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MISSOURI JOURNAL OF RESEARCH IN MUSIC EDUCATION

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Contributions to this journal should be sent to Alfred W. Bleckschmidt, Supervisor, Fine Arts Education, State Department of Education, or Lewis B. Hilton, Editor, Washington University, St. Louis. Authors should observe the following rules in preparing their manuscripts: the editors welcome contributions of a philosophical, historical or scientific nature which report the results of research pertinent in any way to instruction in music as carried on in the educational institutions of Missouri. Articles should be typewritten, with double spacing throughout, including footnotes, long quotations, and itemized lists. Footnotes should be placed consecutively at the end of the article, beginning on a new page, using triple spacing between notes. Authors reporting quantitative studies may substitute a list of references for footnotes in accordance with the practice followed in many scientific journals. In all instances, manuscript style should follow recommendations made in the MLA Style Sheet. The Chicago Manual of Style should be followed in setting up tables, charts and figures, which should be numbered and placed on separate pages. (Suggestions to the authors is reprinted from MENC publication, *Journal of Research in Music Education* by permission of the editors).

FOREWORD

We present with pride this third edition of MISSOURI JOURNAL OF RESEARCH IN MUSIC EDUCATION. This publication reflects the continuing effort of the Missouri State Department of Education to provide quality teaching in our state.

Each day in every facet of our living, we are reminded of the conquering of new frontiers through research. In education, we are grateful to those who conduct and record research. The efforts in these projects strengthen the art of teaching and facilitate learning. We commend those who search out new truths and explore new paths.

This edition contains projects by those in the teaching field, by college students on the graduate and undergraduate levels, and by students in Missouri high schools. As they have shared with us, we are pleased to share with you.



*Assistant Commissioner
Division of Instruction
Director of Vocational Education*

PREFACE

The Missouri Journal of Research in Music Education is a publication devoted to the needs and interests of the school and college music teachers of Missouri and of the nation. It is published as a Bulletin of the State Department of Education. Besides the publication of reports of research or experimentation in progress or completed, included are abstracts of these either completed or in progress, articles of a philosophical nature, as well as simple reports on the results of successful musical pedagogy. Again the Editor is happy to include a paper written by a Missouri High School Student (Number IV by William Prante) It is the hope of the Editorial Staff that it will prove to be a useful means for the exchange of experiences, opinions, and research among practicing music educators as well as those preparing to enter the profession, including those high school students who are interested in music and may eventually enter the field of music education.

Of special interest to University and College musicians are the three preliminary reports on music history and music theory pedagogy and the report on student teaching practices, the results of research sponsored by a continuing committee of the Missouri Music Educators Association, College and University Division. Comments from readers are particularly invited on these reports. Subsequent issues of this Journal will contain Progress Reports in these areas. Since this publication is not copyrighted, complete articles or excerpts from articles may be made without charge. In so doing, it is requested that credit be given to the Missouri Journal of Research in Music Education.

Copies of this Journal are obtainable without charge from the Missouri State Department of Education.

Suggestions to the Editor concerning the format of the Journal or the content of the articles included are solicited. If enough interest is evidenced, future editions of this Journal will include a section devoted to Letters to the Editor.

Grateful appreciation is expressed to those who have assisted in any way in the preparation of this bulletin.

STATUS STUDIES AND RECOMMENDATIONS OF THE MISSOURI MUSIC EDUCATORS COLLEGE AND UNIVERSITY DIVISION IN THE AREAS OF MUSIC HISTORY TEACHING, MUSIC THEORY TEACHING, MUSIC STUDENT TEACHING PRACTICES

The three articles which follow constitute the first reports of a continuing study by the MMEA College and University Division in the teaching areas listed. The recommendations listed at the end of two of the articles were first voted upon and passed by the members present at the College and University Division meeting during the MMEA Convention in Kansas City, Missouri on January 11, 1964. They were subsequently presented to the Executive Board of the Missouri Music Educators meeting in Columbia, Missouri on June 26, 1964 and passed. Progress reports will be made at the MMEA convention in Columbia in 1965.

The Editor

MUSIC HISTORY TEACHING IN MISSOURI COLLEGES AND UNIVERSITIES: A PRELIMINARY REPORT

Martha H. Wurtz
Washington University

The following material has been prepared at the request of Dr. Lewis B. Hilton and the College-University Division of the Missouri Music Educators Association. A questionnaire which dealt with present practice in the teaching of music history for music education majors was sent to 112 staff members of Missouri colleges; these included chairmen of departments, music education faculty, and all faculty listed with the State Department for musicology, music history, music literature, or music appreciation. In addition to dealing with present practice, the questionnaire asked for opinion about various aspects of history training needed for music education majors. Sixty-one persons, or 54.4% responded; since faculty assignments do change, it is possible that some of the blanks were sent to persons not concerned at this time with the area under discussion. In any case, the response indicates a considerable interest in the subject.

The results shown in the information gathered show especially the great diversity in practice in Missouri colleges; a considerable difference of opinion on the amount of history training required, and on the manner of course spread, is also obvious.

One of the factors which influenced the type of questionnaire sent was the similar opinion poll in process relative to the teaching of theory for music education majors. That work is concerned with the possibility of giving some kind of practical application final examination to determine whether the student has absorbed the theory material in such a way that he can apply it to a real situation of the kind he will have to deal with on the job. It is suggested that thought be given to a similar examination for history. This is a much more difficult problem, however, since the physical problems would be much greater. What sort of practical examination could be given to determine, for example, whether the student specializing in choral music truly knows the proper style for performance of a certain Renaissance madrigal? He would need a performing group with which he could work long enough that his performance would be a true demonstration of his abilities. The group is asked, then, to give some thought to a realistic solution to this problem. It is obvious from answers given on the questionnaire that a large number of persons do not feel that the cooperating teachers in the practice teaching situation can be relied on for proper judgment in this matter.

The respondents in several cases did not answer all questions. In some instances a particular teacher did not have the information asked for; in others, the respondent simply did not choose to answer.

The statements and questions from the questionnaire, together with the responses, follow:

I. The amount of history work

1. Music education graduates generally do not get enough training in specialized area history courses (Renaissance, Baroque, etc.)

73.6% agree; 12.2% doubtful; 14% disagree

The wording of this statement in a negative way was an error on the part of the writer. However, the opinion of the respondents is clear, in that a total of 85.8% feel, at least somewhat, that music education people need more special area courses.

2. One year of broadly-based music history is enough for the music education graduate. 12.2% agree; 61.4% doubtful; 26.3% disagree
3. The music education major needs *more* history work than other music majors. 15.7% agree; 57.8% doubtful; 26.3% disagree

25. In my school, the music education major is likely to be able to take — hours maximum in history. (Following are the hours maximum reported. Remember that several persons from the same school may report, so that the largest numbers may include several responses from the same school.

Hours	0	4	5	6	7.5	8	9	10	12	14	14
Persons											

Reporting	1	5	1	17	3	3	4	12	6	2	2
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26. The average music education student gets — hours in specialized area history courses in my school.

Hours	0	2	3	4	6	7.5	8	9	10
Persons									

reporting	25	1	1	6	12	2	2	1	2
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27. 75% report that their students get a broad general history course, but no special area courses. Some respondents must have answered incorrectly on either item 27 or 26, since the figures do not agree.

25. History training for the prospective private teacher should be less detailed than that required for the public school teacher. 5.1% agree; 18.9% doubtful; 75.6% disagree

16. The music education major and the prospective private teacher need much the same history work in college. 94.9% agree; 5.0% doubtful; no disagreement

21. In my situation, the students' programs could be altered so that more history courses could be taken in place of some of their present electives.

19.2% yes; 29.8% doubtful; 50.8% no

22. In my situation, it would be possible to add further history courses to the present load of the music education student.

9.2% yes; 27.7% doubtful; 61.1% no

- II. Regarding proof of ability to perform, grading on the same, and relative matters

7. Before receiving his degree, the music education major should be required to prove by actual performance that he can apply his history knowledge to a practical situation by preparing and performing specified works for choral group, or instrumental group, or preparing and teaching demonstration lesson in history-literature.

77.9% agree; 11.8% doubtful; 10.1% disagree

8. The supervising teachers who work with the student in his practice teaching attend to Item 7 during the practice teaching period.
35.5% agree; 38.9% doubtful; 25.4% disagree
9. The supervising teachers in the practice teaching situation are always capable of judging the student's success in the situations described in Item 7.
8.6% agree; 51.7% doubtful; 39.6% disagree
10. The supervising teachers in the practice teaching situation should decide whether the student can perform satisfactorily as described in Item 7.
28.2% agree; 36.9% doubtful; 56.5% disagree
11. The history teachers at the student's college should have a hand in deciding whether he has performed Item 7 properly.
79.6% agree; 11.8% doubtful; 8.4% disagree
12. History teachers often do not know how to perform what they teach.
62.7% agree; 29.6% doubtful; 7.4% disagree
(It seems strange that 79.6% think history teachers should have a hand in the grading of performance, but 62.7% think history teachers often do not know how to perform what they teach.)
3. "Doing" as described in Item 7 is an unfair test at this level.
8.6% agree; 25.8% doubtful; 60.2% disagree.
5. History training for music education majors should put more stress on performance practices.
65.5% agree; 27.5% doubtful; 6.8% disagree
9. There is no opportunity for practical application of music history knowledge for the teacher whose work is principally with performing groups.
8.3% agree; 8.3% doubtful; 83.3% disagree
10. If a student can write a good history examination paper, he thus can prove a real grasp of the subject matter.
11.5% agree; 44.2% doubtful; 46.1% disagree

This whole group of questions shows a state of dissatisfaction with the present situation. Since the music education person's work on the job is most often largely concerned with performance, especially group performance, he should be able to apply his knowledge to performance. What he has or has not learned in his study of music history should not be divorced from practical application of knowledge gained. Many respondents took this position, and many kindly added explanatory notes to their questionnaires. Many of them felt that the knowledge of history as an isolated body of facts is not the object of the study of history; if the student can not apply the knowledge and perform works in proper style, then he has failed to learn much of his history in a meaningful way.

29. If an examination could be given at the end of the student's last year, what do you think the form of such an examination should be: written? oral? both written and oral? actual performance? Student to criticize performance (i.e., listening to

live or recorded performance, with discussions with the examiners)?

Written only	5
Written and oral	13
Performance only	1
Criticism only	5
Written, oral and performance	13
Written, oral and criticism	4
Performance and Criticism	4
Written, oral, performance and criticism	5
Oral, performance and criticism	1
Oral and performance	1

III. Miscellaneous

4. Music education majors need more work in methodology for teaching history to their students.
33.8% agree; 44.0% doubtful; 22.0% disagree
14. Music education students should have a written screening test at the end of the sophomore year to determine their needs in history.
53.4% agree; 27.6% doubtful; 22.4% disagree
17. Requiring more and better history preparation would keep many good musicians out of music education.
10.5% agree; 38.5% doubtful; 50.8% disagree
18. A detailed knowledge of history if necessary if the music education graduate is to teach General Music at the secondary level.
71.4% agree; 14.2% doubtful; 14.2% disagree

20. Much of what we teach in college music history should have been taught in the high schools or lower.
40.0% agree; 26.6% doubtful; 33.3% disagree

30. What is the climate for interest in history among your students: Do they have personal libraries of books? records? scores?

Does your faculty really encourage students to pursue diligent and scholarly study of history?

It is not possible to arrive at exact percentages on this question. However, most of the respondents reported that the climate for history study was somewhat cold. Only a few thought their students had much in the way of personal libraries of books; a few more thought their students rather well-supplied with records, and only a very few thought the students had scores in any quantity.

64.2% thought their faculties encourage intense study of history, but many of these qualified this remark with various statements. 35.8% are convinced that their faculties do not encourage study of history.

IV. The need for change

23. There is need to change present programming of music history courses. We are not giving adequate preparation in music history to the music education major.
55.1% agree; 29.3% doubtful; 15.5% disagree

24. The College-University Division of MMEA should continue to study this problem, and make recommendations for improvement of the history situation.
93.7% agree; 5.1% doubtful; 1.7% disagree
28. Would your school be willing to cooperate in a pilot program to try new programming and testing in music history for music education majors?
Only 35 persons answered this question; of course some of these are in the same schools. Of those who responded, 30 indicated that their schools would be willing to cooperate. Several persons added the condition which is recognized by all: that any change is subject to departmental approval, and administrative approval. We should recognize also that a testing program does not necessarily assume a change in course offerings.

SUMMARY

1. The response to the questionnaire indicates considerable interest in history teaching for music education majors.
 2. 93.7% of the respondents feel that the College-University Division should work actively in this area.
 3. Many respondents feel that the already-heavy course loads of the students may prevent course changes.
 4. Notes added by many respondents indicate that they feel that the "climate" for history study is set by the faculty, and that some improvement could be gained simply by changes in faculty attitudes.
 5. Notes added by many respondents indicate that they feel their course work is adequate. They feel that the fault lies somehow in the fact that faculty and students do not connect the history knowledge with the *practice* of music.
 6. Several respondents note that they are willing to help in preparation of a testing program.
 7. Other summarizing notes have been included throughout the present paper. Most of the responses are self-explanatory.
- NB: The numbers used throughout refer to the numbers of the items in the original questionnaire.

RECOMMENDATIONS

1. It is recommended that the MMEA College-University Division actively work to improve the history training of music education students, especially in the area of practical application to performance.
2. Interested faculty members are asked to work on some kind of comprehensive examination which would demonstrate the student's ability to apply his history knowledge to the practical performance of music.
3. Missouri colleges should support a continuing program of evaluation in history teaching for music education majors. Reports of progress should be made to the College-University Division, with further reporting at the annual MMEA conference.
4. Articles pertaining to the work should be published in state and national journals.

MUSIC THEORY AND MUSICIANSHIP TEACHING IN MISSOURI COLLEGES AND UNIVERSITIES: A PRELIMINARY REPORT

Dr. Leon Karel

Northeast Missouri State Teachers College

In the winter of 1962-63, Dr. Lewis Hilton, then the Vice-President of the College-University Division of the Missouri Music Educators Association, asked the author to prepare a program for the 1964 MMEA Conference in Kansas City. While searching for a topic of wide interest, the area of college theory instruction commended itself. MMEA has traditionally been interested in this field, but in recent years little of positive nature has been proposed or carried out.

After surveying the field, the author decided that one crucial area concerned the "carry-over" of skills and knowledge from college classes into post-graduate professional work. In a letter and questionnaire sent to 84 theory teachers and music department heads in Missouri, it was proposed that colleges in this state adopt a Theory-Comprehensive Examination at the end of the senior year as a device to insure that students retain and improve what they learn in their course work. It was further proposed that this examination be of "practical" nature rather than deal with written exercises in the manner of traditional theory tests.

An actual comprehensive examination was sent along with the questionnaire. It contained nine "problems" in working theory as follows:

Problem One: You are watching a copy of the music as a soloist plays his part for you. Correct any errors in rhythm, pitch, or phrasing which you detect. The music will be of average high school contest difficulty.

Problem Two: You are given a fairly simple choral piece of not more than 16 measures for fifteen minutes of study. You are equipped with a chromatic pitch-pipe. At the end of the study period you will direct a small choral group in the number, correcting any errors they may make. Such errors may be in written parts. Indicate only starting pitches on pitch-pipe; sing other pitches and chords for the group. Demonstrate suitable conducting techniques on fermatas, meter changes, and so forth.

Problem Three: You are given a four-part vocal score in the chorale style. Starting with only the tonic pitch, study this score carefully for fifteen minutes. Then listen to a piano version pointing out errors in pitch and rhythm.

Problem Four: At the keyboard, harmonize a simple given melody with left hand chords. Continue beyond the normal ending by phrase extension, modulation, sequence, and so on.

Problem Five: At the keyboard, illustrate on request such theory features as types of chords, scales, modes, progressions, intervals, and so on. Be able to do the same vocally where applicable.

Problem Six: The same features of theory as in problem five should be illustrated on your major instrument. If this is either voice or piano, this problem may be omitted.

Problem Seven: Arrange a given melody of simple nature for either band or orchestra in full score, using various types of accompaniment, harmonic variety, simple counterpoint in a counter-melody, and so on. The work should take one day, done under supervision.

Problem Eight: Using a given theme as a beginning, write a piece of music illustrating your knowledge of small forms. The piece should approximate 60 measures. A piano should be used only occasionally as a help in checking.

Problem Nine: Listen to various pieces of music selected by the examiner. Some of these may be familiar, some may not. Write down the themes, motives, instrumentation, styles, periods, probable composers, and analyze their forms.

Of the 84 people to whom the material was sent, 52 answered the questionnaire, a return of 61.9%. Their answers and suggestions may be grouped into six sections, each dealing with a different phase of the problem. Under each section the answers to those questions dealing with that section will be given.

Section One: Carry-over from college to profession of music theory instruction.

Question 1. 57% of those responding feel that college music graduates do not practice what they were taught in their theory courses. 15% feel they do. 28% are doubtful.

Question 2. Only 7% agree with the statement that our colleges are teaching the wrong things in theory classes. 53% disagree with this idea, and 40% are doubtful.

Question 3. 62% feel that music educators specifically do not pass on to their own students what they were taught in college theory courses. Only 4% feel they do. 34% are doubtful.

Section Two: The content of college theory courses.

Question 4. 31% agree that college theory classes are teaching the right material but taking the wrong approach. 29% disagree with this statement, while 40% are doubtful.

Question 5. 63% agree that most college students are not motivated to learn theory as strongly as applied music. 15% disagree, and 22% are doubtful.

Question 6. Only 9% agree that applied music is of greater importance than theory to the high school teacher. 84% disagree, and 7% are doubtful.

Question 7. As to the statement that music education students should have different theory requirements from other types of music students, 62% disagree, 15% agree, and 11% are undecided.

Question 8. Only 9% agree that a music education major needs more theory than other types of major. 67% disagree, while 15% are undecided.

Question 9. 71% agree that music education people and private teachers need the same type of theory in college. 20% disagree, while 9% are uncommitted.

Question 10. 82% agree that much of what we teach in college theory should have been taught in high school or earlier. 7% disagree, while 11% are doubtful.

Question 11. 9% agree that more work in "how-to-do-it" courses (strings, woodwinds) is needed rather than more work in theory. 53% disagree, while 20% are uncommitted.

Section Three: The MMEA College-University Section and the College Theory-Pedagogy Program.

Questions 12, and 13. 81% of those responding felt that the MMEA C-U Division ought to work actively to raise standards.

Section Four: The Theory-Comprehensive Examination.

Question 14. Only 7% felt that the proposed examination would be too difficult. 79% felt that it would not be, while 14% were doubtful.

Question 16. Respondents were heavily in favor of the "doing" aspects of the test, as opposed to more traditional written exercises. 64% agreed with this idea of the exam, while 14% agreed with the traditional type. 17% were uncommitted.

Question 17. No one agreed with the statement that a student preparing for a career in performance would be wasting time on preparing for such an examination. 93% disagreed with this idea, while 7% were undecided.

Question 18. 93% disagreed that the student going into private teaching should not take such an examination. 2% were doubtful.

Question 19. 10% agreed that the pre-private teacher should have a theory exam., but of a different type. 60% disagreed, while 26% were doubtful.

Section Five: The Comprehensive Examination in the Respondent's Own College.

Question 20. Only 7% agreed that the theory teaching "at home" is effective and that no comprehensive is needed. 60% disagreed, and 26% are doubtful.

Question 21. 17% agreed that, though the plan is a good one, it would not work locally for various reasons. 38% disagreed with this statement, while 38% were in doubt.

Question 22. 66% disagreed with the statement that the examination looked difficult and would scare away music majors. 14% agreed, while 22% were undecided.

Question 23. 60% thought the theory-comprehensive idea would improve the theory work in their college. 2% thought it would not. 38% were in doubt.

Section Six: Changes in the Theory-Comprehensive Examination

Question 15. 26% agreed that more requirements ought to be added, 39% thought they ought not, while 33% were undecided.

Question 24. 16% favored the theory examination at the end of the sophomore, rather than the senior year. 37% disagreed, and 29% were doubtful.

Question 25. 66% thought there should be both a sophomore and senior theory-comprehensive examination. 2% disagreed, while 22% were doubtful.

Question 26. 38% thought students ought to be allowed more use of piano during the exam. 22% disagreed, 27% were doubtful.

Question 27. Only one problem received more than one vote for elimination from the exam. This was #9, which received two votes.

Question 28. As for problems which should be made easier, there were 7 votes for #4 (14%), a similar number for #8, and 18% for #9. Only four problems received one vote each on the second part of this question, asking for those which should be made more difficult.

Question 29. Here the respondent was asked to add items he thought should appear on the examination. Answers included:

Transposition of four-part music, score reading, correcting errors while listening to ensemble music as well as solo, arranging for choral groups, proficiency in harmonic and structural analysis, reading of choral parts at the keyboard, piano rendition of pre-assigned scores, practice demonstration of theory teaching in the classroom, listening analysis of stylistic differences in music, dictation in four parts, rhythmic dictation, written formal analysis of larger forms, usage of contemporary idioms, and others.

SUMMARY

1. The fact that 61.9% of those sent the questionnaire responded indicates a general and vital interest in theory teaching in this state.

2. The fact that 81% feel that the MMEA College-University Division should work actively in this area gives a clear mandate to proceed with the work.

3. A lack of motivation on the part of the student is clearly indicated by many who answered. 63% felt that applied music learning was more strongly motivated.

4. The great majority felt that theory is vital to the education of both music educator and private teacher.

5. It is largely agreed (83%) that what is now taught in college theory courses should have been taught earlier. In turn, 62% feel that our students do not pass on what they were taught in our classes.

6. The respondents are definitely in favor of the comprehensive exam in theory at both sophomore and senior levels (66%) and feel that it is not too difficult (79%). It should be a practical rather than "theoretical" exam (64%) and that preparing for it would not waste the students' time (93%).

7. However, faced with actually implementing such an exam in our own colleges, we agree that our local programs are not as effective as they should be (60%) and are in need of such an examination. On the other hand, we felt dubious about the workability of the plan in our own school (38% for, 38% doubtful). Few thought it would "scare off" majors (14%) and many (60%) thought it would improve theory teaching if it were implemented locally.

8. Roughly a third felt that more requirements should be added, while another third felt they should not. 38% felt that more aid in the form of piano usage should be allowed the student at examination time.

RECOMMENDATIONS

1. It is recommended that the MMEA College-University Division actively engage in improving the quality of theory work done in its area, with the following provisions:

a. Revision of the proposed Theory-Comprehensive Examination in conformity with suggestions sent in by those who responded, this revision to be printed and distributed to the colleges of the state with requests that the program be put into operation on a pilot scale in each institution where possible.

b. A continuing program of evaluation of these new theory programs by means of reports to MMEA College-University Division from the colleges involved. A report of progress to be made annually at the MMEA Conference.

c. Publication of articles pertaining to this work in *Missouri School Music* and the *Missouri Journal of Research in Music Education*, as well as in national publications.

2. It is recommended that the MMEA Constitution be amended to place specifically, the responsibility for the above program on the *College-University Division Vice-President* in order to insure that successive officers will know their obligation.

MUSIC STUDENT TEACHING PRACTICES IN MISSOURI COLLEGES AND UNIVERSITIES

A Preliminary Report

Dr. Lansing W. Bulgin
Northeast Missouri State Teachers College

I. The Study

- A. Problem: to determine current practices in student teaching in the preparation of secondary school music teachers in Missouri.
- B. Means used in collecting data: questionnaire; distributed to the colleges October 1963.
- C. Population and response: 17 of 20 colleges in the state which offer a music education curriculum on the secondary level replied, representing 85% response.

II. Findings Concerning Enrollments, Credits, and Time Requirements

- A. Music education comprised a majority function of music departments
 1. One-half of the colleges reported that 90% or more of their music majors were preparing to teach. The over-all average was 78% of the music majors majoring in music education.
 2. The average number of students completing student teaching last year was 9. The range extended from 1 to 22. No further attempt was made to determine the relative size of the music enrollments or the music education programs in the colleges.
- B. Credit
 1. The minimum credit required in student teaching for secondary school certification ranged from 5 to 8 semester hours. The average and most frequent requirement was 6 hours.
 2. As much as 10 hours may be taken in some colleges.
- C. Clock hours required
 1. Although relatively little deviation existed in the number of credit hours given for student teaching, the actual time spent on the job varied considerably. The total clock hours required of student teachers varied from 150 to 330. The variance of time was not necessarily reflected in proportionate adjustments in credit, for in both cases the extremes (150 and 330) were required for 6 hours of credit.
 2. The average was 222 hours of student teaching. See Table I for distribution of hour and credit requirements.
Note: For the most part the total clock hours were calculated from the hours-per-day times the number of weeks required, or in the case of full time teaching on the basis of six hours per day. Therefore these figures actually represent *allowable minimums*. This is substantiated by the fact that 12 colleges reported that student teachers are generally expected to be on the job *outside* of school hours whenever the cooperating teacher is working with students.

TABLE I
DISTRIBUTION OF CLOCK HOURS AND CREDIT
REQUIRED BY SEVENTEEN COLLEGES

<i>Hours</i>	<i>Credit</i>	<i>Number of Colleges</i>
330	6	1
270	8	1
270	6	3
270	5	1
240	6	1
210	6	1
195	5	1
180	6	2
180	5	1
160	5	1
150	6	1
150	5	2
Undetermined	6 & 7	2

3. Pattern of time distribution
 - a. The pattern employed in distributing the required time varied from one hour per day for 18 weeks (plus a substantial amount of observation and conference time) to all day for 11 weeks.
 - b. The most common pattern was that of half-day student teaching extended over the semester (or term).
 - c. Four colleges utilized the "block" system in which the student was on the job the entire day. The shortest block period was 6 weeks, the longest was 11.
4. Satisfaction with present arrangement
 - a. Half of the respondents replied that they were not.
 - b. Comments were:
 - 1) Over-all period too short (coming from college employing a six weeks period and from one utilizing a semester)
 - 2) Would prefer block system
 - 3) Block system takes students away from the campus
 - 4) Assignment can be spread out too much
 - 5) Student teaching should be 300 hours to involve two semesters
 - 6) Students have too many other responsibilities (11 hours of class work) during student teaching
 - 7) Would prefer shorter day over a longer period (now half day for 16 weeks)
- D. Year in which student teaching is taken
 1. At 14 of the colleges (82%) student teaching is always taken in the senior year.
 2. At the other three colleges this was the usual practice, however exceptions were allowed:
 - a. In the junior year (two colleges)
 - b. In graduate school (one institution)

E. Student course load during student teaching

1. In 13 colleges student teachers carried other class work along with student teaching.
2. Only in the colleges employing the block system was the student free to concentrate on student teaching responsibilities.

III. Findings Concerning Schools Used for Student Teaching

A. Types of schools used

1. Seven colleges used college-operated schools (sometimes called laboratory schools).
 - a. Of these seven, six were state colleges, one private.
 - b. Five of these seven also placed students in public schools.
2. Fifteen colleges used public schools in the college community.
3. Eleven used public schools in other communities

B. Use of "home" high school

1. Eleven of the colleges utilizing schools in other communities did not allow the student teacher to return to the high school from which he had graduated for his student teaching assignment.
2. One respondent answered that they did allow it when possible and advisable.

C. Number of cooperating teachers usually involved

Colleges were nearly equally divided: nine indicated that student teacher usually worked with only one cooperating teacher; eight stated that more than one was usually involved in the assignment.

D. Criteria employed in selecting schools and cooperating teachers

1. Qualifications to be met by the school:

	<i>Number of Colleges</i>
All around completeness and strength of music curriculum	7
Full time music teacher in the school	2
Classified as AAA school	1
Any school	1
At the request of the student in some cases	1
Culturally minded district and administration	1
Private or parochial schools for religious emphasis	1
2. Qualifications to be met by the cooperating teacher	
Desire to work with student teachers	4
Demonstrated success of teacher's work	4
General professional reputation of the teacher	2
Master's degree completed or in progress	2
Experience in teaching and in present position	2
Recommended by administration of cooperating school	2
Master teacher and musician	2
Approved by Coordinator of Student Teaching (College)	1
Approved by Chairman of College Music Department	1
Musicianship and administrative ability	1
At least one year of teaching experience	1
Match student teacher and cooperating teacher	1

IV. Nature of Student Teaching Assignment

A. Influence of student preference on assignment

1. The student's area of performance (vocal, instrumental) and grade level preference influenced the assignment to a "considerable" degree in ten colleges.
2. Six respondents replied that it influenced to "some" extent, and one stated "not at all."

B. Breadth of assignment relative to grade levels

1. In eight colleges the student teaching assignment included experience at all three levels (elementary, junior high, and senior high).
2. Three colleges restricted the teaching to senior high level only.
3. One used junior high only.
4. One included elementary and junior high or senior high.
5. One placed student teachers in junior high and senior high.
6. At one college, student teacher was assigned to level of interest only.

C. Typical distribution of assignment as related to areas of instruction

The comparative amount of time spent in the three major areas of music was indicated in terms of percentages. The areas were identified as: 1) Area of own performing medium (if vocalist, choral music); 2) Performing area opposite his major interest (if vocalist, instrumental music); and 3) General music theory, music appreciation, etc.

1. In the area of major interest, the average was 60%, with the range from 25% to 100%. The most common percentages reported were 75% and 50%, each by three colleges.
2. An average of 22% of the time was assigned to the opposite performing area. The distribution extended from 0% to 40%.
3. An average of 18% was devoted to general music, or the non-performance music classes. The range in this instance was from 0% to 50%.

Note: In presenting such statistics it is recognized that any of these percentages does not necessarily constitute a fixed pattern of distribution in any one college, for many factors tend to affect an attempted generalization. The results do bear out, however, that in practice the student spends a majority of his time in the area of his principal interest and supported, in some cases at least, by substantial time in the other areas.

Question: Should we attempt to prepare students to be qualified in all areas of music — and provide student teaching experiences distributed appropriately to accomplish this? Perhaps item D below is one indication. The respondents were asked, "What distribution do you consider the most desirable?"

D. Desirable distribution

1. The distribution was slightly more balanced than that practiced.

2. The averages were 55% in major area, 23% in opposite medium, and 22% in general music.
 3. In comparing the ranges of practice with desirability, one finds more agreement in desired pattern than in practice. As is illustrated in Table II, there was less range difference in the desired pattern as well as a more concentrated grouping of response within the more restricted ranges.
- E. Types of teaching situation usually included in the assignment. The respondents were asked to indicate the extent to which student teachers usually participated in five common teaching situations. In Table III is shown the frequency and the extent of such participation as reported by the 17 colleges.
- Note: As might be expected the preponderance of response was recorded for "great" and "some" combined; however, the large frequency of "some" would lead the observer to question why "great" emphasis was not placed on all of these situations — or at least the first three.
- F. Distribution of time spent in observation as compared with cooperative or independent teaching
1. The range of percentage of time devoted to observation (as a part of student teaching) was 20% to 70%. The average was 43%.
 2. Accordingly, the range of the percentage of time spent in actual teaching was from 30% to 80%, with an average of 57%. These figures were based upon 15 returns.

TABLE II
FREQUENCY DISTRIBUTION OF FOURTEEN COLLEGES
INDICATING PRESENT PRACTICE AND DESIRED PATTERN
IN TERMS OF PERCENTAGE OF STUDENT TEACHING
TIME DIVIDED INTO THREE INSTRUCTIONAL AREAS

Percentage of Time	Major Medium		Opposite Medium		General Music	
	Present	Desired	Present	Desired	Present	Desired
100	1					
75	3	1				
65	2	1				
60	2	3				
50	3	7			1	
45		1			1	
40			1			
35			1	1		
33	1					
30			2	3		1
25	1		4	5	4	6
22			1			
20				2		2
15			2			
10			1	1	3	2
5					1	
0			2	1	3	1

TABLE III
FREQUENCY AND EXTENT OF PARTICIPATION IN FIVE
COMMON TEACHING SITUATIONS

<i>Teaching Situations</i>	<i>Great</i>	<i>Some</i>	<i>Little</i>	<i>None</i>
Rehearse large ensembles	6	10		1
Rehearse small ensembles	7	6	3	1
Teach private lessons, coach individual students	3	8	4	2
Teach classroom music (non-performing group instruction)	9	5	2	1
Assist in special musical shows, concerts, festivals	3	12	2	

G. Written records required of student teachers

1. No accounting sheets or records were required by four colleges.
2. Eleven required an accounting of the student's total time spent.
3. Ten required the student to submit a "log" or notebook in which the student's activities had been recorded.
4. Nine required an accounting of the distribution of time spent in the various activities.

H. Requirement of lesson plans (lesson outlines)

1. Lesson plans not required by four colleges
2. Thirteen colleges required written lesson plans for classroom music.
3. Three colleges required written lesson plans for rehearsals and classroom teaching.

V. Findings Concerning the Evaluation of Student Teaching

A. Four colleges employed a check list or written statement of student teaching activities which served as a guide to assure a complete student teaching experience.

B. Evaluation of the student's achievement

1. Only six colleges utilized evaluative criteria designed especially for music student teaching.
2. Of the nine remaining colleges, only four indicated that they used a standard form shared by the other departments of the college.

Question: Can it be presumed that for the seven colleges not answering in the affirmative, no systematic evaluation of the student teacher is made?

What is the nature of the evaluation that is made? Is it anything other than deciding on a grade?

VI. Supervision of Student Teaching

A. In-service program by which student teaching program is coordinated

Six colleges reported that in-service education sessions were held for the benefit of cooperating teachers. The arrangement for such sessions were:

1. CMSC required a graduate course to be taken by cooperat-

- ing teachers: Supervision of Student Teaching; upon request one meeting per year is arranged at the school; one evaluation meeting is held per year.
2. Culver-Stockton held between 2 and 4 meetings per year, if the maximum number were held, they were spaced at nine-week intervals.
 3. Evangel held a meeting each semester—at midterm.
 4. SEMSC, once per year.
 5. Central Methodist, once during the year (no set time).
 6. Fontbonne, no explanation.
- B. College representatives responsible for supervision
1. In six colleges, music faculty member (s) ONLY supervised.
 2. In six colleges, the supervision was a joint responsibility between music and education departments.
 3. In five colleges, some member of the education faculty was the ONLY supervisor.
 4. Further breakdown showed that in:
 - a. Nine colleges where music faculty supervised, one person did both vocal and instrumental.
 - b. Four colleges where the music faculty supervised, two persons were used, one for vocal and one for instrumental.
(Response totals do not agree with 3 above because CMSC utilizes both arrangements: one person for off-campus, and two people for on-campus supervision.)
- C. Duties of the college supervisor.
1. All held conferences with student teacher.
 2. Sixteen reported that they made periodic visits to the student teacher.
 3. Sixteen observed student at work, criticized, evaluated, and advised the student.
 4. Fourteen used written and oral criticisms-suggestions.
 5. Twelve held conferences with the cooperating teacher(s).
 6. Twelve served as resource persons for student teacher.
 7. Nine consulted with school administration.
 8. One used oral criticisms only.
 9. Other duties and/or techniques were:
 - a. One conducted a Seminar in Education which was used as a critique period.
 - b. One demonstrated various teaching techniques (laboratory school).
 - c. One music supervisor held frequent conferences with education faculty supervisor.
 - d. One held weekly seminars for all student teachers.
- D. Frequency and length of visits by supervisor
1. Because the student teaching period varied from 6 weeks for some colleges to as much as 18 weeks for others, direct comparison as to the number of visits perhaps should not be made. However, the range of the number of visits as reported by 13 colleges extended from 0 to 12. The average number was 4.5.

2. In a further attempt to determine the extent of the supervision which was provided for the student teachers, the respondents were asked to indicate the usual length of a visit — excluding whatever travel time might be involved.
 - a. The length of visits ranged from one-half hour to half a day.
 - b. The distribution was bi-modal in that the two most common lengths of visits were one hour and two hours (five colleges each).
 - c. The average visit was 1.5 hours.

E. Teaching load of college supervisors during student teaching period

1. A most important factor involved in adequate supervision is having the necessary time released from campus responsibilities in which to carry out supervision. The respondents were asked to indicate the number of hours per week they taught during the time the student teachers were in the field.

The average was 5.6 hours per week with a range from 2 to 15 hours per week.

2. In two colleges, the supervisors carried a full load of classes at the time they were supposed to be supervising student teachers!

3. No attempt was made to determine whether there existed a class load reduction scale based upon the number of student teachers enrolled. (NEMSTC has no such thing.) If such a scale were in operation, this might account, at least in part, for an apparent lack of released time in six colleges.

VII. Individual Characteristics Contributory to Success and Failure
 The respondents were asked to indicate those characteristics which seemed to them to be particularly significant in the success and in the lack of success in student teaching. Table IV is a frequency distribution of the qualities of success. In Table V is presented the list of qualities thought to be most significant in a student teacher's lack of success.

TABLE IV
QUALITIES MOST CONTRIBUTORY TO SUCCESS IN
STUDENT TEACHING

<i>Qualities</i>	<i>Frequency</i>
Thorough knowledge of subject matter	7
Solid musical background	4
Pleasing personality	4
Competence in applied medium	3
Willing to give freely of his time	3
Love for children, real interest in working with students	3
Organizational ability	2
Love of teaching	2
High intelligence	2
Personal ability	2
High degree of musicianship	2

Loyalty of purpose	2
Methodological skills	1
Ability to work with other people	1
Ability to communicate	1
Breadth of knowledge	1
Ability to stimulate interest of students	1
Ability to apply knowledge appropriately	1
Sincerity	1
Enthusiasm	1
Emotional maturity	1
Adaptability-versatility	1
Proper ethical attitude	1
Academic competence	1
Ability to achieve good classroom management and discipline ...	1
Strong character	1
Good public relations	1
Strength in educational psychology	1
Knowledge of history and theory	1

TABLE V

QUALITIES MOST CONTRIBUTORY TO LACK OF SUCCESS
IN STUDENT TEACHING

<i>Qualities</i>	<i>Frequency</i>
Not knowing subject matter	6
Lacking a pleasing personality	4
Unable to stimulate interest in students	2
Lacking competence in applied medium	2
Lacking in leadership development	2
Poor musical background	2
Lack of ability to produce	2
Lacking pianistic skill	1
Not having a real interest in children	1
Lacking organizational ability	1
Lacking in industry	1
Lacking the ability to work with other people	1
Not able or willing to cooperate	1
Lack of emotional maturity	1
Carelessness	1
Selfishness	1
Lack of adaptability	1
Poor ethical attitude	1
Failure to achieve academic competence	1
Unable to achieve good classroom management and discipline	1
Unable to see one's own ability to succeed	1
Ill health	1
Lack of knowledge of history and theory	1

VIII. Findings Concerning Financial and Budgetary Arrangements

A. Monetary remuneration for cooperating teachers

1. Ten colleges gave no remuneration to teacher; however, one of them paid the school \$15. per student.

2. Five colleges did pay cooperating teachers. The gratuity ranged from \$25. to \$100. per student per term. Of the five, four were state institutions.

B. Source of funds to pay remuneration

1. Two colleges used monies from the general operating budget.

2. Three colleges levy a student teaching fee to be paid by the student.

a. For two of these colleges, such student teaching fee supplements funds drawn from operating budget.

b. At one college, monies are drawn from student fees, the nature and amount of which were not determined.

C. Recognition given in lieu of remuneration

1. Of the nine colleges paying no gratuity to off-campus cooperating teachers, seven did give some sort of compensating recognition. Included were:

a. Tuition credit ranging from \$10. to \$165.

b. Complimentary admission to athletic and special events, and use of college services.

c. Dinner, given by two colleges.

d. Names of cooperating teachers were listed in the college catalog.

2. Two colleges paid no remuneration nor did they provide any other token of recognition.

IX. Tentative Conclusions, Observations

A. No attempt was made to survey grading criteria or grading procedures, but in light of the response relative to evaluation of student teachers, further investigation of evaluative criteria, means, policies, and the like seem to be in order.

B. There is a most inequitable proportion between the number of working hours required in student teaching and the amount of credit given for it.

C. There should be continued effort toward providing qualified music educators to supervise music student teachers.

D. There is interest from several colleges relative to the adoption of the block system of student teaching.

E. Each college should establish standards and means whereby the highest caliber of student teaching experience will be achieved. Such standards should be related to the comprehensiveness and quality of the experiences, the selection of cooperating schools and teachers, and the supervision of the student teachers.

Colleges Cooperating In This Study

Central Methodist, Fayette

Central Mo. St. College,

Warrensburg

Culver-Stockton, Canton

Drury, Springfield

Evangel, Springfield

Fontbonne, St. Louis

Lincoln University, Jefferson City

Lindenwood, St. Charles

University of Missouri, Columbia

NE State Teachers, Kirksville

NW State, Maryville

SE State, Cape Girardeau

SW State, Springfield

St. Louis Inst. of Music

Tarkio, Tarkio

Washington University, St. Louis

Webster, Webster Groves

BASES FOR THE APPEARANCE OF MUSICAL INSTRUMENTS IN VISUAL WORKS OF ART PREFATORY REMARKS

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It is not the purpose of this article to delve into the history of musical instruments inferred from paintings, drawings, and sculptures of various periods. There are areas which have already justified the prodigious efforts of musicologists' investigations. However, considering another facet of musical iconography, there has been relatively little research undertaken which deals with the bases of the artist's selection of musical instruments in visual works of art. It is the writer's hope that this brief investigation of these bases may prove to be stimulating, and that it may serve to give some indication of the great amount of work which may yet be done in this field. *Editor's note: This paper will be of particular interest to Missouri College and University music teachers who are engaged in training students to teach the Allied Arts Curriculum. (see Missouri Journal of Research in Music Education Volume 1, Number 2.*

INTRODUCTION

There are countless example of music in pictures. They are present everywhere, as one is cognizant through observations made in the course of everyday life, and through a considerable number of writings on this subject. Kinsky's work¹ represents but one of these many endeavors.

It is an interesting fact that musical instruments were frowned upon by the Medieval Christian Church, yet they were used frequently as symbols in writings by the Church Fathers. From the sixth to the thirteenth century, a tremendous number of pictorial representations of instruments can be found in music outside the church. An outstanding example of this category is the thirteenth-century Spanish codex of *cantigas*, displaying a large variety of instruments of the time in its numerous pages of miniatures.

Concerning a later era, Apel states:

As regards the 15th century, our knowledge is in the main restricted to what has been recorded by the painters and drawers, particularly in their numerous representations of "celestial harmony" showing beautifully shaped and decorated instruments in the hands of angels.²

This sentence by Apel is a succinct and manifest statement of the musical historian's position. However, it appears that an intriguing, and perhaps more complex, problem arises in determining *why* specific instruments are used by painters and sculptors.

With this purpose in mind, this article will deal with one exam-

ple of musical instruments in art, that of the *Cantoria* in the *Museo del Duomo*, Florence, done by Luca della Robbia. Prior to this discussion, brief and selected examples of ancient and medieval views regarding musical instruments will be given.

ANCIENT VIEWS

A discussion of the ancients' views concerning musical instruments is requisite for a more complete understanding of this study. Moreover, an investigation of these views and beliefs is, in itself, a very interesting and rewarding undertaking.

In the writings of Plato and Aristotle are found some revealing statements, one of the most pertinent being in *The Republic*, I of the former. Regarding what instruments and instrument makers shall be accepted into the ideal society, this section of the dialogue is summed up as follows: ". . . We are not innovating, my friend, in preferring Apollo and the instruments of Apollo to Marsyas and his instruments."³ The Apollo-Marsyas story shows not only a difference between sounds of the stringed and wind instruments, but, as Winternitz cites, it also shows measure — in the Pythagorean sense — and in the metaphorical sense of measure, as opposed to blind passion.⁴

The wind instrument which Marsyas played in his contest with Apollo, the *aulos*, appeared to be winning over the lyre until Apollo spoke while playing, challenging Marsyas to do likewise. Then Apollo turned his lyre upside down and again challenged Marsyas to play his instrument in this manner.⁵

. . . the *aulos* is not a moralizing but rather an exciting influence, so that it ought to be used for occasions of the kind at which attendance has the effect of purification rather than instruction.⁶

"Plato's writings had made clear for all time that the flute stood for Dionysiac sensuousness . . . Temperate values are symbolized by the lyre or cithara of Apollo."⁷ In his authoritative work on musical instruments, Sachs, discussing Hellenic culture, describes the lyre in detail as the "chief divine instrument."⁸

These observations are important to a more unequivocal understanding of later historical and cultural developments. Apparently, the relative status of stringed and wind instruments in Western culture had its groundwork laid in these ancient views.

MEDIEVAL AND RENAISSANCE VIEWS

Kathi Meyer has brought to light a fascinating study done by a German scholar during the first decade of this century.⁹ Essentially, this study is a comparative one dealing with musical instruments found in medieval illuminations, and exemplifies types of instruments that were drawn for these illuminations.

At the beginning of the eleventh century, instruments from antiquity were the basis for these drawings, such as those found in

manuscripts from the Carolingian era. From about the year 1000 on, Buhle finds that modern instruments are depicted, the biblical *rebec* of David, for example, being replaced by the *lyre* or *psaltrey*. This survey continues to show a kind of cyclical development, with the thirteenth century again using antique instruments, the fourteenth and fifteenth centuries employing modern instruments, and a revival in the sixteenth and seventeenth centuries of the tendency to model instruments after examples from antiquity.

With Buhle's findings as a reference, it is of interest to note the instruments appearing in the sculptures at Cluny, ca. 1000; for, appearing at a transitory point in Buhle's thesis, they follow both trends. Concerning the third mode from the eight on the Cluny capitals, "the instrument has a slight similarity to the form of the antique *lyra*, an instrument sometimes held by Orpheus-Christos."¹⁰

Visual art in the Middle Ages is almost exclusively sacred art. However, scenes from everyday life and various amusements managed to find their way into a number of visual works. In Pucelle's illustrations in the *Hours* of Jeanne d'Evreaux,

... a surprising number of creatures, human or beastlike or compound, are engaged in playing musical instruments. Surprising, that is, to the spectator who is not familiar with the teeming, colorful musical life of the Middle Ages, and especially with the number and variety of musical instruments as compared with the standardized specimens which make up our modern symphony orchestra.¹¹

Finally, in the Middle Ages, certain musical instruments become established as symbolic, and some have retained this symbolism to the present day. For example, the reed pipe — *shawn* or *chalu-meau* — is the typical shepherd instrument, and has become symbolic in Christian iconology of the nativity scene.

Referring to later works of art, Haward takes the view that musical instruments are sometimes utilized in a painting without any specific connection to their actual function or of their symbolism, "for purposes of purely formal design."¹² He cites the instruments in Bosch's *Inferno*, both stringed and wind, being "transformed into monstrous instruments of torture", or the purely decorative features of the instruments, as additional pieces of furniture, in Jan Brueghel's *Allegory of Hearing*.¹³

Many more illustrations could be pointed out from the past 100 years or so, but it is the purpose of this cursory examination to establish a point of departure for a discussion of the musical instruments employed by Luca della Robbia in the *Cantoria* at Florence.

THE CANTORIA DEL DUOMO

The *Cantoria* of Luca della Robbia was commissioned in 1431, and is the first known sculpture by the artist of which the exact date can be ascertained.¹⁴ There is no trace of any competition in-

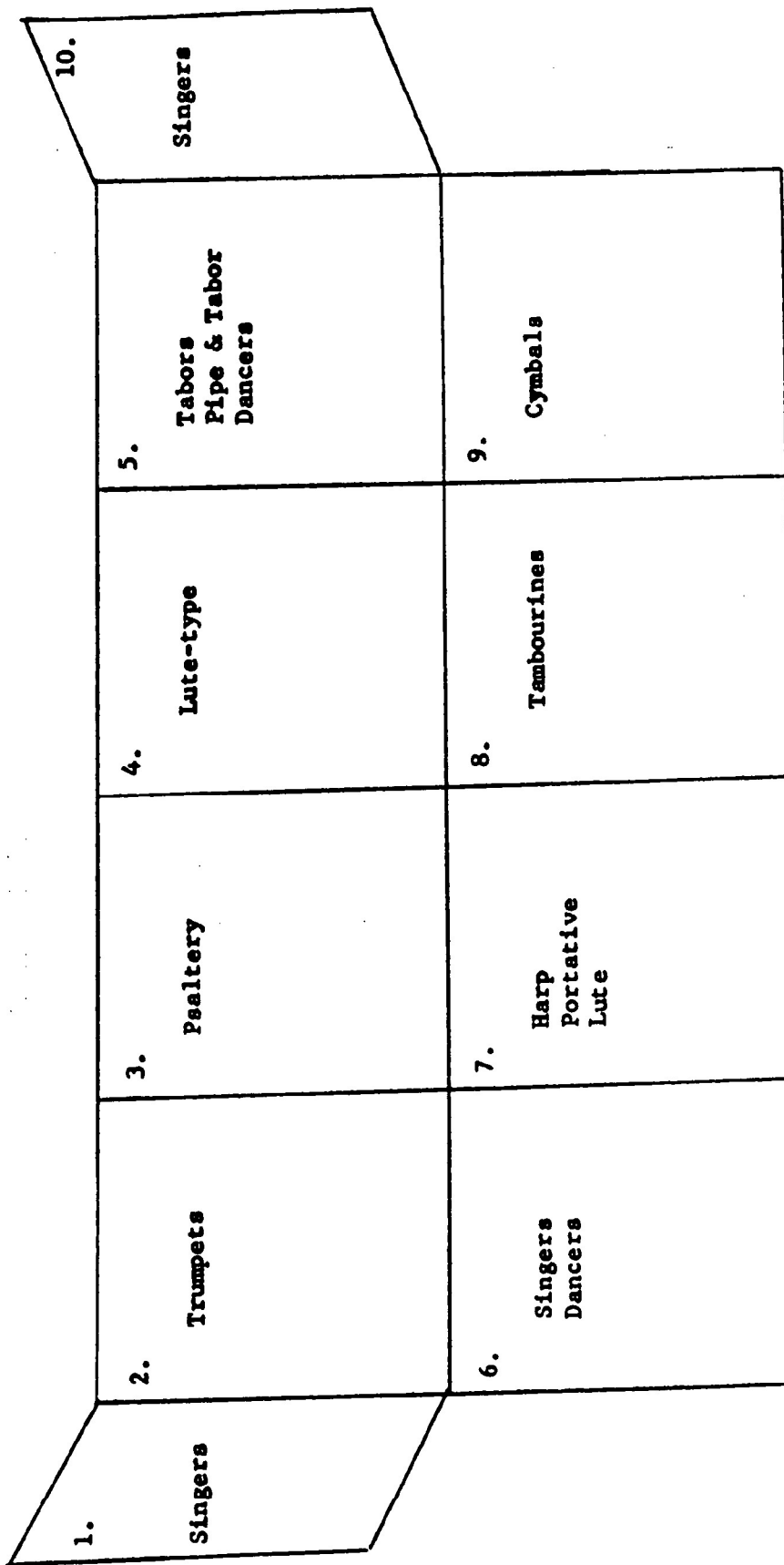
volved, and Luca's other commissions by the Duomo Church indicate that he was a favorite sculptor in their eyes.

The work was completed in 1438 and remained in its rather inaccessible position until 1688. At this time it was removed for the wedding of Prince Ferdinando because a larger choir was needed. The panels were thus removed to storage where they remained until 1822. It was not until 1883 that a serious attempt at restoration was made by Professor Luigi del Moro. Owing to Professor del Moro's work, the *Cantoria* has been restored, although now in a different position in the *Duomo*, and under different lighting conditions.¹⁵

With regard to style, a comparison of Luca with two of his contemporaries, Ghiberti and Donatello, reveals several interesting points. In particular, the comparison between Luca della Robbia and Donatello is heightened because Donatello also did a *Cantoria* for the *Duomo*. Marquand notes that Luca's *Canoria* reliefs were begun several years before those of Donatello.¹⁶ Yet, Donatello undoubtedly had an influence upon Luca's art, although the latter was more restrained, as can be seen, for example, in the dancing children. Furthermore, Donatello, unlike Luca, tends to suggest the indefinite expansion of space. Luca is also unlike Ghiberti who crowds as many figures as possible into a single picture. Luca was apparently content with few figures, simple themes, and restricted space.¹⁷ In general, Schubring's work on Luca makes these same observations.¹⁸

Of the authors of writings dealing with Luca della Robbia, those already cited — namely, Maud Crutwell, Allan Marquand, and Paul Schubring — have all done their research during the early part of this century. All of them are very occupied with the fact that the moldings, pilasters, and decorative material which presently surround the panels are not original.

None of these three is concerned with the arrangement of the panels in the *Cantoria*, although there is a difference of opinion as to how Robbia arrived at this order. Marquand and Crutwell feel that the order follows Biblical scripture in numerical sequence (as illustrated by the diagram below). This is borne out by the Latin inscription which is found above and below the eight panels.



170

Psalm 150

Laudate Dominum in sanctis eius,
Laudate eum in firmamento vitutis eius,
Laudate eum in virtutibus eius,
Laudate eum secundum multitudinem magnitudis eius.
Laudate eum in sono tubae.
Laudate eum in psalteriis et cithara.
Laudate eum in tympano et choro.
Laudate eum in chordis et organo.
Laudate eum in cymbalis benesonantibus.
Laudate eum in cymbalis jubilationis.
Omnis Spiritus laudet Dominum.

Praise ye the Lord.

Praise God in his sanctuary; praise him in the firmament of his power.
Praise him for his mighty acts; praise him according to his excellent
greatness.

Praise him with the sound of the trumpet; praise him with the
psaltery and the harp.

Praise him with the timbrel and the dance; praise him with stringed
instruments and organs.

Praise him upon the loud cymbals; praise him upon the high sound-
ing cymbals.

Let everything that hath breath praise the Lord.

Praise ye the Lord.

Schubring, on the other hand, has a more complex theory which he bases upon the orchestral arrangement of various wind, string, and percussion groups. This thesis might lend itself to credulity were it not for the fact that until approximately 1600, purely instrumental music held a position of inferior importance, while the indiscriminate mixture of voices with instruments was not at all uncommon.

Aside from a few general statements regarding musical instruments in the *Cantoria*, none of these writers makes any appreciable comments along these lines. Crutwell refers to the arrangement of the instruments by stating:

Luca has no more lost sight of the orchestral effect than of the balance of composition, the loudest sounds — the trumpets, drums, and cymbals — coming from the outside reliefs, while the softer cadences of voice, harp, and lute are concentrated in the centre.¹⁹

In fact, a lack of detailed analysis of the instruments is also apparent by what little is said about them. For example, Marquand refers to panel four as being players on the *cithara*, and adds further that these instruments have five strings each. True, the Bible refers to *cithara*, but the instrument which Luca actually used is a lute-type as discussed below.

Panels, 2, 3, 4, 5, 7, 8, and 9 contain musical instruments, and comments on each of these will be given. *Panel two, trumpets:* This

instrument was very common in Roman times, and its use as a noble and majestic symbol is common, even in the present day. After 1000 A.D. it acquired a long slim shape, about four feet, with a funnel-type bell. But, it will be noticed that two types of trumpets are utilized by Luca della Robbia. The second type, appearing behind the Roman type, is the folded trumpet, an innovation of the early fifteenth century, and the prototype of trumpets since then. Thus, both the old and new are represented, and in each case the puffing of the players' cheeks adds a dynamic touch to the sculpturing. *Panel three, psaltery*: The *psaltery* is a type of *zither* of Egyptian origin. From the fourteenth to the sixteenth centuries, *psalteries* were used in the various shapes, with the symmetrical trapezoid being the most common. This panel is thus representative of the kind of instrument which was prevalent during Luca's time. The hands and fingers are especially expressive.

Panel four, lute-type: This is the only panel which has instruments not immediately and clearly identifiable. This panel raises the question of possible unrealistic portrayal, conceivably for increased ornamentation and effect. The head which appears on the end of the fingerboard of one of the instruments at first appears to be somewhat whimsical. This theory is not out of the question, but it is dubious in the light of Luca's clear and simple approach to his art. Evidence points to this instrument as being of the lute family, probably a predecessor of the sixteenth century mandolin. An instrument bearing a striking similarity to that sculptured by Luca, including a carved head on the end of the fingerboard, is found in the *Syntagma musicum* (1615-19) of Michael Praetorius. It is here given the German name, *Mandorgen*, by Praetorius.

Panel five, tabor, pipe and tabor: The pipe is a common and simple instrument of the recorder family. Drums, this type called *tabor*, have been in existence for centuries. What makes their appearance in this work so striking is Luca's sculpture of one of the figures playing the pipe and *tabor* simultaneously. Pipe and *tabor* playing was popular as early as the thirteenth century. This combination of instruments was usually used for accompaniment to the *farandole*, a provincial dance, apparently of ancient origin, which is performed by a chain of people holding hands. There is a suggestion that this dance might be symbolic of Theseus' escape from the Labyrinth. Be that as it may, there are two figures dancing in this panel, with two more — one on each side — suggesting a possible circular chain of dancers.

Panel seven, portative, lute: There is nothing unusual about any of these instruments, either in their representation by Luca, or in their types. The harp is one of the oldest instruments in existence, dating back as far as 3000 B.C. It was widely used on the continent during the time that the Cantoria was sculptured.

The *portative* is a small, portable organ which was also used extensively throughout the Middle Ages and Renaissance. A very interesting point here is the use of a classical motif, much like Donatello, in the leg of the chair on which the player is seated.

The lute in this panel is a very clear representation of the type common during this era. The number and arrangement of strings on the lute at this time is between seven and eleven. These are placed in pairs, called courses, with the odd strings being the highest in pitch, and on the bottom of the instrument. It is difficult to ascertain precisely from reproductions how many strings Luca has given the instrument. There appear to be four courses plus one additional, single string on the bottom. If his intention was to have only eight strings, i. e., four courses, this would be an instrument most widely used about 1400.

Panel eight, tambourines, and

Panel nine, cymbals: The tambourine and cymbal pose no special problem, since these same types of instruments were used in ancient times, and are still in use today. It must be said, however, that these instruments are generally associated with festive occasions, often as accompaniment to lively, dance-like processions.

Conclusion

It can be concluded from the above that Luca della Robbia makes use of both modern and ancient prototypes of instruments in a way that, above all, conveys a mood and atmosphere of joy . . . "Praise ye the Lord." He is extremely careful with the replicas, be they depicting the old or the new, with the exception of one enigmatic lute-type in panel four. The careful positioning of the hands is especially noteworthy, adding immensely to the communicative force of the work.

It is also evident that the artist had no particular preference for stringed or wind instruments. At any rate, he assigned no special status to them in the *Cantoria*. Crutwell does suggest a correlation between the trumpets of panel two and the singers and dancers of panel six. Further, she states that the two center reliefs, panels three and four, are classically draped groups, and implications that these stringed instruments are in a position of preference.²⁰ This writer feels that there is no basis for such conclusions, since, (1) the artist was working within the confines of limited space; (2) his order was determined by scripture itself; (3) the entire subject deals with music — thus, any number of arbitrary relationships between panels could be proposed.

The cost of panels six through nine — i.e., the upper series of four — was slightly more than half the cost of panels two through five, the lower series of four. Nevertheless, the bottom series of four is not to be dismissed as a work of inferior art. The clarity and attention to detail is, at times, exceptional. The leg of the chair in panel seven, the eyes of the cymbal players, the decoration on the tambourine, and particularly the strings of the lute in panel seven, are all examples of this exacting craftsmanship. This aspect of the analysis demonstrates Luca's careful attention to detail, whether or not he is dealing with musical instruments.

The *Cantoria* of Luca della Robbia, taken as a whole, is a remarkable piece of fifteenth-century sculpture. Specifically, it stands as a marvelous attestation of the use and types of instruments during this period. But, more than this, it is a moving example of the fusion of visual art and music. One is struck by the freedom of motion which Robbia achieved in these figures, and of his virtual attainment of the dimension of sound through his expressive portrayals.

FOOTNOTES

1. Kinsky, George, *History of Music in Pictures* (New York: E. P. Dutton, 1930).
2. Apel, Willi, *Harvard Dictionary of Music* (Cambridge: Harvard University Press, 1944), p. 356.
3. Plato, *The Republic*, I (London: W. Heinemann, 1930), tr. by Paul Shorey, p. 263.
4. Winternitz, Emanuel, "The Curse of Pallas Athena," *Studies in the History of Art Dedicated to William E. Suida* (New York: Phaidon Press, 1959), p. 187.
5. Winternitz, *op. cit.*, p. 186.
6. Strunk, Oliver, *Source Readings in Music History* (New York: Norton, 1950), p. 21.
7. Egan, Patricia, "Poesia and the Fete Champetre," *Art Bulletin*, XLI (1959), pp. 303-13.
8. Sachs, Curt, *The History of Musical Instruments* (New York: Norton 1940), p. 129.
9. Meyer, Kathi, "The Eight Gregorian Modes on the Cluny Capitals," *Art Bulletin*, XXXIV (1952), pp. 75-94.
Meyer refers extensively to *Die musikalischen Instrumente in den Miniaturen des Mittelalters*, by Edward Buhle, (Leipzig: 1903).
10. Meyer, *op. cit.*, p. 86.
11. Winternitz, Emanuel, "Bagpipes for the Lord," *Bulletin of the Metropolitan Museum of Art*, XVI (1958), p. 297.
12. Haward, Lawrence, *Music in Painting* (London: Pitman, 1948), p. 2.
13. *Ibid.*
14. Crutwell, Maud, *Luca and Andrea della Robbia* (London: Dent, 1902), p. 47.
15. Marquand, Allan, *Luca della Robbia* (Princeton: Princeton University Press, 1914), pp. 5-6.
16. Crutwell, *op. cit.*, p. 40.
17. Marquand, *op. cit.*, p. xxix.
18. Schubring, Paul, *Luca della Robbia* (Bielefeld: Velhagen and Klasing, 1905).
19. Crutwell, *op. cit.*, p. 55.
20. Crutwell, *op. cit.*, p. 53.

SOME NOTES CONCERNING PERFORMANCE OF RENAISSANCE CHORAL MUSIC

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This literary attempt was originally intended to be a small essay in which precisely and succinctly some guidelines concerning the performance of Renaissance music might be drawn. It was to have been a distillation, if you please, of some of the best authorities on the subject. My purpose in this was — and is — twofold: 1) Hopefully more people, especially in high school work will venture into this music because of my remarks, and 2) For those who have already ventured, or for those who intend to do so, then perhaps these few words will offer aid and comfort.

Diversity of Renaissance Music

However, the problems started appearing almost from the very first. Chief among these was the very fact of performance diversity within the Renaissance itself. For instance, a motet or madrigal might be performed a cappella as written, or with instruments — including continuo — or with instruments playing the parts as written while the singers improvised some very elaborate ornamentation to go along with this. Because of this diversity, practically any rules that one might suggest would, out of sheer necessity, have to be quite fundamental.

Thorny though these problems seem to appear, it is and always has been my contention that herein lies not only a solution, but also one of the most fertile fields imaginable in music education. It only requires a brave soul to do some cultivation.

The very fact that this music was performed in such diverse fashion suggests that high school choral and band directors with creative outlooks could present some extremely imaginative programs. For instance, if you have a choral class with thirty-one sopranos and one alto, then you might be interested in some of the sixteenth century music for equal voices — of which there is quite a bit. If one is in a small high school and is lucky enough to have a small but competent choir, then why not attempt a double chorus piece in which a brass choir would do the second chorus part. If the band director has his troubles also, and no complete brass choir is forthcoming, then you might use a mixed group of some sort. (Saxophones are all right if played with no vibrato; otherwise a virbrato will tend to blur the lines.) The musicians of the Renaissance were accustomed to using what they had at hand; it must be borne in mind, however, that their instruments were softer. A few of our modern instruments go a long way.

Musicology and Music Education

We are living today in the era of musicology, and authenticity has become our watchword. This is good as long as we do not become weird cultists in the name of "performance in the authentic Renaissance manner." It is good as long as musicology is the servant

of good performance. The day that it is more fashionable to talk about music rather than to perform it is the day that our values should be re-examined. A day of re-examination is just as much in order for those people who in the name of music education give the people "what they want". When this "want" consists of educated sideshows and genteel sex, it is extremely hard to see how one can claim to be a music educator. It has long been another contention of mine that music education and musicology go hand in hand; support of that thesis is one of the main reasons for this article.

Musicology has made available to us more early music than we have previously had at any time. In cooperation with scholarship there are more publishers than ever before bringing out medieval, renaissance and baroque music. This is very gratifying; however, this in itself poses a great many problems.

The first thing to remember is that some "practicle" editions are not always reliable. For instance, if a Palestrina motet, which you desire to perform, was first published in the twenties, then the chances are that it is based upon the old Haberl edition. This was a monumental work in its day, but it does contain quite a few errors. It would be better if you would check it with the more reliable Casimiri edition, or if you can obtain an edition which has been published in the last ten or fifteen years, the chances are that it is correct. This is not to say that all of Haberl is wrong; it is just wise to check. We have learned a great deal about text underlay, accidentals, and notation since that edition first made its appearance.

As a rule one sure sign of bad editing is a score which contains quite a few dynamic markins (e.g. Richard Wagner's edition of the Palestrina *Stabat Mater*) without a note explaining that they are mere suggestions. Dynamic markings in the vocal music of the sixteenth century are practically non-existent; the same may fairly well be said for instrumental music, although markings are found from time to time.

Task of Editor and Publisher

In all fairness to the publisher it is well to mention that his job is no bowl of roses as may be witnessed by the following:

Even when all the component parts of a composition have survived intact, the editor's task is far from light . . . in vocal music the words were often either omitted altogether or else set out under the music in a very arbitrary and careless way. In printed music of the sixteenth century both verbal and musical texts were set from movable type, and it was not always practicable to set a syllable exactly under the notes to which it was to be sung . . .

Underlay is not the only problem. Many accidentals were missed out altogether, not through carelessness but because the singing rules of the time would have left the performer in no doubt as to how they should be supplied . . .

. . . The duration of those accidentals that are actually found in the source was governed by a whole complex of interlocking rules which were perfectly familiar to the six-

teenth century singer but have long since been forgotten. The interpretation of certain conventions of notation (rests, ligatures, and so on) was not internationally standardized in the sixteenth century. Plainsong intonations and interpolations were usually omitted since they, too, varied from country to country and even from diocese to diocese. *Instruments could be used more or less at the discretion of the musical director of any particular performance; they might replace the voices or they might double them, or in certain circumstances and at certain times in the year the overriding claims of the liturgy might forbid their use in sacred music altogether.* /italics mine/ But none of these problems is revealed by the study of the musical texts alone.

No tempo marks are found. The time-signatures used were themselves an indication of the proper tempo of the piece, and the living tradition of the time-long-dead would resolve any doubts. There was no accepted standard of pitch, and the choice of clefs for the various parts might at times indicate that the whole work was to be performed at quite a different pitch from that at what it was written down. Dynamic markings of any kind are utterly unknown during the six centuries that separate the plainsong notation of the tenth century from the Venetian music of the 1590s.¹

Nobody is more aware than I that I have used a great deal of space to urge everyone to perform Renaissance music, and then turned and impressed the reader with what a task it will be to interpret such works. However, let the faint hearted take courage. In the first place, anyone who honestly believes that he is going to authentically reproduce sounds of the Renaissance to which Palestrina might have listened after a hard day at the cathedral is exhibiting a naivete in the farthest extreme. Only with such an organization as the Pro Musica of Noah Greenberg is such an experience approximated — and even in this case one may have legitimate doubts. Every age reinterprets the art of the past within the language of its current culture. We assume a good musical instinct on the part of the reader. If this instinct is allowed to wander within certain broad limits, and the reader is willing to do some reading and listen to authoritative records, then in turn he will come to know and enjoy some of the greatest music the world has ever known. Better yet, especially in the field of the madrigal, his students will come to know that inexpressible joy that comes from having participated in performance of a piece that does not call for virtuosity or forty-nine other voices. Just a small group of people will do quite nicely. In turn the small group may be as virtuous as they care to be. In any event they will understand why people stay up too late at night to sing madrigals or play the quartets of Beethoven.

In the second place there are a few ground rules which will help the uninitiated to get started. I will try to give these in some sort of

logical order; however, they are not necessarily in order of importance.

Ground Rules

The first thought that comes to mind has to do with acoustics. It must be remembered that most of the composers — actually until the time of Beethoven, but most especially in the Renaissance — stayed in one place for a good bit of their lives. They wrote for a certain choir with its own peculiar makeup of voices, and, most important of all, they wrote works which were to be performed in a certain building or room. The composition of works to be performed by most anyone in anyplace that happens to be handy is a comparatively late development in the history of music. Giovanni Gabrieli's style was dictated by the architecture at St. Mark's Cathedral. I strongly urge high school bands and choirs to try his work, but I also warn the director to have some understanding of the conditions under which Gabrieli worked, and to perform his works in surroundings that approximate those at St. Mark's. This is not hard to do, and the director will have the further assurance that he is not producing the dud of the ages. One thing which might be mentioned concerning Gabrieli is that his instruments were not our modern brass instruments. This will usually work to our advantage today in that one can use more people in the chorus. I particularly recommend the introduction to the G. Schirmer edition of Gabrieli's *Jubilate Deo*.²

To summarize our first ground rule: Always rehearse any Renaissance piece in the hall in which it is to be performed, in order to ascertain if it is suitable for the acoustical conditions of that particular hall.

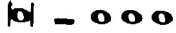
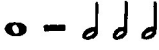
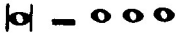
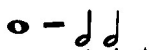
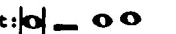
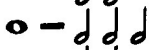

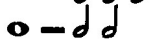
The second thought which comes to mind has to do with the tone quality of the voices. The operatic voice as we know it today was not in existence in the sixteenth century — although there is some evidence to indicate that it might then have been developing. However, in my opinion, one accomplishes the best results by insisting upon a full tone with *no* tremolo. I use the word full to distinguish between it and the disembodied "white" tone which one so often finds among English choir boys. The main point to keep in mind is that the lines in the composition must be heard. Renaissance music is to etching as a chorus by Brahms is to a Rouault painting.

The second ground rule then is as follows: the contrapuntal lines are most important in any composition of the sixteenth century, and great care must be taken that these lines not be obscured by voices with a lot of tremolo.









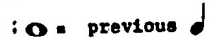

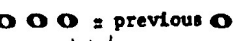



We now approach that most thorny subject: the problem of time signatures and tempo in the sixteenth century. Referring back to our quotation from Thurston Dart, it is obvious that the last word has not been said in this field. However, there are certain practices which seem to be agreed upon more or less universally. From these practices one can usually reason to a satisfactory solution of the exceptional problem. It must always be borne in mind that any one particular piece might have its own particular peculiarities. Be that as it may, we have taken the following table from Robert Doning-

on's *The Interpretation of Early Music*. It is a composite of the signs of mensuration in use around the sixteenth century; appended there-
 o is a short, but very useful, discussion as to how they are applied.

SIGNS OF MENSURATION

SIGN	TIME	PROLATION
○ Perfect:		Perfect: 
○ Imperfect:		Imperfect: 
◐ Perfect:		Perfect: 
◐ Imperfect:		Imperfect: 

DIMINUTION AND AUGMENTATION

	Note values become half those of	
(or) 	" " " " " "	
(or) 	" " " " " "	
" " " " " "		
$\frac{2}{1}$	Dupla (diminution) :	 previous 
$\frac{1}{2}$	Dupla (augmentation) :	 previous 
$\frac{3}{1}$ or $\frac{3}{2}$	Tripla (diminution):	 previous 
$\frac{3}{2}$ or $\frac{3}{1}$	Sesquialtera (diminution)	 previous 

. . . . The true function of these signatures was not to indicate time in our modern sense of tempo, but to indicate time in the old sense of mensuration. The only information which they impart directly is the relative time allotted to each note-value in proportion to the others. Any information which they may incidentally impart about time in the absolute is indirect information, and neither exact nor reliable.

The only reason why the signatures can impart event indirect information about the absolute time in which the music proceeds is that for certain stable forms of late Renaissance polyphony a conception seems to have been current of a roughly uniform pulse (tactus) of which the remaining note-values were either multiples or subdivisions. It will be appreciated that this was not a means of dictating tempo, which would be a musical absurdity, but of teaching it, and that it would not have been practicable if it had not been

kept quite flexible in its actual application.³

A few notes on the above table would not be amiss at this point.

1) For those readers who are not familiar with scholarly editions, simply reduce the values by one: i.e. breve becomes whole, whole becomes half, etc. Thus you arrive at our common usage today. 2) We know from sixteenth century treatises that the *tactus* in alla breve was equal to a half note at M.M. 60. 3) The signs C and C frequently meant the same thing. If you have a signature of C and the half note at 60 is too fast (in modern notation), then try the quarter at 60. 4) French music as a rule was faster than Italian, so the *tactus* will vary as high as 80. Be it noted also that some Italian secular music will work better at this faster tempo.

A summary of the third ground rule is: In any piece of sixteenth century music the tempo is governed by a pulse or *tactus* which was understood by all sixteenth century musicians. This pulse in our modern four-four would indicate that the half note moves at M.M. 60. Any time signatures or tempo changes would always be made in proportion to that pulse.

The fourth item to be considered is that of rhythm. Although bar lines did exist in sixteenth century music, it did so primarily in tablatures and served the practical purpose of keeping the performer from getting lost in the maze of numbers. This is a prelude to saying that sixteenth century music will not sound at all, if you allow the students to accent as we do in our modern music because of the bar line.

To illustrate the above point, I have reproduced the composition of William Byrd, *I Thought That Love Had Been A Boy*, first as it appears in the complete works; then I have taken each part, and written it out as Byrd would have heard it.

NO 32. I THOUGHT THAT LOVE HAD BEEN A BOY.

Very fast.

SOPRANO. (SUPERIUS.)
 ALTO. (MEDIUS.)
 ALTO. (CONTRA TENOR.)
 TENOR. (TENOR.)
 BASS. (BASSUS.)

I thought that love had been a
 I thought that love had been a
 I thought that love had been a
 I thought that love had been a

For practice only.

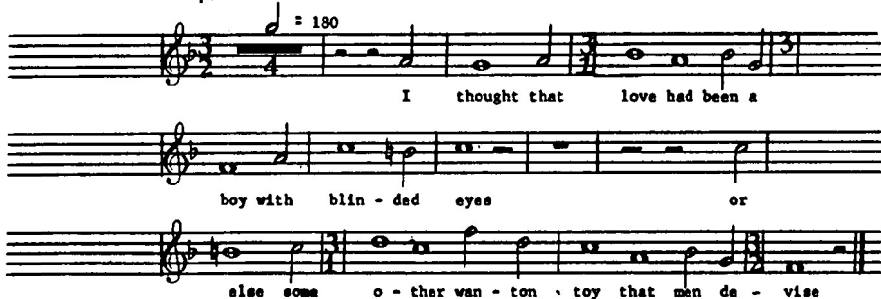
I thought that love had been a boy with blind - ed
 boy, that love had been a boy with blind - ed
 boy, I thought that love had been a boy with blind - ed
 boy, I thought that love had been a boy with blind - ed eyes, blind - ed
 boy, with blind - ed eyes, with blind - ed

eyes, or else some o - ther wan - ton
 eyes, or else some o - ther wan - ton toy that men de - vise,
 eyes, or else some o - ther wan - ton toy that men de -
 eyes, or else some o - ther, some o - ther wan - ton toy
 eyes, or else some o - ther wan - ton toy, some o - ther wan - ton

toy that men de - vise, like tales of
 - that men de - vise, like tales of fai -
 - vise, that men de - vise, that men de - vise, like tales of
 that men de - vise, de - vise, like tales of fai - ries, of
 toy that men de - vise, like tales of fai - ries, like tales of

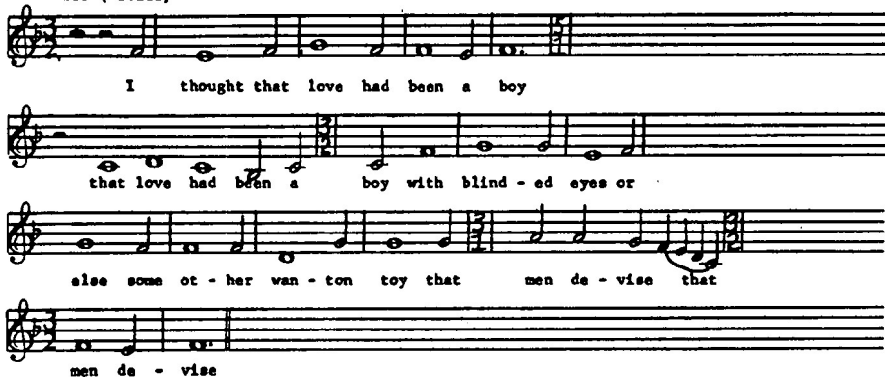
Soprano $\text{♩} = 60$ half note is constant

$\text{♩} = 180$



I thought that love had been a
boy with blind - ed eyes or
else some o - ther wan - ton toy that men de - vise

Alto (Medius)



I thought that love had been a boy
that love had been a boy with blind - ed eyes or
else some o - ther wan - ton toy that men de - vise that
men de - vise

Alto

I thought that love had been a boy I
 thought that love had been a boy with blind - ed
 eyes or else some o - ther wan - ton toy that men de -

Tenor

I thought that love had been a boy I thought that
 love had been a boy with blind - ed eyes blind - ed eyes or
 else some o - ther some o - ther wan - ton toy
 that men de - vise de - vise

Bass

I thought that love had been a boy
 with blind - ed eyes with blind - ed eyes or
 else some o - ther wan - ton toy some o - ther wan - ton
 toy that men de - vise

As one can see from the foregoing, the score in our modern notation does not show the entire rhythmic picture at all. It is because of these problems that an understanding of the tactus is most important. The tactus must remain constant; this gives the tempo. Any divisions or multiplications of time values are in relation to this. **ANY ACCENTS OF WORDS, ETC. ARE GOVERNED BY THE PRONUNCIATION OF THE WORDS IN RELATION TO THE TIME VALUES OF THE NOTES USED.**

A summary of the fourth ground rule would read thus: Each part is completely independent from the other as regards rhythm and accent; furthermore, the barlines in our modern score have no validity whatsoever except as a means of reference in rehearsal.

The fifth ground rule is: Know the essential differences of the national styles. One can get this from any decent music history book.

The sixth ground rule is: Read some good books on the subject. Check the periodicals from time to time. A list of good books and articles (by no means complete) is included at the end of this article.

The last thought that comes to mind is that madrigals took the place of television, radio, etc. in the sixteenth century. The reason that such things lasted as long as they did is that the people had fun doing these things. They had to or a lot of printers would have gone out of business. So the seventh and final ground rule is: **HAVE FUN.**

NOTES

1. Thurston Dart, *The Interpretation of Music*, Harper Colophon Books, 1963, pp. 136-138.
2. G. Wallace Woodworth, ed. *Jubilate Deo*, G. Gabrieli, G. Schirmer Publishers, Ed. No. 2070.
3. Robert Donington, *The Interpretation of Early Music*, Faber & Faber, London, 1963, p. 339.

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1. Apel, W. *The Notation of Polyphonic Music 900-1600*, Cambridge, Mass., 1942, 4th. Edition, 1949.
2. Dart, Thurston. *The Interpretation of Music*, Harper, N.Y., 1963.
3. Donington, Robert. *The Interpretation of Early Music*, Faber & Faber, London, 1963.
4. Woodworth, G. W. "Introduction to *Jubilate Deo*", G. Schirmer, N.Y., Edition No. 2070.

NOTE: All of the above have bibliographies within them; however, I particularly recommend the Donington for further bibliography, also the Woodworth introduction.

HAYDN, MUSIC, AND LITERATURE

William Prante

Kirkwood Senior High School

William Prante is a junior at Kirkwood Senior high school, Kirkwood, Missouri. His English composition teacher is Mrs. I. B. Williams and his music supervisor is Mr. Burton Isaac. The paper is included for its own intrinsic interest and as another example of the quality of work which can be done in academic music by interested high school students with proper faculty leadership.

* * * *

For many years writers and composers alike have concerned themselves with the problem of defining the proper relationship between good music and good literature. Novels, operas, poems, and even symphonies have been written in the hope of maintaining a subtle balance between the two mediums. A conclusive result, however, has been difficult to obtain. Either the literature is to "high" for the music, or the music itself overshadows the text.

Many examples may be cited. The great individualism and melancholy displayed by Shakespeare's Hamlet could not begin to be represented by Tschaikovsky's famous fantasy-overture. Likewise, Tolstoy, in his novel "The Kreutzer Sonata," finds himself unable to understand fully the total make-up of Beethoven's music. Nevertheless, we are not interested here in placing musical allusions into poetry or prose, nor are we concerned with describing a great work of literature through music. Rather, the problem is specifically one of actually joining together the two arts of language and sound.

Joseph Haydn, perhaps, came closest to this ideal when he wrote his famous oratorio "The Creation." The thrilling music along with the simple, yet moving narrative gives the listener a real experience of enjoyment. Archangels recite the Scripture! . . . and the Chorus tells of the glory of God. A man thinks about his dear Lord; his music "leaps for joy." And God says, "Let there be light," and there is light. (Such are the moments in Haydn.)

The "Scripture" is taken basically from Books VII and VIII of John Milton's great epic poem "Paradise Lost." Already, many will argue, as a result, that Haydn does not include the whole poem in his work; that because he is to *limited* to these two books, Haydn does not actually succeed in "marrying" his music to this epic. This argument is supported by the fact that most of the theology presented by Milton is not even presented in Haydn. Indeed, the specific Miltonian concepts of God, Satan, and Man are scarcely represented, or even mentioned in Haydn's "Creation." This is particularly arresting when we realize the grave truth of C. S. Lewis' statement: "Milton's thought, when purged of its theology, does not exist."¹ And what is "Milton's thought" but his poetry? Thus, we cannot but

help to reach the conclusion that Haydn, too, has failed in his grand mission to combine the arts.

But first, let us make a closer analysis of the facts. The "Creation" is concerned only with one aspect of the poem ("... hows the heavens and earth rose out of Chaos" —I: 9-10). The "Man's first disobedience" is simply not relevant to the "perfect" nature of the Creation story. In fact, the very concepts of Milton's theology exist only *because* of the Creation. Notice that the greater parts of Chapters VII and VII do not even concern themselves with either God, Man, or Satan. The main emphasis, to be sure, is not on the "paradise lost," but rather on the "paradise." This same argument, of course, applies to Haydn's oratorio.

Haydn's genius, however, even extends further. Rather than establishing the concrete facts of "Chaos" through an aria, chorus, or recitative, Haydn decided to present only a "Representation of Chaos" through the subtle abstractions of music. This overture is very interesting from the standpoint of Haydn's originality. The unpredictability of the chaotic nebula is cleverly illustrated by Haydn's "chaotic" choice of keys and dissonances, and the tone-colouring is quite effective in that it implies the translucent quality of a total state of nothingness. As the "Representation" subsides, the first statement is announced ("In the beginning God created . . ."). The "chaotic" accompaniment reappears as the "Spirit of God moves across the waters," and the effect is heightened as the first tangible evidence of creation is marked by the first evidence of a confirmed key — C major. ("Let there be Light.")

Some critics contend, however, that even though Milton's "thought" may be in evidence somewhat, the whole idea of "spirit" is lacking. In other words, if a successful union is ever to emerge between two artists, their respective attitudes should complement each other, not contradict. The conclusion of this argument could only lead to the fact that a 19th century musician could not possibly understand a 17th century poet. Indeed, the simple, happy, child-like faith of Haydn ("At the thought of God, my heart leaps for joy and I cannot help my music doing the same."²) could not possibly be compared to the "blind and furious Milton fighting and slashing the air."³

Nevertheless, the two classics are universal, and they do both represent the same, universal emotions of mankind. In dealing with universality, it is not so important to understand as it is to feel. Thus, Haydn and Milton do seem to "compare;" they do seem to understand. For just as Adam and Eve rejoice in Raphael's account of the Creation as described in "Paradise Lost," so the listener rejoices in Haydn's account. Professor D. J. Grout feels that "no music more perfectly captures the mood of pure delight in nature" than the "Creation."⁴ From the "foaming billows" of the stormy seas to the clear brooks "murmuring sweetly," Haydn sets his faith into a simple and refreshing love for nature.

The delightfully charming *terzetto* "How many are thy works" is another good illustration of this. The beauty and the sublimity of this little gem describes so well (beyond words!) the miracle of creation. There is no great surprise in the glorious praise to God from the chorus: "The Lord is great in his might and ever shall his glory remain." The emotional reaction is only natural.

Nevertheless, even though the emotions are present, we should, perhaps, question the validity of this "art." We realize that just through the music alone, the oratorio is quite beautiful and distinctive. The artistic advantages of the literature, however, have not as yet been proven. Quite often, for example, Bach's music far surpasses his text. In fact, the only reason the verses themselves seem as profound and powerful as they do is simply because of Bach's great music. The words themselves often have no literary merit.

This same argument could so easily apply to Haydn if only because of Baron van Swieten's third-rate German translation of "Paradise Lost." Through this translation, Swieten completely stripped the poem of the traditional classic-style in which Milton had written.⁵ Because of this, many complain that the existing literary parallels and allusions found in "Paradise Lost" no longer remain in Haydn's music.

Fortunately, this is not altogether true. Even though the Virgilian or Homeric images of Milton do not permeate the Swieten translation, there still remain references to many other works. Among such examples include the Book of Genesis, the Psalms of David, and of course, the poetry of Milton.

To quote from the great Psalmist:

The heavens declare the glory of God;
and the firmament sheweth his handiwork.
Day unto day uttereth speech;
Night unto night sheweth knowledge.
There is no speech nor language,
where their voice is not heard.

—Psalm xix:1-3.

However, one point yet remains. "At the heart of every true epic," states Davis P. Harding, "is the attempt to express a way of life, and an attitude toward it, which will enable man to live out in his days 'upon the rack of this tough world.'"⁶

The "perfect" harmony of the "Creation" seems only to be disrupted once by Uriel's fateful warning:

O happy couple, and happy eternally, if
vain illusion does not mislead you to
desire more than you already have.

Unhappily, this lone recitative is the only representation found in the "Creation" of the tragic element which Milton used so greatly

in his "Paradise Lost." As a result, the only effects Haydn achieves here are simply those inane realizations that not only is Uriel's warning correct, but that we no longer exist in a perfect world.

Despite these criticisms, however, Haydn does express "an attitude and a way of life." For example, the love and happiness of Adam and Eve is beautifully outlined in their elegant duets in Part Three. Even in the aria "In native worth," the very fact that man (the very "soul, the breath, and image of God") should be described in such a subdued fashion, pointedly shows the lovely relationships of man and woman to their God.

Surely, in spite of the tragic loss of both Milton's original style and story, the "heart of the epic" still exists; a marriage has been performed. For even though the faults may be many and the balance unequal at times, a partnership between music and literature has been reached, a work of art completed.

Footnotes

1. C. S. Lewis, *A Preface to Paradise Lost*. (New York: Oxford University Press, 1961), p. 65.
2. Joseph Machlis, *The Enjoyment of Music*. (New York: W. W. Norton and Co., Inc., 1957), p. 221.
3. Introduction by Edward LeConte, *Paradise Lost*, Milton (New York: Mentor Books, 1961), p. 33.
4. Donald J. Grout, *A History of Western Music*. (New York: W. W. Norton and Co., Inc., 1960), p. 453.
5. Notes by Robert Cushman. Vox recording of *The Creation* by Haydn, (New York: Vox Productions, Inc., 1959).
6. David P. Harding, *The Club of Hercules*. (University of Illinois Press, 1962), p. 24.

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AN INVESTIGATION OF THE EFFECT OF THREE CONTRASTING TYPES OF MUSIC ON THE ELECTRIC POTENTIAL GENERATED BY THE HUMAN BRAIN

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ABSTRACT

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Introduction

Music has been associated intimately with the activities of man for thousands of years. Music has played a role in mythology, folklore, magic, religion, work, love-making, entertainment, war and medicine. Some musical selections seem to have a relaxing effect upon the listener, while others seem to have an exhilarating effect. Some selections tend to make the listener appear sad, while others are inclined to induce a happy or joyful state of mind.

A great amount of literature on music and its effect upon the human body is in the form of empirical observations that give only the bright or positive side of music's effect.

Numerous attempts have been made to investigate the psychological effects of music. They have been made in terms of moods and ideas induced by listening to music. The method most frequently used involves the checking of nouns or adjectives which, after hearing a particular musical selection, best describes the listener's feeling. A similar type of study is one in which the subjects spontaneous reactions to the music are recorded through the interview technique immediately after the music has been heard.

Another, more objective type of study, has been carried out by certain investigators to ascertain music's effect upon respiration, heartbeat, blood pressure, and other physiological changes.

Statement of the Problem

Music has often been defined as the "universal language." Literally speaking, this could be construed to mean that certain types of music would have the same communicative properties to all peoples of all lands and nationalities. Under this hypothesis, a musical selection capable of producing a certain mood or state of mind for one listener would do so for all listeners.

It may also be assumed that under this hypothesis, more exacting influences than that of mood might be evident when particular selections are heard. These influences would include some objective measurements as rate of heart pulsations, blood pressure, breathing rate, psycho-galvanic reflex, and electric impulses produced by the brain.

The purpose of this study was to further investigate one of the

physiological effects of music, by ascertaining if there were any changes in the electric impulses produced by the human brain, as measured by the electro-encephalograph, when certain categorized musical selections were introduced to the subject. Stated as a null hypothesis: at the 5 per cent level, there is no significant difference between the frequency of the electric potential produced by the human brain when no stimulant is applied to the subject, and the frequency of the electric potential produced by the human brain when certain categorized selections of music are applied to the subject as a stimulant.

In order to accomplish this purpose it was necessary to seek answers to the following questions:

1. To what extent does the frequency of the brain wave pattern vary from normal, when certain selections of categorized music are introduced to the subject?
2. Does the introduction of categorized music have a similar effect upon the frequency of the human brain wave pattern in different subjects?
3. Is there a significant sex difference in the frequency variation of the brain wave pattern when music is used as a stimulant?
4. Does the intercomparison of the brain wave frequencies recorded by the subjects for the three categorized musical selections show a significant difference?

Need for the Study

A musical composition, like a poem, is capable of producing or expressing a definite emotional state of mood. This mood may be said to constitute its meaning.

One of the first recorded uses of music to affect the emotions of man, is found in the first book of Samuel:

And it came to pass, when the evil spirit was upon Saul, that David took an harp and played with his hand; so Saul was refreshed, and was well, and the evil spirit departed from him.¹

It has been observed that a good band can furnish a very definite pickup for weary, marching troops. Music has been generally recognized by our present military service. Troops are still awakened by the bugle, but in some instances the bugle's call is followed immediately by some lively recorded selections played by a military band. Troops are encouraged to sing as a means of letting off excess emotional energy; and, at many military installations, musical instruments are provided for the men to play.

Music has been used with favorable effects in factories and work rooms.² It has also been used effectively in hospitals and dentists' offices.^{3, 4, 5, 6} As a background for a theatrical play, music helps enhance the mood and emotional effect of the play.

Although most people would agree that certain musical compositions seem to have the power to produce certain moods and emotions while being heard, we have only their opinions about the type of mood, the intensity of the emotions and the duration of both. It

is often hard to describe in words the reaction the listener may have while listening to a musical composition. It becomes a question of semantics.

Quite a number of studies, concerning the effect of music, have been completed since the early part of this century. In one type of psychological study, the subjects were given lists of words, indicating various mood values, and asked to check the ones that seem best suited to convey the mood of the music to which they were listening. Others have been asked to indicate the mood of a selection by a descriptive sentence or paragraph. This involves an opinion on the part of the listener, and also semantics. This type of study is valuable, for its findings help accumulate information about the psychological effects of music, its social and aesthetic attributes.

Another, more objective type of study, has been carried out by researchers to determine the physiological effect of music on certain organs and functions of the body. In these studies, the rate of heart-beat, breathing rate, galvanic skin response, blood pressure, metabolism, and muscular energy were measured while music was being used as a stimulant.

With all due respect to the scientifically produced psychological studies and other studies that may have been empirically produced, the writer felt that there was a great need for more of the objective type of research, which would possibly substantiate or refute previous observations concerning the capability of music to affect mankind.

Limitations of the Study

This study was limited as follows:

1. This study was limited to children in the sixth grade.
2. This study was limited to those children who were regularly enrolled in Southwest Missouri State College laboratory school.
3. The musical selections used in this study were limited to three.
4. The number of subjects in this study were limited to thirty.
5. This study was limited by the differences in the time of day that each subject was tested.
6. This study was limited by the individual physical and mental state of each subject at the time of testing.
7. This study was limited due to the fact that the researcher was not qualified to read the electroencephalograms, and of necessity relied on the opinion of a qualified electroencephalograph technician.
8. Although the reproducing instrument for the musical selections was constant, the recorded music used was constant, the electroencephalograph machine was constant, and the method of presenting the musical selections was constant, there was no way in which all factors other than these could be held constant. Therefore, the study could not be termed a completely controlled experiment.

Definition of Terms Used

Electroencephalograph is a vacuum tube amplifying device with oscillographic writing pens, for recording changes in the electrical potential of the brain.

Electroencephalogram is a visual recording of the electric potential of the brain, as measured by the electroencephalograph.

Electric potential is that minute voltage generated in the brain.

Brain wave pattern is a term used to indicate the tracings of the electric potential as they appear on the electroencephalogram.

Normal brain wave pattern, for the purpose of this study, is that pattern of the subject's electric potential as recorded on the electroencephalogram when no apparent stimulant is being used.

Stimulant is anything that promotes the activity of some physiological process. For the purpose of this study, selections of instrumental music are used as stimulants.

Response is the way in which a living body, or one of its organs or parts, reacts to a stimulus.

Assumptions

The following assumptions were made at the inchoation of this study:

1. It is assumed that the electroencephalograph technician was thoroughly qualified to accurately record and determine the measurements of frequency of the electric potential of the brain.
2. It is assumed that the selected musical item schedule as developed in Moon's investigation of the scope of mood responses of intermediate grade pupils in a valid schedule.⁷
3. It is assumed that the eight categories of moods as developed by Hevner in her Adult Mood Reaction Study are valid categories.⁸
4. It is assumed that this study is not concerned with the assessment and alleviation of the problems of persons who are mentally distressed or disturbed, and should not be construed to be in any way connected to the problems or activities of clinical psychology.
5. It is assumed that this study in no way attempts to interpret the objective findings in terms of mood or emotion, nor does it profess to imply any connection whatsoever between the findings and mood or emotion.
6. It is assumed that this study is not concerned with any psychological effects of music when used as a stimulant.
7. It is assumed that this study does not attempt to interpret the electroencephalograms, but only to determine any numerical differences in brain wave frequency.

Related Studies

No real effort was made to determine the effect of music upon the human body and mind until the arrival of the experimental method of investigation in the eighteenth and nineteenth centuries.

Since that time there have been many reports on music and

its effect upon humans, but a good proportion of these reports have been in the form of empirical observations and individual case studies. Some of the investigations were carried out by the use of the scientific method, while others were merely opinions which seemed to have resulted from observations alone.

There does seem to be a definite indication, from the literature surveyed, that music has some psychological effect on certain organs and functions of the human body. Studies have been made, the results of which indicate that music may: (1) produce variable effects on blood circulation, blood pressure, and pulse; (2) influence the electrical conductivity of the skin as manifested by galvanic skin response; (3) increase or decrease muscle tension; (4) affect the rate of breathing; (5) be influential as an attraction or distraction factor; and (6) have some effect on the pupillary and pilomotor reflexes, the pain perception threshold, the breathing rate, the painting skills, and the chemical action of the body.

None of the literature reviewed made use of the electroencephalograph to record the possible effect of music on the electric potential of the human brain in normal subjects.

SOURCES OF DATA AND PROCEDURES USED

The Development of Electroencephalography

The application of electroencephalography has made tremendous strides during the last twenty years. Almost all the larger hospitals in the United States now have facilities for electroencephalography.

In 1875⁹ Canton reported the first observation on electric potentials of the brain. Using a sensitive galvanometer, he recorded currents from the exposed brains of monkeys and rabbits, by connecting electrodes to the brain.

The first descriptive record of currents originating in the brain, but recorded without contact of the electrodes directly with the brain, was made in 1890 by Von Marxow.¹⁰

One of the latest instruments of precision, the electroencephalograph, was first described in 1924 by Berger¹¹ as the result of his work, which was started in 1902.

Electroencephalography is the science of recording the electrical output of the several sections or divisions of the brain. At all time, whether asleep or awake, the human brain produces a minute but measurable electrical discharge called electric potential. This potential does not enter into the brain from any outside source, but is the product of the energy expenditure within the brain.

With sensitive instruments, the electric potentials may be amplified sufficiently to drive an oscilloscope or a graphic ink-writing mechanism. The electroencephalograph is such an instrument. Electrodes, which are pickup units made from electrical conducting material, are fastened on the outside of the head by an adhesive, or through the skin of the head by a small needle. These electrodes are placed on the head over the section of the brain from which the electric potentials are to be measured.

Wires conduct the impulses received by the electrodes to an electronic amplifier which amplifies the minute electrical pulsations many thousands of times. These amplified pulsations activate the ink-writing pens. Under the pens a calibrated paper chart is made to move at regulated speed. Thus the combination of the action of the pens on the moving paper produces a line graph representing the change in strength and intensity of the electrical activity in the brain.

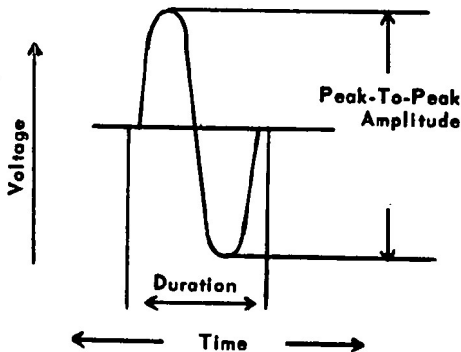
The electroencephalogram is the written record of tracing made on the electroencephalograph. It is a series of waves that represent the brain's electric potential or activity. These waves vary in number, duration, and voltage.

The term frequency, as used in electroencephalography, denotes the number of times a wave is repeated in a given unit of time. In electroencephalography, the unit of time is one second.

Amplitude represents the maximum displacement from a neutral reference line of a given oscillation. It is difficult to measure amplitude of the waves appearing on the electroencephalogram since a steady neutral mid-point is difficult to determine, because of the base-line swinging of the drawing pens.

A complete description of a wave is made with the determination of duration or frequency, amplitude and contour. Figure 1 shows these measurements.

FIGURE 1. The Sine Wave



The Pilot Study

To determine if there was reason to believe that information could be gathered and used concerning the problem of the investigation, a pilot study was instigated several months before the data for the main experiment were collected. It was believed that through the employment of a pilot study, certain anticipated complications, as well as unanticipated ones, could be surveyed and remedies em-

ployed, so that the collection of data for the main study might be expedited.

After completing the pilot investigation, it was the technician's opinion that, although slight, there was an apparent difference in both frequency and amplitude of the sine waves between the segments of silence and the segments of music recorded on the tape. It was also his considered opinion, that because of the apparent difficulty of obtaining an accurate measurement of the amplitude of the sine wave, the main study should be concerned only with the measurement of frequency.

The Main Investigation

A letter was sent to the parents of each subject to be used in the experiment explaining the proposed study and asking permission to use their child as one of the subjects. Enclosed in the letter was a statement from a leading surgeon regarding the lack of possibilities of any harmful effects through the use of the electroencephalograph machine, a permission slip for the parents to sign and return, along with a stamped envelope addressed to the researcher.

The subjects were contacted personally by the researcher while they were in their daily music class. A day was chosen for the explanation of the proposed study to the students, so that it coincided with the day the parents received the letter asking for their permission for the student to participate. It was gratifying to learn that all members of the class were enthusiastically in favor of participating. Schedule times were made with the participating students by allowing them to form themselves into groups of three or four, and choosing the evening that would be most convenient for them.

To help allay any fears or anxieties on the part of the subject, the nurse, who would be in attendance during the entire time the electroencephalogram on each subject was being made, was asked to come to the school to talk with the students. At this meeting the nurse demonstrated the placing and removing of the electrodes. The nurse's personality enthralled the students. They were anxious to start the experiment.

The Sample

The sample for the main study was composed of the members of the sixth grade class of Southwest Missouri State College laboratory school in Springfield, Missouri.

The sample included fifteen boys and fifteen girls, ranging in age from eleven years, one month, to twelve years, two months. The intelligence quotients of the class, as determined by the 1957 short form of the California Test of Mental Maturity, ranged from eighty-seven to one hundred forty-four. The median intelligence quotient was one hundred eighteen. The socio-economic status of the parents of the students ranged from low through high, with the average for the class falling in the upper middle category.

The Recording Tape

The tape used in the investigation was produced in the professional recording studio of Radio Ozark Enterprises and Radio

Station KWTO in Springfield, Missouri, by a recording engineer for that company.

Two minute portions of each selection were recorded on the tape in the following order:

1. Silence.
2. Bach, J. S., "Air for the G-String," from "Suite in D Major," recorded by Nathan Milstein, Violin, with Leon Pommers, Piano, a Capitol recording #P-8396.
3. Liadoff, "The Music Box," recorded by the RCA Victor Orchestra under the direction of Ardon Cornwell, RCA Victor Recording #WE81, 41-6126.
4. DeLisle, "La Marseillaise," recorded by the Band of the Grenadier Guards under the direction of Major F. J. Harris, London Recording #P-8396.

The opening statement used in the pilot study was condensed to read as follows:

This is Mr. McCurry. I would like to ask you to lie still and relaxed, while you listen to three different selections of recorded music. Before each piece of music is played, you will hear a soft tone like this: (a soft bell tone was sounded here).

Between each selection of music, you will hear no sound for just a short time. Just before the first tone, there will be two minutes of no sound. Now lie quietly, and within two minutes you will hear the first tone.

Similarly, the closing statement was made as follows:

This is Mr. McCurry again. The music is finished. Lie still, and I will come in to take the earphones from your ears. Thank you very much for your help.

The Reproducing Machine

The machine used to play the completed tape recording for the subject was a Wollensak model T-1500 high fidelity portable recorder, having a frequency response of from forty to fifteen cycles per second, plus or minus three decibels at seven and one-half inches per second. The instrument's signal to noise ratio was forty-eight decibels, wow and flutter less than 3 per cent, and distortion less than 8 per cent.

A junction box with one input connection and three output jack receptacles was devised so that three sets of earphones could be used simultaneously. One set was used by the subject, one by the researcher, and one by the technician. All three sets of earphones were matched and were of high impedance type. The output gain of the tape recorder was set on the second position of the ten position scale. This setting was used for all subjects.

The Electroencephalograph

The electroencephalograph used was located at St. John's Hospital in Springfield, Missouri. A room, pleasantly appointed, adjacent to the equipment room, was available as a waiting room for the subjects.

Four connecting rooms were used for the examination. The first

of the three was used as a waiting room. Another was equipped with lavatory, cabinets, chairs, and the necessary items used in preparing the subject for the actual making of the electroencephalogram record. The other two rooms housed the electroencephalograph instrument and an examination cot, respectively, and were separated by heavy mesh wire screen so that the subject might be observed while the record was being taken.

The room in which the examining cot was located was an electrically shielded room, so designed that the room was a complete enclosure of conducting material connected at only one point to the ground of the recording instrument.

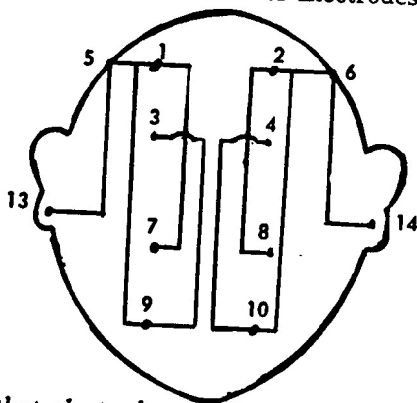
The electroencephalograph machine used in the study was a Grass, model number six, with capabilities of measurement of up to eight channels.

For the collection of data for this study, a calibration of fifty microvolts was used. A graphic record of the calibration was made at the beginning and at the end of each subject's electroencephalogram. For each subject, the programming of the machine was the same.

Since it was evident that the subdermal electrodes could cause an added amount of anxiety on the part of the sixth grade subjects, the surface electrode type was used in the collection of data. Before the record was taken, the resistance between electrodes was measured to determine whether or not a good contact was made.

There are many possible systems of electrode placements, all of which have their advantages and disadvantages. Electrode placement in this study was left to the decision of the electroencephalographer in charge of the laboratory after an explanation of the study was made to him. Figure 2 shows the placement of electrodes.

FIGURE 2. Placement of Electrodes



It will be noted that electrodes numbered 11 and 12 were not used by the electroencephalograph technician for technical reasons.

Data for this study were collected by using the bipolar method of connecting the electrodes to the amplifiers.

A qualified electroencephalograph technician was in attendance

at all times when the electroencephalograph equipment was being used. Since there was a possibility that individual subjects might react in different ways to the experimental process, a registered nurse was employed to be in attendance for any emergency that might arise.

The Examining Procedure

Data for the study were collected generally in the evenings between the hours of six-thirty and nine-thirty.

Upon entering the examining rooms, the subjects and their parents were invited to tour the four rooms being used, noting the arrangement of equipment. They were given a short resume of the procedure for the evening. The technician and nurse were introduced, and their part in the experiment explained.

The subject was then taken to the preparation room where the electrodes were placed on his head by the nurse.

The subject was then directed to the examining room in which the hospital bed was located, and asked to lie down and be comfortable. It was gratifying to know that all thirty of the subjects first asked if they were not expected to remove their shoes. They seemed pleased and a little bit devilish when they were told that they did not have to remove them. This unanticipated bit of joviality seemed to attenuate any anxiety the subjects might have been experiencing.

While the technician connected the color-coded wires of the electrodes to the cable leading to the electroencephalograph instrument, the researcher gave the subject final instructions.

During the actual taking of the subject's record, the technician monitored the record tape through his set of earphones, and marked on the electroencephalogram the exact second of the beginning and ending of each section of silence and of music.

During the time the record of one subject was being taken by the technician, the nurse had prepared the next subject. The process was then repeated in its entirety with the next subject.

The Frequency Measurement

To interpret the information collected by the use of the electroencephalograph, each electroencephalogram had to be changed from line graphs representing the electric potential of eight sections of the brain, to numerical values. This was done by measuring the frequency per second and recording that number on the electroencephalogram. To facilitate the measurement of the frequency per second, a tool called the EEG ruler was used.

A decision was made to measure those seconds in the center of each section of each electroencephalogram, so that any variation in brain wave which might have been caused by the starting and stopping of the sound of music would be eliminated. Thus, a portion of the section with a more stable wave pattern would be designated.

The center second of each section of all electroencephalograms was determined and marked. The thirtieth second before the midpoint, and the thirtieth second after the midpoint was designated as the starting and ending points respectively for the total area of the record to be measured.

The frequency per second was measured in alternate seconds

within the boundaries of the area designated at the center of the section. This procedure was followed for each line, in every section of all electroencephalograms.

Figure 3 shows a sample from a page of a section of an electroencephalogram.

The total frequency per second per line for each section of each electroencephalogram was recorded on the subject's information chart, and a grand total determined for each of the four sections. This grand total per section was used as the raw data to be treated statistically.

Another chart was made indicating the total frequency per second for each section of all the male and female subjects' electroencephalograms.

Statistical Treatment

The significance of the difference of the means was the statistic used to determine whether or not the mean difference between those sections in which the experimental factor of music was presented, and the control section in which no apparent stimulant was present was a real difference, or if it was merely a chance variation.

At the inception of this study, a decision was made to reject or accept the null hypothesis at the 5 per cent level of confidence.

The following formula for determining the standard error of difference between means was used in the first treatment of the data collected in this study:

$$SD_{\bar{x}} = \sqrt{S_{\bar{x}}^2 + S_{\bar{y}}^2 - 2(r)(S_{\bar{x}})(S_{\bar{y}})}$$

in which $SD_{\bar{x}}$ is the standard error of difference between means, $s_{\bar{x}}$ is the standard error of the mean, and r the Pearson's product-moment correlation coefficient.

In order to use the above formula, the standard deviation for each distribution was computed by using the formula:

$$S_x = \sqrt{\frac{\sum x^2}{N-1}}$$

in which $\sum x^2$ is the sum of the deviations squared.

Then the standard error of each mean was computed with the following formula:

$$S_{\bar{x}} = \sqrt{\frac{S_x}{N}}$$

and the Pearson r by the formula: $\frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}}$

$$R = \frac{\sum xy}{\sqrt{(\sum x^2)(\sum y^2)}}$$

in which $\sum xy$ is the symbol for the sum of the product of the deviations.

After determining the standard error of difference between the means, the t-test was applied by the use of the formula:

$$t = \frac{\bar{x} - \bar{y}}{SD_{\bar{x}}}$$

in which X and Y are symbols for the actual means of the two groups.

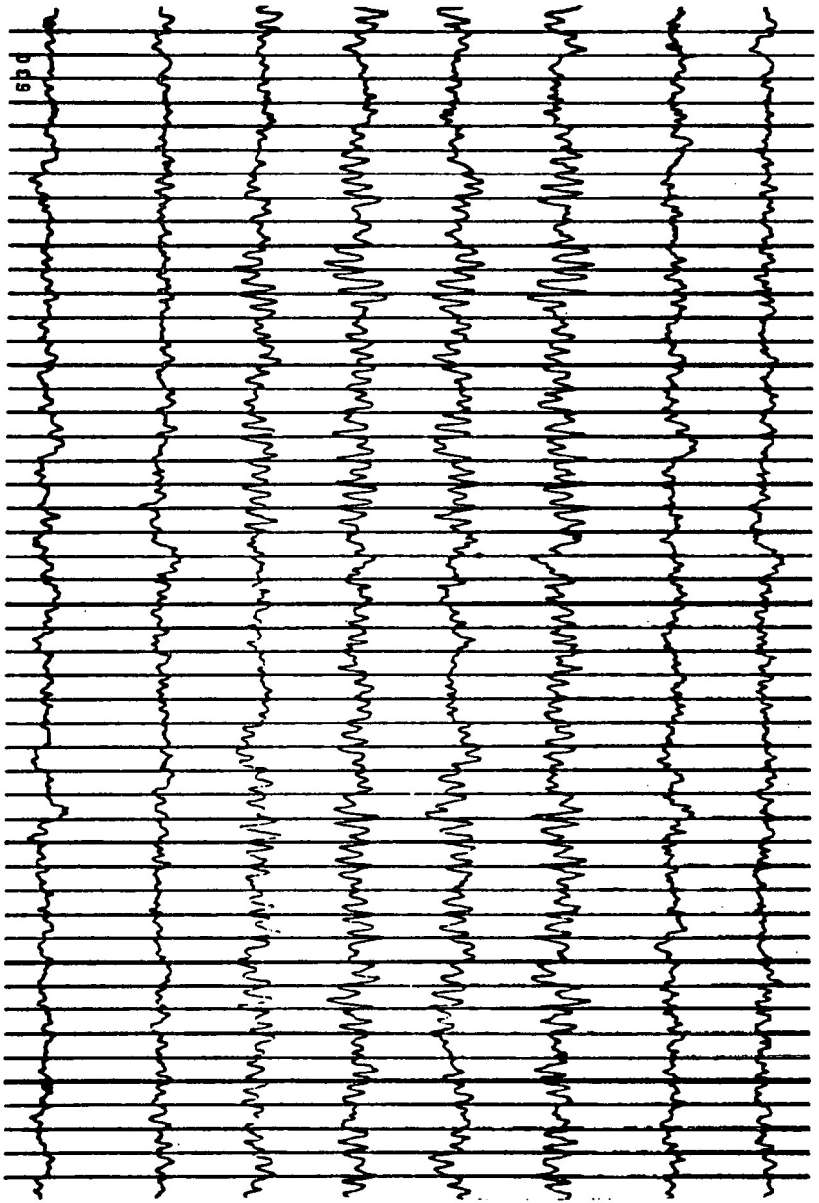


FIGURE 3. A Sample from a Page of the Control Section of an Electroencephalogram

For the purposes of identification, the symbol X and its various forms was used to indicate that the data were from the control section. The symbols A, B, C, and their various forms were used to indicate that the data were from the music No. 1, music No. 2, and music No. 3 sections, respectively.

In the second statistical treatment of the data, which was undertaken to determine if there was a significant sex difference, the formula used for determining the standard error of difference between means was:

$$SE_D = SD \sqrt{\frac{N_1 + N_2}{N_1 N_2}}$$

in which SD is the symbol for the standard deviation of the means, and N is the symbol for the number of cases.

To determine the standard deviation, the following formula was used:

$$SD = \sqrt{\frac{\sum x^2 + \sum y^2}{(N_1 - 1) + (N_2 - 1)}}$$

in which $\sum x^2$ and $\sum y^2$ are the symbols for the sum of the deviations squared.

The t-test was applied by use of the formula:

$$t = \frac{\bar{X} - \bar{Y}}{SD_{\bar{X}}}$$

AN ANALYSIS OF THE BRAIN WAVE DATA

The analysis of the brain wave data consisted of three major parts: (1) the effect of music on the brain wave frequency of the thirty subjects; (2) the effect of music on the brain wave frequency of the male and female subjects; (3) a comparison of the recorded brain wave frequency for each of the three categorized selections of music.

In the first part, a comparison was made of the mean of the data gathered in the first section of the thirty electroencephalograms in which no music stimulation was applied, with the mean of: (1) the second section of the thirty electroencephalograms in which the musical section "Air for the G-String" was used as the experimental factor; (2) with the third section of the thirty electroencephalograms in which the musical selection "The Music Box" was used as the experimental factor; and (3) with the fourth section of the thirty electroencephalograms in which the musical selection "La Marseillaise" was used as the experimental factor.

The four sections of the electroencephalograms were referred to as: (1) the control sections; (2) the music No. 1 section; (3) the music No. 2 sections; and (4) the music No. 3 section.

In the second part of the analysis, a comparison was made of the data recorded for the male subjects with the data recorded for the female subjects. The comparisons were made for: (1) the control section; (2) the music No. 1 section; (3) the music No. 2 sections; and (4) the music No. 3 section.

The third part of the analysis was divided into three sections. These subdivisions present a comparison of: (1) the mean of the

data gathered in the music No. 1 section with the mean of the data gathered in the music No. 2 section; (2) the mean of the data gathered in the music No. 2 section with the mean of the data gathered in the music No. 3 section; and (3) the mean of the data gathered in the music No. 1 section with the mean of the data gathered in the music No. 3 section.

The Results

The results of the statistical treatment of the data indicated: (1) that there was a significant difference between the mean of the total frequency per second measurement in the control section of the thirty electroencephalograms, and the mean of the total frequency per second measurement in each of the three music sections.

The results also indicated that the t-ratio value was greater between the control section and the music No. 2 section, than it was between the control section and the music No. 1 section. Furthermore, the results indicated that the t-ratio value was greater between the control section and the music No. 3 section, than it was between either control and the music No. 1, or the control and the music No. 2 sections.

The results of further statistical treatment of the data indicated that in the control section, the music No. 1 section, the music No. 2 section, and the music No. 3 section, there was no significant difference between the means of the total frequency per second measurement recorded for the male subjects, and the means of the total frequency per second measurement recorded for the female subjects.

The results of the third part of the statistical treatment of the data indicated that there was a significant difference between the means of: (1) music No. 1 and music No. 2 sections; (2) music No. 2 and music No. 3 sections; and (3) music No. 1 and music No. 3 sections.

The results also indicated that the computed t-ratio value was greater between the music No. 1 and the music No. 3 sections than it was between either the music No. 2 and the music No. 3 sections, or the music No. 1 and the music No. 2 sections.

The comparison of individual total frequency per second measurement in the control sections with the individual total frequency per second measurement in each of the three music sections indicated that there was a wide range of individual differences in the way in which the music affected the brain wave frequency for separate subjects. Similar indications of individual differences was evident in the intercomparison of the three music sections.

In view of these findings, and within the limitations of this study, the null hypothesis of no difference must be rejected with confidence.

Conclusions

In light of the evidence, as the result of this study, the following conclusions seem warranted:

1. The frequency of the electric potential produced by the human brain is affected when certain categorized selections of music are applied to the subject as stimulants.

2. The introduction of certain categorized selections of music produces different effects upon the frequency of the human brain wave pattern of individual subjects.

3. There is no significant difference between the total frequency per second measurement recorded by the male subjects, and the total frequency per second measurement recorded by the female subjects when music is used as a stimulant.

4. There is a significant difference between the three categorized selections of music as evidenced by the recorded brain wave frequency when these selections are introduced as stimulants.

Implications

In view of the findings of this study, certain implications seem justifiable:

1. Music educators should be cognizant of the possibility that separate results might be obtained with careful consideration of the musical selections chosen for use in the directed listening program.

2. Since the experimental results of this study indicate that music does have qualities which affect one of the physiological processes of the human body, and since it is apparent that the effects of music are highly complex, the most important implication would seem to be to determine, through further scientific research, other effects music stimuli may have.

Extension of the Investigation

As the data for this investigation were collected and analyzed, various problems, which were not included within the limitations of this study, were recognized as being worthy of consideration for investigation:

1. The correlation of the effect of similar categorized selections of music on the frequency of the human brain wave pattern, with the results of this study.

2. The effect of certain categorized selections of music on the electric potential of the separate parts of the human brain.

3. An investigation of the reason for the decrease in total frequency per second measurement for a limited number of individual subjects when music is introduced as a stimulant.

4. The effect of certain categorized selections of music on the amplitude of the human brain wave pattern.

5. The effect of certain categorized selections of music on the electric potential of the brain in children of the lower elementary grade level, which would lead to possible correlation with the results of this study.

6. The effect of certain categorized selections of music on the electric potential of the brain in adults, which would lead to possible correlation with the results of this study.

7. The effect of certain categorized selections of music on the brain wave pattern of the mentally ill, or subjects with known abnormalities.

Suggestions for Further Study

In addition to the extensions of the present study, further related problems were indicated as being worthy of consideration for investigation:

1. Studies relating to the correlation of the effect of music on the electric potential of the brain with the effect of music on other body functions.

2. Studies relating to the effect of poetry on the electric potential of the brain, which would lead to a correlation with the effect of music on the electric potential of the brain.

3. Studies to determine the possible use of the findings of this investigation as a therapeutic device.

4. Further development of categorized lists of selected music.

FOOTNOTES

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CRITIQUE I: F. BION McCURRY'S STUDY OF THE ENCEPHALOGRAPHIC REACTIONS OF CHILDREN TO DIFFERING SELECTIONS OF MUSIC

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Details concerning the operations and statistical treatment of data in Dr. McCurry's experimentation are omitted from this review, since these appear in the abstract which can be found elsewhere in this issue of the *Journal of Research*.

The essential contributions of this piece of research are to be found in the method of investigation and in the verification in the findings of the results heretofore derived from studies dependent upon the introspections of the subjects. Within the limitations of the knowledge of the reviewer, this is the first time that the reactions within the brains of subjects have been actually measured objectively while the subjects were listening to differing selections of music. With the availability of equipment, trained operating personnel, and time for application, the method opens up a whole new series of possibilities for studying the effects of music on human subjects. The pioneer application of the method seems most significant, and in many ways may be more important than the actual findings reported.

Older studies of the effects of listening to different types of music have depended upon the reports of the subjects themselves about how they felt upon hearing different selections of music. Such reports of feelings are obviously subject to many kinds of errors due to external conditioning factors which exist at the time of the experiment, or may have been applied to the subjects before entering the experiment. The present study seems to prove quite objectively that listening to music does change brain reaction, that the reactions in listening to the same music vary with the different subjects, and that the reactions of the same subjects change in listening to different musical selections. Obviously these things have always been assumed by both musicians and laymen. Existing introspective studies support the assumptions. Dr. McCurry seems to have the objective proof.

There are at present some rather severe limitations upon the widespread use of the method employed in this piece of research. The electroencephalograph is not commonly available for use outside hospitals for the mentally ill. The fact that the machine has been used frequently for diagnosis of mental illness may make many potential subjects shy away from tests for normal reaction to music. Interpretations of results, the reading of the encephalograms, requires trained technicians. There are at present not enough of such technicians to make it possible to carry on many studies of numbers of school children or of unselected adults, in their reactions to music. The measurement with the machine requires individual application to subjects. This means that the whole process is exceedingly time consuming, or that the number of subjects that can be treated in any one group must be relatively small. The reading and interpretation of the graphs themselves is a very slow and laborious process. This tends, too, to limit the numbers of subjects in any one experimental group. The smallness of numbers in experimental groups tends to limit the application of conventional statistical procedures to the results obtained.

In examining the encephalograms of the individual subjects in this study the reader may speculate upon the significance of the amplitudes of the graphs as well as that of the frequencies. In the results reported, only the frequencies were used in interpreting results. It is very possible that the amplitudes of the waves may be quite as important as the frequencies. This would seem to be of special importance in trying to estimate the effects upon an individual of widely different types of music. In future experimentations of this kind it would seem desirable to devise some means of rapidly scanning, or counting, frequency in order to reduce labor and time in interpretation of encephalograms. Some way should be found for objectively determining change in amplitude so that results in amplitude can be reported in figures and submitted to statistical treatment.

The musical selections actually used in the study were chosen deliberately from those found in earlier investigations depending upon introspective evaluations. This seems a desirable feature in

that an important part of the experiment derives from the objective verification of the results of these earlier experiments. Such choice also relieved the investigator of the burden of trying to establish a presumed musical difference in a new set of selections. There is also the point that a chain, or series, of related research is much more informative than an unrelated or isolated experiment. The use of selections of music taken from the work of earlier investigators provides the chain of relatedness which seems so desirable. Results of this study can be compared more readily with the earlier ones because of the use of the same musical selections.

Probably of greater importance is the shortness of the parts of the selections used. This is at the same time related to the brief time of exposure to any one of the selections. The musical material actually taped and used for exposure to the subjects consisted of small excerpts and the duration of exposure time was quite short in each case. If the length of excerpts could be increased and the time of exposure for each selection lengthened, results might achieve a higher level of confidence. This whole question of length of excerpts and of time of exposure is tied in with the limitations imposed by the apparatus used. Involved are the application to individual subjects, the length of the encephalograms, and the problems of reading, measurement, and interpretation. Future experimenters, however, may well consider how to attack this problem of increasing the length of exposure to particular selections of music.

An additional experimental element lacking in this study is that of repetition. It would be highly desirable to determine whether or not the same subjects, under the same conditions, react in the same way to the varying selections of music. In other words, it would have been desirable to repeat the whole experiment and then compare the two sets of encephalograms of each individual subject to determine the extent to which the results are alike or different. Again, limitation on the use of the machine, the time involved in testing subjects, and the problems of interpretation of the graphs placed severe restrictions on the possibility of repetition. It is to be hoped that some future experimenter will carry on such an investigation to the point of repetitive verification of results.

The investigation has great merit as a pioneer study. It opens many doors and suggests almost endless challenges for future investigation. The group of subjects consisted of a small number of sixth graders. Do other sixth graders react in the same ways to the same musical selections? How do sixth graders react to other musical selections? How do the reactions of adults compare with those of children in listening to the same musical selections? How do the brain waves of musicians with varying degrees of musical training compare with those of laymen when listening to the same musical selections? The musical material for the present experiment consisted entirely of instrumental excerpts. A whole new series of experiments can be made with vocal and choral music. Comparisons can be made also between reactions to vocal music and those to instrumental music. It would be highly intriguing to compare the brain wave charts of a group of subjects when listening to music with

the impulses of the same subjects when listening to the reading of poetry. These are just a few of the possibilities that Dr. McCurry's investigative technique suggests.

Much that can be done with the challenges outlined above depends upon further refinement in the application of the technique of this study. Much depends upon arriving at some quick means of determining the frequency of waves which appear on the graphs and of some quantitative means of estimating the significance of amplitude of these waves. Perhaps Dr. McCurry can solve these problems in his next investigation, or some cooperative music educator with access to suitable equipment may be able to aid in the solution to the mechanical difficulties. There is the further suggestion that more rapid progress can be made with the effects of music on the human brain if some foundation with funds can make available to music educators access to electroencephalographs and the technicians to operate them.

CRITIQUE II: F. BION McCURRY'S STUDY OF THE ENCEPHALOGRAPHIC REACTION OF CHILDREN TO DIFFERING SECTIONS OF MUSIC

(Excerpts from correspondence with the Editor)

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I thank you for bringing this thesis to my attention and for giving me the opportunity to look at this new piece of work. The review of the pertinent literature contained in the thesis is very competently done and will be a useful reference source for anyone interested in this field. I am troubled, however, by the conception of the experimental work and its execution. The thing that bothers me about the conception is my belief that the problems pertaining to different affects of different kinds of music are essentially behavioral ones and should be studied behaviorally. The use of various adjectives, of rating scales, etc. has been difficult, to be sure, but is clearly relevant to some of the problems. The use of a physiological measure appears to me to be something of an escape from the immediate problem to one that is at least quantifiable but there is no clear relation to the emotional states that presumably are of basic interest. The execution of the experiment itself suffers from at least one important omission. On the basis of the work that Mr. McCurry reports, I cannot conclude that those changes in frequency in the EEG that he observed have anything to do with the musical character of the acoustic stimulus that he used. I could still maintain the hypothesis that such frequency changes are characteristic of the EEG response to sound. From a logical point of view, the design would have been more complete had he included a condition in which, for the same period of time, he would have introduced some noise or other non-musical sound. Here the implication that there is something in the musical message that is controlling these different frequency changes is not quite borne out directly by his observations.

THE END