

THE EFFECTS OF OVERLEARNING, INITIAL LEARNING ABILITY
AND REVIEW UPON THE MUSIC MEMORY OF JUNIOR HIGH
SCHOOL CORNET AND TRUMPET PLAYERS

by

William Robert Becker

A dissertation submitted in partial fulfillment of
the requirements for the degree of Doctor of
Philosophy in the Department of Music in
the Graduate College of the State
University of Iowa

June 1962

Chairman: Assistant Professor Edwin Gordon
Co-Chairman: Associate Professor Leonard S. Feldt

TABLE OF CONTENTS

CHAPTER	PAGE
I. THE PROBLEM	1
Purpose of the Study	3
Statement of the Problem	5
Definitions of Terms	8
Initial mastery	8
Initial learning ability	8
Overlearning	9
Temporal position	9
Relearning-review	10
II. RELATED RESEARCH	11
Rubin-Rabson Study Number V	11
Rubin-Rabson Study Number VI	23
Rubin-Rabson Study Number VII	30
Evaluation	32
Design	32
Subjects	35
Music material	35
Overlearning	36
Initial mastery	37
Relearning-review	37

CHAPTER	PAGE
<i>Summary</i>	38
III. PROCEDURE	40
<i>Selection of Subjects</i>	40
<i>Music Material</i>	42
<i>Method</i>	42
<i>Session I: Initial learning (initial mastery)</i>	
<i>and overlearning</i>	44
<i>Initial learning</i>	44
<i>Overlearning</i>	45
<i>Session II: Relearning to initial mastery at</i>	
<i>the two weeks temporal position</i>	46
<i>Session III: Relearning to initial mastery at</i>	
<i>the four weeks temporal position</i>	46
<i>Additional controls</i>	46
<i>Design and Evaluation of the Experiment</i>	48
<i>Design</i>	48
<i>Statistical tests</i>	50
IV. ANALYSIS AND INTERPRETATIONS OF DATA	53
<i>Analysis</i>	53
<i>Interactions and effects</i>	53
<i>Correlations</i>	61

CHAPTER	PAGE
Interpretations	61
Overlearning	61
Initial learning ability	62
Review	63
Correlations	64
V. SUMMARY AND CONCLUSIONS	66
Summary	66
Conclusions	67
Suggestions for further research	68
BIBLIOGRAPHY	70
APPENDIX	76

CHAPTER I

THE PROBLEM

Educational psychologists generally accept the theory that practice beyond a point of learning a response aids in the retention of the response. The same principle is applied to the memorization of material. Crow and Crow state, "The more often the learner repeats the material the more likely he will be to remember it."¹

Such practice beyond a criterion of mastery is usually referred to as overlearning and is described by Stroud as "a term employed in psychology to signify any amount of learning or practice exacted of the subject beyond that which is required to reach a criterion."²

Kingsley and Garry state, "Overlearning works to reduce forgetting and undoubtedly accounts for the retention of skills in some degree after long periods of disuse."³

¹Lester D. Crow and Alice Crow, Educational Psychology (New York: American Book Company, 1948), p. 226.

²James B. Stroud, Psychology in Education (New York: Longmans, Green and Company, 1956), p. 478.

³Howard L. Kingsley (rev. by Ralph Garry), The Nature and Conditions of Learning (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1957), pp. 250-52.

Luh, Cuff, Krueger, and McClelland experimented with the effects of overlearning various types of material. Luh used material consisting of nonsense syllables and concluded that overlearning is not worthwhile.⁴ Cuff employed consonants, digits, and nonsense syllables and concluded that overlearning may or may not be worthwhile.⁵ Krueger improved upon Luh's design, using one-syllable nouns and a much larger number of subjects.^{6,7} The results of Krueger's investigations indicate that overlearning facilitates recall. McClelland compared the effects of overlearning with review as applied to written material. Results indicate that review is not significantly superior to overlearning, but that both overlearning and review are superior to no form of additional study.⁸

⁴C. W. Luh, "The Conditions of Retention," Psychological Review, Psychological Monograph Supplement, 31 (1922), pp. 1-87.

⁵Noel B. Cuff, "The Relation of Overlearning to Retention," Contributions to Education, George Peabody College for Teachers, 43 (1927).

⁶Wm. C. F. Krueger, "The Effect of Overlearning on Retention," Journal of Experimental Psychology, 12 (1929), pp. 71-78.

⁷Wm. C. F. Krueger, "Further Studies in Retention," Journal of Experimental Psychology, 13 (1930), pp. 152-63.

⁸T. N. McClelland, "Overlearning and Review," (unpublished Master's thesis, The State University of Iowa, Iowa City, 1940).

Music psychologists have very little objective evidence to support their opinions concerning the effects of overlearning upon the retention of music. The Rubin-Rabson studies represent the best known examples of controlled research in music overlearning. The conclusions drawn from these studies are not favorable to the concept of learning beyond initial mastery.^{9,10,11,12} Farnsworth states, "With no other studies to contradict those of Rubin-Rabson, her conclusions must be at least tentatively accepted."¹³

I. PURPOSE OF THE STUDY

Even though Rubin-Rabson found that overlearning has no

⁹Grace Rubin-Rabson, "Studies in the Psychology of Memorizing Piano Music. V: A Comparison of Pre-Study Periods of Varied Lengths," Journal of Educational Psychology, 32 (1941), pp. 101-12.

¹⁰Grace Rubin-Rabson, "Studies in the Psychology of Memorizing Piano Music. VI: A Comparison of Two Forms of Mental Rehearsal and Keyboard Learning," Journal of Educational Psychology, 32 (1941), pp. 593-602.

¹¹Grace Rubin-Rabson, "Studies in the Psychology of Memorizing Piano Music. VII: A Comparison of Three Degrees of Overlearning," Journal of Educational Psychology, 32 (1941), pp. 688-95.

¹²Grace Rubin-Rabson, "Mental and Keyboard Overlearning in Memorizing Piano Music," Journal of Musicology, 3:1 (1941), pp. 33-40.

¹³Paul R. Farnsworth, The Social Psychology of Music (New York: The Dryden Press, Inc., 1958), p. 201.

significant value, it seems only logical that significant amounts of practice after initial memorization of a music composition should facilitate recall. The lack of evidence to support this hypothesis has failed to convince the writer that there is no significant value in practice or continued learning beyond the point where a composition is memorized. Furthermore, Rubin-Rabson limited her investigations to the overlearning of piano music. Thus, her conclusions provide music psychologists with no evidence concerning the effects of overlearning with respect to other instrumental mediums. Investigations of the phenomena of music learning and overlearning should be subsequently undertaken on instruments other than the piano, and carefully controlled experimental designs should be employed in these investigations. With a wealth of allied research at their disposal, music psychologists may be able to supply music educators with more scientific bases for utilizing learning and overlearning in the teaching of music.

The primary purpose of this study was to undertake new research in music learning and to determine if overlearning is a significant factor for music retention. It was not anticipated that this study would yield data of immediate practical value to music teachers. If it could be shown, however, that overlearning does facilitate relearning, this finding would have important long-range implications for the profession.

Ultimately, when the effectiveness of varying amounts and types of overlearning is more thoroughly studied, it might be possible to develop practical suggestions for the improvement of music instruction.

II. STATEMENT OF THE PROBLEM

This study was concerned with the following specific situation. Suppose that three highly similar populations of junior high school students learn a short trumpet or cornet selection to a defined criterion of performance. Suppose further that following this initial learning, each member of the first population is given no further practice. Each student of the second population is allowed additional trials (overlearning) equal to half the number he required to learn the selection. Each member of the third population is allowed additional trials equal to the full number he initially required to learn the selection. Within this experimental framework, the following major questions were investigated:

- 1) How do these three populations compare in their average ability to relearn the selection two weeks later? How do they compare in their ability to relearn the selection four weeks later?
- 2) Does ease of relearning depend on the level of ability of the subject, as inferred from the number of trials required for

initial learning?

3) If overlearning has any effect on ease of relearning, is that effect identical for above-average, average, and below-average students?

4) Is the ease of relearning after four weeks affected by relearning which occurs after two weeks?

5) If overlearning has any effect on ease of relearning, is the effect reflected as strongly after four weeks as it is after two weeks?

This theoretical learning model was applied to samples of students drawn from a junior high school population. Junior high school students were used because it was assumed that they would find the music material neither too easy nor too difficult. Also, junior high school students were selected because the time needed to conduct the experiment did not conflict with class scheduling and contest activities.

The cornet and the trumpet were selected as the instrumental mediums of this study. These two mediums were selected for three reasons. First, the writer has had considerable experience in brass instrument performance and instruction; second, a large number of cornet and trumpet players were available for the experiment; and third, the use of these instruments permitted the control of the instrumental medium.

The short composition used for the music selection of

this study served two purposes. It made feasible the use of a large number of subjects, and it enabled the writer to minimize the problem of physical endurance present in brass playing.

On the basis of the opinions of educational psychologists and the findings of Krueger and McClelland, it was hypothesized that overlearning would be of significant value for the retention of music. Educational psychologists have found that, trial for trial, overlearning done by a fast learner is more effective than that done by a slow learner.¹⁴ It also has been observed that a slow learner, by virtue of requiring more learning and overlearning trials, shows a greater improvement in relearning than does the fast learner.¹⁵ It was anticipated that the faster learners of this experiment would consistently relearn in fewer trials than would the slower learners. It also was hypothesized that the slower learners would show a greater improvement in retention scores than would the faster learners. It further was hypothesized that overlearning would be increasingly effective for retention as the time periods for relearning increased. This hypothesis was based on Krueger's findings. Krueger discovered that when the time

¹⁴ Stroud, op. cit., p. 482.

¹⁵ Ibid.

interval between initial learning and relearning is increased, the higher degrees of overlearning are more effective for retention.¹⁶

III. DEFINITIONS OF TERMS

Initial Mastery

The criterion of initial mastery in this study was one correct memorized rendition of the music material. The criterion for a correct rendition included no errors in pitch, time, and articulation. Tone quality was not considered as a factor in the acceptance of a student's correct rendition unless it was evident that this factor hindered technical facility. A note that was sounded on the correct harmonic was acceptable even though the note was rendered slightly sharp or flat in pitch.

Initial Learning Ability

Initial learning ability in this study was determined by the number of trials each subject required to reach the criterion of one correct memorized rendition of the music material. The initial learning ability of a subject was inversely proportional to his learning score. As the ability level became higher, the number of trials needed to attain initial mastery

¹⁶Krueger, op. cit.

became smaller.

Overlearning

Overlearning is usually defined by the amount of additional practice a subject has after he has reached a specified criterion of performance. In this study, overlearning was specified in terms of the proportion (or per cent) of additional times the subject was allowed to play the composition. Each subject in the first experimental group was allowed no additional practice, hence no overlearning. Each subject in the second group was administered an additional fifty per cent of his number of original learning trials. This is called fifty per cent overlearning.* Students in the third group were administered as many additional trials as they had required for initial mastery. This is called one hundred per cent overlearning.

Temporal Position

Temporal position refers to the time intervals at which the subjects were requested to relearn the music material. The temporal positions in this study were designated as approx-

* If a subject who was assigned fifty per cent overlearning reached initial mastery in an odd number of trials, he received overlearning to the next whole trial (i.e., three trials initial mastery warranted two trials overlearning).

imately two weeks and approximately four weeks from the initial learning date for each subject.

Relearning-review

Relearning-review, as used in this study, refers to the amount of review received by each student when he first relearned the music material at the temporal position of two weeks. The amount of review varied with the amount of relearning needed to re-attain initial mastery at the temporal position of two weeks.