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CHARLES EDWARD NELLONS

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AN EXPERIMENTAL INVESTIGATION OF THE EFFECT OF BLOCKING

ON THE MEMORIZATION OF SELECTED PIANO LITERATURE

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CHAPTER I

INTRODUCTION

Need for the Study

The memorization of music is an important aspect of piano study and performance and is of concern to pianists at all levels. This concern has been evident since Liszt on one occasion cast aside the music, to the astonishment of his audience, and played the remainder of a recital from memory. Although critics labeled Liszt's memorization feats as affectation, through the years audiences have come to expect memorized performances. It is generally held that performance without benefit of musical score permits the pianist to give full attention to technical and interpretive matters allowing for higher levels of artistic attainment and more effective communication with audiences. Piano performance without use of the musical score, thus, is standard practice in competitive events as well as educational and professional recital settings.

Increased demands upon performers to memorize music have not facilitated the memorization task. Many accomplished and amateur pianists experience difficulty with memorization. Newman observes:

> About a fourth of those who get ahead in piano playing have very little trouble with memorizing. For the others, this skill--

and it is indeed a skill--looms as one of the biggest obstacles to their prospects of being a "compleat" pianist.[1]

The need for sound memorization procedures is illustrated in the studies and conclusions of Rubin-Rabson. She contends that students receive little instruction in memorization and, as a result, spend hours in unproductive practice.[2] Rubin-Rabson continues thus:

> If music pedagogues would acquire some idea of the exorbitant amount of labor wasted in the name of art, they might, as did the writer, watch advanced piano students--who, by their own admission, had no problem in memorizing music--consume seventy and eighty minutes, and as many repetitions, in the learning and memorizing of a twenty-four-measure, first-grade piano composition! From this they could make some deductions as to the degree of slavery involved in the preparation for performance of the student's own repertory.[3]

The subject content in most piano journals is devoted to skill development involving fingers, wrists and arms, and perfecting general control of the instrument. Where attention is given to memorization procedures, a majority of writers advise the pianist to exercise maximum use of associations to aid memorization. Other writers advise the pianist to copy notation, verbalize ideas, reduce the music to its chordal structure, practice sections in various keys, and mentally review the composition.

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[1]William S. Newman, The Pianist's Problems (New York: Harper and Row, 1956), p. 110.

[2]Grace Rubin-Rabson, "The Psychology of Memorizing," Music Educators Journal, XXXVI (January, 1950), 22.

[3]Rubin-Rabson, pp. 22-23.

Ching,[1] Newman,[2] and Bryant,[3] among others, offer still another technique for facilitating memorization, that is, blocking. Blocking involves the identification of note groups according to hand positions. The trio of authors previously mentioned advocate blocking as a means of facilitating the learning and memorization task. As their views concerning blocking have not been objectively substantiated, the present study represents an attempt to formally evaluate the utility and efficacy of the procedure and its potential as an aid to keyboard memorization.

Purpose of the Study

The purpose of the study was to investigate the effect of blocking on the memorization of selected piano literature. Specifically, the study was concerned with determining the effect of a blocking procedure on the number of repetitions and amount of practice time required for the memorization of selected piano compositions. The study also sought to determine the effect of a blocking procedure on retention accuracy.

Hypotheses

It was hypothesized that students utilizing a blocking procedure would require fewer repetitions and less practice time in the

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[1]James Ching, Piano Playing (New York: Bosworth & Co., 1946), pp. 244-77.

[2]Newman, pp. 40-41.

[3]Celia Mae Bryant, "Memorizing: A Science," Clavier, II (October, 1963), 20-25.

memorization of piano music than counterparts left to their own devices. It was further hypothesized that students memorizing piano music through means of a blocking procedure would demonstrate a high degree of retention accuracy.

To facilitate the analysis of data and the drawing of conclusions, the following null hypotheses were formulated:

N H_1: There will be no difference in the mean repetition scores of students assigned to each of the two treatment groups.

N H_2: There will be no difference in the mean time scores of students assigned to each of the two treatment groups.

Definition of Terms

Blocking. In the present study, blocking[1] is a procedure designed to aid memorization. It includes prestudy of the music score, identification of note groups according to hand positions, and identification of patterns of compositional devices employed by the composer.

Control treatment. Students achieve memorization by employing their own strategies while utilizing the regular music score.

Experimental treatment. Memorization by employing a blocking procedure and utilizing a prepared music score.

Memorization. As employed in the present study, this term implies the faculty to acquire and retain musical impressions gained from experience with a music score as demonstrated by an ability to

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[1]Because of its special nature, blocking is further described with appropriate examples in Chapter III.

identify and reproduce the music contained therein without overt visual reference.

Limitations of the Study

The present study was conducted during the spring of 1972 and was concerned with determining the effect of blocking on repetitions and time required for memorization of piano music. Students participating in the study were music education majors enrolled at Texas Southern University, Houston, Texas. Participants were selected by their piano teachers as having the requisite facility to play the experimental compositions.

One control and one experimental group with eleven students in each were involved in the investigation. The period of the investigation was eighteen weeks, and involved weekly sessions with students in each group.

The professional piano literature contains relatively little information on blocking procedures. Blocking is mentioned by only a few writers, and its relationship to memorization is uncertain. There appears to be no evidence of previous experimental research which involves utilization of blocking. For these reasons, the generalized outcomes of the study are limited to the blocking procedure employed.

The various mechanical and interpretive aspects of piano playing are excluded from the study. Also excluded are psychological implications of overlearning and unlearning.

Factors influencing skill development, such as attitudes, motives, affective or emotional response, and individual potentialities, are excluded from the study. Where their influence is implied, their positive aspects are presupposed.

Generalized outcomes of the study are limited by the experimental procedures employed and consideration of repetitions and time as dependent variables.

Basic Assumptions

The following assumptions were basic to the investigation:

1. A basic memorization procedure can be derived from an analysis of the principles of blocking.

2. Appropriate piano compositions can be selected to demonstrate the blocking procedure.

3. Effectiveness of the blocking procedure can be determined through the study of repetition and time as factors of a memorization task.

Summary

The purpose of the study was to determine the effect of blocking as an aid to memorizing selected literature, as advocated by Ching, Newman and Bryant. The need for the study is based upon a conviction that the blocking procedure should be scientifically investigated for the purpose of determining general utility. The null hypotheses for this investigation state that there will be no difference in mean repetition and time scores of students assigned

to each of the two treatment groups. Blocking and other important terms are defined. The study was limited to determining the effect of a blocking procedure on the memorization of selected piano compositions as revealed through the number of repetitions and amount of time necessary for completion of the task. The writer assumed that basic memorization procedures could be derived, appropriate piano literature selected, and effectiveness of the blocking procedure determined.

CHAPTER II

REVIEW OF RELATED LITERATURE

The study was concerned with the development and application of a blocking procedure in reducing the number of repetitions and amount of time required for the memorization of selected piano compositions. The present chapter reports on professional literature related to the problem. Included are data on note grouping, harmonic reduction, analytical prestudy, and related research in areas of music memorization other than piano. Also included is a review of related literature pertaining to different types of learning associations utilized in memorization.

Note Grouping

Many procedures developed to assist learning in piano study are methods of technical analysis for the specific purpose of facilitating the execution of scales and arpeggios. These procedures have implications for the present study in that it is assumed music beyond the technical facility of the performer cannot be memorized.

Ching devised a "method of groups," a procedure in which the pianist starts with the first note and determines the successive notes that can be played in one position of the hand or arm. A clean break

is then made which shifts the hand and arm to the position required for the next group, and so on. This method of technical analysis is dependent upon the careful selection of a practical fingering. Where there is a choice of fingerings for an extended passage, the one which requires fewer groups is likely to be more efficient. Several guiding principles for the grouping of finger passages are offered: (1) obtain as few groups or changes of arm positions as possible, (2) employ the same fingering for passages similar in technical construction and lay-out, (3) group according to rhythmic structure or accentuation, and (4) avoid sudden and rapid lateral shifts of the thumb or any finger position. Although Ching basically advocates grouping to avoid lateral shifts of the hand, he is careful to point out that certain widely spaced elliptical shaped note groups, rather than being broken up into smaller groups, are played by rapid reversals of direction of the arm movement, that is, by rotation of the wrist.[1]

Ching may have summarized his personal evaluation of this method of technical analysis when he said, " . . . I have never yet met a case of a student who has given the analytical method a fair trial and who has afterwards returned to the 'good old ways.'"[2]

The concept of note grouping is employed by Newman to create corrective exercises out of technical situations such as weak scales and arpeggios in the actual music. Problem passages become exercises played in "simultaneous blocks of notes or 'clusters,' according to the

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[1]James Ching, Piano Playing (New York: Bosworth & Co., 1946), pp. 244-77.

[2]Ching, p. 250.

grouping of the fingers."[1] Newman emphasizes the need to have the fingering cover as many of the coming notes as possible in one grasp of the hand in order to reduce the number of thumb shifts and to promote a solid style of playing.[2]

Bryant also urges the utilization of note grouping to solve technical problems and is particularly concerned with its application as an aid to memorization:

> Since all music can be reduced to chords and note groupings, . . . the fastest and most effective way to learn correct notes and fingering is to block intervals into chords and scale patterns into note groupings [clusters].[3]

She describes the preparation of brief block outlines of the analysis and blocking of pieces for the purpose of assisting memorization. The outlined material is "the solid foundation on which analytical [intellectual] memory is built. . . . The combination of the block outline plus aural memory of each note provides the memorization."[4]

The procedures of Ching, Newman, and Bryant are important sources of data for the formulation of the blocking procedure under investigation in this study.

Harmonic Reduction

Other writers recommend the employment of procedures for study and memorization which reduce the music to its basic chordal structure.

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[1]William S. Newman, The Pianist's Problems (New York: Harper and Row, 1956), pp. 40-41.

[2]Newman, p. 81.

[3]Celia Mae Bryant, "Memorizing: A Science," Clavier, II (October, 1963), p. 21.

[4]Bryant, p. 23.

The entire composition is played through as a series of chords with nonharmonic tones removed.

According to Diller, recognition of harmony and harmonic progressions is a factor in phrasing and it is helpful to reduce passages to their simplest rhythmic and harmonic terms. The process of reduction involves simplifying the time-values, and removing nonharmonic tones so that the passage is reduced to its basic chord structure. In reducing passages in this way, the pianist hears the chordal background as an integral part of the composition and is aware of the harmonic framework from which phrasing derives.[1]

Also concerned with reducing music to its basic chord structure, Last feels that broken chord passages should be practiced as a series of block harmonies. Last particularly approves of this activity for younger students having difficulty in learning or memorizing notes because "their hands are then shaped over the chord instead of over one note at a time . . . ."[2]

Cooke also feels that the pianist should reduce music to solid chords. Cooke advises:

> Carefully note the chord progressions, as apart from the melody line. Note how most "running" passages are built on familiar chords, though at first glance the passage's "passing notes" (notes not from the basic chord) may obscure its fundamental chordal structure. Such passages become instantly less forbidding

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[1]Angela Diller, The Splendor of Music (New York: G. Schirmer, 1957), pp. 51-59.

[2]Joan Last, Interpretation for the Piano Student (London: Oxford University Press, 1960), p. 46.

> and easier to memorize, when we mentally X-ray them and see their bony structure of solid chords.[1]

Cooke's suggested procedure for study is to play the composition as written, play the reduction, then play the composition again as written.

In Everhart's opinion, the pianist is unable to read a passage at sight without practice because "he does not mentally attain the adorned skeleton of the passage before he reads it. . . ."[2] According to Everhart,

> The sight-reader has to become adept in assorting passages at a glance, all passages to be classified mechanically under the chords or scales from which they are derived. This activity may be called blocking.[3]

Scale and chord passages should be analyzed to determine their harmonic basis. Scale passages, for instance, are basically the harmony notes of a chord connected by diatonic or chromatic passing tones. Everhart says:

> blocking of scores to be sight-read, involving talent and culture in tonal and harmonic analysis, will readily cause the basic and decorational (coloristic) aspects of musical ornamentation to be clearly perceived and played.[4]

In reading "modern music," inexperienced sight readers should "dissect the score" before attempting its reading. On the other hand, readers who are acquainted with the concept of "breaking up figures fundamentally built upon commonly used chords and scales" can work directly at the

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[1]Charles Cooke, Playing the Piano for Pleasure (New York: Simon and Schuster, 1941), p. 72.

[2]Powell Everhart, The Pianist's Art (Atlanta: By the Author, 962 Myrtle Street, N.E., 1958), p. 282.

[3]Everhart, p. 280.

[4]Everhart, p. 281.

keyboard, and play "dissonant agglomerations of apparently unrelated tones . . . as aggregates of black and white keys without analyzing respective correlations of them at the moment of reading."[1]

Analytical Prestudy

Many investigations have been conducted to determine the effect of prestudy on memorization. As a result of a review of research concerned with study and analysis of the score before practice, Lundin concludes that "analytical study of the score before practicing is begun serves as an aid to the most efficient learning of a piece."[2]

In an early study, Rubin-Rabson compared four methods of memorization for their relative efficiency: (1) preliminary study of the score with the aid of a given outline before playing; (2) preliminary study of the score and production of the subject's own analysis before playing; (3) learning at the keyboard with no analytical prestudy; and (4) listening to four pre-hearings before using one of the three methods described above. Twenty-four subjects participated in the experiment. A rotating design permitted subjects to learn every composition and employ every method in every order. Equal allotments of time to learn the compositions by any of the four methods was allowed. After three weeks, subjects relearned compositions using the same experimental design omitting all prestudy. Learning time

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[1]Everhart, p. 281.

[2]Robert W. Lundin, An Objective Psychology of Music (New York: Ronald Press Co., 1953), p. 128.

was compared with relearning time, and the difference between the two indicated the amount of retention produced by each method and its relative efficiency. Rubin-Rabson found that the methods employing analytical study were superior to keyboard method approaches without prestudy. Students who had no prestudy before proceeding to the keyboard experienced "annoyance and irritation." After studying the analysis, their keyboard performance seemed firmer and less subject to error. Prehearing before learning showed no advantage in relearning.[1]

Adams applied the connectionist and gestalt theories to formulate two methods of piano instruction and to determine the effects of applying these methods to piano teaching. Thirty subjects participated in the study. Connectionist procedure involved predetermined routines in learning scales and compositions. Scales were played hands separate, then hands together. Compositions were played hands separate, phrase by phrase, while naming notes and counting aloud, then played hands together while counting. Verbal incentives, grades, and prizes were employed. Gestalt procedure involved problem solving without having to follow predetermined procedures. Prehearing and pre-analysis were employed. Subjects played entire pieces hands together. Drill and repetition were not emphasized. The gestalt group performed slightly faster with greater accuracy and cleaner performance. Adams considered one or more features of the gestalt

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[1]Grace Rubin-Rabson, "The Influence of Analytical Pre-Study in Memorizing Piano Music," Archives of Psychology, XXXI (November, 1937), pp. 1-53.

method to have some influence on the slightly better performance of the gestalt group. These features include the whole approach, including the hands together procedure, prehearing, or pre-analysis.[1]

Related Research

Ross conducted a study to determine the extent of transfer of guided analytical training in increasing the efficiency of memorizing a one-dimensional musical line. After memorizing a pretest, twenty college wind instrumentalists were divided into two matched groups. The experimental group memorized twenty training examples to test the possibility that training in guided analysis would improve memorization. Guided analysis consisted of an explanation of constructive principles, tonal centers, important patterns and devices, intervals serving as a foundation on which to base the memorization of a melodic line or segment, the use of sequences and forms of imitation. The subjects in both groups were administered the posttest. Posttest results indicated a significant decrease in learning trials from pretest to posttest for the experimental group. Ross concluded that guided analytical training significantly reduced time required for memorization of a one-dimensional musical line.[2]

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[1]Sterling Cameron Adams, "An Exploratory Study of the Application of Two Learning Theories to the Teaching of Piano" (unpublished doctoral dissertation, Indiana University, 1962).

[2]Edgar Cecil Ross, Jr., "An Experimental Study of the Effect of Analytical Guidance in Music Memorization" (unpublished doctoral dissertation, State University of Iowa, 1961).

In a similar study, Williamson investigated the effect of instruction upon speed, transfer and retention of learning in the memorization of songs. Eighty-six male subjects participated in the investigation. Subjects in the experimental group were instructed in memorization using the whole approach, analysis, giving attention to intermediate goals, and self-testing by unaccompanied recitation. Subjects in the control group were not instructed. Subjects in the experimental group exceeded the control group in speed of memorizing, transfer of training to new material after three weeks, and retention by relearning three weeks later.[1]

The findings of Ross and Williamson indicate the efficiency of analysis in areas of music other than piano.

O'Brien[2] investigated economy of time in memorizing music by the whole and part methods. Subjects memorized one selection by studying the music from beginning to end. A second selection was memorized concentrating upon one portion of music at a time. Recognizing that an investigation must take cognizance of the visual, auditory and tactile memories involved in memorizing piano music, O'Brien conducted six experiments. Experiments one and two involved employment of auditory, visual and tactile phases of memory in pianistic memorization. Experiment three employed visual memory alone in an effort to eliminate the

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[1]Samuel Charles Williamson, "The Effect of Special Instruction on Speed, Transfer and Retention in Memorizing Songs" (unpublished doctoral dissertation, University of Kansas, 1964).

[2]Cyril C. O'Brien, "Part and Whole Methods in the Memorization of Music," Journal of Educational Psychology, XXXIV (December, 1943), pp. 552-560.

factor of sound. Subjects visualized, that is read, the notes of piano music. The letter name was associated with each note, but not the pitch, until the selections could be written on manuscript paper. Experiment four was auditory memorizing. The notes were played on a piano and, given the key, the subjects wrote the notes on manuscript paper. In experiment five, subjects memorized the melody and words of songs. In experiment six, the kinesthetic and visual memories were predominant. Subjects memorized their selections by playing a pipe organ with its sound eliminated. O'Brien reported time saved ranging from twenty-five to sixty-five percent where aural, visual and tactile memories were employed. When using visual memory alone, that is, soundless memorizing, the part method was superior. The results of the aural memory experiment favored neither part nor whole method. The figures obtained from the results of learning melody and words were partly positive and partly negative. There was a saving of time ranging from thirty-five to sixty percent in the experiment where the kinesthetic memory was predominant. O'Brien concluded that his data support the part method of memorizing music.

Associations

Most experienced teachers and professional writers advise that memorization of piano music is based and dependent upon the activation and coordination of the sensory faculties to provide varied associations, or types of memory. These associations are identified as aural, visual, tactile, kinesthetic and intellectual or analytical. To a great extent the associations are interdependent. The extent to which each is developed varies with the individual. Accurate and

retentive memorization implies the possession, development and maximum utilization of each association.

Tactile Memory. Tactile memory refers to the sense of touch, the sense of contact, or the feel of the keys under the fingers.

Seroff finds tactile memory indispensable to a nervous or distracted performer. "The fingers alone will usually 'take him out of the woods,'" claims Seroff.[1]

Most writers, however, generally regard the tactile sense as the least dependable of all. If tactile memory alone is relied on and there is a finger slip, a phrase may be started on an incorrect note and it will be necessary to return to some convenient starting place. Moreover, complete loss of memory may result if there is a missed cue.[2] In memory lapses of this nature, the performer of necessity may have to rely on other associations, aural or intellectual, for example, in completing the piece.

Because tactile memory implies muscular coordination developed through practice repetitions for an automatic, or subconscious, response, a convenient fingering should be selected and remain unchanged. If, however, it becomes necessary to alter fingering at some later time, a deviation from the set pattern occurs and the change of fingering must be consciously controlled to avoid confusion.[3]

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[1]Victor Seroff, Common Sense in Piano Study (New York: Funk and Wagnalls, 1970), p. 46.

[2]Bryant, "Memorizing: A Science," p. 21.

[3]Cora B. Ahrens and G. D. Atkinson, For All Piano Teachers (Oakville, Ontario: Frederick Harris Music Co., 1955), pp. 80-81.

The tactile memory is developed by repeatedly playing a composition until the fingers fall into place. The silent keyboard is also useful. The first missed note will cause the pianist to stop immediately because the feel of the note is wrong. Employing silent practice is more suitable for advanced players because aural associations are excluded.[1]

Kinesthetic Memory. Kinesthetic memory refers to the act of location to position as in making rapid movements from one part of the keyboard to another. It is the sense of position, direction of movement or direction of effort.[2]

Mackinnon describes memory for movement as "muscular (or motor) memory." Rather than becoming mechanical, movements must become automatic, in the sense of subconscious. Furthermore, "only by learning to perform without looking can one fully realize how infallible can be this memory for movement, which includes a sense of direction."[3]

Bonpensiere reports this personal observation concerning movements from one part of the keyboard to another without aid of visual reference:

> When I want to hit the mark without looking at it, I need not close my eyes. I can look elsewhere, provided I keep its mental image. So, I may be looking at something with my physical eye, while I see another object in my memory. This fact, . . . , tends to show in this case that it is not the vision of the

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[1]Seroff, p. 47.

[2]Ahrens and Atkinson, p. 81.

[3]Lilias Mackinnon, Music by Heart (Baltimore: Monumental Publishing Co., 1954), p. 10.

> vision of the object that determines the motion, but the mental fixing of a point in space where the end-results of the motion must take place.[1]

In other words, the kinesthetic sense enables a pianist to move from point to point on the keyboard in any direction and land safely on the mark. This is similar to the way organists manage to locate the pedals without looking.

Visual Memory. Visual memory implies the formation of a mental image of the way the music looks on the printed page, as in photographic memory, or the way the notes look on the keyboard. According to Deutsch, memory for notation appears to be the combination of memory for the sound with the ability to reconstruct the notation from a recollection of the music.[2] If the pianist thinks of the notes while playing from memory, it is in connection with the sound.

Visual memory is useful but not indispensable since, for instance, blind pianists memorize music without visualizing it. Even a pianist with well developed visual memory cannot retain a photographic image of a complex music score long enough to rely on it. Visual memory may be the least secure of all since photographic memory can be upset by a change to a differently framed edition.

Nevertheless, Leimer reports that his celebrated student Walter Gieseking impressed a large repertoire upon his memory not by

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[1]Luigi Bonpensiere, New Pathways to Piano Technique (New York: Philosophical Library, 1953), p. 32.

[2]Leonhard Deutsch, Piano: Guided Sight-Reading (Chicago: Nelson-Hall, 1959), p. 55.

playing the compositions on the piano but by visualizing them through silent reading.[1] This implies, however, that Gieseking probably had cultivated an ability to hear with the inner ear, to "feel" the music as it would be played, and to employ the analytical sense while reading the score.

Development of visual memory might be assisted by memorizing one or two measures or a phrase at a time away from the piano, then proceeding to the piano to play what the visual memory has retained. This procedure would be more advantageous to those who have the ability to form aural images of the sound during memorization away from the piano. At the same time, those who must carefully analyze the music to acquire the visual images are likely to retain them longer. Other aids suggested for the development of visual memory include note reading and writing.

Since visual memory is difficult to acquire and there seems to be little that can be done to further its development, Newman advises, "Any time spent trying to recall the look of the staff or the keyboard is probably much better spent on other, more positive, approaches to memorizing."[2]

Aural Memory. Aural memory is the ability to hear the approaching sounds, that is, to hear what comes next in the music. It involves

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[1]Karl Leimer and Walter Gieseking, The Shortest Way to Pianistic Perfection (Bryn Mawr, Pennsylvania: Theodore Presser Co., 1932), p. 11.

[2]Newman, The Pianist's Problems, p. 113.

mental hearing of all the materials of the music. It is also the ability to hear sound mentally when looking at the score.

Deutsch emphasizes that the chains of finger movements on the keyboard are not retained as movements in the pianist's memory, and that pianists with good visual memory do not retain complex notation vividly enough to rely on it. The pianist who plays from memory is recalling sound. If he does think of notation, it is usually associated with an aural image. The fingers follow recollection of the sound rather than recollection of the notation.[1]

According to Newman, pianists produce cold, mechanical performances because they do not listen to what they play, or fail to hear tonal patterns which appear in the music. Newman is of the opinion that:

> by translating to the piano a mental concept that comes via the ear, rather than a printed page that comes via the eye, the student takes active steps to heighten his harmonic, melodic and rhythmic acuity.[2]

Newman observes that pianists are capable of aural anticipation in that the immediate sonority at any given point in a performance provides the aural cue for that which is to follow. He claims the main problem is that "many of them cannot translate this into fingers and keys when they hit a snag."[3] A goal for the pianist is to develop the ability to play by ear. Newman continues thus:

> The performer who plays by ear can usually get near enough to the actual notes he hears to improvise his way out of his

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[1]Deutsch, pp. 54-55.

[2]Newman, p. 7.

[3]Newman, p. 112.

> troubles, or at least to improvise to a respectable cadence from which he can either go on or go back.[1]

The development of aural memory is assisted by a knowledge of music theory, including analysis, harmony, playing by ear, sight reading, solfeggio and transposition. It may be of additional assistance to sing and listen to a composition before it is played or as it is played.

Intellectual Memory. Intellectual memory is based on concentrated analysis of content, and analysis is generally considered the solid foundation upon which memory retention is built. Because intellectual, or analytical, memory involves the player's knowledge of form, structure and progression, a thorough and practical knowledge of music theory is of vital importance for its development and successful utilization.

In this regard, Newman comments thus:

> Anything that brings the music to the performer's consciousness contributes to intellectual memory, whether it concerns form, tonality, counting, technique, melodic line, or programmatic suggestion.[2]

A comprehensive mental grasp of a piece is essential to satisfactory performance. This implies digital familiarity and musical knowledge. According to Rubinstein,

> Musical knowledge in this sense does not pertain to emotional values, but to an intellectual understanding of the construction of a piece not only in its general outline but in every detail of repetition of sequence, of harmonic progression, of key, of

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[1]Newman, p. 113.

[2]Newman, p. 113.

> chord structure, of transposition, of figuration design, of intervals . . . .[1]

Although the pianist is unlikely to remember every chord structure or progression under the stress of performance, the detailed analysis plus intelligent repetition by sections can assist memory retention.

Kohler is convinced that for most students the analytical is the superior memorization system in terms of speed and reliability. His basic approach to memorization is through harmonic analysis by chord type. Kohler notes, however, that contrapuntal music does not lend itself well to this approach, and that the kinesthetic and aural memories are of more assistance. Also, Kohler finds contemporary music more difficult by the analytical approach than by the visual approach. In many instances, traditional chords appear with added dissonant notes. In such cases the chords are remembered along with the added notes.[2]

Bryant is of the opinion that the development of intellectual memory can be greatly assisted by reducing the music to blocks of notes that reveal hand positions and musical ideas.[3] The intellectual requirement in the analysis of the score resulting in the reduction of observed musical phenomena to block patterns is self-evident.

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[1]Beryl Rubinstein, Outline of Piano Pedagogy (New York: Carl Fischer, 1947), p. 66.

[2]Jean Charles Kohler, "Some Ideas on Memory," Clavier, V (May-June, 1966), p. 46.

[3]Bryant, "Memorizing: A Science," p. 23.

The utilization of block outlines is also approved by Nagy who appraises them as "useful contributing factors" in the mental engraving process.[1]

Two other aspects of memory in piano study, beyond the scope of this investigation, involve (1) memorization of interpretive elements, and (2) Diller's observation that, in playing from memory, "We are also remembering the composition as an emotional experience."[2]

Fortunately, there is little disagreement in professional literature on the importance of the role of associations in the memorization of piano music. There are differences of opinion, however, as to which should be stressed. Although some references have placed emphasis on one or more of the various memory types, there is an apparent consensus that memorization can be facilitated through the efficient utilization of each.

Summary

The current chapter presents a review of literature and research related to the problem and provides important sources of data for the formulation of the blocking procedure under investigation. A very small amount of literature on blocking and similar procedures is available. In addition, there appears to be no evidence of previous research employing a blocking procedure.

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[1]Bela Boszormenyi Nagy, "Must it be Memorized?" Clavier, IV (January-February, 1965), p. 22.

[2]Angela Diller, The Splendor of Music, p. 96.

Briefly summarized, the review of literature discloses that (1) there is a growing concern for problems inherent in the memorization of piano music, (2) memorization procedures that involve blocking piano music into clusters and chords or reducing the music to the basic harmonic structure have been employed in studio teaching, (3) the relative efficiency of prestudy has been revealed through research studies, and (4) memorization of piano music is based and dependent upon the activation and coordination of sensory faculties to provide associations which tend to set up ideas and insure recall.

Several of the procedures reviewed in the present chapter involve the utilization of analytical prestudy and note grouping or harmonic reduction techniques to achieve memorization. Blocking, considered as a type of technical analysis of music, involves the utilization of similar techniques. According to several of the authors cited, blocking appears to have potential as a resource for facilitating the memorization of piano literature.

CHAPTER III

BLOCKING

The present study represents an investigation of the potential of blocking as a facilitating procedure for the memorization of piano music. In the current chapter, blocking is defined and described with appropriate illustrative examples.

Background

The history of blocking is obscure; the professional writers who practice and teach blocking give no indication of its origins. It is common knowledge among pianists, however, that blocking was practiced during the Nineteenth Century and may well have derived from an impatient desire to master technical difficulties encountered in learning a new musical composition.

Definition

A vast majority of the literature for the piano consists of passages based on a wide variety of scale patterns and chord designs; that is, solid chords, broken chords, and arpeggios. In most instances, the passages can be analyzed into blocks, or groups, of successive notes that the pianist can play before having to move the fingers or hands to new notes or new locations over the keys. Blocking is, in

part, the combining of the notes on the printed page into clusters and chords that make up the various positions the hands must take to play the notes. Additionally, the occurrence and nature of the variety of passages in piano music requires a broadening of the concept of blocking to include a determination of the composer's use of patterns or devices that might assist the pianist in memorization. Hence, blocking is primarily (1) identifying scale patterns as clusters, (2) identifying intervals, arpeggios, and chord fragments as solid chords, and (3) identifying patterns of compositional devices employed by the composer.

As noted in Chapter II, blocking involves the interaction of the several sensory associations reviewed. For example, blocking requires detailed analytical prestudy, the translation of observed musical phenomena to block patterns for visual and tactile reference, and subsequent musical realization derived through aural associations. As a process, an individual familiar with the blocking procedure might apply these principles mentally. For the novice, it may be necessary to prepare an appropriate outline of observed musical phenomena from which organizational patterns may be practiced and memorized. Another possibility would involve the use of appropriate markings on the original score, the procedure employed in the present study. The remainder of the present chapter is devoted to a discussion of the specifics of the blocking procedure as applicable to the several utilization modes mentioned.

Memorization

Memorization of music begins with the first playing or hearing. Therefore, a memorization procedure should be employed at the first lesson and first practice of each new composition. In the present study, students employing blocking as an aid to memorization were instructed according to the procedure that follows:

1. Analyze the piano score for key, meter and mode, phrasing and important cadence points, rhythmic and tonal patterns, repetition, sequence, imitation and other compositional devices, and for form and structure. An important part of the initial prestudy is to understand the music before playing it since memorization begins with the first playing or hearing of the music.

2. Block the music into hand positions based on a convenient, practical fingering. The pianist must know the various hand positions the hands will take to play the notes. In addition, the pianist must observe and consider groups of notes rather than individual notes.

3. Play the notes as written to acquire an aural reference. The aural reference, along with adequate practice repetitions, establishes tactile memory, while the intellectual, visual, and kinesthetic senses complete the process of memorization.

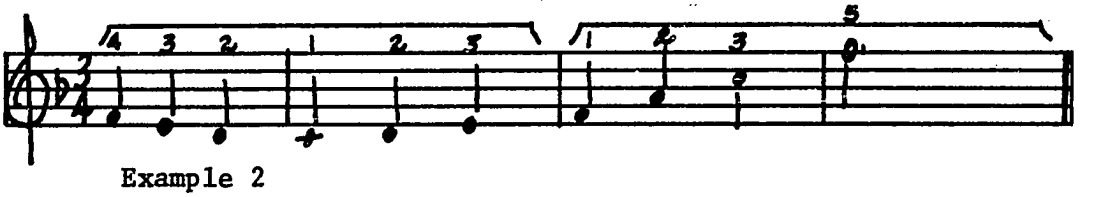
Analysis assists in developing intellectual memory and in implementing the blocking process. Playing from the printed page is assisted by aural and visual memory, along with tactile memory and kinesthetic memory which have been developed through consistent practice repetitions. Instruction and interaction concerning the five learning associations are employed throughout the memorization procedure.

Obtaining the Block

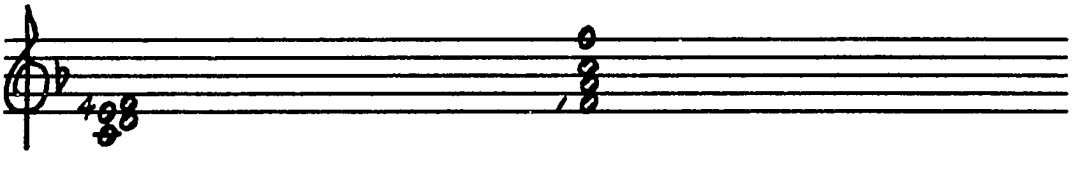
The majority of passages in piano music consists of scale and mode patterns or simple chord designs. To obtain a block, the pianist begins with the first note and, with due consideration for the principles of fingering and size of hand, determines all of the successive notes that can be played without moving the fingers to new notes or moving the hand to a new location over the keys. The next succession of notes that can be played without moving the fingers to new notes or moving the hand to a new location over the keys forms another block, and so on. It should be pointed out that the thumb is usually the key finger that will determine each new block pattern. For further clarification, the method of obtaining blocks is described as follows:

Employing the intellectual sense and a practical and convenient fingering, the pianist determines the succession of notes that can be played without moving the fingers to new notes or moving the hand to new locations over the keys. The notes that are components of individual blocks are enclosed by brackets on the musical score, as illustrated in Example 1. The pianist perceives the notes as two blocks, a cluster and a chord which represent two hand positions, as shown in Example 2.

Example 1



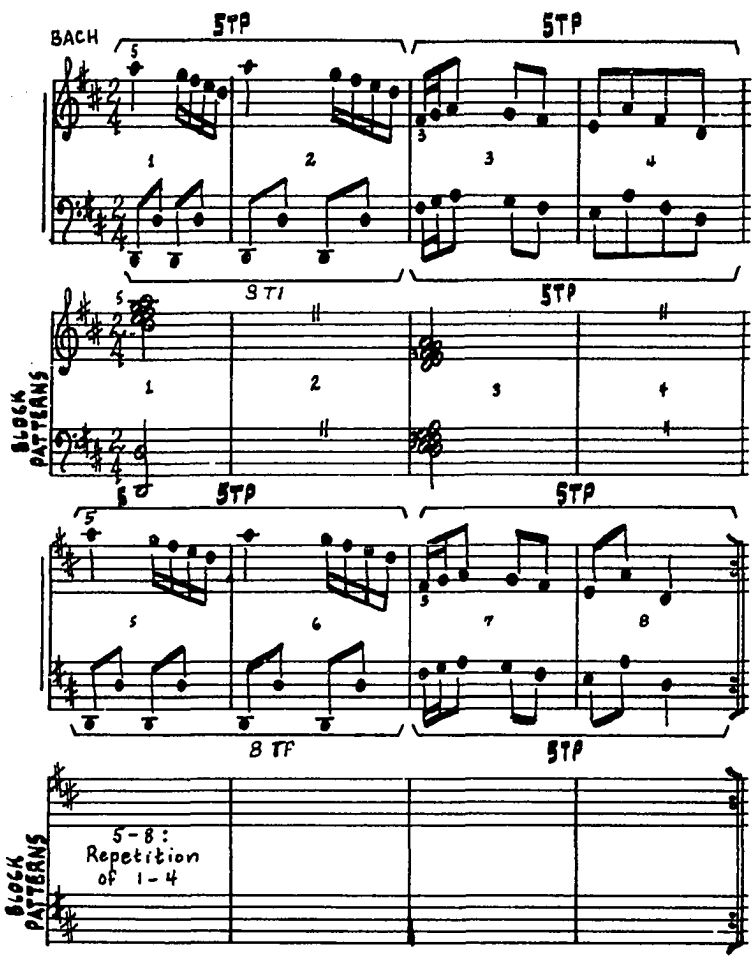
Example 2



Examples with Block Outlines

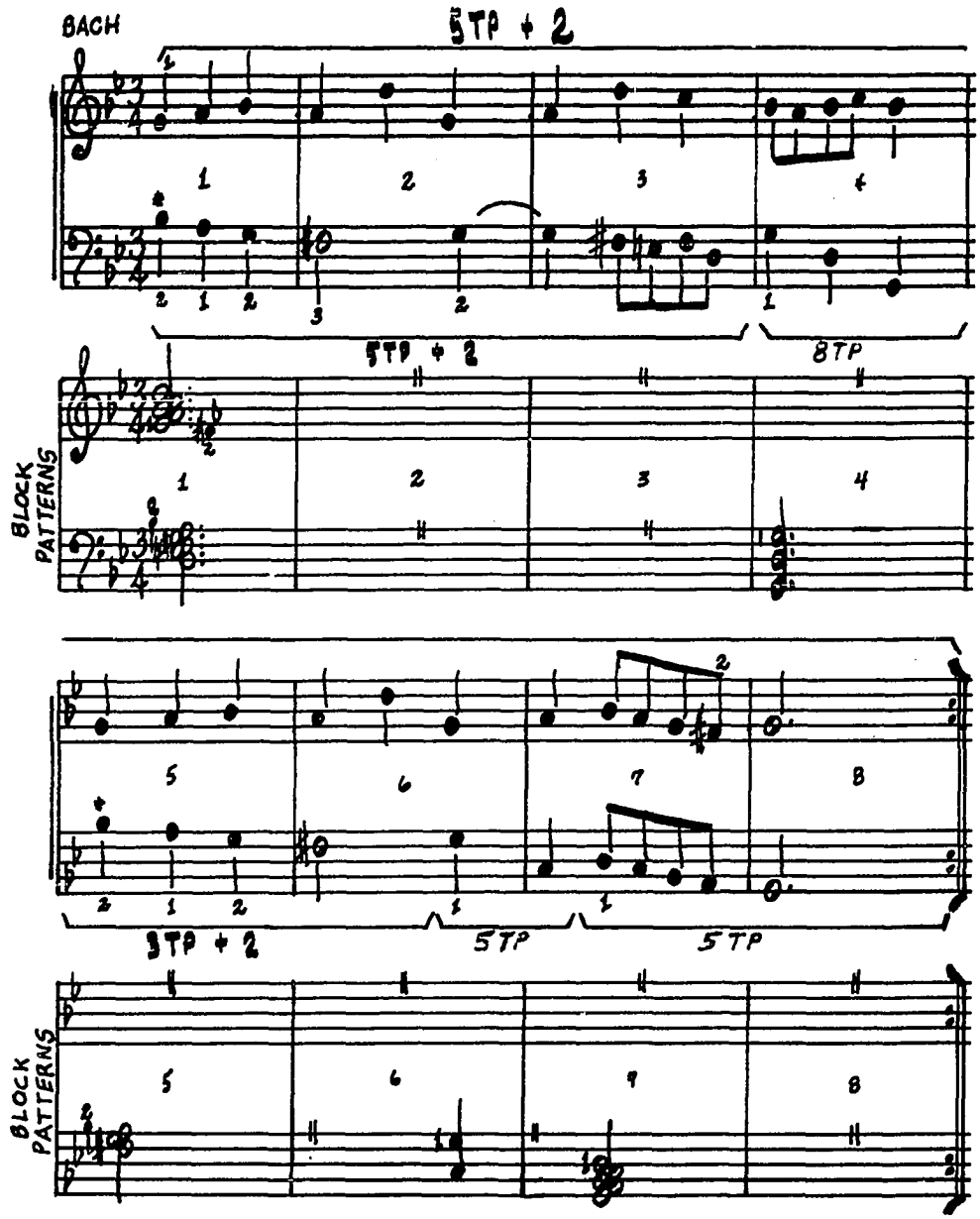
Example 3 blocks into two positions for each hand. Five-tone patterns, abbreviated 5TP, have the outer interval of a fifth, as indicated by the numeral 5. Eight-tone patterns have the outer inverval of an octave. Thus, numerals followed by the abbreviation TP refer to the outer interval of the notes in the blocks. The symbol ‖ indicates a continuation of the preceding block. A block outline, or skeleton outline, of the block patterns is shown below the music. The finger that plays the first note of a block is indicated on the block outline.

Example 3



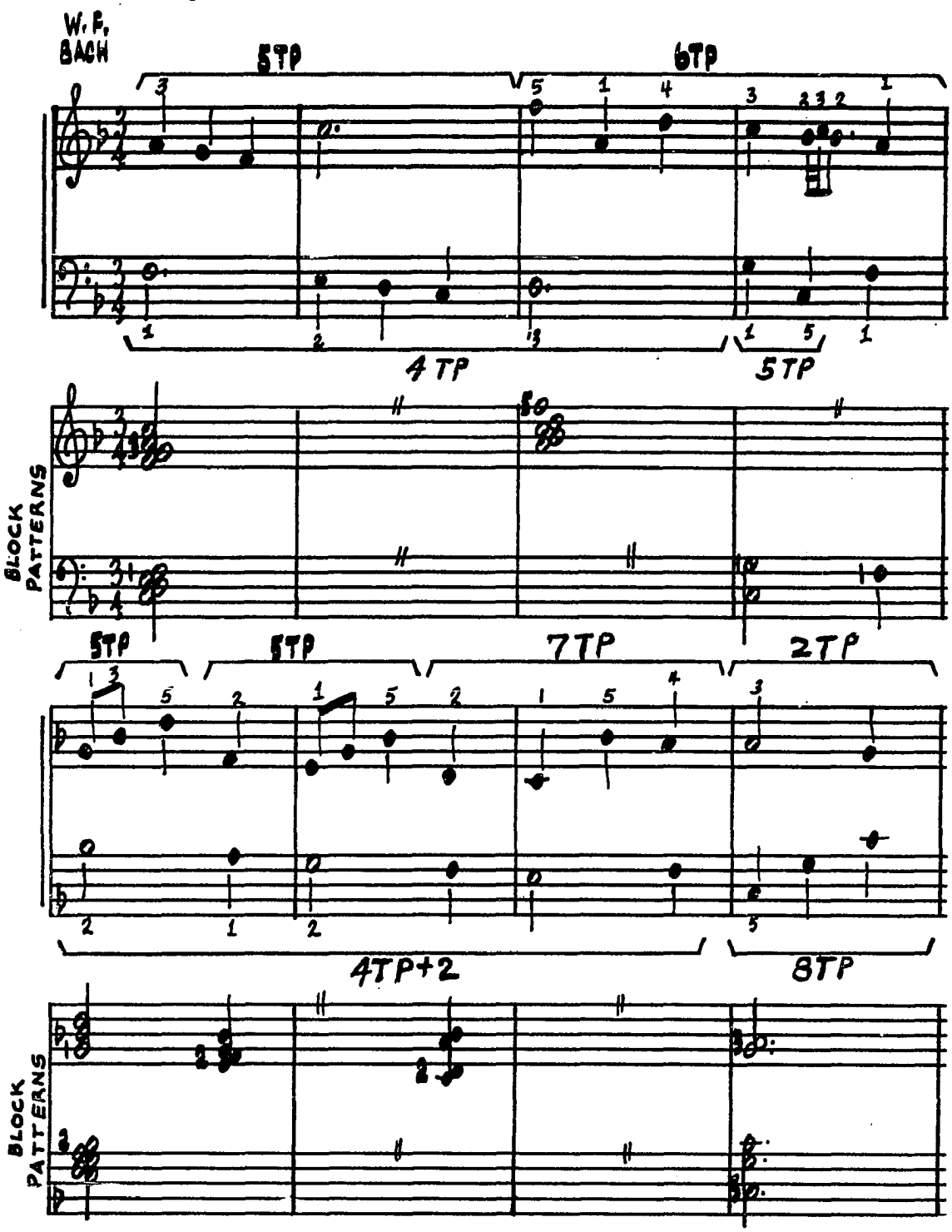
One finger often has to cross over the thumb to the next scale degree above or below. These scale degrees are conveniently considered as an extension of the hand position. The designations 5TP+2 and 3TP+2 in Example 4 indicate that the basic tone patterns are extended one scale degree to include a note which will be played by the second finger.

Example 4



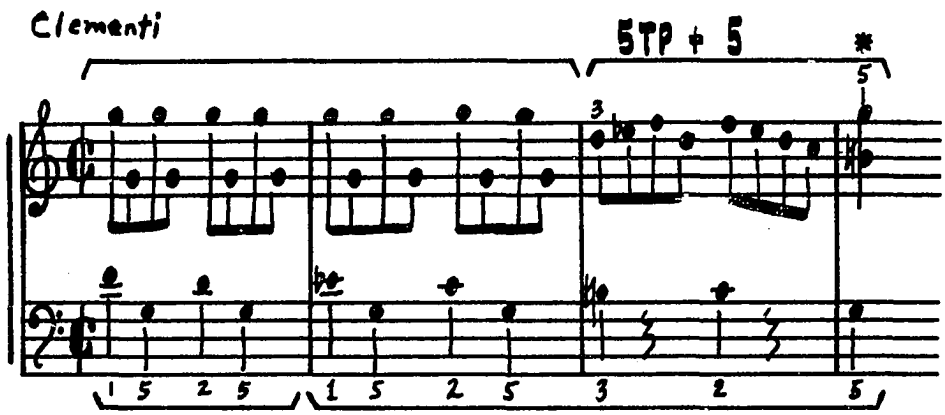
In Example 5 there are several blocks for each hand. The block designated as 4TP+2 indicates a four-tone pattern in which the second finger crosses the thumb to play an additional note.

Example 5



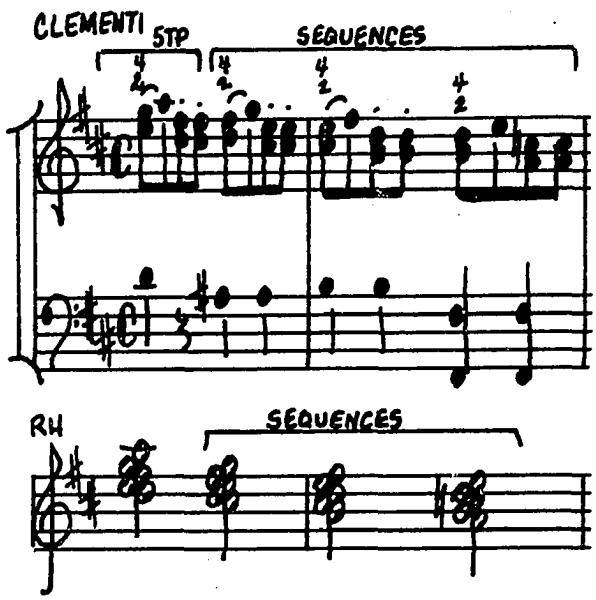
Either of the outer fingers, 1 or 5, may need to extend one scale degree. The note played by either of these fingers is included in the block. The designation 5TP+5 indicates a five-tone pattern plus the addition of the fifth finger, as shown in Example 6.

Example 6

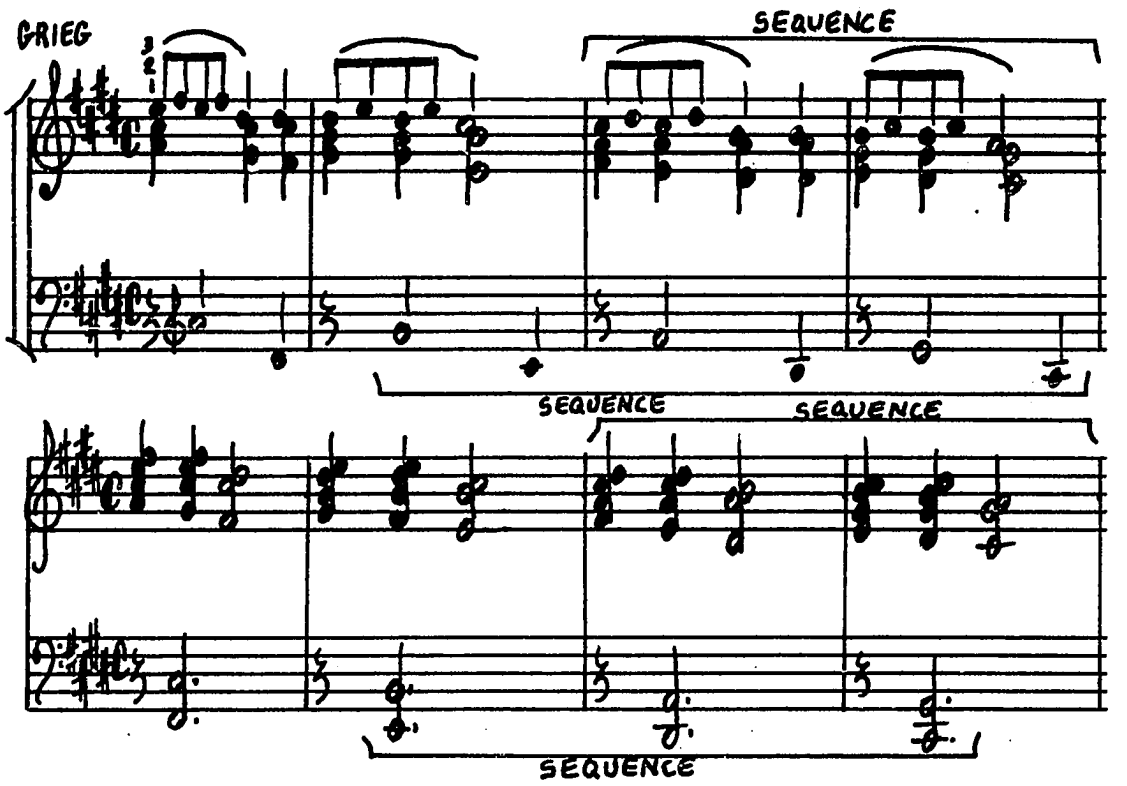


As shown in Example 7 and 8, sequences are clearly revealed on block outlines.

Example 7



Example 8



Blocking Difficult Passages

As the pianist becomes adept at blocking and more proficient in memorization, it is unnecessary to block passages which already can be played without the score. Blocking would continue to be employed, however, for those passages which tend to be elusive after one or two repetitions.

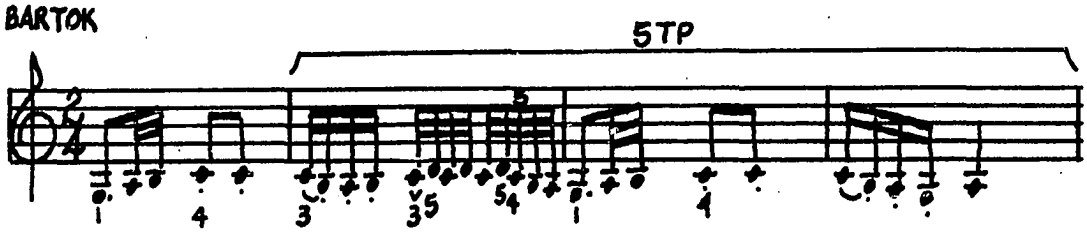
Although the basic principle of blocking is to have as many keys lie under the fingers as possible, it is occasionally necessary to use small finger blocks in consideration of the technical facility or degree of finger strength in young and inexperienced fingers. In addition, contraction is favored over expansion of the hand. The

utilization of the five-finger position sometimes places undue stress on the weaker fingers.

The entire passage shown as Example 9 lies within five-finger position on G-A-B-C-D. As a five-finger pattern, the thirty-second notes on C and D would be played by the weak combination of fourth and fifth fingers. A solution which will retain the passage in one hand position is to use the third and fifth fingers. This is a stronger fingering, particularly for less advanced pianists. The block remains the same with no change in hand position.

The passage in Example 9 also demonstrates the need to select a practical fingering that is suitable for the tempo as well as the hand.

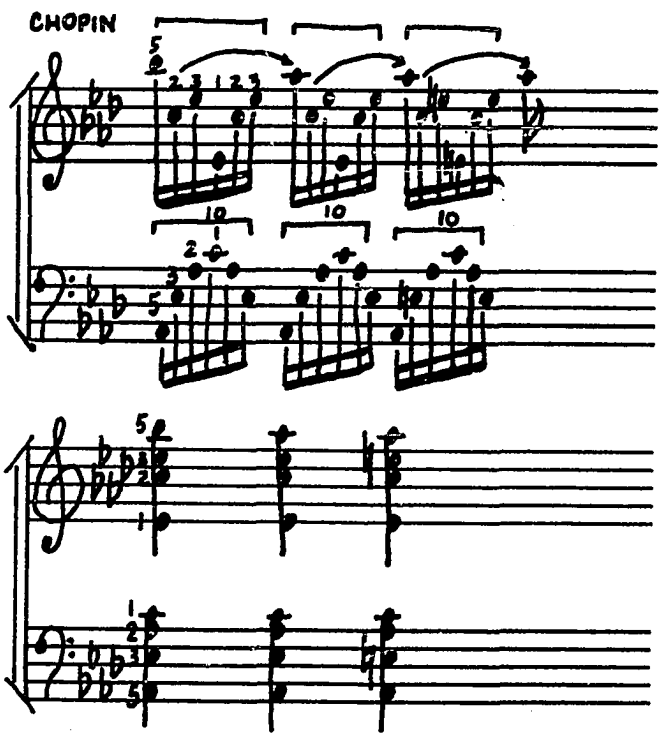
Example 9



The nature of a passage, including inflection and tempo, can make it impossible to group patterns of notes that are within the normal span of the hand. The apparent complexity of such passages makes them appear to require more hand positions than actually possible for smooth playing and tone control. In Example 10, the principal notes of the melody occur on the accent of the beats. The remaining notes of each beat are an underlying accompaniment that serves as a pickup to the melody note that follows. While it is

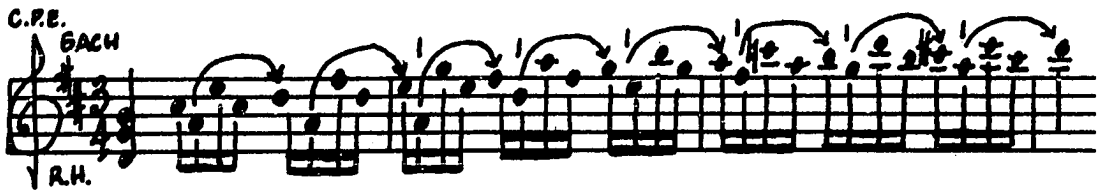
possible to have two blocks of three notes per beat, this would seem to draw the attention to two separate movements on each beat. A more appropriate blocking, from the technical point of view and for memorization purposes, is the single block per beat which is executed on the keyboard by rotation of the wrist.

Example 10



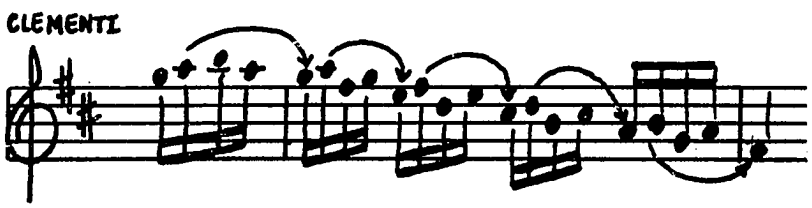
The detailed articulation required for many passages of music from the early periods, such as the Baroque, often makes it necessary to block passages into groups of only a few notes. Blocking and memorization of such passages may be facilitated by determining the inflection of proper tones (pickup notes), through little crescendos, to principal notes (landmarks). The main stress falls on tones of the ascending D major scale in Example 11.

Example 11



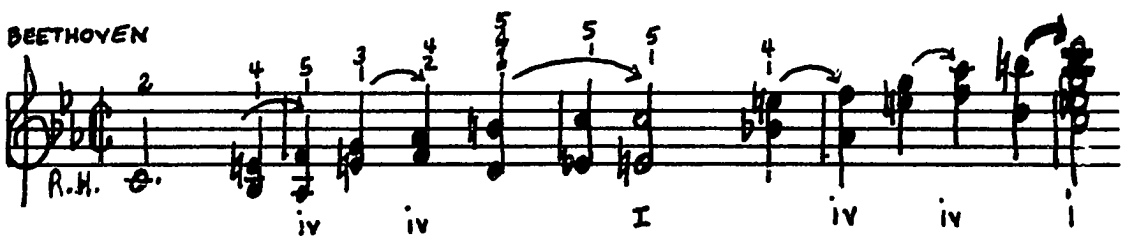
Landmarks are in thirds in Example 12.

Example 12



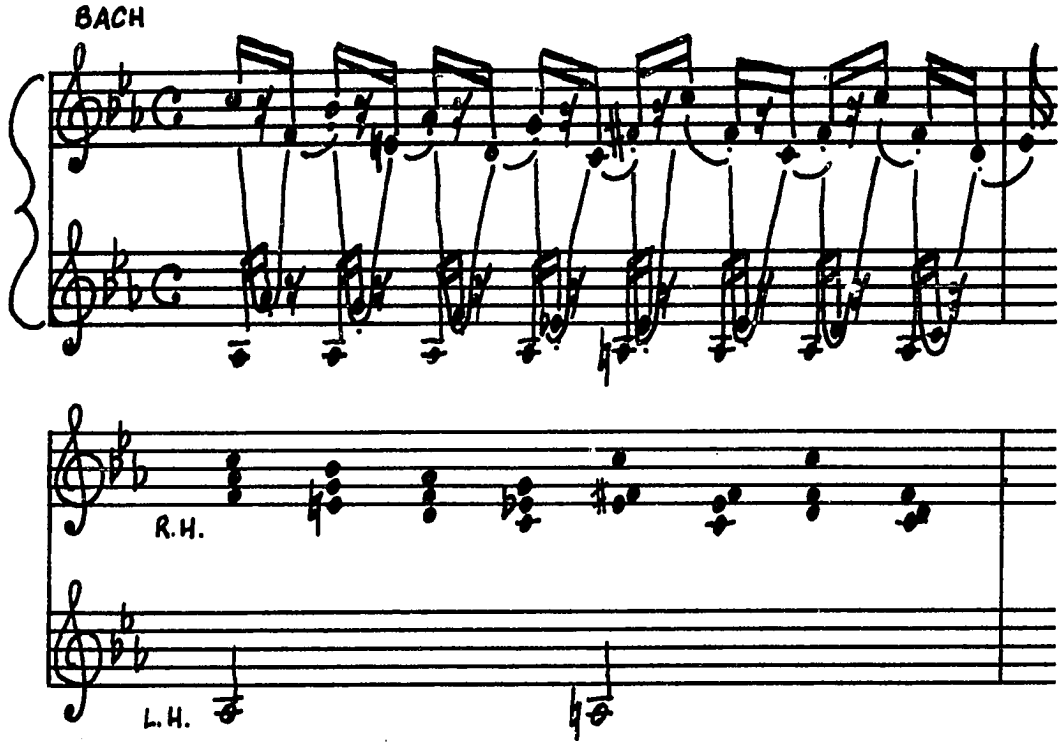
In Example 13, the main stress falls on the subdominant and tonic chords.

Example 13



Occasionally, it is possible to redivide the notes of a passage between the hands. Redividing the notes and blocking them as they will actually be played assists in eliminating a possible problem in rhythmic coordination, and simplifies the passage for memorization, as in Example 14.

Example 14

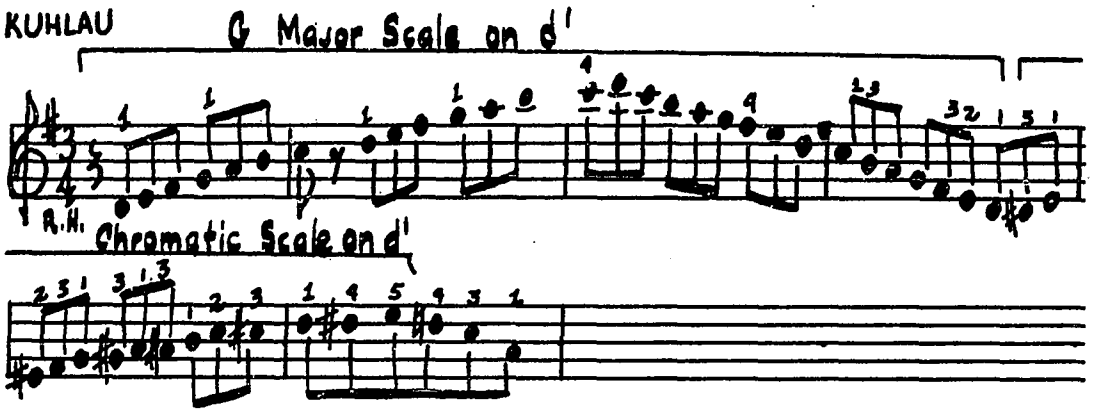


Extended Scales and Arpeggios

The pianist is often confronted with extended scale and arpeggio passages. It is essential to know (1) the structure of the scale or arpeggio to be played, (2) the fingering, (3) the beginning and ending notes, and (4) the rhythm. When blocking extended scale passages, it is unnecessary for the pianist to spend time blocking those passages into several small blocks of clusters. Rather, it may only be necessary to consider the entire passage as a single block. For instance, when the pianist discovers that the excerpt illustrated in Example 15 is a G major scale line followed by a chromatic scale, only the rhythm has to be checked. There is no necessity for

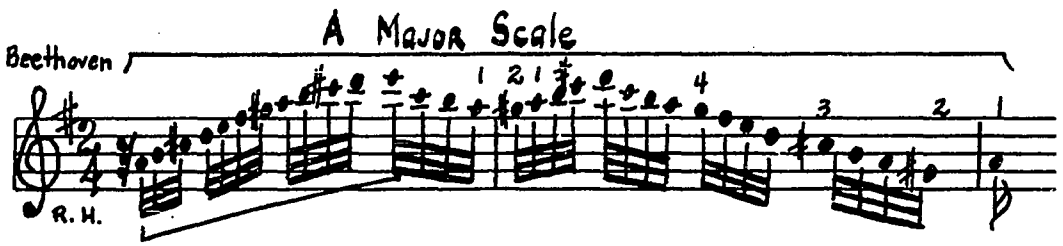
excessive note-by-note practice since the pianist already knows he is required to play only the notes of the G major scale. Blocking makes this clear in the example provided.

Example 15



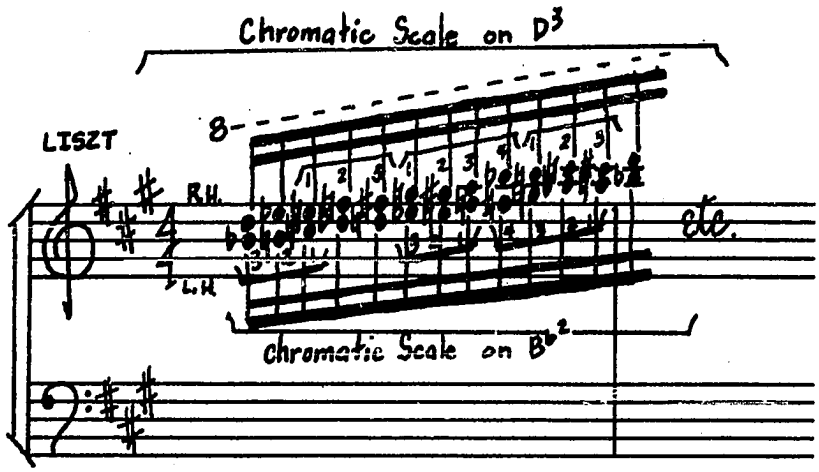
In Example 16, an A major scale passage is brought about through the utilization of C-sharp and G-sharp.

Example 16



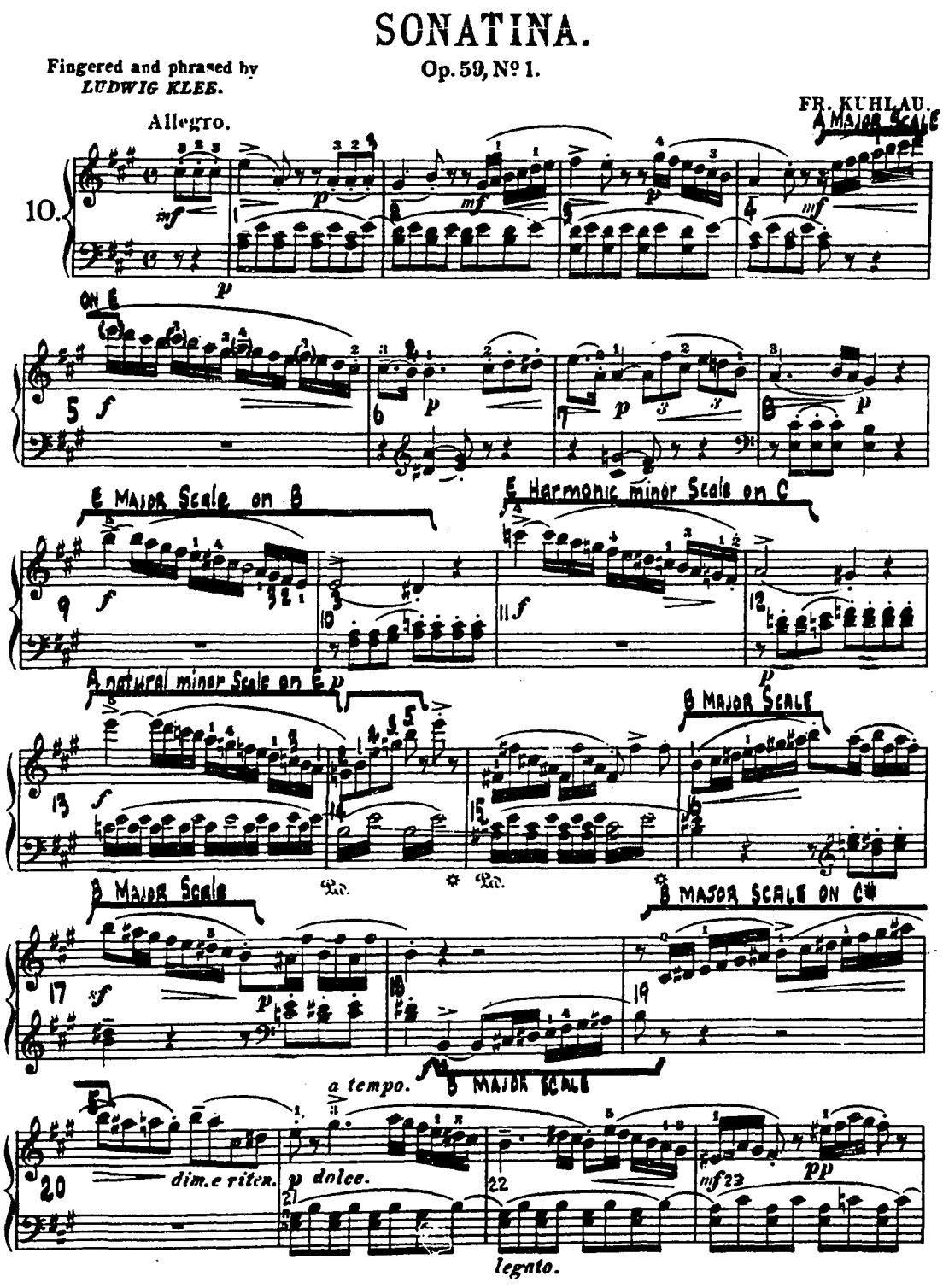
As in playing other extended scales, it may be necessary only to determine the first and last notes of a chromatic scale passage. If, however, both hands must play chromatic scales in parallel thirds, the closeness of hand positions may require a more detailed blocking, as in Example 17.

Example 17



Several scales are obvious in the excerpt shown in Example 18.

Example 18



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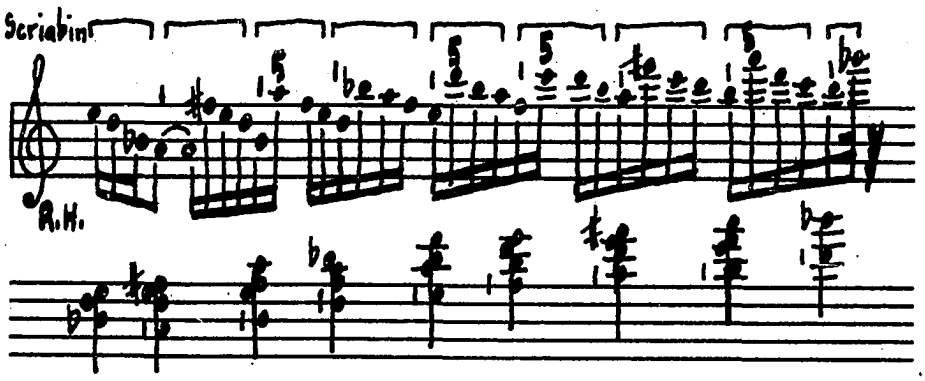
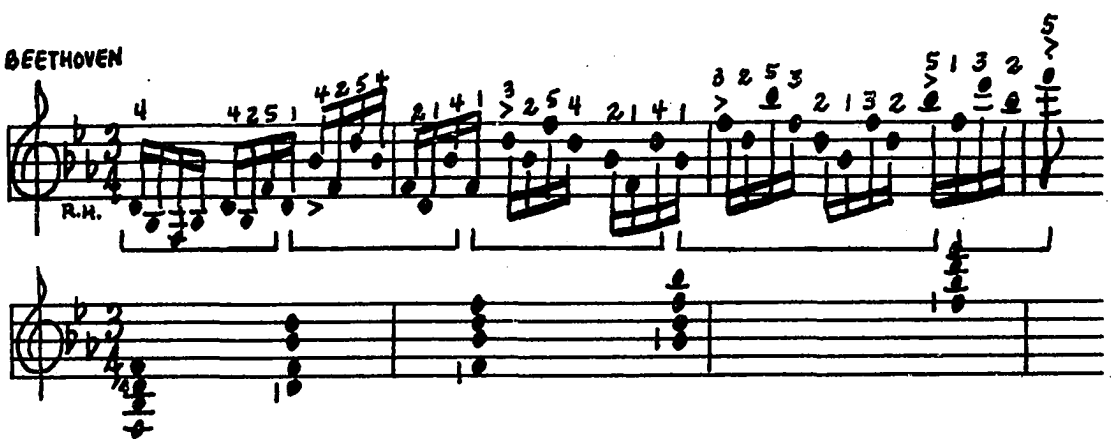
Blocking the passage in Example 19 is facilitated in that only the first and fifth fingers can play the large intervals of a seventh. For memorization, the first finger is the guiding finger, ascending by major seconds and minor thirds. The entire passage is constructed on A, Bb, D, E, and F#.

Example 19



The extended broken chord passage in Example 20 blocks easily into solid chords for memorization.

Example 20

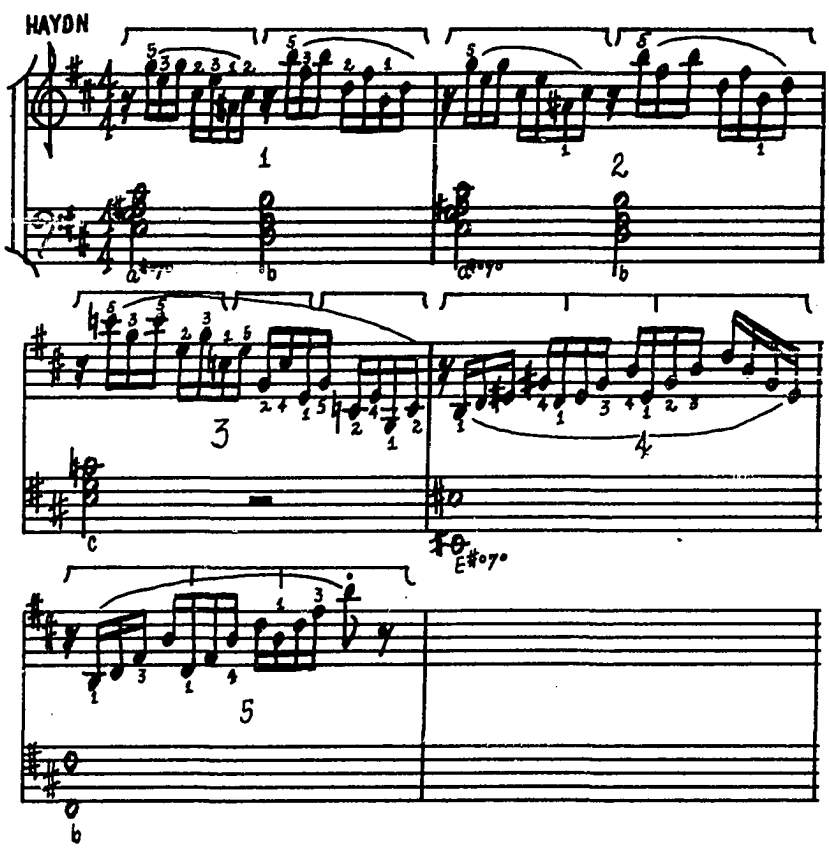


Harmonic Blocking

Knowledge of harmonic progressions is desirable and should be a part of the general study of new piano compositions. It is unlikely, nevertheless, that the pianist would have either the time or the need to think of all the chords and progressions during practice. Additionally, this detailed information can be elusive under the stress of memorized performance. Such knowledge must be an aural concept primarily for interpretation.

The blocks in Example 21 are merely broken chords of the underlying harmony.

Example 21

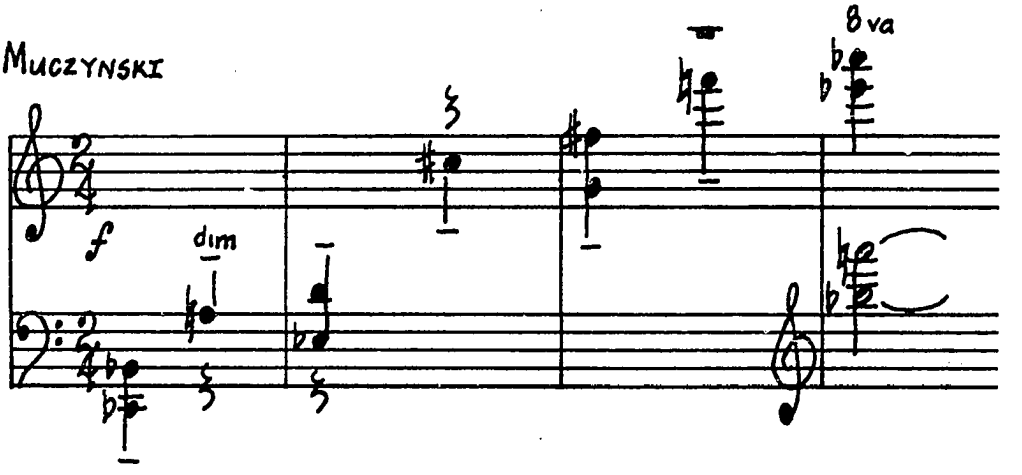


Pattern of Abstract Blocking

A more abstract type of blocking is particularly applicable to certain devices employed by composers. A careful scrutiny of the musical score might reveal the composer's utilization of patterns of black and white keys, or directional patterns such as up-down progressions, patterns of interval combinations such as perfect fifth plus diminished fifth, or chord patterns such as a diminished seventh or a broken diminished seventh chord.

Example 22 illustrates the composer's use of the interval of a major seventh in the left hand followed by the minor seventh in the right hand. The example might also be analyzed as a major seventh chord in the left hand followed in the right hand by a major seventh above the upper note of the left hand.

Example 22



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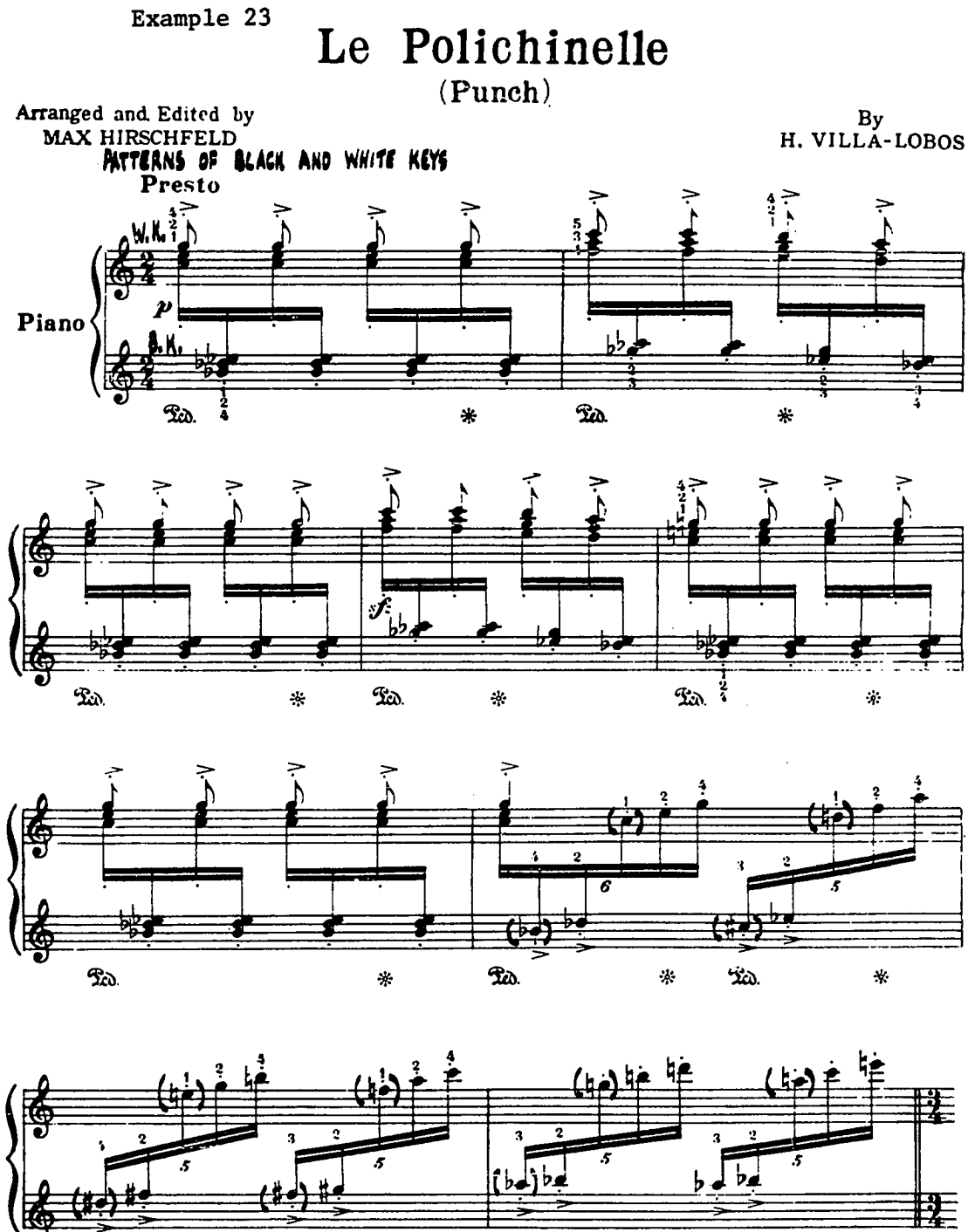
The excerpt in Example 23 blocks into patterns of black and white keys, usually black keys for the left hand and white key triads for the right hand.

Example 23



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CHAPTER IV

PROCEDURES

The study was concerned with determining the effect of a blocking procedure on the number of practice repetitions and the amount of practice time utilized for memorization of selected piano literature. The current chapter details procedures followed and describes treatments employed.

Experimental Procedures

The study was conducted at Texas Southern University, Houston, Texas, over a period of eighteen weeks in the spring of 1972. The participants in the study, n=22, were undergraduate music education majors enrolled in piano as the principal or secondary applied emphasis. The nature of the study necessitated that participants possess the requisite facility to perform the compositions to be utilized. In this regard, piano teacher colleagues of the investigator provided a list of names of students capable of performing the compositions selected without undue difficulty. From this list, twenty-two students volunteered to participate in the investigation. Students volunteering to participate in the study were then randomly assigned to either the experimental or control group. Form A of the

musical memory section of the Drake Musical Aptitude Tests[1] and the memory section of the Wing Standardised Tests of Musical Intelligence[2] were administered to all participants before the experiment was initiated. These measures served as a check on assignment procedures to determine equivalency on the factor of musical memory. As there was no significant difference between test scores of students assigned to the control and experimental groups, the groups were assumed equivalent on the factor of musical memory.

Students in each group were randomly assigned to play one of the compositions selected for the study. Three compositions illustrating a variety of blocking possibilities were selected for the experiment:

1. Diversions (Number 2), by Richard Rodney Bennett.
2. The Rain and the Rainbow, Opus 65, Number 8, by Sergey Prokofiev.
3. Prelude in E minor, by Domenico Zipoli.

The compositions were musically interesting and relatively free of technical difficulties. Composition one was twenty-five measures in length, generally modal in tonality, and based largely upon broken chords. Composition two was twenty-two measures in length, major in tonality, contained tonal patterns that required playing black and

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[1]Raleigh M. Drake, Drake Musical Aptitude Tests (Chicago: Science Research Associates, Inc., 1957).

[2]Herbert D. Wing, Standardised Tests of Musical Intelligence (Buckinghamshire, England: National Foundation for Educational Research, 1961).

white keys, and consisted of four-measure phrases. Composition three was thirty measures in length, minor in tonality, and set in a two-voiced linear style. Of the twenty-two students involved in the study, four students in each treatment group were assigned to play composition one, three students were assigned composition two, and four students were assigned composition three. Students assured the investigator that they had never heard or played the assigned selections.

The experimental sessions were privately conducted and every effort was made to maintain a relaxed atmosphere. Sessions were arranged at a time mutually convenient to both parties. Each student averaged one experimental session per week. In order to overcome the effects of fatigue, a one-hour time limit was set for each session.

At the first session for each student, the purpose of the experiment was explained, as were the procedures that would be followed. The composition was played in accordance with the procedure for the group, control or experimental, to which the student had been assigned. Rapid memorization with economy of repetition was emphasized. The number of practice repetitions and amount of playing time were recorded. Each attempt to play any part or all of a composition was considered as one repetition. A stopwatch was employed to insure an accurate record of playing time utilized. The composition was considered memorized when played through twice without reference to score and with perfect or near perfect performance. In that repetitions beyond the number required to complete the memorization task might be utilized for purposes of performance security, the

determination of task completion was jointly decided by the investigator and student pianist.

The effect of blocking on retention was of additional interest. Evaluation of retention accuracy occurred seventy-two hours after the composition was performed twice from memory. The composition was performed without benefit of score and recorded on tape with the student's knowledge. The taped performances were evaluated by a jury of three piano teachers. Participants in the study were not, and had not been, piano students of the jurors. Each juror was provided with a composite tape of the retention performance of all participants and asked to rate retention accuracy on a three-point scale: 3 = high, 2 = average, and 1 = low. Performances were randomly arranged on the tape. The performers were not identified by name or by treatment group. For reference, the list of jurors is provided in Appendix C.

The experimental design employed in this investigation approximates the posttest-only group experiment described by Campbell and Stanley.[1] The specific condition under investigation was blocking and its effect on the number of repetitions and the amount of time required for memorization. Blocking refers to the practice of identifying note groups that indicate hand positions, and identifying patterns of compositional devices employed by the composer. In the present study, blocks of notes indicating hand positions were

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[1]Donald T. Campbell and Julian C. Stanley, Experimental and Quasi-Experimental Designs for Research (Chicago: Rand McNally & Co., 1966), pp. 25-26.

enclosed in brackets and memorization cues were indicated on the music scores for the experimental group. The blocking procedure is described and illustrated with appropriate examples in Chapter III.

Description of Treatments

The investigation involved the memorization of three piano compositions according to procedures designed for the control and experimental groups. Regular, or unblocked, music scores were utilized by the control group. Scores for the experimental group were prepared, or blocked. For reference, facsimile copies of the three prepared scores utilized in the experimental treatment are presented in Appendix A. In order to control outside practice, the music was retained by the investigator after each session and students were instructed not to practice outside the studio.

The initial session for students in the experimental group was primarily one of becoming acquainted with the memorization task and orientation to the prepared, or blocked, score. Blocks and other markings on the score were explained. Guidance was provided in making an informal analysis of the score. Prestudy and blocking were described as methods to facilitate memorization of the music. In following sessions, the basic instructional procedure was to analyze, block and play. Prestudy of the score was allowed for five minutes. Following prestudy, block patterns, generally clusters and chords, were played a few measures or entire section at a time. Subsequently, the notes were played as written. This procedure continued until the entire composition was played twice from memory. The score was

withheld when the student was ready to play part or all of the composition from memory.

Instruction and interaction concerning the five learning associations were included in the experimental procedure. If a student in the experimental group had difficulty with a passage, the investigator urged utilization of learning associations to solve the problem. For example, when a passage was elusive, the student was instructed in utilization of aural associations to assist recall of note order. Thus, the student was able to perceive terminology, conceptualize it, and perform the action. These aspects of learning associations exemplify the type of instruction provided the experimental group.

Upon reporting for each session, students in the control group were given the unblocked, or regular, music score and asked to memorize the composition rapidly and with as few repetitions as possible. Further procedural instruction was not given, but all questions were answered. Thus, strategies employed to achieve memorization were devised by the students. Errors were pointed out by the investigator. This procedure was continued until the entire composition was played twice, relatively free of errors and without the score. The score was withheld when the student was ready to play part or all of the composition from memory.

CHAPTER V

PRESENTATION AND ANALYSIS OF DATA

This chapter presents the data obtained, their analyses, statistical treatments and findings.

Preliminary Analysis

Before the experiment was initiated, Form A of the musical memory section of the Drake Musical Aptitude Tests[1] and the memory section of the Wing Standardised Tests of Musical Intelligence[2] were administered to all participants. A correlation coefficient of .54 was found to be significant at the .01 level of confidence. Since it was not possible to have true random selection of participants in the study, the Drake Test and the Wing Test served as a check on assignment procedures to determine equivalency of the treatment groups on the variable of musical memory. As there was no significant difference between the test scores of students assigned to the control group and students assigned to the experimental group, the two groups were

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[1]Raleigh M. Drake, Drake Musical Aptitude Tests (Chicago: Science Research Associates, Inc., 1957).

[2]Herbert D. Wing, Standardised Tests of Musical Intelligence (Buckinghamshire, England: National Foundation for Educational Research, 1961).

considered equivalent on the variable of musical memory.[1] The mean scores and standard deviations of the students on the Drake Test and the Wing Test are reported in Table 1.

Table 1.--Means and Standard Deviations for Each Treatment Group on the Drake and Wing Music Memory Aptitude Tests

Treatment Group	Test	Mean	Standard Deviation
Blocking	Drake	37.18	10.73
Blocking	Wing	22.36	4.81
No-Blocking	Drake	36.45	6.33
No-Blocking	Wing	20.73	3.31

Analysis of the Repetition Data

The first null hypothesis for the study states: There will be no difference in the mean repetition scores of students assigned to each of the two treatment groups. Subquestions are listed as follows:

1. Were the compositions a factor in the number of repetitions required for memorization?

2. What was the interaction effect, if any, of the treatments and compositions employed in the investigation?

To test the hypothesis and study the subquestions, the data were analyzed by a two-factor analysis of variance described by Kerlinger.[2] The statistical summary is exhibited in Table 2.

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[1]Fred N. Kerlinger, Foundations of Behavioral Research (2d ed.; New York: Holt, Rinehart and Winston, 1973), pp. 287-288.

[2]Kerlinger, pp. 246-255.

Table 2.--Analysis of Variance of Repetition Scores

Source of Variation	Sum of Squares	d.f.	Mean Squares	F-Ratio
Between Variance				
Treatments	1222.55	1	1222.55	1.97
Compositions	5092.74	2	2546.37	4.10*
Treatments by Compositions	1.37	2	.69	.001
Within Variance	9935.17	16	620.95	

*Significant at the .05 level

Main effects. For the treatments effect, the obtained F-ratio of 1.97 was less than the critical value of F at the .05 level. The two treatment group scores could not be differentiated from chance. The null hypothesis was thus retained. Means and standard deviations for each treatment group on the repetition factor are shown in Table 3.

Table 3.--Means and Standard Deviations for Each Treatment Group on the Repetition Factor

Treatment Group	Mean	Standard Deviation
Blocking	48.64	20.41
No-Blocking	63.55	30.82

Concerning the first subquestion, the obtained F-ratio of 4.10 exceeds the critical value of F at the .05 level, indicating that the repetition performance of the students varied significantly among

the three compositions employed in the investigation. Means and standard deviations of the repetition factor for each composition by treatment group are reported in Table 4. These data are graphically presented in Figure 1.

Table 4.--Means and Standard Deviations of the Repetition Factor for Each Composition by Treatment Group

Treatment Group	Composition	Mean	Standard Deviation
Blocking	1	56.25	15.55
No-Blocking	1	71.5	30.43
Blocking	2	23.67	4.99
No-Blocking	2	39.0	11.52
Blocking	3	59.75	15.35
No-Blocking	3	74.0	31.02

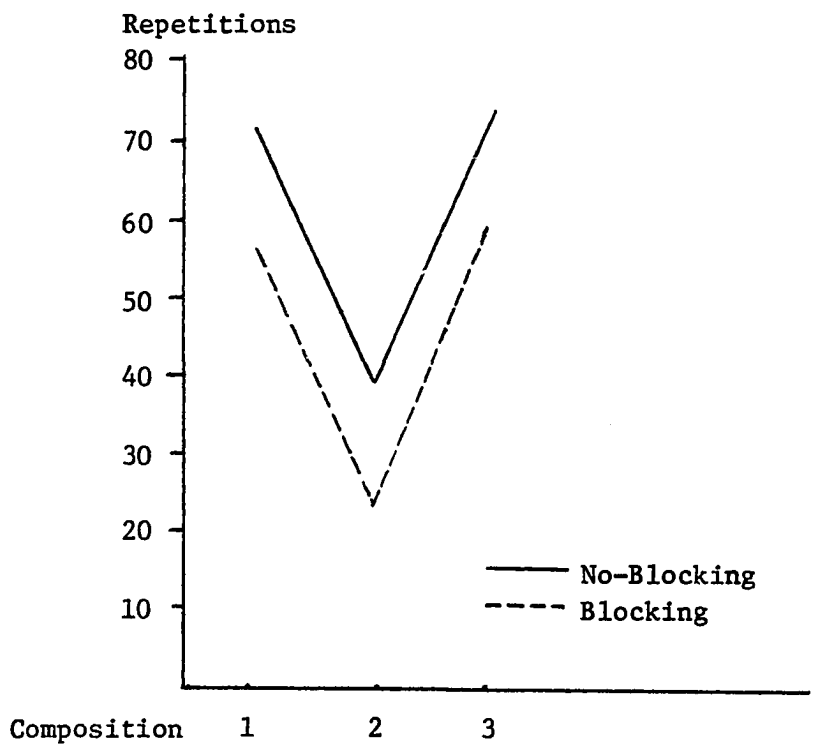

Figure 1.--The Interaction of the Repetition Factor Means for Each Composition

Interaction effect. Examination of Table 2 shows that the interaction of treatments by compositions produced an F-ratio of less than one. There was no significant interaction between the treatments and the compositions.

Findings. The testing of the hypothesis of no difference between treatment groups in number of repetitions resulted in the retention of the null hypothesis. The obtained F-ratio of 1.97 indicates that the repetition scores of the subjects were not significantly altered by the treatments employed. Although Table 3 shows that the group employing the blocking treatment achieved a lower mean score, indicating fewer repetitions utilized, the repetition scores of the blocking treatment group did not differ significantly from those of the no-blocking group.

Concerning the first subquestion, the obtained F-ratio of 4.10 indicates that the repetition performance of the students varied significantly among the three compositions. As confirmed by the data in Table 4, both treatment groups obtained their lowest mean score on composition two, while their highest mean score was obtained on composition three. For each group, the mean scores and standard deviations obtained for composition one and composition three were very similar.

As a result of the F-ratio obtained for the composition effect, the repetition data for the two treatment groups were analyzed separately for each of the three compositions. The t-values resulting from this procedure were found not to be significant and thus support

the findings of the initial analysis of the composite data and the retention of the null hypothesis.

For students experiencing the blocking treatment, the lowest repetition score was 17 for composition two and the highest score was 83 for composition one. The lowest score achieved by the group experiencing no-blocking was 26 for composition two and 26 for composition three, while the highest score for this group was 112 for composition three. Ranges of scores for the repetitions factor by each treatment group are listed in Table 5.

Table 5.---Ranges of the Repetition Factor for Each Composition by Treatment Group

Treatment Group	Composition One	Composition Two	Composition Three
Blocking	45-83	17-29	35-74
No-Blocking	30-111	26-54	26-112

The interaction of treatments by compositions obtained an F-ratio of .001, disclosing no significant interaction between the treatments and the compositions. As illustrated in Figure 1, the performance of each treatment group was consistent on each of the three compositions utilized. The means and standard deviations on the repetition factor for each group on each composition are provided in Table 4.

Analysis of Time Data

The second null hypothesis of the study states: There will be no difference in the mean time scores of students assigned to each of the two treatment groups. Subquestions for the hypothesis are listed as follows:

1. Were the compositions a factor in the amount of time required for memorization?

2. What was the interaction effect, if any, of the treatments and compositions employed in the investigation?

To test the hypothesis and study the subquestions, the data were analyzed by a two-factor analysis of variance. The statistical summary is shown in Table 6.

Table 6.--Analysis of Variance of Time Scores

Source of Variation	Sum of Squares	d.f.	Mean Squares	F-Ratio
Between Variance				
Treatments	15133.14	1	15133.14	6.75*
Compositions	16471.06	2	8235.53	3.67*
Treatments by Compositions	8932.16	2	4466.08	1.99
Within Variance	35880.42	16	2242.53	

*Significant at the .05 level

Main effects. The testing of the hypothesis for the treatment effect obtained an F-ratio of 6.75, exceeding the critical value of F at the .05 level. The null hypothesis was thus rejected. Means

and standard deviations for each treatment group on the time factor are shown in Table 7.

Table 7.--Means and Standard Deviations for Each Treatment Group on the Time Factor

Treatment Group	Mean*	Standard Deviation
Blocking	83.09	30.99
No-Blocking	135.55	67.91

*Minutes

Concerning the first subquestion, the obtained F-ratio of 3.67 exceeds the critical value of F at the .05 level, indicating a relationship between the time factor and the three compositions. Means and standard deviations of the time factor for each composition by treatment group are listed in Table 8. A graphic representation of these data is provided in Figure 2.

Table 8.--Means and Standard Deviations of the Time Factor for Each Composition by Treatment Group

Treatment Group	Composition	Mean*	Standard Deviation
Blocking	1	82.75	14.79
No-Blocking	1	187.0	69.42
Blocking	2	48.33	24.24
No-Blocking	2	85.0	49.69
Blocking	3	109.5	19.42
No-Blocking	3	122.0	35.55

*Minutes

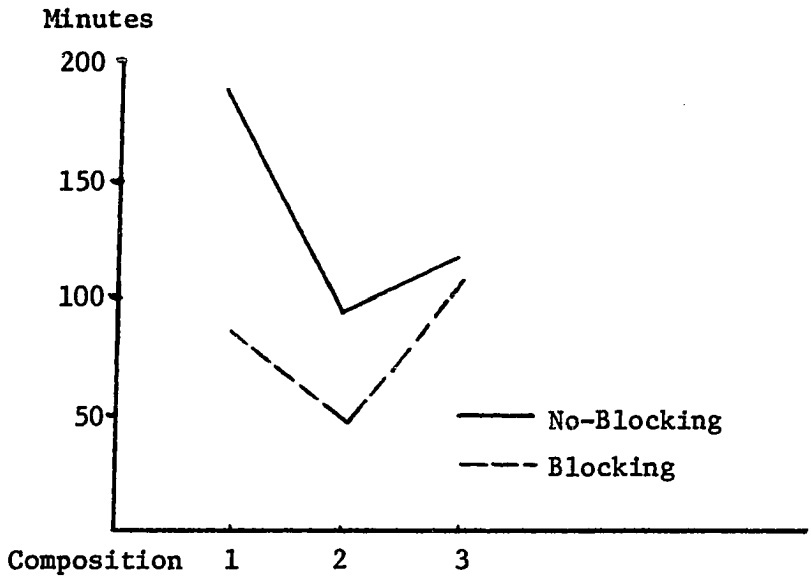

Figure 2.--The Interaction of the Time Factor Means for Each Composition

Interaction effect. As shown in Table 6, the obtained F-ratio of 1.99 indicates no significant interaction of treatments and compositions.

Findings. The statistical evidence listed in Table 6 resulted in the rejection of the null hypothesis. The obtained F-ratio of 6.75 for the treatment effect indicates a significant difference in memorization time utilized by the students in each of the two treatment groups. There is more than a chance relationship between treatments employed and memorization time. Examination of the mean time scores listed in Table 7 shows that the group assigned the blocking treatment achieved a lower mean treatment score, indicating that memorization time scores for the blocking group differed significantly from those of the no-blocking group.

Concerning the subquestions, the obtained F-ratio of 3.67 for the compositions effect indicates that memorization time varied significantly among the compositions utilized. The blocking group generally required less memorization time than the no-blocking group, and thus achieved a lower mean score for each composition, as shown in Table 8. The students from each group memorized composition two in less time than was utilized for either composition one or three. The blocking group utilized the greatest amount of time memorizing composition three, while the no-blocking group utilized the greatest amount of time memorizing composition one. The largest difference between the mean time scores of the two treatment groups was obtained for composition one. The mean time difference was less for composition two and smallest for composition three. The mean time score difference is graphically represented in Figure 2.

Examination of Table 9 discloses that memorization time scores for the blocking group range from a low of 23 for composition two to a high of 132 for composition three. Scores for the no-blocking group range from a low of 39 for composition two to a high of 284 for composition one. Further examination of Table 9 discloses that the blocking group utilized the least amount of memorization time for compositions one and two with scores of 63 and 23, respectively. For composition three, the lowest memorization time score of 69 was achieved by the no-blocking group.

The obtained F-ratio of 1.99 for the treatment by compositions effect indicates an absence of significant interaction. While variability on each composition was significant, the performance of

Table 9.--Ranges of the Time Factor* for Each Composition by Treatment Group

Treatment Group	Composition One	Composition Two	Composition Three
Blocking	63-104	23-81	79-132
No-Blocking	97-284	39-154	69-169

*Minutes

the treatment groups on each of the three compositions was consistent. These data are provided in Table 8 and graphically presented in Figure 2.

Retention Data

The analysis of the retention data disclosed that the two treatments do not appear to differ in their effect on the students' retention of the music previously memorized. The nature of the evaluation of retention data and the nondiscriminate rating scale employed precluded probability analysis. Findings relating to the retention variable are thus limited to the visual comparisons of the data reported in Tables 10, 11 and 12.

Means and standard deviations for each treatment group on the retention factor are shown in Table 10.

Table 10.--Means and Standard Deviations for Each Treatment Group on the Retention Factor*

Treatment Group	Mean	Standard Deviation
Blocking	2.01	.83
No-Blocking	1.76	.68

*Rates on a scale of 1.0 low to 3.0 high

Means and standard deviations of the retention factor for each composition by treatment group are reported in Table 11.

Table 11.--Means and Standard Deviations of the Retention Factor** for Each Composition by Treatment Group

Treatment Group	Composition	Mean	Standard Deviation
Blocking	1	2.10	.80
No-Blocking	1	1.43	.44
Blocking	2	1.90	.59
No-Blocking	2	1.67	.53
Blocking	3	2.00	1.00
No-Blocking	3	2.18	.77

**Rated on a scale of 1.0 low to 3.0 high

Ranges of scores for the retention factor by each treatment group are listed in Table 12.

Table 12.--Ranges for Each Composition by Treatment Group on the Retention Factor*

Treatment Group	Composition One	Composition Two	Composition Three
Blocking	1.0-3.0	1.3-2.7	1.0-3.0
No-Blocking	1.0-2.0	1.0-2.3	1.0-3.0

*Rated on a scale of 1.0 low to 3.0 high

CHAPTER VI

SUMMARY AND CONCLUSIONS

Purpose of the Study

The purpose of the study was to determine the effect of a blocking procedure on the number of practice repetitions and the amount of practice time utilized in the memorization of selected piano literature. As defined in the study, blocking is the identification of note groups according to hand positions required for performance. The blocking procedure includes prestudy for identification of memorization cues. The study also was concerned with determining the effect of the blocking procedure on retention accuracy.

Experimental Procedures

The experiment was conducted at Texas Southern University, Houston, Texas, over a period of eighteen weeks in the spring of 1972. The students involved in the experiment, n=22, were undergraduate music education majors enrolled for piano study in the Department of Music. Since the students were not likely to memorize music beyond their technical ability, it was necessary to obtain participants who possessed the requisite facility to play the

compositions selected for the experiment. Piano teacher colleagues of the investigator provided a list of names of students who could play the compositions. From this list, twenty-two students volunteered to participate in the investigation. The students were randomly assigned to the control and experimental groups. Each student was also randomly assigned one of the three compositions selected for the experiment.

Prior to the experiment, Form A of the musical memory section of the Drake Musical Aptitude Tests and the memory section of the Wing Standardised Tests of Musical Intelligence were administered to all participants. These measures served as a check on assignment procedures to determine equivalency on the factor of musical memory since it was not possible to have true random selection of participants. The two groups were also considered experimentally equivalent on the variable of musical memory because there was no significant difference between the test scores of students assigned to the control group and those assigned to the experimental group.

The two treatments employed in the investigation were administered during a time mutually convenient for the students and the investigator. Students averaged one experimental session per week. A one-hour time limit was set for each session.

The experimental treatment involved blocking. Briefly considered, the term blocking refers to the practice of identifying note groups according to hand positions required to realize a piano score by means of identifying scale patterns as clusters; identifying intervals, arpeggios and chord fragments as solid chords; and

identifying and classifying compositional devices employed by the composer. Students in the experimental group utilized a piano score prepared by the researcher for experimental purposes. The prepared score identified each block of successive notes that could be played without change of hand position. Each block identified was enclosed in brackets. In addition, various memorization cues were indicated on the prepared scores. Facsimile copies of scores prepared in this manner are provided in Appendix A.

As formulated for employment in the study, the blocking procedure included (1) prestudy of a prepared score to determine meter, key and/or mode; phrasing and important cadence points; repetition, sequence, imitation and other devices; and form or overall structure; (2) blocking the succession of notes into hand positions; (3) playing the notes as written; and (4) instruction and interaction concerning the five learning associations as part of the systematic procedure.

The blocking procedure and prepared score were not utilized by students in the control group. Students in this group memorized from the regular, or unblocked, music score.

The investigator's role for the control group was that of describing the memorization task, pointing out errors, and answering questions. For the experimental group, the investigator's role was that of describing the memorization task, providing orientation to the prepared score, providing procedural instruction, pointing out errors, and answering questions. Students in both groups were encouraged to memorize as rapidly as possible.

Since it was desirable to utilize as many blocking possibilities as practical, three compositions were selected and utilized in the study. In each treatment group, four students memorized composition one, three students memorized composition two, and four students memorized composition three. During the weekly sessions with each student, the number of practice repetitions and the amount of playing time were recorded by the investigator.

The effect of the treatments on retention accuracy was also investigated. Each student returned after seventy-two hours to record the experimental composition without study or practice. The student was aware that the performance was being recorded. Three jurors subsequently rated retention as either high, average or low.

Findings

The preliminary analysis of data revealed that the scores on the Drake Test for each of the two groups and the scores on the Wing Test for each of the two groups were not significantly different. Thus, for purposes of the experiment, the two groups were considered experimentally equivalent on the variable of musical memory.

The first null hypothesis, which stated that the mean repetition scores of the two treatment groups would be equal, was tested by a two-factor analysis of variance. The analysis disclosed that the number of repetitions required for the memorization task was not significantly affected by the treatments employed. The null hypothesis was thus retained.

Though the average number of repetitions required by students in the blocking group was substantially fewer than that of

their counterparts, variance among students within each group appeared as a factor deserving further consideration. The analysis of the data revealed less within-group variance for the experimental group. A visual examination of the repetition data discloses one student in the blocking group requiring extensively more repetitions than the arithmetical average of the group. Conversely, several students in the no-blocking group completed the memorization task with substantially fewer repetitions than that averaged by counterparts employing the blocking procedure. The raw data relating to the repetition criterion is provided in Appendix C on page 98. The means and standard deviations for the repetition data are provided in Table 3 on page 55.

The repetition scores of students varied significantly among the compositions utilized. The analysis disclosed that composition two required considerably fewer repetitions than compositions one or three. As noted above, the mean score for the blocking group on each composition was consistently lower than that of counterparts required to apply their own strategies to the memorization task. The standard deviation for each compositional mean disclosed more consistency within the blocking group. As a result of this disclosure, the group means for each composition were submitted to a t-test. The obtained t-values representing differences of group performance on the repetitions criterion for each composition were not significant. This analysis supports the retention of the null hypothesis concerned with repetition scores. The fewer repetitions required of students in the blocking group were not beyond chance occurrence.

The analysis disclosed no significant interaction between treatment group mean scores for each of the compositions. The performance of each treatment group was consistent on each of the three compositions utilized. These data are graphically presented in Figure 1 on page 56.

The second null hypothesis, which stated that the mean time scores of the two treatment groups would be equal, was tested by a two-factor analysis of variance. The analysis resulted in the rejection of the null hypothesis. The average amount of memorization time required by students in the blocking group to complete the memorization task was significantly less than that of their counterparts who were required to apply their own strategies.

The amount of time required for the memorization task varied significantly among the compositions utilized. Analysis disclosed that composition two required less memorization time than either compositions one or three. Consistent with the rejection of the null hypothesis, the mean score for the blocking group on each composition was lower than that of counterparts applying their own strategies to the memorization task. The standard deviation for each compositional mean disclosed more consistent performance for students employing the blocking procedure. The means and standard deviations for the time data are provided in Table 8 on page 60.

Analysis revealed no significant interaction between the treatment group mean scores for each of the compositions. The performance of each treatment group was consistent on each of the three

compositions utilized. These data are graphically presented in Figure 2 on page 61.

The analysis of the retention data disclosed that the treatments employed did not affect retention of the music previously memorized. The means and standard deviations for the treatment groups are reported in Table 10 on page 64. The compositional means and standard deviations are provided in Table 11 on page 64.

Conclusions

The investigation of related literature disclosed no evidence of previous research pertaining to the effect of blocking on the number of repetitions required and time needed to complete memorization of piano music. However, the findings of this study support, in part, the contention that blocking music into clusters and chords that reveal hand positions, along with intellectual study based on informal analysis, can facilitate memorization.[1] Specific conclusions are presented and discussed in this section of the present chapter.

The analysis disclosed that the number of repetitions required for completion of the memorization task was not significantly affected by the treatments employed. However, the average number of repetitions required by students in the blocking group was substantially fewer than that of their counterparts in the no-blocking group. Based upon informal observations which were recorded during the

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[1]Celia Mae Bryant, "Memorizing: A Science," Clavier, II (October, 1963), p. 21.

investigation, it may be concluded that familiarity with the blocking procedure is an important consideration on the repetition factor. During the early stage of the study students in the experimental group utilized numerous repetitions before feeling comfortable with a particular section or block indicated on the prepared score. Later, as familiarity, confidence, and insightfulness into the systematic blocking procedure were developed, students employed far fewer repetitions before going on to new material. A similar condition did not prevail for students in the control group. The number of repetitions required by the control group seemed to be influenced more by the length of the phrase or section being studied, technical difficulty encountered, or other variables specifically related to the composition. Relatedly, because students in the experimental group lacked blocking procedure experience, they approached the memorization task more cautiously and deliberately. Thus, repetitions beyond the number required for actual memorization may have been utilized for purposes of performance security.

As the analysis of the data disclosed, the compositions employed in the study varied significantly with regard to the repetition and time factors. Composition two required significantly fewer repetitions than either of the others. Composition two also required significantly less time. Since the compositions were selected on the basis of blocking possibilities rather than equality of difficulty, this situation may be due to factors inherent in the music. Though not supported empirically, observations noted by the investigator indicate that technical difficulty and the aesthetic appeal of one or

more parameters of music such as melody, harmony, rhythm or overall style may be factors affecting the repetitions and time required for memorization.

As indicated by the data recorded and analyzed, the amount of time required for completion of the memorization task was significantly affected by the treatments employed. The average amount of time required by students in the blocking group was considerably less than that required by their counterparts in the no-blocking group. This conclusion is in accord with the views of Bryant who stresses the importance of employing the process of association and utilizing blocking procedure as a means of economizing on the amount of time required for the memorization task.[1] The evidence presented seems to indicate that piano students tend to memorize faster when instruction incorporates procedures which lend themselves to perceptual and conceptual learning.

Analysis of the data disclosed that the blocking group completed the memorization task in significantly less time. The analysis also disclosed that individuals comprising the group were more consistent in performance than counterparts required to employ their own strategies. Since the number of repetitions required for memorization is a crucial factor, it can be concluded that blocking allowed for a requisite number of repetitions to be completed in less time. The consistency of within-group performance underscores the importance of this determination. Generalizing beyond the specific blocking procedure

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[1]Bryant, pp. 21-23.

employed in the study, it would appear that the memorization task is facilitated when students are provided with instruction and systematic procedures utilizing the several learning modes normally associated with piano study.

As the retention phase of the study employed a very narrow rating scale, retention data were limited in scope and not tested for statistical significance. While no definite conclusion can be drawn, the obtained data appears to indicate that there is little difference between the groups in retention accuracy after seventy-two hours.

As the experimental procedure involved blocking groups of successive notes into clusters or chords, it might be surmised that technical problems in one or more of the compositions tended to impede the memorization task of students in the blocking group. Overlapping between block patterns in the left and right hands, for example, was most prevalent in composition three where there were very few clearly defined phrase endings occurring in both hands at the same time and where there was difficulty in determining the termination point of the passages to be memorized.

The procedure for the experimental group required the students to begin playing from memory as soon as a few measures or a passage was studied. Thus, these students, unlike those in the control group, could not play through the compositions several times before beginning memorization. This procedure lessened reliance on aural memory while requiring an overt dependence on the cognitive and kinesthetic learning modes and associations. Aural reference, then, was employed for purposes of organizing rather than formulating

cognitions. The findings of the study suggest the efficiency of approaching memorization by means of intellectual and tactile prestudy, reserving aural association as a means of codifying component sections into a meaningful whole as well as making value judgments relating to expressive and stylistic matters.

As noted, blocking is an analytical procedure requiring intellectual prestudy prior to performance trials. The findings of the study are generally consistent with previous piano research,[1,2] as well as that conducted in a related applied music field.[3] Inasmuch as the previous research concerned with memorization of piano music was conducted in a clinical setting, the outcomes here reported demonstrate the appropriateness of employing similar strategies in a studio setting. While the present study focused attention on a procedure mentioned in the literature concerned with piano pedagogy, it is perhaps noteworthy to mention that blocking, as a formal procedure, is a balanced embodiment of the several learning associations reviewed in Chapter II. Thus, the results of the study, considered in a practical sense, support the contention that memorization is primarily a learning task and needs to be approached accordingly. Further,

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[1]Grace Rubin-Rabson, "The Influence of Analytical Pre-Study in Memorizing Piano Music," Archives of Psychology, XXXI (November, 1937), 1-53.

[2]Grace Rubin-Rabson, "Studies in the Psychology of Memorizing Piano Music: V. A Comparison of Pre-Study Periods of Varied Length," Journal of Educational Psychology, XXXII (February, 1941), 101-12.

[3]Edgar Cecil Ross, Jr., "An Experimental Study of the Effect of Analytical Guidance in Music Memorization" (unpublished doctoral dissertation, State University of Iowa, 1961), pp. 1-97.

blocking, as a systematic procedure, can be employed in a studio setting, is easily learned by students with varying piano backgrounds, and is correlative to accepted common practice methodology in the general field of piano pedagogy. Memorization, then, is largely a dimension of an overall learning task.

As a final observation, the question whether or not keyboard experience was a memorization factor in student performance may be raised. Nothing in the experimental design appears to provide a basis for response to the question.

Relatedly, however, Rubin-Rabson reports thus:

> Since practically no relationship exists between piano experience and learning, experience in playing does not imply that memorizing of new material will be quickened in direct ratio to the amount of such experience.[1]

In summary, the investigation seemed to demonstrate the practicality of approaching piano study with guiding principles and systematic procedures for memorization. The procedures demonstrate that blocking provides for efficiency in learning by permitting repetitions in less time as opposed to the traditional practice utilized in the control group. Thus, economy of memorization time is perhaps the chief consequence derived from applying the blocking procedure. Further refinement of the blocking procedure might identify specific factors that would assist teachers and students in achieving the economical utilization of repetitions as well as rehearsal time and, hence, the facilitation of memorization in piano study.

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[1]Rubin-Rabson, "The Influence of Analytical Pre-Study in Memorizing Piano Music," 44.

Recommendations for Additional Research

A study to investigate the effectiveness of specific blocking procedures as means of facilitating memorization. The study would be a one-group design and include several approaches utilizing different but equal compositions. The first would involve memorization without blocking. The second would involve mental blocking, that is, blocking without a prepared score. The third would involve blocking with the utilization of a prepared, or blocked, score. The three procedures might be repeated with new compositions for a second and third replication. Such a study could provide substantial data on each procedure and allow comparisons to be made.

A study to further investigate the effectiveness of the blocking procedure. Such a study would involve students drawn from a large sample and skilled in utilizing blocking procedures. The study could also employ daily experimental sessions as an attempt to control forgetting that occurs between sessions.

A study to determine the relationship between blocking and the learning/memory associations. A study of this type could give indications of the associations most effectively employed and those that need to be developed or stressed. The results of the study could also provide data that would be of assistance in developing procedures for learning and teaching utilization of the five associations. A discussion of learning associations is presented in Chapter II.

A study to further determine the effect of blocking on retention. Such a study could employ a broad rating scale to allow more precise evaluation of retention accuracy.

A study to determine the effect of blocking on several types of piano literature. The study could involve compositions of various lengths, degrees of difficulty and styles, including unorganized sounds. Music materials could be rotated so that each student would memorize every composition.

A study to investigate the effect of blocking with prestudy and blocking without prestudy. The study could be a one-group or two-group design employing two groups of compositions. Such a study could reveal the specific value of prestudy as a component of the blocking procedure.

BIBLIOGRAPHY

BIBLIOGRAPHY

Books

Ahrens, Cora B., and G. D. Atkinson. For All Piano Teachers. Oakville, Ontario: Frederick Harris Music Co., 1955.

Bonpensiere, Luigi. New Pathways to Piano Technique. New York: Philosophical Library, 1953.

Bruning, James L., and B. L. Kintz. Computational Handbook of Statistics. Glenview, Illinois: Scott, Foresman and Co., 1968.

Buck, Percy C. Psychology for Musicians. New York: Oxford University Press, 1944.

Campbell, Donald T., and Julian C. Stanley. Experimental and Quasi-Experimental Designs for Research. Chicago: Rand McNally & Co., 1966.

Carre, John F. The Psychology of Piano Teaching. Rockville Centre, New York: Belwin, 1957.

Ching, James. Piano Playing. New York: Bosworth & Co., 1946.

Cooke, Charles. Playing the Piano for Pleasure. New York: Simon and Schuster, 1941.

Deutsch, Leonhard. Piano: Guided Sight-Reading. Chicago: Nelson-Hall, 1959.

Diller, Angela. The Splendor of Music. New York: G. Schirmer, 1957.

Everhart, Powell. The Pianist's Art. Atlanta: By the Author, 962 Myrtle Street, N.E., 1958.

Gat, Jozsef. The Technique of Piano Playing. London: Collet, 1959.

Goodrich, A. J. Guide to Memorizing Music. New York: John Church Co., 1906.

Jones, John Charles. Learning. New York: Harcourt Brace and World, 1967.

Kerlinger, Fred N. Foundations of Behavioral Research. 2d ed. New York: Holt Rinehart and Winston, 1973.

Last, Joan. Interpretation for the Piano Student. London: Oxford University Press, 1960.

Leimer, Karl, and Walter Gieseking. The Shortest Way to Pianistic Perfection. Bryn Mawr, Pennsylvania: Theodore Presser Co., 1932.

Lundin, Robert W. An Objective Psychology of Music. New York: Ronald Press Co., 1953.

Mackinnon, Lilias. Music by Heart. Baltimore: Monumental Publishing Co., 1954.

Newman, William S. The Pianist's Problems. New York: Harper and Row, 1956.

Philipp, Lillie H. Piano Study: Application and Technique. New York: MCA Music, 1969.

Robinson, Helene, and Richard L. Jarvis (eds.). Teaching Piano in Classroom and Studio. Washington: Music Educators National Conference, 1967.

Rubinstein, Beryl. Outline of Piano Pedagogy. New York: Carl Fischer, 1947.

Schauffler, Lawrence. Piano Technic: Myth or Science. Chicago: Gamble Hinged Music Co., 1937.

Schelling, Ernest, and others. Oxford Piano Course. Teacher's First Manual. New York: Oxford University Press, 1932.

_____. Oxford Piano Course. Teacher's Second Manual. New York: Oxford University Press, 1946.

Seroff, Victor. Common Sense in Piano Study. New York: Funk & Wagnalls, 1970.

Whiteside, Abby. Indispensables of Piano Playing. 2d ed. New York: Coleman-Ross Co., 1961.

Articles and Periodicals

Brown, Roberta W. "The Relation Between Two Methods of Learning Piano Music," Journal of Experimental Psychology, XVI (February, 1933), 435-41.

Bryant, Celia Mae. "Memorizing: A Science," Clavier, II (October, 1963), 20-25.

Kohler, Jean Charles. "Some Ideas on Memory," Clavier, V (May-June, 1966), 45-49.

Mainwaring, James. "Kinaesthetic Factors in the Recall of Musical Experience," British Journal of Psychology, XXIII (1932-33), 284-307.

_____. "Memorizing," Grove's Dictionary of Music and Musicians, 1954, Vol. V.

_____. "Psychological Factors in the Teaching of Music," British Journal of Educational Psychology, XXI (1951), 199-213.

Nagy, Bela Boszormenyi. "Must it be Memorized?," Clavier, IV (January-February, 1965), 20-23.

O'Brien, Cyril C. "Part and Whole Methods in the Memorization of Music," Journal of Educational Psychology, XXXIV (December, 1943), 552-60.

Rayfield, Robert. "Memorizing at the Organ," The Diapason, August, 1965. pp. 34-35.

Rubin-Rabson, Grace. "The Influence of Analytical Pre-Study in Memorizing Piano Music," Archives of Psychology, XXXI (November, 1937), 1-53.

_____. "The Psychology of Memorizing," Music Educators Journal, XXXVI (January, 1950), 22-23, 45.

_____. "Studies in the Psychology of Memorizing Piano Music: III. A Comparison of the Whole and the Part Approach," Journal of Educational Psychology, XXXI (September, 1940), 460-76.

Winslow, Robert W. "The Psychology of Musical Memory," Music Educators Journal, XXXV (January, 1949), 15-16.

Unpublished Materials

Adams, Sterling Cameron. "An Exploratory Study of the Application of Two Learning Theories to the Teaching of Piano." Unpublished doctoral dissertation, Indiana University, 1962.

Ross, Edgar Cecil Jr. "An Experimental Study of the Effect of Analytical Guidance in Music Memorization." Unpublished doctoral dissertation, State University of Iowa, 1961.

Williamson, Samuel Charles. "The Effect of Special Instruction on Speed, Transfer, and Retention in Memorizing Songs." Unpublished doctoral dissertation, University of Kansas, 1964.

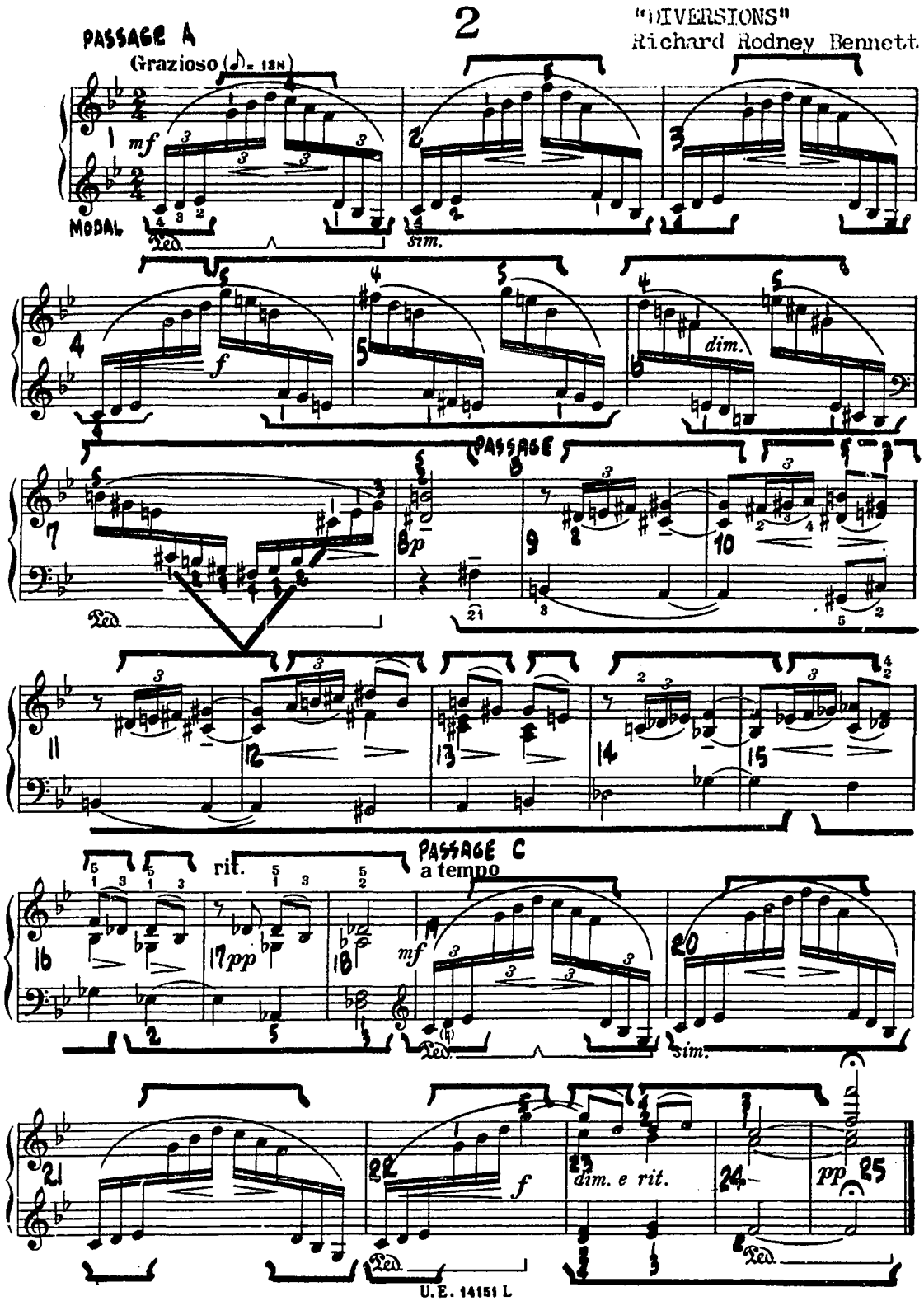
Psychological Measures

Drake, Raleigh M. Drake Musical Aptitude Tests. Chicago: Science Research Associates, Inc., 1957.

Wing, Herbert D. Standardised Tests of Musical Intelligence. Buckinghamshire, England: National Foundation for Educational Research, 1961.

APPENDIX A

EXPERIMENTAL COMPOSITIONS



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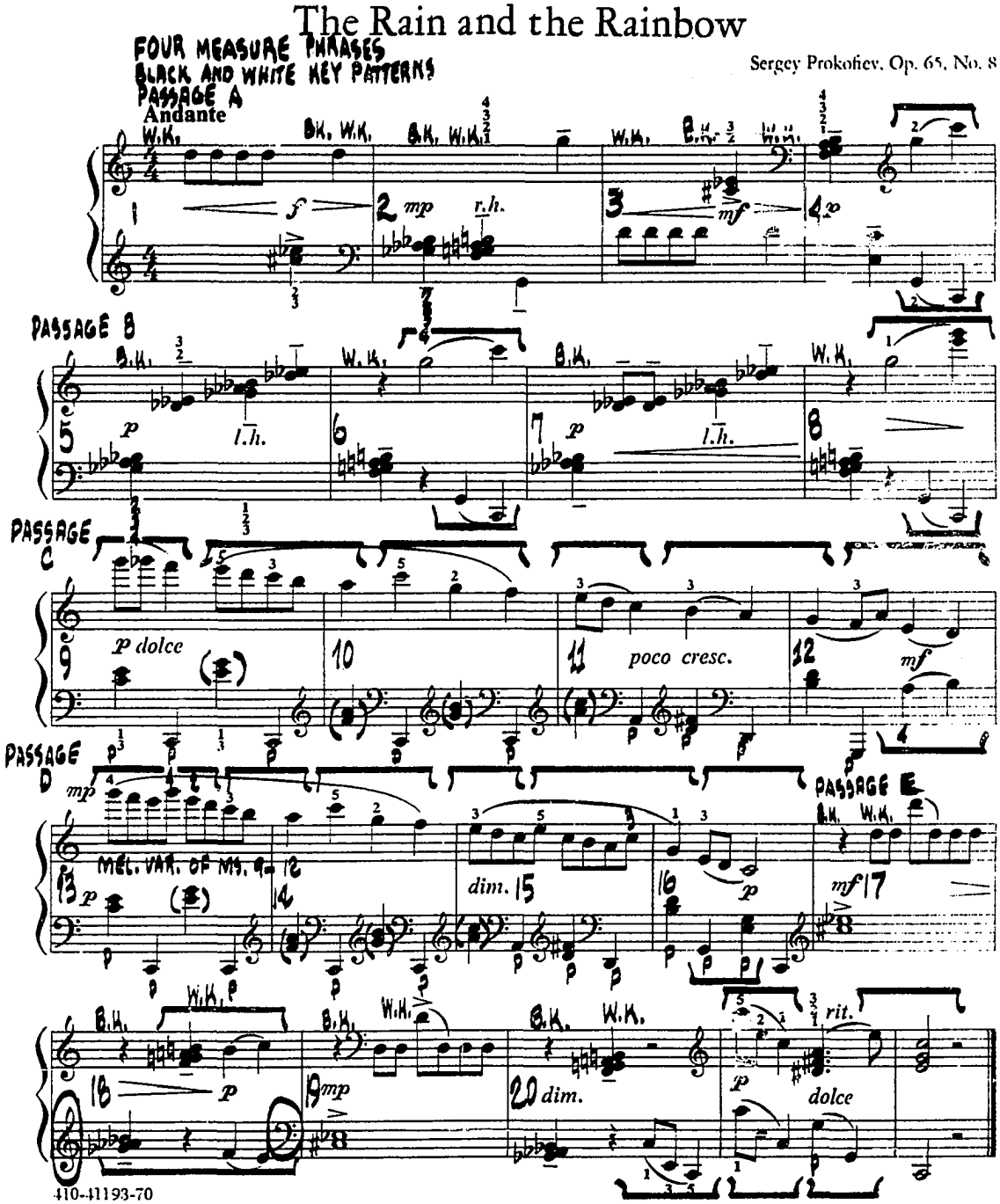

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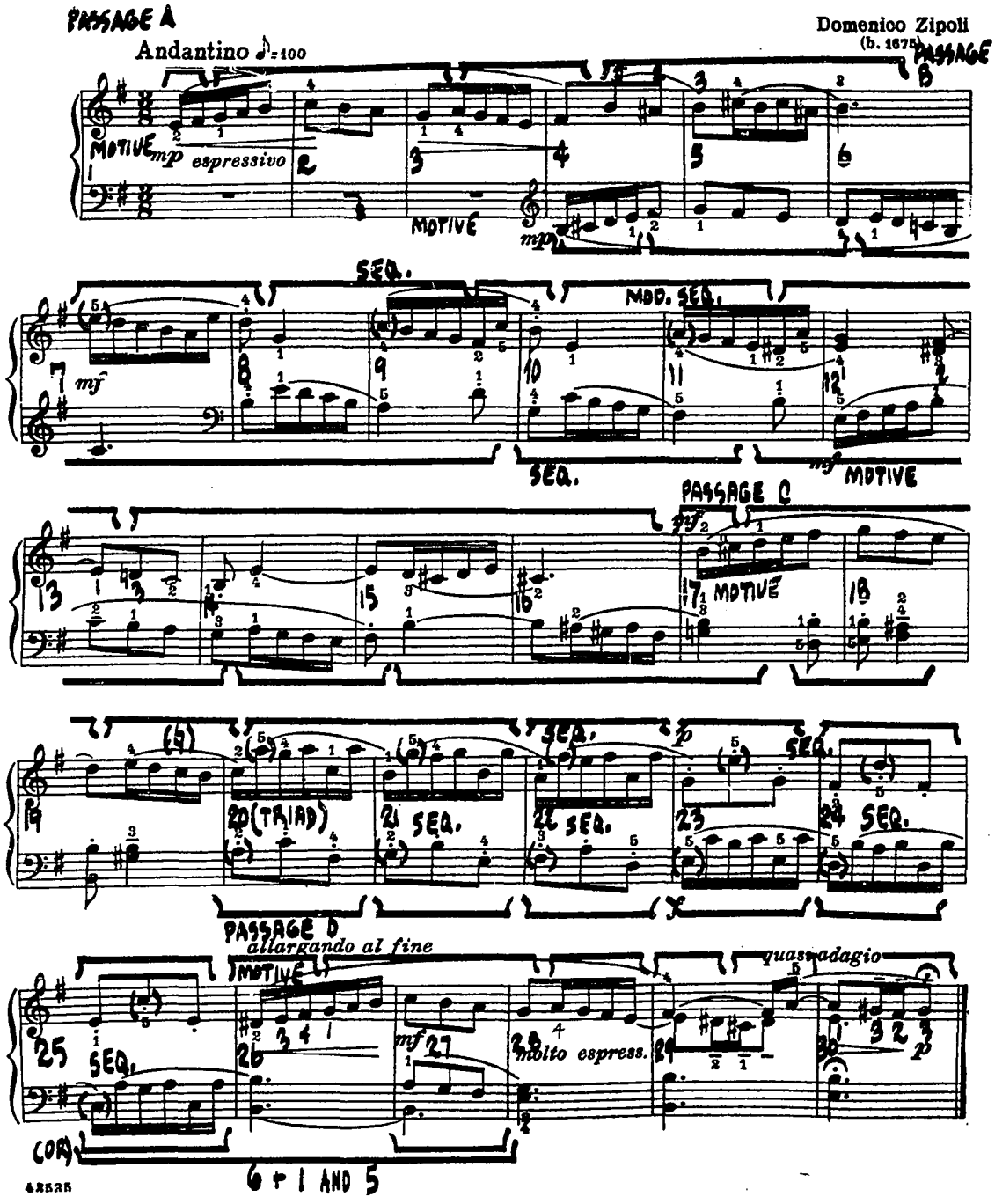
2

Prelude in E minor



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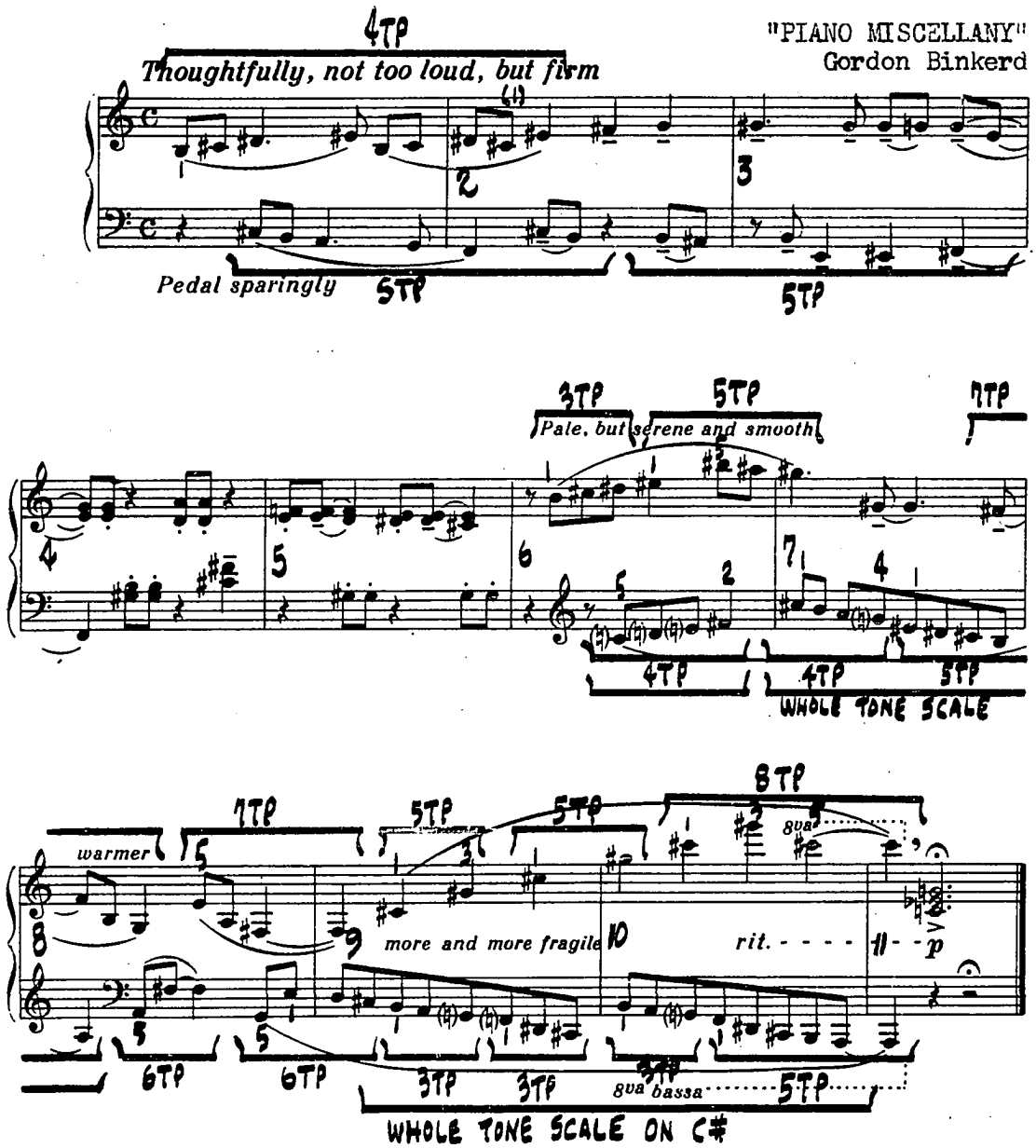
APPENDIX B

COMPOSITIONS BLOCKED INTO HAND POSITIONS

III

SOMETHING SERIOUS

"PIANO MISCELLANY"
Gordon Binkerd



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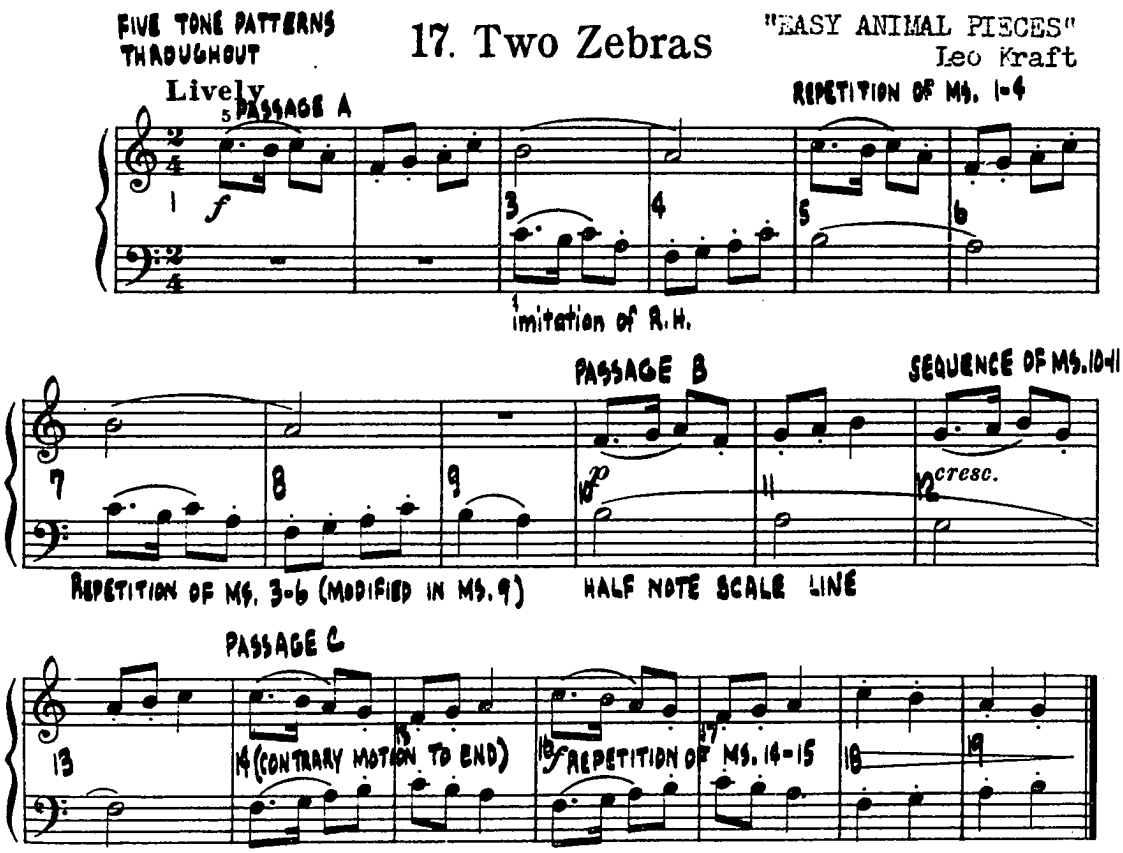

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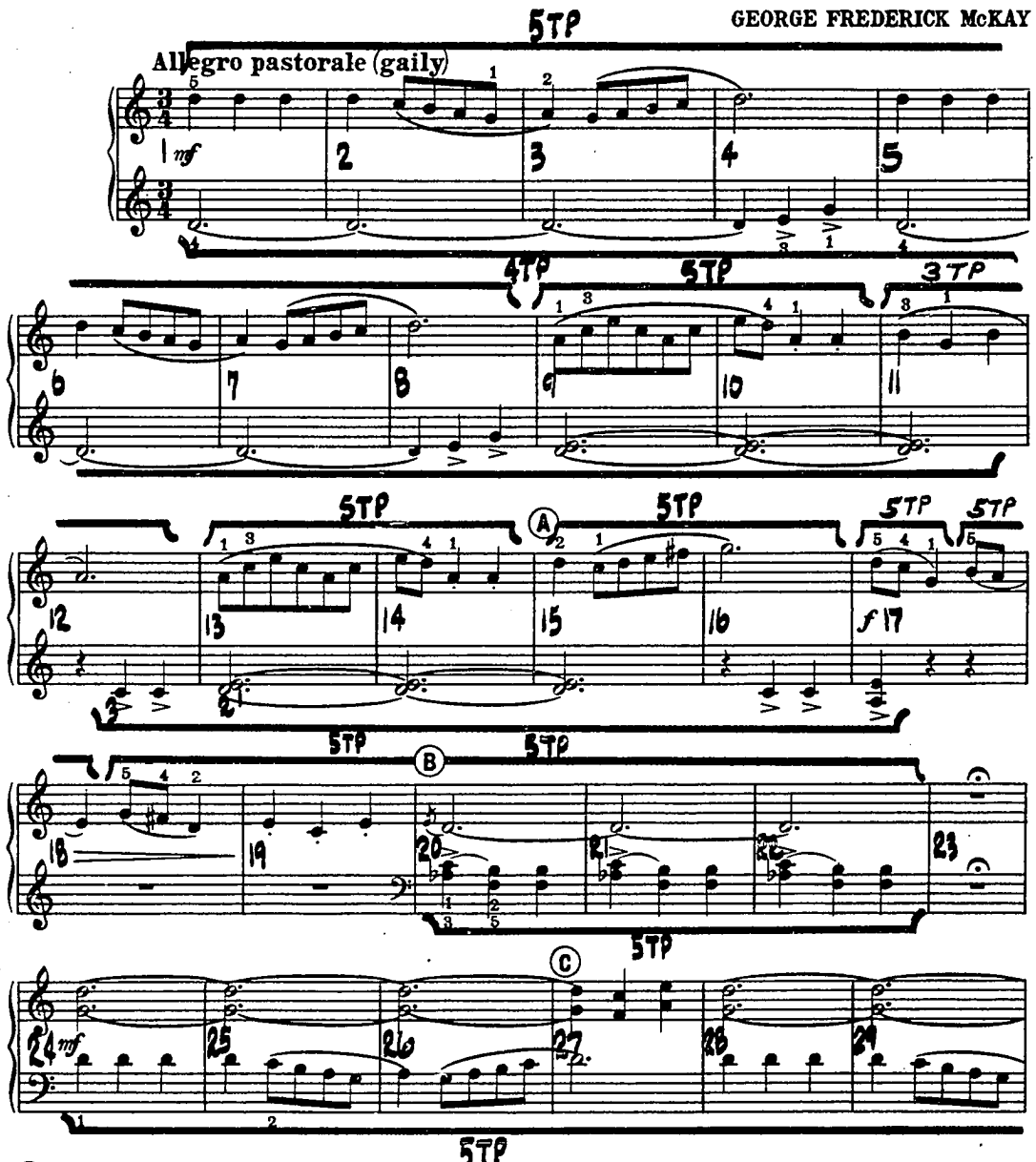
Dance Pastorale

(Rondino)

There is a vagueness of key in this lovely pastoral rondino; yet a feeling of G major pervades the music. Note that the major form of the G scale appears at (A) where F♯ is used. At (C) the mixolydian form of the scale with F♮ is used. There are two modulatory interludes at B and D. The last one leads to an abrupt conclusion in C major. We cite the unusual pause after letter (B); this brings back the theme in the left hand.

GEORGE FREDERICK McKAY



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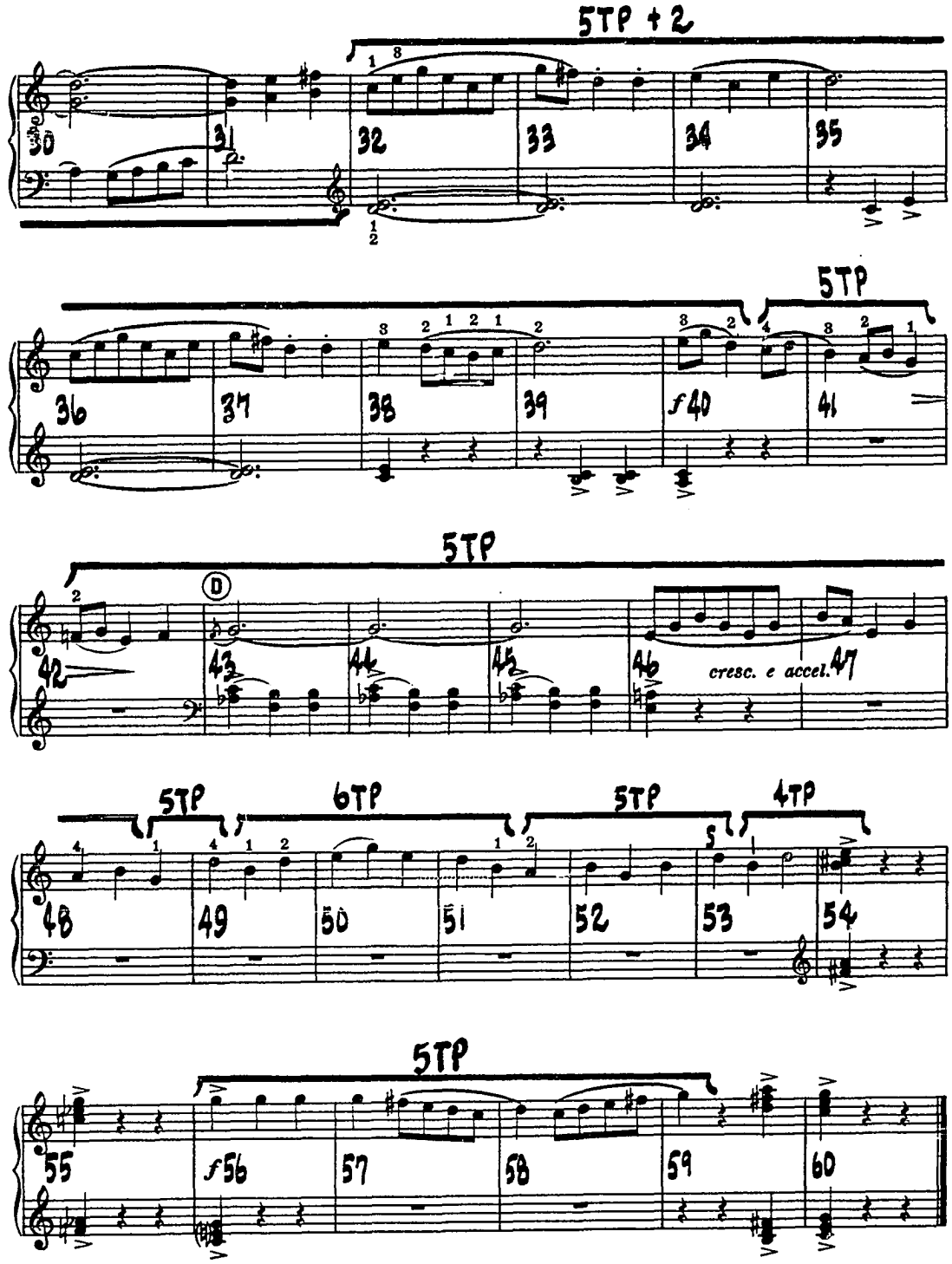

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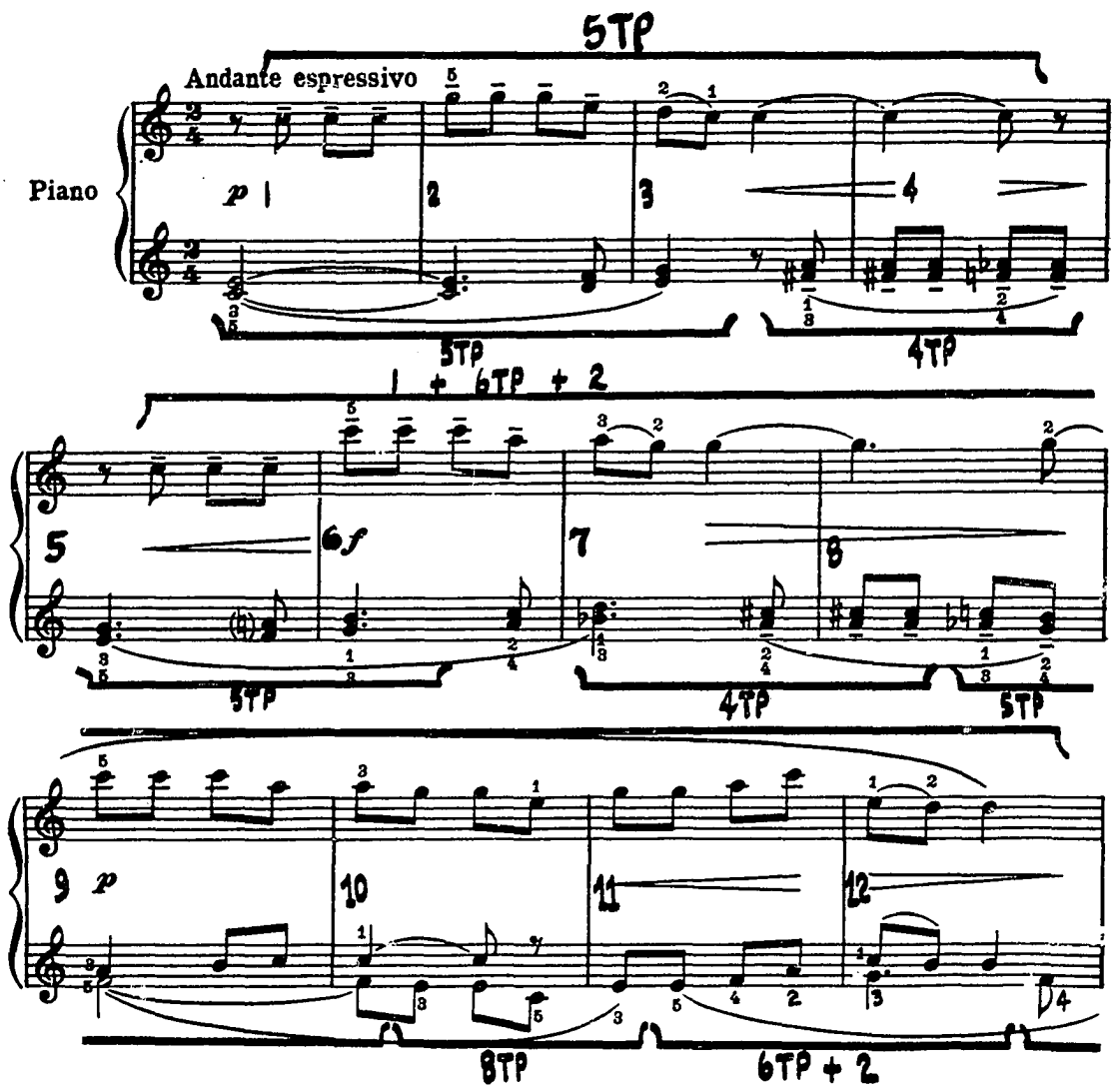
For Sarah

Grievin' Annie

DOUGLAS MOORE

This music is suggestive of the American folk-ballad. The left-hand accompaniment, in which minor thirds predominate, is noteworthy. Observe the dialogue with the melody in measures 3 and 4, and again in measures 7 and 8. The second statement of the theme is in minor at Ⓐ, where the colorful right-hand accompaniment adds to the mournfulness of the piece.



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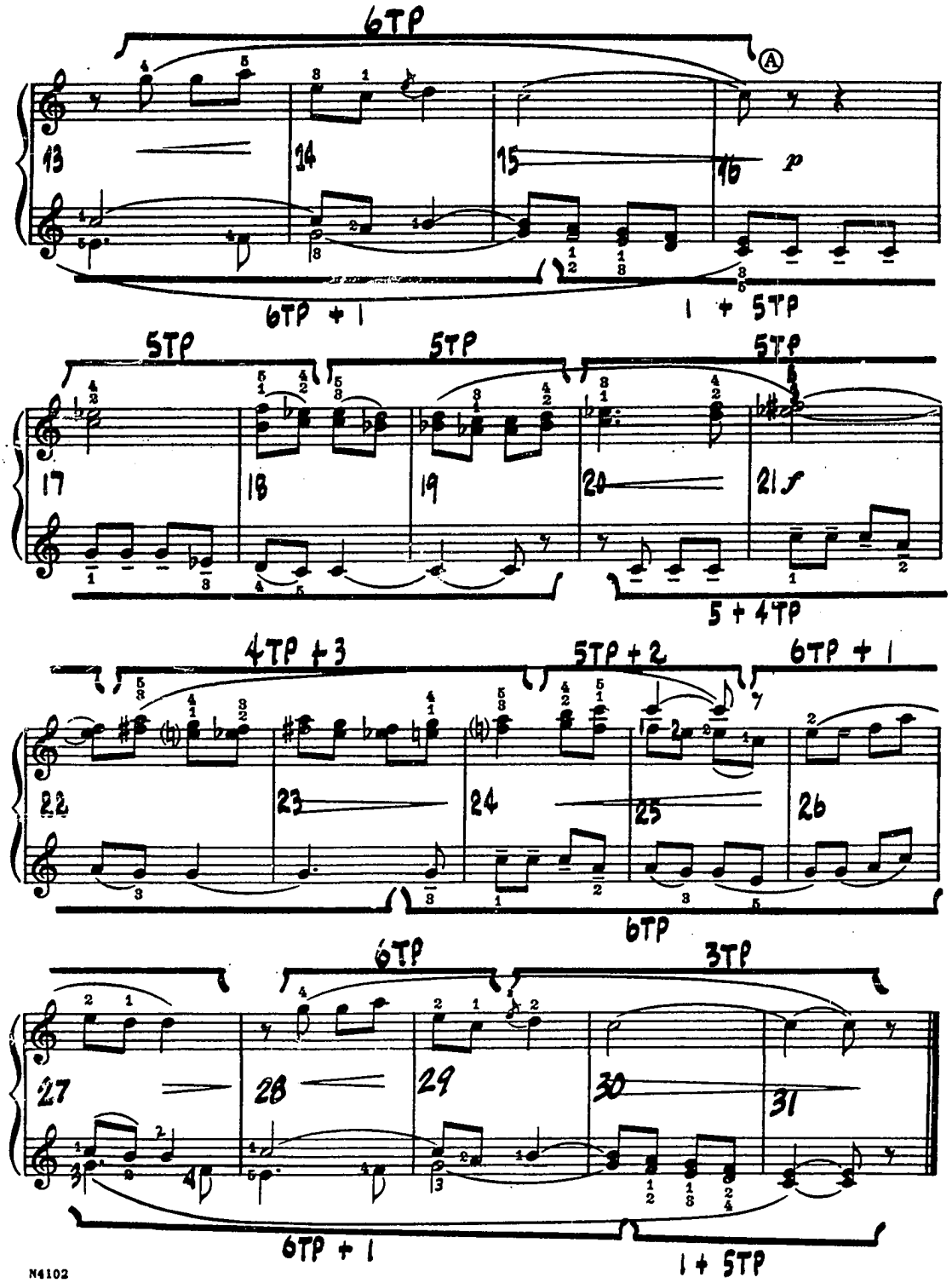

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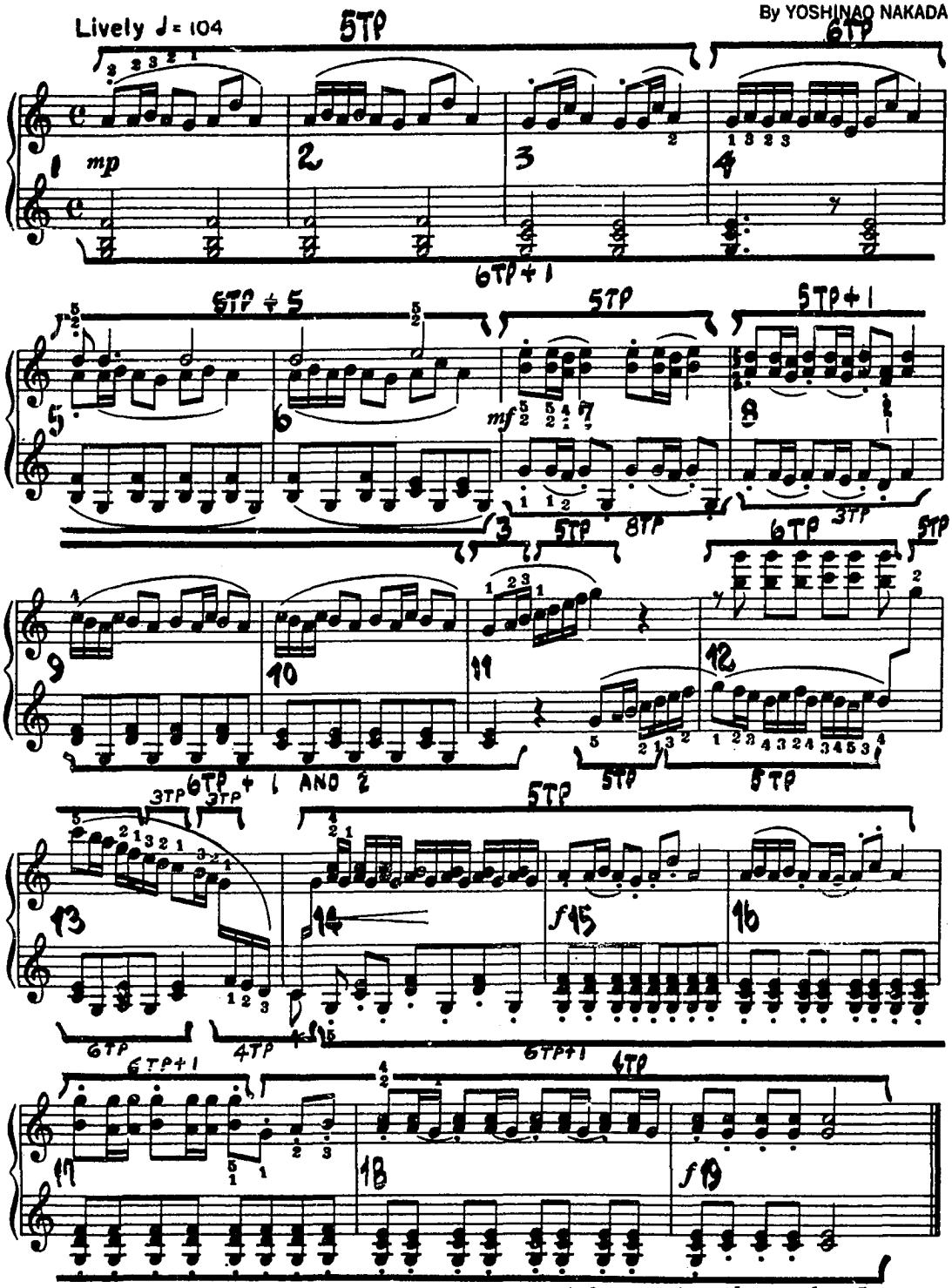
THE GEAR-WHEELS OF A WATCH

時計のはぐるま

"JAPANESE FESTIVAL"
By YOSHINAO NAKADA



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APPENDIX C

RAW DATA

REPETITIONS RAW DATA

Composition Number	Control Group	Experimental Group
1	30	45
1	58	47
1	87	50
1	111	83
2	26	17
2	37	25
2	54	29
3	26	35
3	74	59
3	84	71
3	112	74

TIME RAW DATA

Composition Number	Control Group	Experimental Group
1	97	63
1	154	78
1	213	86
1	284	104
2	39	23
2	62	41
2	154	81
3	69	79
3	122	109
3	128	118
3	169	132

CONTROL GROUP RETENTION DATA

Composition Number	Jurors			Rating Average
	A	B	C	
1	2	2	1	1.7
1	1	1	1	1
1	1	1	1	1
1	2	2	2	2
2	1	1	1	1
2	3	2	2	2.3
2	1	2	2	1.7
3	1	1	1	1
3	2	3	3	2.7
3	3	3	3	3
3	2	2	2	2

EXPERIMENTAL GROUP RETENTION DATA

Composition Number	Jurors			Rating Average
	A	B	C	
1	3	3	3	3
1	1	1	1	1
1	3	2	3	2.7
1	2	1	2	1.7
2	2	2	1	1.7
2	3	3	2	2.7
2	1	2	1	1.3
3	1	1	1	1
3	1	1	1	1
3	3	3	3	3
3	3	3	3	3

APPENDIX D

JURORS

JURORS

Mildred Green, Assistant Professor, LeMoyne-Owen College, Memphis, Tennessee.

Marguerite Miller, Assistant Professor, Wichita State University, Wichita, Kansas

Ruth Harrison, Instructor, Texas Southern University, Houston, Texas