapes with respect to notes, rhythms, articulation and phrasing. Performances were randomly mixed so that it was impossible to know to which group a performance belonged. An independent observer listened to 20% of the tapes with respect to each variable to establish reliability. The researchers obtained the degree of agreement between evaluators using the formula of agreements divided by agreements plus disagreements and found the degree to be acceptable. The results of this study indicate that listening to a model alone (without opportunity for practice) seems to be about as effective as practicing

with the instrument in hand. Silent analysis did not seem to provide any benefits over sight-reading except in the performance of rhythms.

Summary

Research has shown the value of structuring musical practice. The use of mental practice and imagery as well as the importance of modeling has been shown to increase practice effectiveness. The studies reviewed included elementary and college students in modeling and mental practice. While high school students were the subjects of the study by Barry (1990), practice structure was the only variable examined. A comparison of modeling and structured practice with high school students has not been examined. Research is needed to determine the effectiveness of these techniques with high school musicians.

Chapter 3

METHODOLOGY

The purpose of this study was to determine the effectiveness of modeling and structured practice on the performance accuracy of high school instrumental music students. This study will address and answer the following questions:

1. Does modeling have an effect on high school instrumental music students' ability to accurately perform rhythms and pitches?
2. Does structured practice have an effect on high school instrumental music students' ability to accurately perform rhythms and pitches?
3. Does participation in private lessons effect the students' performance accuracy in either group?

Hypothesis for this study, stated in the null form, were:

1. Modeling will have no effect on high school instrumental music students' ability to accurately perform rhythms and pitches.
2. Structured practice will have no effect on high school instrumental music students' ability to accurately perform rhythms and pitches.

3. Participation in private lessons have no effect on the students' performance accuracy in either group.

Design

A pretest-posttest design was used to investigate the questions addressed in this study. Strengths of this design included the use of separate control and experimental groups as well as a pretest and a posttest. The pretest was used to determine the student's ability to perform the etude on the first reading. After the experimental groups participated in modeling or structured practice, all groups were given a posttest to measure gain differences in performance accuracy.

In addition to those strengths mentioned above, threat to external validity was controlled so that gain differences were more generalizable to subjects outside this study. Using separate control and experimental groups controlled interference of prior treatment. All groups practiced during the regular scheduled rehearsal time. To prevent experimental bias, three outside judges scored the pretest and posttest.

MEASUREMENT INSTRUMENTS

Judging Instructions

In order to assess rhythmic and pitch accuracy, the judges were given instructions on how to adjudicate each performance. The instructions and judging sheets can be found in Appendices B - F.

Subjects

The subjects in this study were ninth through twelfth grade instrumental music students (n=60) from a high school in the Omaha Public School District. Of the 60 students, 12 students had been taking private lessons for at least 9 months. All students were guaranteed anonymity and identified with a number throughout the research. Furthermore, participation in the study was not used in calculating grades in band.

Procedures

Upon receiving approval from the Internal Review Board and the Omaha Public Schools Research Review Committee, arrangements were made to administer the student pretest which consisted of sight-reading an etude from Develop Sight Reading by Dufrense. A metronome established a metronome marking of 100 = the quarter note

for both pretest and posttest. All performances were audiotaped.

Prior to the pretest, the students were assigned to two experimental groups and one control group each having 20 students. The three groups were (1) Modeling - the students were asked to listen to a tape recording of the etude performed by a professional pianist with the printed music available; (2) Structured Practice - The students were given a practice procedure determined from a survey of experienced music instructors; (3) Control - students in this group practiced a different etude from the same book. Care was taken to create a stratified random sample by identifying students who had been taking private lessons for at least nine months.

Participants in the experimental groups met for 10 minutes to explain the procedures for a particular group and answer any questions. Subjects were given two ten-minute practice sessions on two consecutive days. Following the practice, students performed the etude as a posttest; measurement and identical procedures were followed.

Data and Analysis

The score for the students' performance on the etude was calculated for two factors:

- Pitch - a pitch was considered to be accurate when the student played the correct melodic notes for each measure. Intonation was not a consideration.
- Rhythm - rhythm was considered to be accurate when the student performed the correct note values for each measure. Consistency of tempo was not a consideration.

Each subject's performance on both the pretest and posttest was evaluated on a measure by measure basis by three independent judges. The judges marked each error in rhythm or pitch and tallied the errors. An analysis of variance (ANOVA) was used to determine differences between and within groups. A t-test was used to compare differences between private and non-private lesson students

Time of the study

The study was completed during the spring semester 2001 academic school year. Preliminary writing occurred in the Summer of 1999 with data collection and analysis,

reporting, conclusions and educational implications during the 2001 Spring semester.

Chapter IV

RESULTS AND DATA ANALYSIS

The purpose of this study was to compare the effectiveness of structured practice and modeling techniques in increasing high school student's performance accuracy. For the purpose of this study the areas of technique included correct pitch and correct rhythm. Pitch was the playing of the correct note and correct rhythms mean the note values will be consistent on both pretest and posttest recordings.

Subjects in this study were ninth through twelfth grade instrumental music students (n=60) from a high school in the Omaha Public School District. Of the 60 students, 12 students have been taking private lessons for at least 9 months. Although care had been taken to establish a stratified random sample one student was suspended from school, 5 students were absent from school during pre or post test and 5 subjects were lost due to tape malfunction. The final sample consisted of 49 instrumental music students, 12 of whom participated in private lessons.

Before pre testing, the students were assigned to two experimental groups and one control group divided

evenly. The three groups were (1) Modeling - the students were asked to listen to a tape recording of the etude performed by a professional pianist with the printed music available. (2) Structured Practice - The students were given a practice procedure determined from a survey of experienced band instructors; (3) Control - students practiced a different etude from the same book.

The structured and modeling group pre tested by sight-reading Etude 3 from Develop Sight Reading by Dufrense. The control group sight-read Etude 2 in the same book. A metronome marking of 100 = the quarter note for both pretest and posttest was given by the researcher before taping the tests. All performances were audio taped.

Participants in the experimental groups met for 10 minutes to explain the procedures to each particular group and answer any questions. Subjects were given two ten-minute practice sessions on two consecutive days. Following the practice, students performed the etude as a posttest. Three judges listened to the pre test and posttest tapes and recorded the number of errors for each performance. All the judges were wind players with at least 5 years of public school high school teaching. Two

of the judges were college professors and the third was a middle school teacher with a masters degree. Statistical tests comparing the three judges' scores indicated a high correlation (above .90) was achieved.

The first null hypothesis stated that modeling would have no effect on high school instrumentalists' ability to accurately perform rhythms and pitches. An analysis of variance (ANOVA) was performed on the data and Table 1 compares the scores between Group 3 (Modeling) and Group 1 (Control).

Table 1.

Comparison of Modeling and Control Groups

Skill	N	Mean Difference	Std. Error	F	Sig.
Pitch	36	-.8519	1.351	.536	.821
Rhythm	36	.8889	.983	.423	.667

No statistical significance could be found between the modeling group and the control group. Therefore, the null hypothesis failed to be rejected.

The second null hypothesis stated that structured practice would have no effect on high school instrumentalists' ability to accurately perform rhythms

and pitches. An analysis of variance (ANOVA) was performed on the data and Table 2 compares the scores between Group 2 (Structured Practice) and Group 1 (Control).

Table 2.

Comparison of Structured Practice and Control Groups

Skill	N	Mean Difference	Std. Error	F	Sig.
Pitch	31	-1.5028	1.476	.536	.599
Rhythm	31	.6011	1.073	.423	.855

No statistical significance could be found between the structured practice group and the control group. Therefore, the null hypothesis failed to be rejected.

The third null hypothesis stated that there is no significant difference in the performance accuracy of rhythms and pitch between Group 3 (Modeling) and Group 2 (Structured Practice). An analysis of variance (ANOVA) was performed on the data and Table 3 compares the scores between Group 2 (Structured Practice) and Group 3 (Modeling).

Table 3.

Comparison of Structured Practice and Modeling Groups

Skill	N	Mean Difference	Std. Error	F	Sig.
Pitch	31	-.6510	1.476	.536	.907
Rhythm	31	-.2877	1.073	.423	.965

No statistical significance could be found between the structured practice group and the modeling group. Therefore, the null hypothesis failed to be rejected.

The fourth null hypothesis stated participation in private lessons would have no effect on the students' performance accuracy in either group. Table 4 compares students who participated in private lessons and those that did not.

Table 4.

Comparison of Private and Non Private Lesson Students

Skill	N	t	df	Sig.
Pitch	49	1.843	47	.072
Rhythm	49	1.604	47	.116

No statistical significance could be found between the students who participated in private lessons and students who did not. Therefore, the null hypothesis failed to be rejected.

Chapter V

SUMMARY AND DISCUSSION

The purpose of this study was to compare the effectiveness of structured practice and modeling techniques in increasing high school student's performance accuracy. For the purpose of this study the areas of technique included correct pitch and correct rhythm.

Summary of Results

Subjects in this study were 49 ninth through twelfth grade instrumental music students from a high school in the Omaha Public School District. Of the 49 students, 12 students had been participating in private lessons for at least nine months. Before pretesting, the students were equally assigned to one of three groups. The three groups were (1) Modeling (2) Structured Practice and (3) Control. Participants in the experimental groups met for 10 minutes to explain the procedures to each particular group and answer any questions. Subjects had two, ten-minute practice sessions on two consecutive days. Following the practice, students performed the etude as a posttest. Three judges listened to the pretest and

posttest tapes and recorded the number of errors for each performance.

The results of the study indicated that the treatments had no significant effect on improving the accuracy of high school instrumentalists. Participating in private lessons also was not a significant factor in improving performance accuracy.

This study was designed to answer the following questions: Does modeling have an effect on high school band students' ability to accurately perform rhythms and pitches? Does structured practice have an effect on high school band students' ability to accurately perform rhythms and pitches? Does participation in private lessons effect the students' performance accuracy in either group? These research questions will be addressed in this chapter and will be followed by conclusions, implications for music education and future research.

Discussion in relation to research questions

1. *Does modeling have an effect on high school instrumental music students' ability to accurately perform rhythms and pitches?*

Modeling did not have a significant effect on improving the students' ability to accurately perform

rhythms and pitches. Several factors could have effected the result.

First, students expressed a concern that only one listening wasn't enough to understand the piece. While the single presentation of the model was based on previous research designs, it may not have been sufficient for students to effectively process the modeled example. In addition to limiting the modeled example, students were given only two ten-minute practice sessions. This time constraint could have effected the student's ability to achieve greater performance accuracy.

Finally, the tape example provided was performed on a piano. The timbre of the piano of may have been too dissimilar from the students individual instrument timbres. Models utilizing like-timbre instruments may have proven to be more effective.

2. *Does structured practice have an effect on high school instrumental music students' ability to accurately perform rhythms and pitches?*

Structured practice did not have an effect on the students' ability to perform rhythms and pitches accurately.

Students received 10 minutes of training on the structured practice procedures prior to the pretest. The subjects were encouraged to ask questions concerning the structure. The amount of training time may have been insufficient for the students to fully understand the procedure. The students would need to internalize the practice procedures as well as process the musical material during the practice sessions. It may be that the constraints of the practice sessions were too short for students to process practice structure and musical material.

3. Does participation in private lessons affect the students' performance accuracy in either group?

Participation in private lessons did not affect the students' performance accuracy in either group.

Assumptions were made that students who take private lessons would be more likely to be more accomplished sight-readers and more proficient in practicing. The students in this study who took private lessons did not perform with greater accuracy than those who did not participate in private lessons. While the sample was a representative percentage of instrumental students who participate in private lessons, this sample may have been

too small to yield significant results. Furthermore, students who take private lessons may not have been able to transfer the skills taught by their private teacher to different settings. Private teachers may not be incorporating sight-reading or practice procedures as part of their private lessons.

Conclusions

1. Modeling did not have a significant effect on improving the students' ability to accurately perform rhythms and pitches.
2. Structured practice did not have an effect on the students' ability to perform rhythms and pitches accurately.
3. Participation in private lessons did not affect the students' performance accuracy in either group.

Discussion in relation to past research

While research has examined the role of structured practice and modeling, the factors of student age and treatment time have produced varied results.

Many of the modeling studies (Rosenthal 1984, Rosenthal Wilson, Evans and Greenwalt 1988) utilized college music students as the subjects. Graduate and

upper level undergraduate students have more skills than the subjects of this study. Students in this study were truly a random sample of members of both the band and orchestra in a large urban school. Subjects of this study were limited to the skills they had developed over their average of five years of experience. College music majors would have more musical independence and experience with sight-reading and listening that might make a modeling-based practice structure more effective. Future research needs to include performers at all levels.

The other factor in this study that effected the results have been related to time: 1) The number of times students were given a modeled example and 2) The length of practice time. In a study by Rosenthal (1984), subjects' performance significantly increased after hearing an etude three times. While the frequency of hearings was increased, students were also given a verbal guide that directed the students listening to various musical details. It is not clear whether the increased frequency, the verbal guide, or a combination of the two factors effected the results. It may be that more than

a musical model is needed to produce greater performance accuracy.

While subjects in the Fortney study (1992) were elementary students in their second year of instrumental instruction they listened to a recording of the etude and after a study and review period of only two minutes, performed the etude. The modeling group recorded the largest gain score from pretest to posttest. This points to a memorization situation where the students mimic rather than practice independently. Giving students more time not guided by a teacher leaves more to chance. Students can practice incorrectly, forget the recording and begin creating their own music.

Implications for Music Education

Music educators agree on the role of practice to musical skill acquisition. Motor skills learning theories point to the importance of tasks being learned thoroughly in sequence at an appropriate speed and with feedback that gives the learner knowledge of results as well as knowledge of results. Structuring a student's practice will create a sequence of motor learning that should enhance learning. To give proper feedback, an expert musician listening to a student at regular

intervals can guide a student to a higher level of musical achievement.

The theories of motor learning from Swinnen (1996) discuss the importance of feedback which he calls knowledge of results (KR) and knowledge of performance (KP). In the private music studio, instructors try to make students aware of their own progress (KR/KP) through feedback during a lesson. While higher conceptual learning is involved, students at all levels of proficiency need feedback to improve. Without the KR and KP students will not see real improvement and students with less experience need more feedback. The private lesson students involved in this study had varying degrees of ability and various experience levels in private lessons.

The challenge for music educators is to properly incorporate these concepts into the student's practice regime. This study points to the importance of not assuming or skipping a step in the development of a student musician. Modeling should not be used as a purely mimicking device or sight-reading skills will not be fully developed. Students that are not given feedback when learning a new piece, even when they have a model

may not improve in rhythm and pitch. The common factor in this study was that students were never given feedback on what was correct and what was not. Consequently, the only feedback was their own personal experiences. Teachers need to work closely with students by monitoring their progress, encourage the rhythmic skills necessary for the development of sight-reading skills and give regular feedback to encourage higher level learning.

Implications for Future Research

The purpose of this study was to compare the effectiveness of structured practice and modeling techniques in increasing high school student's performance accuracy. For the purpose of this study the areas of technique included correct pitch and correct rhythm. The results of the study indicated that the treatments had no significant effect on improving the accuracy of high school instrumentalists. Participating in private lessons also was not a significant factor in improving performance accuracy.

Future research should include a larger sample to insure more representation in each group. The subjects could be given more time to practice as well as multiple listening of the model example. With multiple

listenings, future research could use verbal guides to direct the subjects to important musical aspects of the etude. Use of verbal guides and other feedback would be important to include in future studies. Use of a like timbre instrument model could help the subjects relate the etude to their particular instrument.

Other practice structures could be included in future research. Peer practice where students teach other students and self-taping by the students are two areas that could be explored in future research. Reflective practice procedures offer another avenue of practice structure research.

There was no difference in performance accuracy between students taking private lessons and those not enrolled in private lessons. This indicates that the role of communication between private teachers and instrumental music directors should be examined. The importance of both parties sharing concepts related to modeling, feedback, practice structure and sight-reading could help create more consistent instruction in the private studio and the ensemble. The old adage states, "Practice makes perfect." Results of this study indicate

that music educators need to continue to examine ways to make practice perfect.

Appendix A

Structured Practice Instructions

1. Notice the key signature and time signature.
2. Try to sing or clap rhythms that you find difficult before playing the piece.
3. As you play the piece the first time, keep a slow but steady pulse and do not change the underlying tempo which will be quarter note = 100.
4. Look at the pitches and listen to make sure your are playing the correct intervals (An explanation of intervals may be necessary).
5. Practice the difficult passages in small sections at a slow tempo.
    a. Pay close attention to the triplet figures in measure 9 and do not play the dotted eight and sixteenth notes as triplets in measure 12.
    b. Ties across the bar lines (measure 10) can be eliminated to simplify the rhythm and added as you practice the piece.
    c. Keep the pulse consistent as you play measures with rests on the first beat of the measure (ex. Measure 18 and 20).

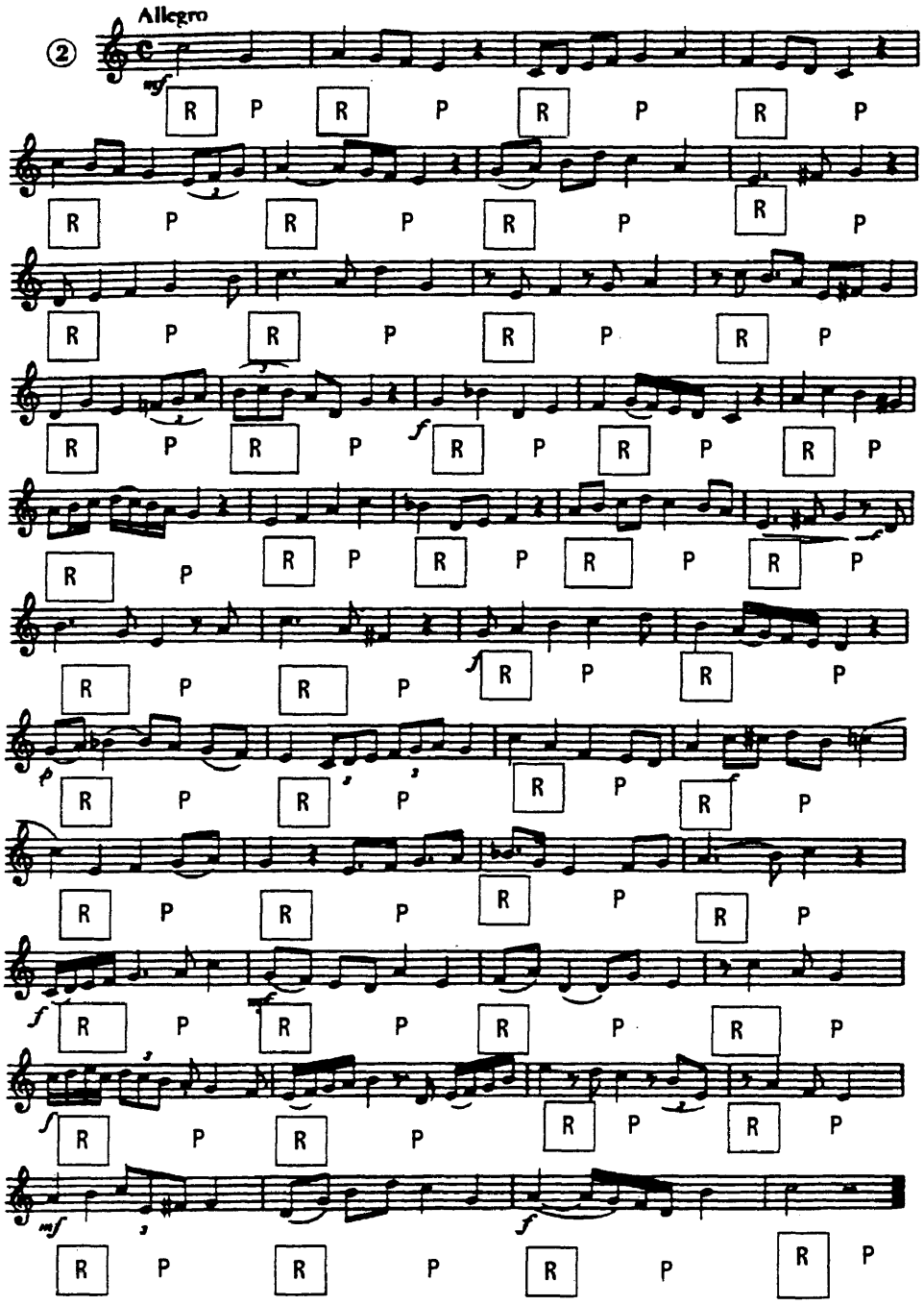
d. Once you are comfortable with the passage, try playing it within the context of the etude at a faster tempo.

6. Set a goal of eliminating mistakes and improving every time you play the etude.

Appendix B

Treble Clef Control
Judges Sheet

5

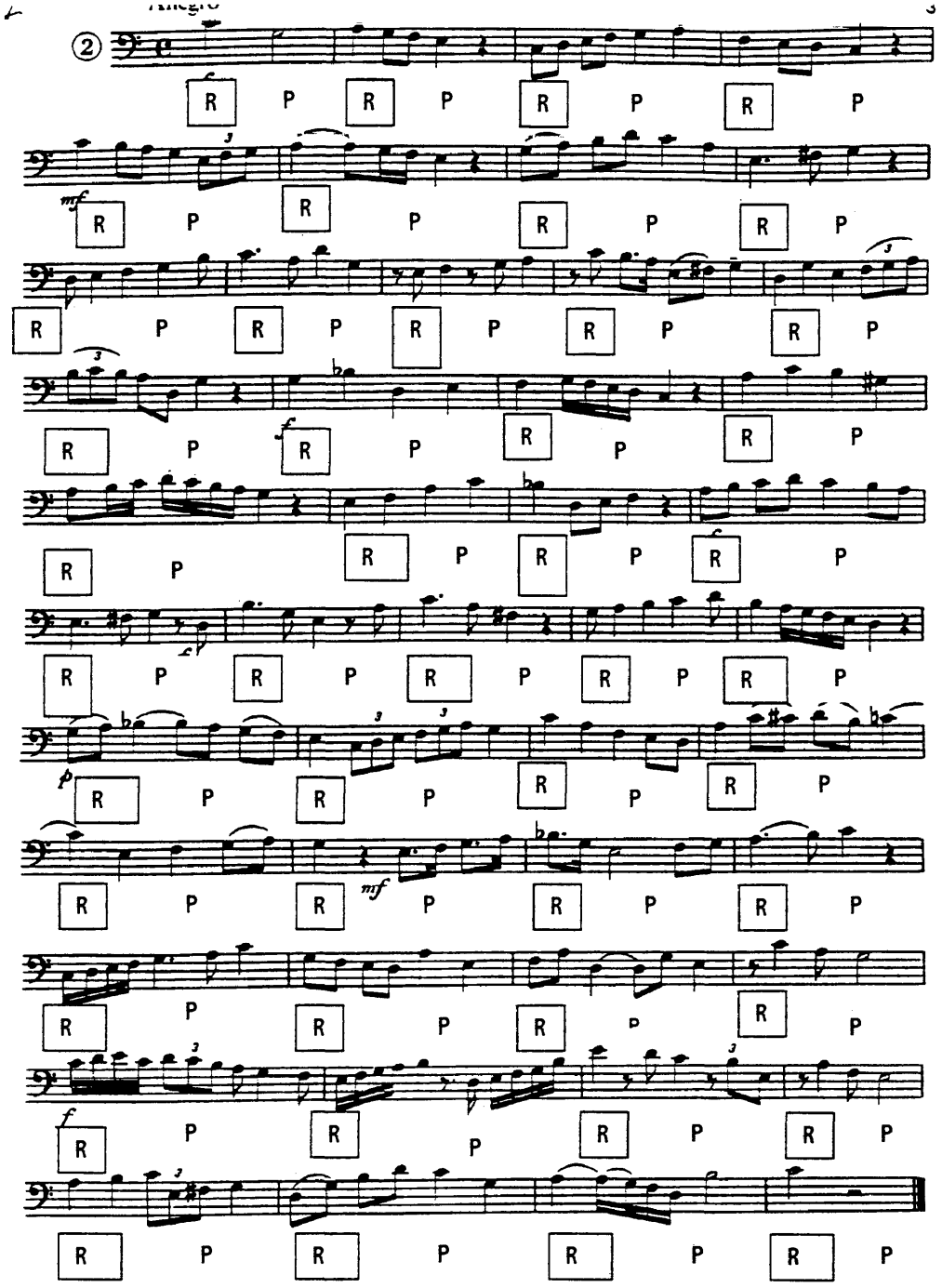


R Errors = /46

From Develop Sightreading
by G. Dufrense, edited by R. Voisin

P Errors = /46

Appendix C
Bass Clef
Control Group
Judges Sheet

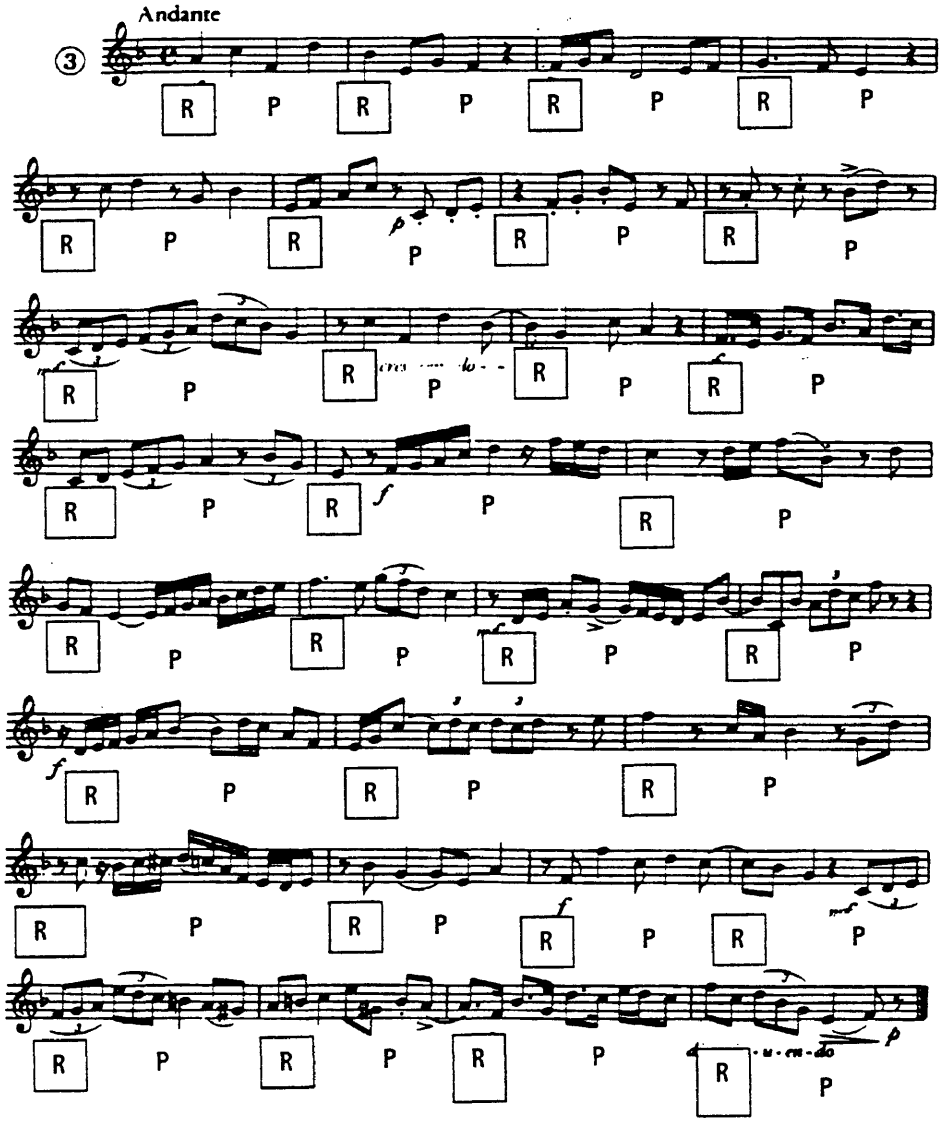


From Develop Sightreading
by G. Dufrense, edited by R. Voisin

R Errors = /46

P Errors = /46

Appendix D
Treble Clef
Structured/Modeling
Group
Judges Sheet

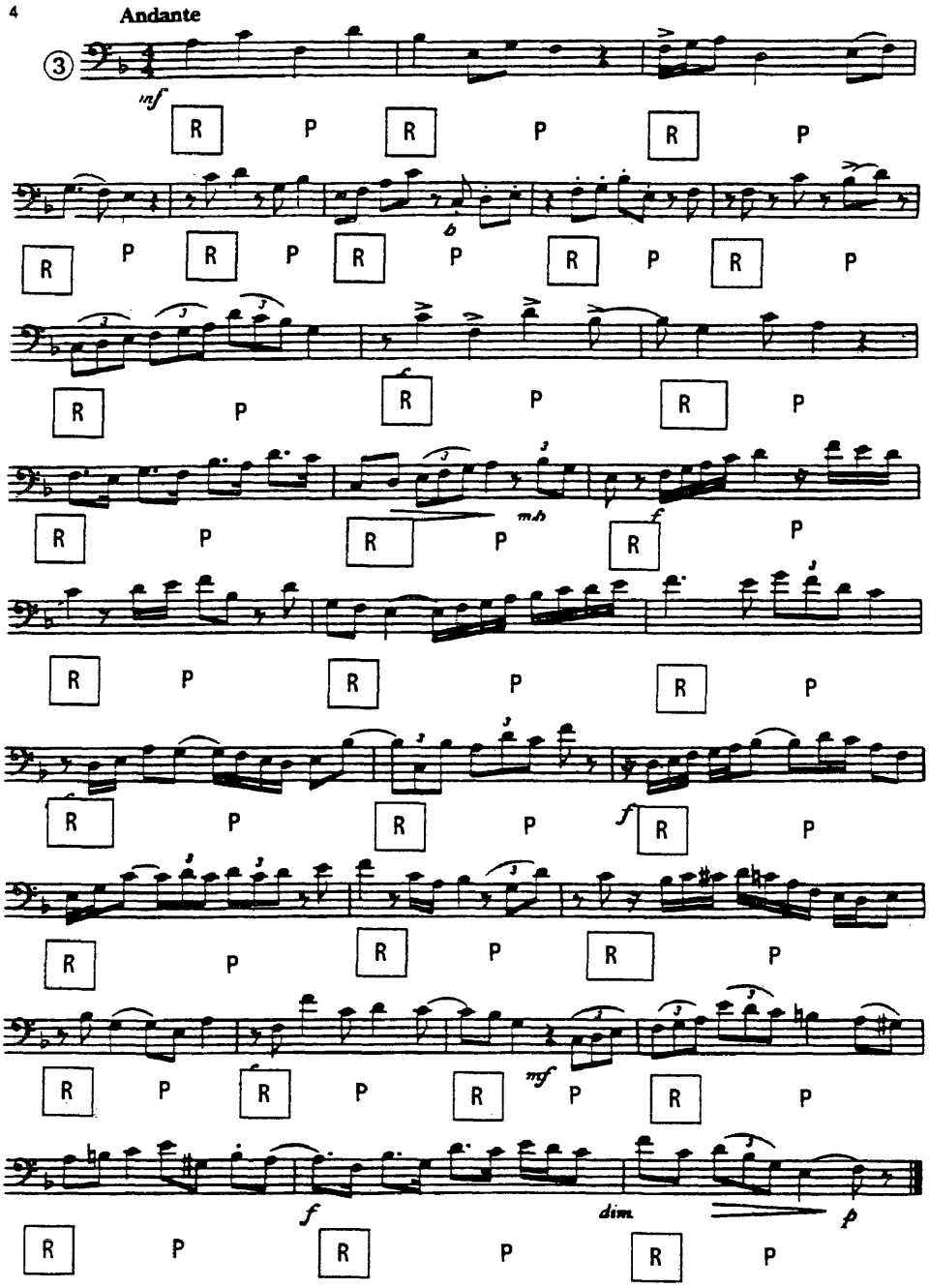


R Errors = /30

P Errors = /30

From Develop Sightreading
by G. Dufrense, edited by R. Voisin

Appendix E
Bass Clef
Structured/Modeling
Group
Judges Sheet



From Develop Sightreading
by G. Dufrense, edited by R. Voisin

R Errors = /30

P Errors = /30

Appendix F

Judge Sheet Instructions

Listen to each performance twice.

First listening: Put a slash through the [R] in any measure that has any rhythmic error.

Second listening: Put a slash through the **P** in any measure that has any pitch error.

Articulations and dynamics are not a consideration in the study.

Pretest and Posttest tapes are recorded in the same order. In the case of Group 2, Alto Saxophone 2 and Bassoon 1 posttests were recorded on a separate tape because of an assembly.

Additional Judges Instructions:

1. Use a tape player with a counter and or immediate search to find instruments more easily.
2. If a student repeats a measure and achieves the correct pitch or rhythm, count as correct.
3. Within a measure, if a rhythm is accurate and the pulse changes (e.g. speeding up or slowing down) count the measure as correct.
4. Use your best judgment when determining intonation versus inaccurate pitch.

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