RHYTHM IN THE THEORY AND MUSIC OF PAUL HINDEMITH

By

Gary Allen Sprague

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Music Theory
School of Music

1997

ABSTRACT

RHYTHM IN THE THEORY AND MUSIC OF
PAUL HINDEMITH

By

Gary Allen Sprague

This study investigates the similarities and differences between Paul Hindemith's theoretical writings on rhythm and the application of rhythmic principles in his musical compositions. Hindemith's primary texts address the function of harmony and melody; the omission of rhythm has been described as a major flaw in his theory. However, references to rhythm are scattered throughout Hindemith's writings. Additional questions address the relationship of rhythm to melody and harmony according to Hindemith, similarities and differences between Hindemith's concept of rhythm and other theories, and the development of an analytical model for use in studying Hindemith's music.

Chapter One presents biographical information concerning Hindemith and his major works. A brief survey of rhythmic theory is presented to place Hindemith's ideas in historical context. Chapter Two presents Hindemith's theories of melody and harmony from The Craft of Musical Composition. References to rhythm are taken from all three volumes of The Craft, Elementary Training for Musicians, the two volumes of Traditional Harmony, and Hindemith's lecture notes. Chapter Three develops an analytical model for rhythm by exploring five recent models. Chapter Four applies this model in a rhythmic analysis of the First Piano Sonata (1936) by Paul Hindemith. To answer the primary research question, a comparison is made between the rhythmic characteristics of Hindemith's music and the general features of rhythm in music of the common practice period.

The major findings of the research are:

1) Hindemith's understanding of rhythm is orthodox compared to his alternative theory of harmonic and melodic organization;
2) Hindemith's writings confirm that rhythm, and especially meter, is the organizational force that controls the other elements and parameters of music;
3) Hindemith's application of rhythm is similar to that of the common practice period, although he does veer from common practice norms in certain areas;
4) The proposed model of analysis based on Hindemith's compositional procedures and metric organization does not conflict with Hindemith's theories of rhythm;
5) Hindemith's application of rhythmic principles in his music does support his theoretical references to rhythm.

This dissertation is dedicated to my family, who have remained loyal and supportive through the life of this project: my wife Julie, children Sarah and Ben. Thank you for your loving patience and support.

ACKNOWLEDGEMENTS

The writer graciously expresses his thanks to Dr. Bruce Campbell, guidance committee chairman, for his assistance in completing this dissertation project. Committee members Dr. Charles Ruggiero, Dr. Dale Bonge, and Dr. Jere Hutchesen, and Dr. Dixie Durr are also thanked for the final reading of the manuscript. Thank you to Dr. Cynthia Taggart for much-needed encouragement.

Dr. David Neumeyer of Indiana University is thanked for his assistance in acquiring the partial translation of Craft III and the Cleveland lecture notes of Hindemith. Without his previous research this work could not have been completed.

Permission was granted from European American Music Distributors Corporation, sole U.S. and Canadian agent for Schott & Co., to reproduce excerpts and examples from the copyrighted works of Paul Hindemith: from Erste Sonate für Klavier, 1936, © B. Schott's Soehne, Mainz, 1936, © renewed, all rights reserved; from The Craft of Musical Composition Book 1: Theory, ©1942 Schott & Co., Ltd., London, copyright renewed, all rights reserved; from Craft of Musical Composition Book 2: Exercises in 2-Part Writing, ©1939 by B. Schott's Soehne, English translation ©1941 by Schott & Co., Ltd., copyright renewed, all rights reserved.

"Theory cannot do everything: it can only guide. The human element of feeling, with its imperfections, must be present to move the emotions."

C. F. Abdy Williams,
The Rhythms of Modern Music.
(London: Macmillan and Co., Ltd.,
1909: 85.)

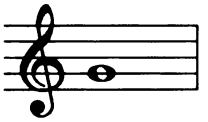
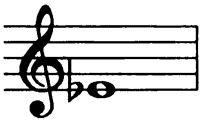
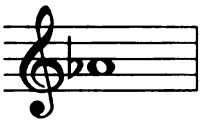
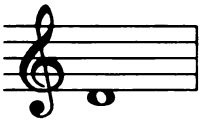
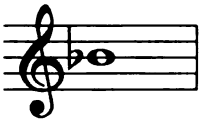
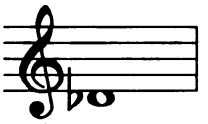
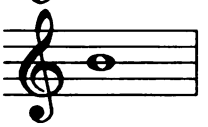
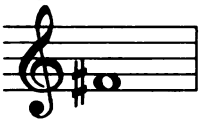
TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

(List of Figures, continued)

Key to Symbols

	Hindemith's Symbols	Neumeyer's Adaptations	Root Function
	Φ	Φ	Tonic
	♁	♁	Perfect Fifth
	♀	♀	Perfect Fourth
	VI	VÍ	Major Sixth
	III	IÍI	Major Third
	II\III	IÌI	Minor Third
	V\VI	VÌ	Minor Sixth
	II	II	Major Second
	VI\VII	VII	Minor Seventh
	↧	↧	Minor Second (Upper Leading Tone)
	↥	↥	Major Seventh (Lower Leading Tone)
	♉	♉	Tritone

Chapter 1

Introduction

Paul Hindemith (1895-1963) was influential as a performer, conductor, composer, teacher, and music theorist. His musical life has borne much criticism, from his belief in the usefulness of music (popularly labeled Gebrauchsmusik), to his formulation of unique theoretical ideas. Kemp has stated that Hindemith was "the foremost German composer of his generation;" he was important to musical developments in both Europe and America preceding and following World War II.[1] Musicians still perform Hindemith's sonatas while most major orchestras include Symphony: Mathis der Maler (1934) and Symphonic Metamorphosis of Themes by Carl Maria von Weber (1943) in their repertoires. Other works such as Ludus Tonalis for piano (1942) and the song cycle Das Marienleben (1922-23, revised version 1948) are interesting from a contrapuntal and theoretical viewpoint.

Hindemith's teaching stresses three criteria for a composer: inspiration, worthwhile musical ideas, and technique. "When a composer writes he must be able to do so without any consciousness of technic [sic]....the composer must be wholly unhampered by mechanical contrivances of any kind."[2] His books

---

[1] Stanley Sadie, ed. New Grove's Dictionary of Music and Musicians, Volume 8, (New York: MacMillan Publishing Co., Ltd., 1980), s. v. "Paul Hindemith," by Ian Kemp, 573.

[2] Paul Hindemith, "Time, Only, Tells," Etude 57 (October, 1939): 629; Idem, The Craft of Musical Composition, Vol. 1: Theoretical Part, trans. by Arthur Mendel (New York: Associated Music Publishers, 1942, rev. 1945): 2, 11.

develop a concise theory of music, emphasizing the development of technique for the success of the composer.

Statement of the Problem

Hindemith felt that the old system of tertian harmony was useful only as an historical method,[3] so many of his books on music theory provided teaching materials for his classes at Yale University. The two-volume set A Concentrated Course in Traditional Harmony provides teaching materials in condensed form which introduced the student to the study of traditional harmony in an efficient yet thorough manner.[4] His intent was to move the student quickly from the exercises to what he considered to be "living music."

Elementary Training for Musicians is a rudiments text covering basic fundamentals and aural training for the beginning musician.[5] Each chapter is divided into three parts: Action in Time, Action in Space, and Coordinated Action. Exercises develop awareness of rhythm and meter by stressing the activities of clapping or tapping rhythms, singing intervals and melodies, and taking rhythmic and melodic dictation. A third book, A Composer's World: Horizons and Limitations, is based upon the 1949 Norton lectures at Harvard University.[6] In this

---

[3] Hindemith, Traditional Harmony, Vol. I, iv.

[4] Paul Hindemith, A Concentrated Course In Traditional Harmony, Volume I. (New York: Associated Music Publishers, 1943); Idem, A Concentrated Course In Traditional Harmony, Volume 2: Exercises for Advanced Students, translated by Arthur Mendel. (New York: Associated Music Publishers, 1949).

[5] Hindemith, Elementary Training for Musicians. (New York: Associated Music Publishers, 1946).

[6] Hindemith, A Composer's World: Horizons and Limitations. (New York: Anchor Books, 1952, rev. 1961).

volume Hindemith discusses many aspects of music, including his personal philosophy of music.

The Craft of Musical Composition is the main source for Hindemith's theory.[7] In these three volumes he works out a system of composition and pedagogy that attempts to explain all music—past, present, and future—and that is also applicable to music of non-Western traditions. The Craft series is both a theoretical treatise on the nature and order of tones as well as a method of teaching composition. Hindemith emphasizes the role of harmony and melody in his theory, providing a unique alternative to traditional harmonic and melodic analysis. The development of his theory in The Craft led him to an increasing reliance on a type of functional harmony, especially with those works directly aligned with The Craft theory, such as Ludus Tonalis for piano (1942).

> His devotion to tonality, a melodic style based on the four-phrase sentence derived from folk-song, chorale, and march, and a metric accentuation drawn from similar models yielded a personal profile already well-established by the 1930's.[8]

Although many references to rhythm occur in his books and articles, he fails to include a detailed discussion of the role of rhythm in the creation of a musical composition.[9] When rhythm is mentioned it is usually linked in some way to its interaction with melody and harmony.

While Hindemith consistently criticizes the world of music theory for being

---

[7] Paul Hindemith, The Craft of Musical Composition, Vol. 1: Theoretical Part, trans. by Arthur Mendel (New York: Associated Music Publishers, 1942, rev. 1945); Idem, Vol. 2: Exercises in Two-Part Writing, trans. by Otto Ortmann (New York: Associated Music Publishers, 1941); Idem, Übungsbuch für den dreistimmigen Satz, ed. by Briner, Meier, and Rubeli. (Mainz: Schott and Co., 1970.) Hereafter referred to as Craft I, II, or III.

[8] Glenn Watkins, Soundings: Music in the Twentieth Century, (New York: Schirmer Books, Inc., 1988): 348.

[9] William Thomson, "Hindemith's Contribution to Music Theory," Journal of Music Theory 9 (1965): 66, 69.

unable to explain the working processes of rhythm, he himself formulated only an incomplete theory of rhythm.[10] In light of the fact that Hindemith's theories of harmony and melody have been used to analyze much of his music, the specific role of rhythm in his compositions and theory has been largely neglected. A comparison of Hindemith's theoretical concepts of rhythm with the application of rhythmic principles in his musical compositions needs to be addressed more completely.

Background of the Problem

Hindemith's work has been divided into three style periods: his youth to 1923, 1924-1933, and 1933-1963.[11] Born on November 16, 1895, his family moved to Frankfurt, Germany in 1902 where his father was a house painter. Hindemith began violin lessons at age 9 and four years later received free admission to the Hoch Conservatory, his teachers being Anna Hegner and Adolf Rebner. In 1912 he began composition lessons with Arnold Mendelssohn and Bernard Sekles.

The works of the first period consist primarily of required conservatory compositions in the late Romantic style of Brahms.[12] Representative of his student pieces are the String Quartet in C major from 1915 (his Opus 2), a

---

[10] Hindemith, Craft I, 179; Idem, Elementary Training for Musicians, 157, 159; Idem, Craft III, 30, Translation, 21-22; Idem, "Methods of Music Theory," 23-24.

[11] Sadie, s.v. Kemp, 575.

[12] For a complete chronological listing of Hindemith's works see David Neumeyer, The Music of Paul Hindemith (New Haven: Yale University Press, 1986), 253-283.

Concerto in E♭ for cello and orchestra (Opus 3 composed in 1916), and many smaller works for voice, piano, and accompanied instruments. He was the leader of the Frankfurt opera orchestra and second violinist in the Rebner string quartet. In 1917 Hindemith was drafted to serve in the German infantry during World War I where his commanding officer allowed him to form a regimental band and string quartet. Hindemith continued to compose and perform after the war, experimenting with different styles and means of expression.

His first important operas are the one-act plays produced during the 1919-21 seasons in Frankfurt. Mörder, Hoffnung der Frauen (1919) is based on the play by Kokoshka which ten years earlier had started the expressionist movement in literature. Das Nusch-Nuschi (1920) mimics Schoenberg's "Pierot" in the use of Burmese marionettes. The third opera, Sancta Susanna (1921), is a study of sexual tension and religious desecration. The scandalous subject matter of these three operas is reinforced by a very chromatic musical language in the style of the atonal expressionists. Hindemith was also influenced by American jazz with its robust rhythms and futuristic, experimental tendencies representative of the Dadaist movement in art.[13]

Hindemith received further national recognition as a composer at the 1921 Donaueschingen festival. The Amar quartet, in which he played viola, performed his second String Quartet. The success of Hindemith's Kammermusik No. 1 for twelve instruments at the festival the following year established him as one of Germany's leading young composers.[14] During the 1920's, Hindemith concentrated on reading and studying historical music manuscripts and treatises by such authors as Boethius, Zarlino, and Fux. He was also well versed in the writings of his contemporary theorists Riemann, Schenker, and

---

[13] Watkins, 291-292.

[14] Ian Kemp, Hindemith, (London: Oxford University Press, 1970), 10.

Schoenberg.[15]

Neoclassicism is one description of Hindemith's style, which he may have emulated from his knowledge of early music.[16] Neoclassical tendencies include the use of smaller, mixed ensembles of instruments, the use of concise formal structures based on earlier models such as the sonata and dance forms, and the extensive use of counterpoint.[17] The music of Bach is especially influential during his second style period from 1924-1933. The Kammermusiken series for chamber orchestra and various solo instruments reflects the Baroque concerto grosso in instrumentation and contrapuntal technique. These years have been labeled Hindemith's neo-Baroque period.[18]

Two developments are important to Hindemith's career during his second period. The first is his appointment to teach at the Hochschule für Musik in Berlin in 1927. "His teaching...was based more on practice—composing, singing, playing instruments—than on theory. He insisted on the writing of many basic exercises and on practical experience in ensemble performance."[19]

Hindemith quickly fell in love with teaching and eventually developed several useful books and techniques to explain contemporary music. Hindemith required his students to perform music by singing, playing instruments, and

---

[15] David Neumeyer, The Music of Paul Hindemith. (New Haven: Yale University Press, 1986): 24.

[16] James Kidd, "Aspects of Mensuration in Hindemith's Clarinet Sonata," The Music Review 38/3 (August, 1977): 211-222. Kidd claims to have discovered features of fourteenth-century mensural rhythmic practices in measures 12-25 of Hindemith's clarinet sonata by 1) the change of pulse duration opposing the meter, 2) division from triple to duple, and 3) unusual proportional groupings such as four half notes in the time of three and three half notes in the time of six.

[17] Watkins, Soundings, 341ff.

[18] Sadie, s.v. Kemp, 573.

[19] Marcelle Vernazza, "Paul Hindemith—Music Educator," The American Music Teacher (June/July, 1974): 30.

composing basic exercises in theory and composition.

The second development is founded in his belief in the practical necessity of music. He wrote Gebrauchsmusik, or music for use, beginning in the mid-twenties to 1932. Hindemith tried to bridge the gap between the creator, the performer, and the listener by writing music that is readily accessible to all.[20] He believed that composers had a moral obligation to create music for the good of society, which includes amateurs as well as professional performers.[21] "In composing music for this series, he used the same practical principles he insisted on with his composition students, that is, that the composer keep in mind who is to play the music and for what kind of an audience."[22] These pieces include, among many others, the last six Kammermusik (1924-1927) for various soloists and ensembles, the musical Lehrstucke (1929), the children's musical Wir bauen eine Stadt (1930), and Plöner Musik tag (1932).

The change in politics in Germany during the 1930's is a catalyst for Hindemith's third style period beginning about 1933. He refused to write music that directly supported Nazi government policy which promoted German nationalistic music of a more conservative nature. The avante-garde chromatic style of his early music was not favored by the government. He also maintained professional and personal relationships with Jewish musicians. His opera Mathis der Maler (1933-35) about Mathias Grünewald's struggle during the peasant revolts of the sixteenth century was construed as representing the government's censorship of non-German artists. The National Socialist political party began a newspaper campaign against Hindemith in the late 1920's. Hindemith struggled to retain artistic individuality, but his music was officially boycotted by the

---

[20] Neumeyer, The Music of Paul Hindemith, 5.

[21] Hindemith, A Composer's World: Horizons and Limitations (New York: Anchor Books, 1952), 144; Idem, Craft I, 12.

[22] Vernazza., 31.

Nazis in October of 1936. He was accused "of lacking proper respect for German traditions, associating and working with Communist musicians and artists, writing music simply for profit, and other acts deemed felonious by the Nazis."[23]

Folk music is another influence on Hindemith's style during this time .[24] Folk elements are used extensively in the opera Mathis der Maler (1933-35), the viola concerto "Der Schwanendreher" (1935), and his third organ sonata (1940).[25] He also began a series of sonatas for every instrument of the orchestra, in keeping with his neoclassical emphasis. Other important works are the Symphonic Metamorphosis on Themes of Carl Maria von Weber (1943), the revised opera Cardillac (1926, 1952) and Die Harmonie der Welt (1957). Hindemith began teaching at Yale University in 1940. From 1953-58 he was professor of music at the University of Zurich. He remained active as a composer and conductor until his death in 1963.

Early Rhythmic Theories

Since a primary concern of this study is to explore Hindemith's ideas about rhythm, it will be necessary to investigate the history of the word "rhythm." The English word "rhythm" has been traced to its ancient Greek origins meaning "to flow," as in the action of moving water. Some writers suggest that to study

---

[23] Luther Noss, Paul Hindemith in the United States (Urbana: The University of Illinois Press, 1989), 10-11. See also Heinrich Strobel, Paul Hindemith: Testimony in Pictures (Mainz: B. Schott's Söhne, 1961), 53-55.

[24] Watkins, Soundings, 293-94.

[25] Albert George Bolitho, "The Organ Sonatas of Paul Hindemith" (Ph.D. diss., Michigan State University, 1968).

rhythm is to study sounds and silences as they occur in the flow of time.[26]

Rowell has provided a more complete understanding of the etymology of "rhythm."[27] The ancient Greek word rhythmos has several origins that resulted in a variety of meanings. The older form of the word deals with both the character and temper of a person and the daily divisions or events in a person's life. Later, the term takes on other more specific meanings, from shaping a cake, to directing one's mind, to the motion of a battle line or the scansion of poetry. He concludes that,

> ...the basic meaning was form, specifically the form of a moving thing with both internal structure and external limitation....The Greeks slowly worked out a problem—how to describe what they perceived as structural movement with clear limitations. In this process the meaning hold, flow, and pull, as well as character, form, and back-and-forth, were mingled. By the time of Aristides Quintilianus, rhythm in music was defined as schêma ('shape') + táxis ('structure') + kínesis ('motion').[28]

The problem arises in defining the articulations. What divides the internal structure and sets the external limitations, whether it be in a building, a sculpture, or a musical composition? Rowell goes on to explain:

> In the theory of Greek music the semeîa are the points that mark the extremities of musical figures, a dancer's pose, the extremity of a gesture, speech syllables. Both Aristides and Aristoxenus clearly thought of single musical tones and single musical time units as points.[29]

These "points" are directly related to the points of mathematical geometry and astronomy. Furthermore, ancient Greek music is based upon mathematical proportions. The primary purpose of rhythm is to organize the musical elements

---

[26]Allen Winold, "Rhythm in Twentieth-Century Music," Aspects of Twentieth Century Music, ed. by Gary Wittlich. (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1975): 209.

[27] Lewis Rowell, "The Subconscious Language of Musical Time," Music Theory Spectrum 1 (1979): 96-106.

[28] Ibid., 99-100.

[29] Ibid., 102.

into comprehensible structures.[30] Anything not based on proper proportions was considered unnatural and therefore unmusical. A definition of rhythm that is based upon the Greek meaning should also include an idea of the "seams" or time-points which articulate structure.

In Greek music, the semia, or timepoints, may have been related to durational emphasis derived from spoken language and poetry. The three primary types of accent in ancient Greek language, as well as other ancient languages, are the acutus, the circumflex, and the gravis, and indicate high or rising, rising-falling, and low or falling pitch respectively.[31] Greek accents did not include the idea of dynamic stress; the emphasis is one of duration in which syllables with long vowels are approximately twice as long as the duration of syllables with short vowels.

Another concept from Greek theater is the arsis and thesis, or upbeat and downbeat. The leader marks time for the dance and chorus by tapping a series of beats very lightly with the foot. Poetry which emphasizes the thesis too much is considered flawed.[32] It is, however, argued that stressed syllables occurring with the thesis are a natural phenomenon, even as it developed in the Greek chorus.[33] The Greek concept of marked time is quite different than the modern emphasis on dynamic accent and stress.

Features of rhythm in medieval music coincide with the development of music notation. Music in the Roman empire maintains many of the concepts of

---

[30] Ibid., 103-104.

[31] James Morgan Thurmond, Note Grouping: A Method for Achieving Expression and Style in Musical Performance, (Camp Hill, PA: JMT Publications, 1982): 26-27.

[32] Ibid., 28.

[33] Curt Sachs, Rhythm and Tempo: A Study in Music History, (New York: W.W. Norton, Inc., 1953): 140-143.

Greek music theory and rhythm. During the early Christian era music is divided between the Gregorian chant in the sacred liturgy of the church and monophonic secular music. By the ninth century the system of neumes, used as a mnemonic aid in the northern countries, is used to show relative pitch relations.[34] Some early manuscripts also show rudimentary rhythmic symbols, but there is no agreement as to the interpretation of those symbols.[35] Eventually the four-line staff, attributed to Guido d'Arezzo, shows more exact pitch relationships.

A more precise system of rhythmic notation developed as a result of measured polyphonic music at Notre Dame and elsewhere in the twelfth century. The rhythmic modes, probably based upon meters of ancient Greek poetry, provided a means to notate rhythm as well as pitch (Figure 1). The rhythmic modes relied on the difference in length between the long and breve and were used in both sacred and secular music of the time. The modes helped bring about the idea of the single group of notes heard as a unit, which possibly influenced the development of the single measure or bar.

Rhythmic developments of the fourteenth century are an increased freedom in the application of different durations and the the use of rhythm as a formal device. The isorhythmic motets of this century use both a repeated melody, the color, and a repeated metric or rhythmic pattern, the talea, set against a cantus firmus. Rhythm begins to play a more prominent role in the construction of musical forms.

---

[34] Richard Hoppin, Medieval Music, (New York: W. W. Norton, 1978), 57-58.
[35] Ibid., 89-90.

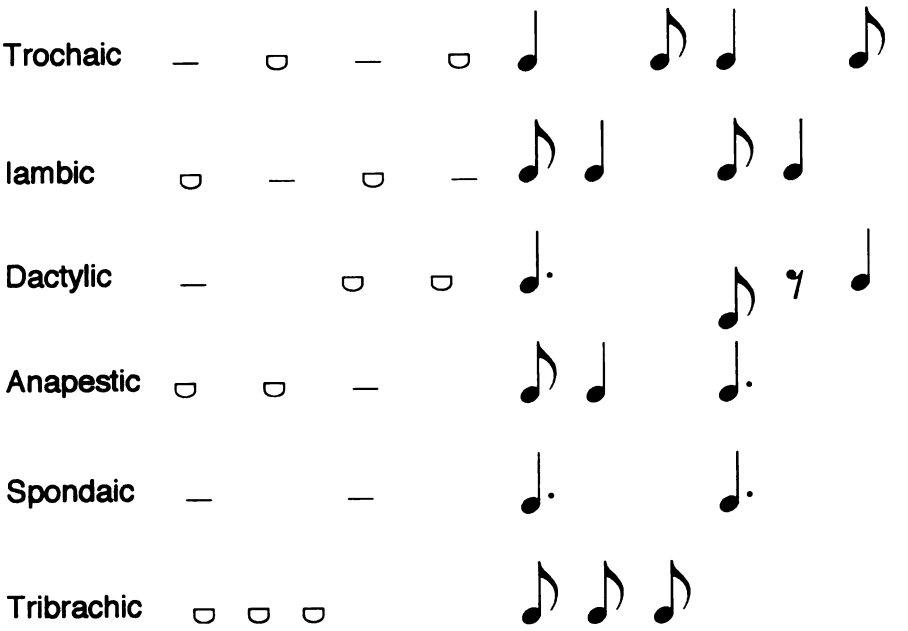


Figure 1: The Medieval Rhythmic Modes

Notational conventions quickly codified musical practices of the Ars Nova. Increasingly, composers use shorter and shorter note values and mensural notation eventually replace the old rhythmic modes in practice as well as effect (Figure 2).[36] Triple subdivisions of the longer note values are labeled "perfect" while duple divisions, now allowable, are considered "imperfect." A system of time signatures is introduced to assist performers in interpreting the new rhythmic notation. By the end of the fifteenth century notational practices became more consistent, even though older systems are in use long after new developments take place. The basis for modern notation is in place by the beginning of the Renaissance.[37] Textual phrases and repetitions determined formal musical structures of secular monophonic songs such as the ballade, virelai, and rondeau.

The notational conventions of the Ars Nova continue to develop into the Renaissance period. Metric proportions are a regular feature of Renaissance music. As proportional meters replace the original meter in sections of the composition, or even in different vocal parts, the result is notationally complex and often conflicting rhythm patterns.

A solution to reading music more fluently is the addition of barlines to the score.[38] An ultimate result of the stress on the thesis in the old rhythmic modes is rhythmic grouping around the barline.[39] The regular addition of barlines to the score result in a stronger emphasis on the downbeat and assist in the development of four- and eight-bar phrase structures in stylized dance music.

---

[36] Hoppin, 354-355.

[37] Gustave Reese, Music in the Middle Ages, (New York: W.W. Norton and Co., 1940): 346.

[38] Ibid., 257-259.

[39] Thurmond, 31-33.

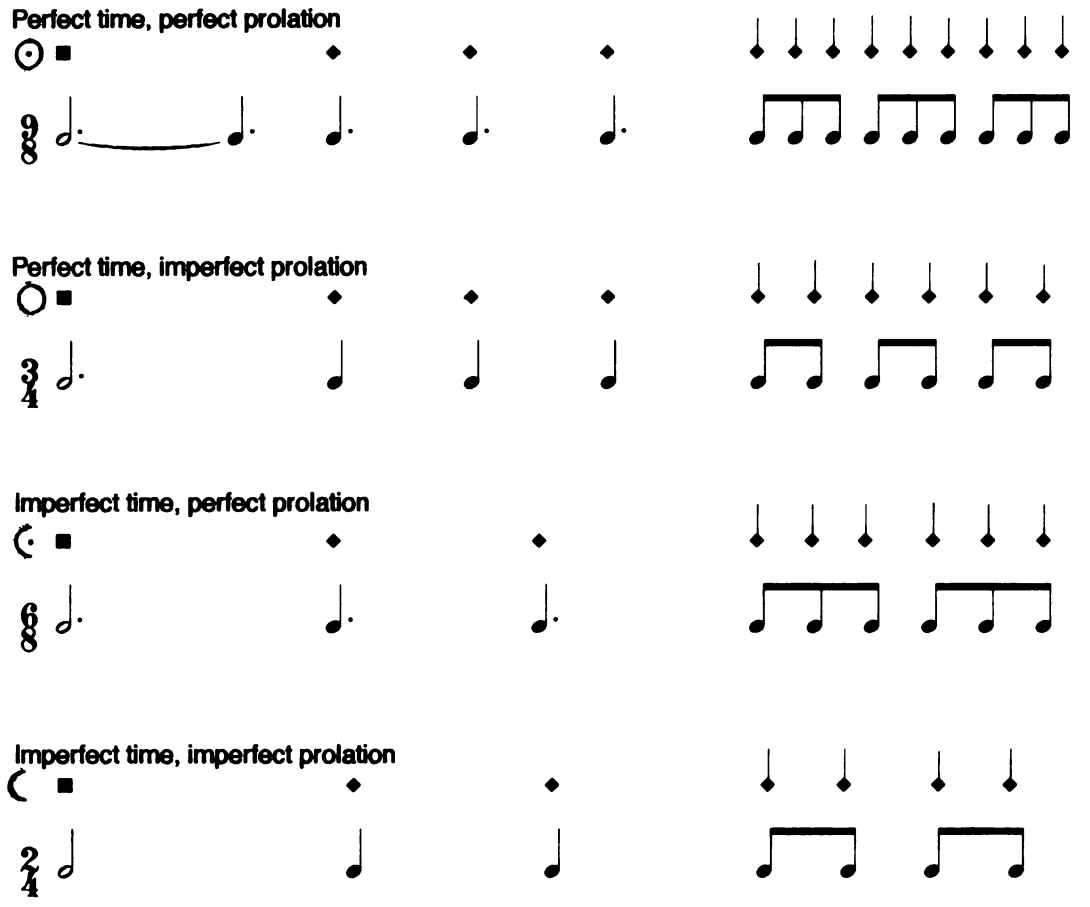


Figure 2: Notational Mensurations of the French Ars Nova

Throughout the Baroque era rhythm is divided between free and strict practices.[40] In general, early Baroque Italian madrigals and the monody and recitative of the first operas require a free, unencumbered rhythmic flow. Instrumental music, in the form of freely improvised toccatas, adapt the free rhythms and tempos of vocal music. However, compositions which are of more precise formal construction such as dance movements, fugues, canons, and the da capo aria require a much stricter tempo and rhythmic flow.

By the end of the Baroque period, the modern system of notation and rhythm is finalized. Once composers consistently use standardized notational practices, theorists begin to concentrate on matters of form, or the anatomy of musical composition. Mattheson and Koch, among others, use terms such as paragraph, sentence, predicate, subject, and comma to describe musical phrases and period structure. In Kirnberger's theory, accentual differences of adjacent measures are prominent. He did not apply the concept of alternating heavy and light accents to larger formal units, however.[41] Concepts of phrase length and rhythmically-defined harmonic cadences are used to analyze music by the end of the eighteenth century.[42]

Some theorists in the nineteenth century looked more broadly at the constructions of rhythm. According to Morgan, the theorist Gottfried Weber formulated the first clear hypothesis concerning the function of rhythm on a higher level than measure to measure.

In Weber's theory of rhythmic grouping, beats group together to create measures. These groups then in turn form larger symmetrical groups with the

---

[40] Sachs, 273-82.

[41] Robert P. Morgan, "The Theory and Analysis of Tonal Rhythm," The Musical Quarterly 64/4 (October, 1978): 436-37.

[42] Leonard G. Ratner, "Eighteenth-Century Theories of Musical Period Structure," The Musical Quarterly 62:4 (October, 1956): 442.

same inherent qualities as the smaller group. These longer groups are then combined to build even longer rhythmic structures. Three basic assumptions inherent in Weber's theory of rhythm permeate rhythmic thought to the present:

> (1) accents of sufficient weight and importance assume formal significance; (2) these accents relate to one another in a manner analogous to the relation of beats within measures; and (3) larger formal units result from an accumulation of smaller units through a process of addition (or more precisely, multiplication) into ever larger groups.[43]

Hauptmann's systematized theory of symmetrical rhythmic structures, which appears later in the nineteenth century, stresses beginning-accented rhythms which he termed "positive," and end-accented rhythms which he labeled "negative." Hauptmann's theory is based on a two-element pattern called the "thesis." Rhythmic units that appear to be longer than two-element units are made up of intersections of the shorter two-element units. The three-element unit is the "antithesis" and the four element unit (the combination of two-element units) is the "synthesis."[44]

In Riemann's theory a motif (a stream of pulses or beats in a weak/strong relationship) is considered the smallest rhythmic unit. Motifs combine to create phrases, then periods, and finally whole sections of a composition.[45] Phrases of shorter or longer length are a result of elision, extension, or truncation.[46] Riemann's system of diagraming phrases uses slurs to indicate the various types of extensions and truncations. He further develops Weber's original concept of rhythmic structural symmetry, insisting on the notion that all phrases commence with an upbeat, the universality of the four-bar phrase, and the relationship of

---

[43]Morgan, 437.

[44] Ian Bent, Analysis. (New York: W.W. Norton and Co., 1987): 30.

[45] Bent, Analysis, 90-93.

[46] Sadie, Volume 1, 375-376.

the antecedent and consequent.[47] Of Riemann's treatise, Hindemith says "what [Riemann] accomplished was the analysis of rhythms, not the discovery of the principles underlying them." [48]

Morgan has divided these early rhythmic theories into two schools of thought, both of which arrive at similar conclusions.[49] One school uses the analogy of language and describes musical rhythm in terms of poetic feet. This group includes Westpahl (1880), Wiehmayer, and Cooper and Meyer (1960). The other school emphasizes meter and the measure and includes Weber, Hauptmann, and Riemann.[50] Both schools begin with small units that are combined into longer structures organized around a system of accents which creates a hierarchy of structural levels. Hindemith's ideas concerning rhythm fall into the group concerned with metric organization rather than organization by poetic feet.

Through analysis of the music of various composers, Winold has identified twelve characteristics of common practice rhythmic patterns.[51] Common

---

[47] Nicolas Slonimsky, ed, Baker's Biographical Dictionary of Musicians, 7th ed. (New York: Schirmer Books, Inc., 1992): 1,898. Riemann took a different approach to harmonic theory during his time, which taught chords as part of patterns of progressions according to Rameau's ideas of the thorough bass. Riemann developed the idea of the functionality of triads in the tonal system. The secondary chords (II, III, and VI) served as representatives of the primary chords rather than independent members of a chord progression. Therefore, the II chord fulfills the function of IV, III of V or I, and VI of I or IV. Functionality of the triads was presented in great detail in his treatise Vereinfachte Harmonie lehre oder die Lehre von den tonalen Funktionen der Akkorde (1893).

[48] Hindemith, "Methods of Music Theory," 24.

[49] Morgan, 439.

[50] The conflict between language-based rhythms and musically-based rhythms has existed throughout Western music history, even in ancient Greece. See Sachs, 138-140..

[51] Allen Winold, "Rhythm in Twentieth-Century Music," in Aspects of Twentieth Century Music, ed. by Gary Wittlich. (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1975): 216-17, 244.

rhythmic features among many tonal compositions include the following:

1. Regular pulses are clearly heard or implied and are equal-timed;
2. Pulses are grouped into two's or three's;
3. Pulse groups are maintained throughout most of the composition;
4. Pulse groups on various levels coincide with pulse groups on higher or lower levels;
5. Constant tempo predominates throughout an entire composition or section;
6. Meter signatures remain constant throughout an entire composition or section;
7. One duration predominates as the basic unit of movement, and very short durations are rare except in special localized circumstances;
8. Motivic, ("rhythmic") units are primarily based on metric patterns;
9. A limited number of rhythmic units combine to create longer "rhythmic gestures";
10. Upbeat, or anacrustic, beginnings predominate;
11. Repetition and variation of rhythmic gestures is quite common as well as rhythmic gestures in ternary patterns;
12. The composite rhythm generally confirms the metric structure.

Such a list of common features as this is used as a standard to identify stylistic traits. It is interesting to see how composers work against these basic features in their compositions to create their own individual styles.

Purpose of the Study

The brief survey of the history of rhythm serves to show the disparity among theorists and composers regarding the rhythmic element of music. Finding a complete and adequate explanation of rhythm may be altogether impossible, as agreement among scholars is inconsistent.[52]

It has been proposed that Hindemith's theory presented in The Craft is lacking in one important area—that of an adequate explanation of rhythmic

[52] David Epstein, Shaping Time: Music, the Brain, and Performance, (New York: Schirmer Books, 1995): 3-4.

principles, yet it will be interesting to see how Hindemith's views on rhythm fit into the overall historical debate. Since rhythm is considered to be one of the primary elements of music, it seems that this omission is a major flaw of Hindemith's theory.

There are, however, numerous references to rhythm throughout Hindemith's writings. This researcher's purpose is to discover if there are similarities between Hindemith's theoretical writings on rhythm and the application of rhythmic principles in his musical composition. Furthermore, The Craft theories are directly linked to Hindemith's experiences as a teacher of composition and his practice as a composer. A rhythmic analysis of some of his music will lend practical information to the comments from the written literature. The Craft must be understood in light of its intent: to provide a method of teaching musical composition. The theories of melody and harmony presented by Hindemith will be studied to see if Hindemith's rhythmic ideas are explained equally well.

Research Questions

Research question: Does Hindemith's use of rhythm in his musical compositions reflect his explanations of rhythm in the theoretical writings?

Collateral question 1: What is the relationship of melody, harmony, and rhythm in The Craft of Musical Composition and Hindemith's other writings?

Collateral question 2: What are the similarities and differences between Hindemith's concept of rhythm and other theories of rhythm?

Collateral question 3: Can a method of rhythmic analysis be developed which supports Hindemith's concept of rhythm?

Organization

In the introductory chapter, I have presented necessary background information about the topic. The need for the study is stated as a necessary endeavor which will clarify our understanding of Hindemith's conception of rhythm. Biographical information concerning Hindemith and his major works with divisions of his compositional life has been given as an aid to understanding the development of the theory and his growth as a musician. A brief historical survey of rhythmic theory has been presented to place Hindemith in proper historical perspective.

In Chapter 2 I will review Hindemith's theories of melody and harmony from The Craft. His ideas of rhythm will be explored from The Craft and other sources. Chapter 3 will compare five current models of rhythmic analysis. A method of analysis will be developed which supports Hindemith's understanding of rhythmic structure in both foreground patterning and background organization. An application of this model of analysis will be presented in Chapter 4 using Hindemith's Piano Sonata in A from 1936 as the music sample. Finally, Chapter 5 will provide a summary of the findings of the research, answering the stated research questions presented above. Areas of continuing research will also be proposed and discussed.

Scope and Limitations

This study will be limited in its scope to a narrow range of Hindemith's output. It is believed that the music written at the same time that The Craft theories were being developed reflects the application of those theories. Therefore, the sample of music to be analyzed will be chosen from Hindemith's second style-period. A second concern is in the varied genres of Hindemith's music. The text of vocal genres may influence the application of certain rhythmic principles because of the requirements of language. For example, normal structures of vocal music are dependent upon characteristics of the text such as number of syllables per line, phrase length, and rhyme scheme, among others. The study will therefore be limited to instrumental music. The first piano sonata (1936) falls quite readily into this context and provides a sample that is easily accessible. This study will not directly compare Hindemith's three style periods. Traits of his style will be recognized which may be used for comparison to his earlier and later music. Another limitation of this study will be in the specific analysis. The project is concerned primarily with rhythm in the theory and music of Paul Hindemith. Therefore, the analysis will deal with the nature of durations, from longer sections and movements to individual notes and groups of notes. The separation of rhythm from the other elements of music is in keeping with the pedagogical method of The Craft, as will be seen in Chapter 2.

The present study will be profitable in several areas. It will explore the omission of rhythm in Hindemith's theory and correlate that omission with current thought, providing a new perspective on Hindemith's music which emphasizes his concepts of rhythmic theory. The study will also provide a summation and

review of current approaches to rhythmic analysis and develop a model of analysis that will be applicable specifically to Hindemith's music as well as to the music of other composers.

Definitions

For this study the definition of rhythm will consist of these two parts: from a formal standpoint rhythm consists of the sectional divisions of a musical composition articulated by specific musical events. On a more fundamental level rhythm is the grouping of time into recognizable units by duration and stress.

The New Harvard Dictionary of Music defines rhythm as "the pattern of movement in time."[53] There are two connotations that this definition entails, the general idea of rhythm covering all aspects of musical movement as ordered in time, and the attacks of musical sounds that fall into patterns. These attacks or changes are perceived against the backdrop of tempo, the rate of speed of the changes. The patterns within the passage of time are caused by the changes in musical events. The definition given by The New Grove's Dictionary of Music and Musicians describes rhythm as "the subdivision of a span of time into sections perceivable by the senses; the grouping of musical sounds, principally by means of duration and stress."[54].

Schachter points out that rhythm must be defined in terms of how we hear—the perception of musical events. He refers to the Greek idea of flow in

---

[53] Don Michael Randel, ed. The New Harvard Dictionary of Music, (Cambridge: The Belknap Press of Harvard University Press, 1986): 700.

[54] Sadie, 804-805.

defining rhythm "as organized movement in time."[55] Smith has used a similar definition of rhythm: "the organization of musical things (events) in time."[56] There must be some sort of patterning or grouping in effect to aid the listener in organizing the ebb and flow of rhythmic events; the continuity of rhythmic flow must be divided and articulated in some way.

Meter is caused by the regularly recurring pulsation of beats organized into accented and unaccented patterns.[57] In Western tonal music meter is the most fundamental method of grouping. The perception of a stress or accent on the first beat of a group creates the feeling of meter. The most common metrical groupings are of duple and triple beats. Rhythm and meter should not be considered as separate elements, even though rhythms often oppose the effect of the metric barline. In notation barlines is separate the patterns of meter which are identified by the time signature at the beginning of the composition or bar. Meter can also be identified by grouping of events into recognizable patterns of stressed and unstressed beats.

Meter also is hierarchic in nature, that is, it exists on several levels simultaneously. Rhythm and meter are established by the interaction of at least two levels of activity.[58] A single stratum cannot induce a sense of rhythm, but must be understood in relationship to a higher or lower stratum. Therefore, a rhythmic pattern has implications on several different levels.

---

[55] Carl Schachter, "Rhythm and Linear Analysis: A Preliminary Study," in The Music Forum, Vol. IV, ed. by Felix Salzer, (New York: Columbia University Press, 1976): 311-312.

[56] Charles Smith, "Rhythm Restratified." Review of The Stratification of Musical Rhythm, by Maury Yeston, (Perspectives of New Music 16/1, 1977): 150.

[57] Joel Lester, The Rhythms of Tonal Music, (Carbondale, IL: Southern Illinois University Press, 1986): 45.

[58] Maury Yeston, The Stratification of Musical Rhythm, (New Haven: Yale University Press, 1976), 38.

Accent is important for perception of meter; it is the emphasis of a particular musical event which sets it apart from others.[59] There are several types of accents that occur in music. In the setting of meter an accent is perceived to occur on the first beat of a measure. The dynamic accent refers to a tone being louder than others, the tonic accent is a pitch being higher or lower than others, and in an agogic accent a pitch has a longer duration.[60]

Often several types of accent simultaneously reinforce the musical event. The accented event becomes the focal point around which the unaccented events are grouped. Furthermore, accents often mark the beginning of a musical event and therefore can be considered "points of initiation."[61] These points can be emphasized by a change in any of the elements of music.[62] Syncopation occurs when the expected metric accent is shifted to a weak beat or pulse.

One rarely perceives an individual note unless it is accented in some way, but even accented notes are understood within a context as a beginning, middle, or ending note. Notes that are predominantly aligned with the metric structure are said to be rhythmically consonant. Those that oppose the meter or are misaligned with the metric structure of a composition are rhythmically dissonant.[63]

---

[59] Grosvenor W. Cooper and Leonard B. Meyer, The Rhythmic Structure of Music. (Chicago: The University of Chicago Press, 1960): 8.

[60] Randel, 3.

[61] Lester, 16.

[62] Anne Alexandra Pierce, "The Analysis of Rhythm in Tonal Music." Ph.D. diss., Brandeis University, 1968, 42.

[63] John D. White, The Analysis of Music, 2nd ed. (Metuchen, New Jersey: The Scarecrow Press, Inc., 1984), 83-84.

Chapter 2

Review of Hindemith's Theory

Hindemith began teaching at the Hochschule für Musik in Berlin in 1927. He enjoyed teaching from the very beginning and held subsequent positions at Harvard, Yale, and the University of Zurich. In addition, Hindemith helped to design a state-sponsored music school in Turkey during the 1930's.[1] He firmly believed that music theory and composition could be taught systematically. He wrote,

> Music theory investigates, arranges, and explains the working material of the composer...to comprehend once and for all the whole domain of tone in all directions and relationships, so that every conceivable sort of music can be explained....[2]

But he was displeased with the lack of music textbooks that explained modern music. The theory of harmony which was formulated from music of the common practice period was inadequate to explain the new music, according to Hindemith.[3] He set out to develop a theory of music that would explain music of the past, present, and future.

The Craft of Musical Composition is Hindemith's solution to the lack of conventional theory textbooks to adequately explain music. More than an apology for Hindemith's musical style, it attempts to develop a systematic method for

---

[1] William D. Pack, Paul Hindemith in Turkey: Some Contributions to Music Education, (Brigham Young University: Ph.D. Diss., 1977).

[2] Hindemith, "Methods of Music Theory," 20.

[3] Vernazza, "Paul Hindemith—Music Educator," 30.

teaching composition based on the species exercise.[4]

Hindemith's theory of music is derived from his investigation and perception of "the laws of nature." He tries to prove the immutability of a tonal system built on the major triad derived from the overtone series.[5] But this foundation in natural order has a much broader basis than physical and mathematical principles. "He felt a moral responsibility in being a composer, and believed a composition should bring about moral improvement in the listener."[6] Hindemith believed strongly in the social obligation of the composer. Even in his mature style he "remained loyal to his belief that music should be useful and practical, and should not be a vehicle for self-expression."[7]

Hindemith was familiar with the philosophical and natural laws formulated by many writers such as Boethius, Zarlino, Tartini, Rameau, Descartes, and his contemporary Schenker. He tried to rationalize his new theory by an appeal to a natural order. Hindemith writes:

---

[4] Hindemith, Craft I, 1-2. Neumeyer points out that Hindemith intended to revise The Craft and other writings into a complete method of teaching composition. The new curriculum would begin with Elementary Training for Musicians (1946), continue with the combined reworking of Craft I and II which would provide the speculative theory and two-part exercises, Craft III (published posthumously in 1970) for three-part writing, an unfinished Craft IV which would include four-part writing as well as incorporating materials from Traditional Harmony I and II, and end with a fifth volume providing a transition to free composition. Unfortunately Hindemith was unable to complete a revision of such magnitude. (Neumeyer, The Music of Paul Hindemith, 21-23).

[5] Hindemith, Craft I, 4. See also Norman Cazden, "Hindemith and Nature," The Music Review 15/4 (November, 1954): 288-306 and Victor Landau, "Hindemith the System Builder, A Critique of His Theory of Harmony," The Music Review 22 (1961): 136-151. Clifford Taylor addresses problems with both Cazden's and Landau's criticisms in "The Hindemith Theories, A Revaluation of Premise and Purpose," The Music Review 44n3-4 (August/November, 1983): 246-262.

[6] Sister R. Christine Daehn, "Paul Hindemith: Author, Craftsman, Philosopher." (unpublished Master's thesis, Michigan State University, 1974.): 3.

[7] Sadie, s.v. Kemp, 579.

> The teacher will find in this book basic principles of composition, derived from the natural characteristics of tones, and consequently valid for all periods. To the counterpoint and harmony he has already learned...he must now add a new technique, which, proceeding from the firm foundation of the laws of nature, will enable him to make expeditions into domains of composition which have not hitherto been open to orderly penetration. (emphasis added)[8]

Hindemith built his theory on his own investigation of these "natural laws."

The basic premise with which Hindemith works is the necessity of tonal centricity. The major triad is the basis of all music because it occurs naturally from the first six pitches of the overtone series (Figure 3).[9] He claimed that the major triad is "the most impressive phenomenon of nature."[10] The continuation of the overtone series results in the pitches of the chromatic scale, which in equal tempered tuning divides the octave into twelve equal parts.

Equal tempered tuning is one of the problems Hindemith saw in music. Hindemith was displeased with equal temperament because in his opinion it lacked luster.

> In equal temperament...music performed on keyboard instruments lacks the fine lustre [sic] of the light that falls at ever-changing angles as it is cast by different generators. It does not have any of that fine inner agitation that arises from slight variations of pitch.[11]

Instead he develops a "new" tuning system to derive the twelve semitones of the octave.[12]

---

[8] Hindemith, Craft I, 9.

[9] Richard Bobbitt, "Hindemith's Twelve-tone Scale," Music Review 26 (1963): 105. Bobbitt points out an error in the translation. The term "overtone" is used incorrectly as this indicates the harmonic partials excluding the fundamental. "Partial" is clearer, describing the multiple vibration frequencies of a composite tone including the fundamental.

[10] Hindemith, Craft I, 4.

[11] Ibid., 43; 154-155.

[12] Ibid., 32-41.

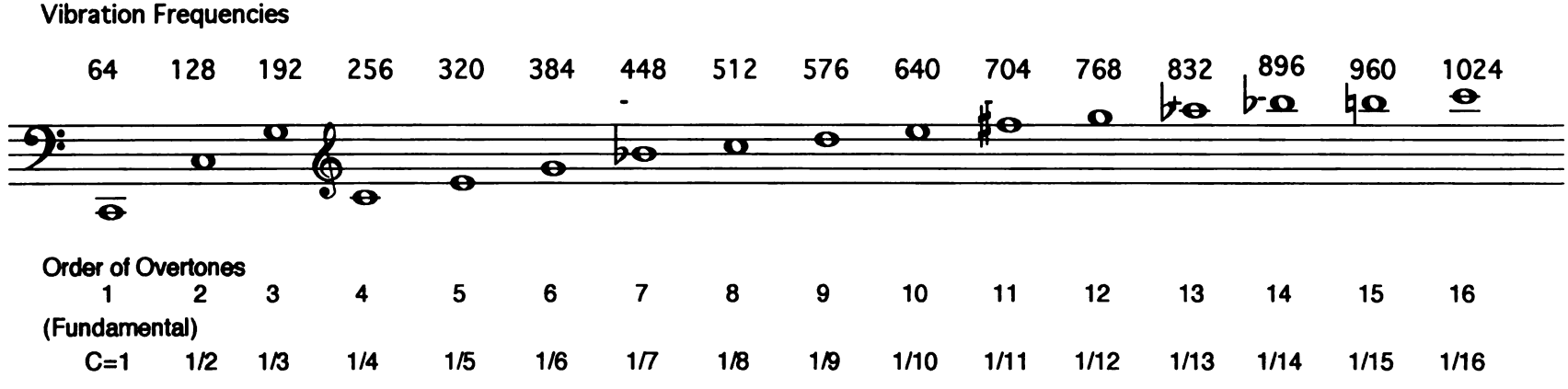


Figure 3: The Overtone Series. Hindemith, The Craft of Musical Composition Book 1: Theory, 17. (©1942 Schott & Co., Ltd., London. Copyright renewed. All Rights Reserved. Used by permission of European American Music Distributors Corporation, sole U.S. and Canadian agent for Schott & Co., Ltd., London.)

According to the theory the most important partials for scale derivation are the first six. But instead of using one fundamental pitch as the foundation for the series, he uses multiple fundamentals. To keep within the limits of the octave C(64)[13] to c(128), the third partial of C(64), g(192), becomes the second partial of the fundamental tone G (96).[14] In other words, "to arrive at each new tone of the scale, divide the vibration-number [sic] of each [partial] successively by the order-numbers of the preceding tones in the series."[15] The process is done in three steps.

The first step takes the third through sixth partials of C (64) and divides them by the preceding partial numbers 2, 3, 4, and 5 respectively (Table 1).

Table 1

Hindemith's Scale Derivation, Step 1

Partial 3: g (192) ÷ 2 = G (96)
Partial 4: c^1 (256) ÷ 3 = F (85.33)
Partial 5: e^1 (320) ÷ 4 = E (80)
Partial 6: g^1 (384) ÷ 5 = E♭ (76.8)

Step two uses the principle of addition, using the "sum" (up to and including the sixth partial) by considering the pitches to be higher in a series of

[13] The number in parentheses refers to the frequency of vibrations per second of that particular pitch.

[14] Several methods of octave identification are in use. The one employed for this paper is C_1 - C - c - c^1 - c^2 - c^3 - c^4 - c^5 (middle c = c^1).

[15] Hindemith, Craft I, 34. The vibration-number is the frequency expressed in the number of vibrations per second.

overtones.[16] The third, fourth, and fifth partials of C (64) are used as the fourth, fifth, and sixth partials, dividing to achieve new fundamentals, then multiplying the result by 2 in order to keep the tones within the octave C (64) to c (128). In steps one and two, the first six partials of C (64) were used to derive G (96), F (85.33), A (106.66), E (80), $E^{\flat}$ (76.8), and $A^{\flat}$ (102.4).

Table 2

Hindemith's Scale Derivation, Step 2

g (192) ÷ 4 = G (48)
g (192) ÷ 5 = $E^{\flat}_1$(38.4) x 2 = $E^{\flat}$ (76.8)
g (192) ÷ 6 = C_1 (32) x 2 = C (64)
c_1 (256) ÷ 5 = C (64)
c_1 (256) ÷ 6 = $A^{\flat}_1$ (51.2) x 2 = $A^{\flat}$ (102.4)
e_1 (320) ÷ 6 = A_1 (53.33) x 2 = A (106.66)

In step three the remaining six chromatic tones are derived from "grandchild" fundamentals using the same processes previously described.[17] The completed scale adds D (72), $B^{\flat}$ (113.78), $D^{\flat}$ (68.27), B (120), $G^{\flat}$ (91.02), and $F^{\sharp}$ (90). An inconsistency in Hindemith's procedure lies in using some of the partials more than once to derive the scale pitches. He also uses several different mathematical equations to achieve his end results. In looking at the derived scale from an historical point of view, there is a striking resemblance to two

[16] Ibid., 35.
[17] Hindemith, Craft I, 39-41.

earlier models.[18]

In translating Hindemith's scale into cents (the octave divided into 1200 cents, each tempered half step equaling 100 cents), Bobbitt discovered that it is identical to Ptolemy's diatonic syntonon (A.D. 140) and a chromatic scale produced by Alexander Malcolm in 1721 (Figure 4). Hindemith merely duplicated earlier scale formations. Bobbitt even explored a simpler method of formulating Hindemith's scale, and corrected some minor calculations overlooked by him.

Hindemith's concept of chromaticism and diatonicism is also different than earlier theorists. Hindemith believes that tonality includes both the seven diatonic scale pitches as well as the chromatic pitches. In traditional harmony the seven diatonic pitches of the major or minor scale produce triads or chords. The chords function in relation to the tonic/dominant axis.

In Hindemith's theory, the interval, not the chord, is the basic unit of measure against the tonic. He says that...

> the key and its body of chords is not the natural basis of tonal activity. What Nature provides is the intervals. The juxtaposition of intervals, or of chords, which are the extensions of intervals, gives rise to the key. We are no longer prisoners of the key. Rather, we have a free hand to give the tonal relations whatever aspect we deem fitting.[19]

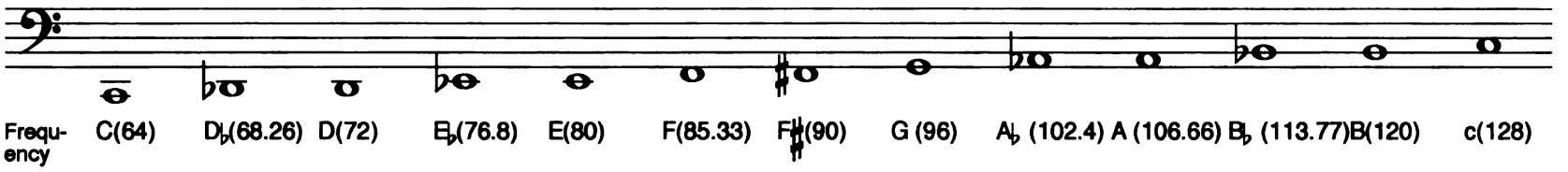
The use of the interval in this way is an important innovation of Hindemith's theory.[20] It allows the composer to break away from the influence of the traditional harmonic framework but still retain a tonal center.

---

[18] Bobbitt, 111-12. See also Felix von Cube, The Book of the Musical Artwork: An Interpretation of the Musical Theories of Heinrich Schenker, translated by David Neumeyer, George Boyd, and Scott Harris (Lewiston, New York: The Edwin Mellin Press, 1988), 66-72.

[19] Hindemith, Craft I, 107.

[20] William Thomson, "Hindemith's Contribution to Music Theory," Journal of Music Theory IX (1965): 55.



Frequency	C(64)	D♭(68.26)	D(72)	E♭(76.8)	E(80)	F(85.33)	F♯(90)	G (96)	A♭ (102.4)	A (106.66)	B♭ (113.77)	B(120)	c(128)
Hindemith Chromatic Intervals	112	92	112	70	112	92	112	112	70	112	92	112	
Diatonic	C	D♭	D	E♭	E	F	F♯	G	A♭	A	B♭	B	c
Intervals		204		182		112		204		182		204	112
Ptolemy Diatonic	C		D		E	F		G		A		B	c
Syntonon		204		182		112		204		182		204	112
Malcolm Chromatic Intervals	112	92	112	70	112	92	112	112	70	112	92	112	
Diatonic	C	D♭	D	E♭	E	F	F♯	G	A♭	A	B♭	B	c
Intervals		204		182		112		204		182		204	112

Figure 4: Hindemith's Scale Compared to Ptolemy and Malcom

Series 1 is the tonal framework which Hindemith derives from the overtone series.[21] It places the twelve tones of the chromatic scale in a relative relationship to the starting tone. (Figure 5) Neumeyer suggests that the order of tones in Series 1 is of primary importance to Hindemith's theory.

> It is not only an indication that the tones have a family relationship, expressed in their connections to the principal tone; it is also an index to the ranking of these connections....This value-order of the relationships is valid under all circumstances.[22]

The tones to the left in the series have a closer relationship to the starting tone than those to the right. Thus, beginning with C, the pitches of Series 1 in decreasing relationship are G, F, A, E, E♭ or D♯, A♭, D, B♭, D♭, B, and F♯. Were the starting pitch other than C, the intervals would remain the same. Hindemith provides further insight into the function of Series 1 in Craft III:

> A. It does not consist of 'tones.' The notation of tones is only a necessary aid, but each tone really stands for one of the poles of a field of harmonic force existing between it and the tonic.
> B. The tonic, as the central tone of the tonality, stands above and apart from tonal relationship.
> C. The relationships of the series follow one another in steadily decreasing harmonic value. The dominant represents the highest-valued relationship.
> D. The most distantly related of all is the tritone. Its connections with the tonic are so tenuous and ambiguous that it, too, in the opposite sense, stands apart from (i.e. below) the other related tones.[23]

Series 1 is not to be considered a tone row or a scale, but is used by the composer to establish control over a root progression, to establish the tonal center of a composition, and to establish the "best interval" for determination of chord roots. The best intervals of the series also identify closely related keys.

---

[21] Hindemith, Craft I, 56.

[22] Neumeyer, The Music of Paul Hindemith, 54.

[23] Hindemith, Unterweisung im Tonsatz III: Übungsbuch für den Dreistimmigen Satz (Mainz: B. Schott's Söhne, 1970), 86. Typescript translation of Chapters 12-16, Yale University and Indiana University libraries, 77.

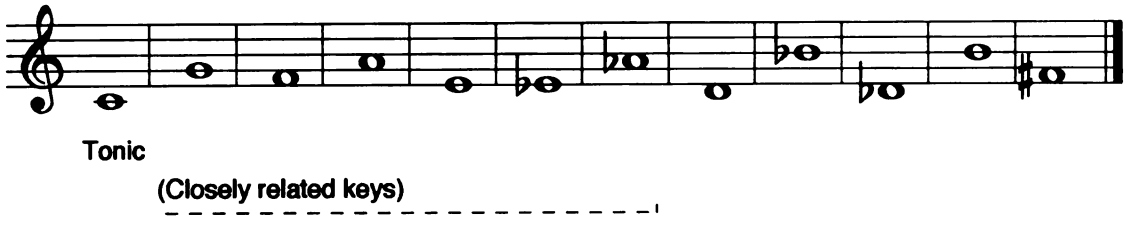


Figure 5: Series 1

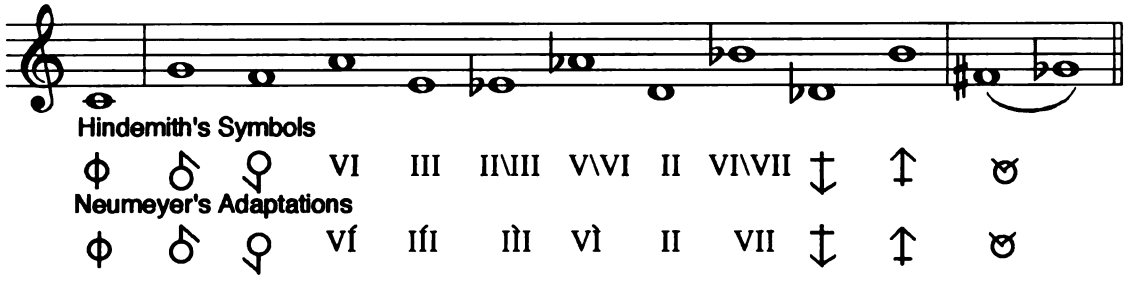


Figure 6: Symbols of Chord Root Relationships

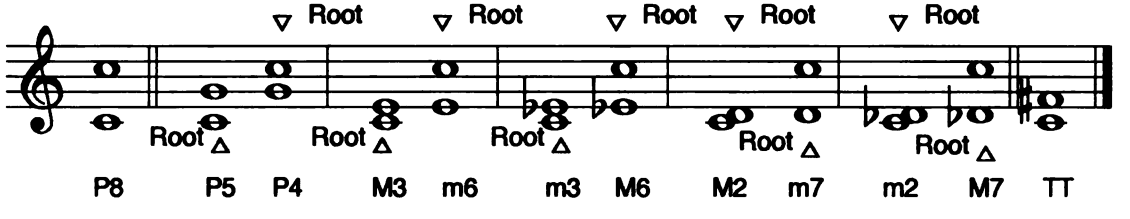


Figure 7: Series 2 (Hindemith, The Craft of Musical Composition Book 1: Theory, 81. ©1942 Schott & Co., Ltd., London. Copyright renewed. All rights reserved. Used by permission of European American Music Distributors Corporation, sole U.S. and Canadian agent for Schott & Co., Ltd., London.)

Symbols given by Hindemith are used to describe analytically the harmonic relationships.[24] These symbols, listed in Figure 6, identify the relationship of the chord roots to a given tonic. According to Series 1, the fifth holds the strongest relationship to the tonic, while the tritone is the furthest removed.

Series 2 is an ordering of the interval relationships within the chromatic scale, ranking the intervals from strongest to weakest (Figure 7). Used to identify the roots of intervals and chords, the members of each pair are not of equal strength—the root of the interval is the lower tone of the first and the upper tone of the second of each pair except for the minor second and major seventh, in which the root is the upper tone of the first and lower tone of the second. The octave stands at the beginning of the series because of its strength while the tritone, the only interval without a root, stands alone at the end of Series 2.

Series 2 is derived from another "natural phenomenon," combination tones. Unlike overtones, which "are produced in varying numbers by a single tone, combination tones arise only when two or more tones sound simultaneously."[25] First order combination tones are those created from the two original tones. The frequency of the combination tone is the difference in frequency of the two original tones. In other words, the c (128) is produced by the sounding together of c^1(256) and g^1(384), (384 - 256 = 128). Secondary combination tones are produced by the difference between the frequency of the first combination tone and the lower pitch of the original interval. Hindemith claims, however, that the primary combination tones are only audible with amplification, and that the secondary combination tones are even "less intense than the original ones."[26]

---

[24] Hindemith, Craft III, 99 (Translation, 87), quoted in Neumeyer, The Music of Paul Hindemith, 53, 55.

[25] Hindemith, Craft I, 58.

[26] Ibid., 60-61.

Earlier theorists had identified combination tones. In the early eighteenth century Tartini recommended them as an aid in tuning violin double stops. They have also been used extensively in organ tuning. Helmholtz, calling them difference tones, also identified summation tones, equal to the sums of the frequencies of the original tones.[27] Hindemith, however, claims to be the first theorist to use the combination tones to explain the "properties of musical materials and the rules for musical writing," but gives credit only to organ builders for his theory of combination tones.[28]

Hindemith is in agreement with Apel in recognizing that combination tones are generally inaudible unless amplified.[29] If such is the case, the question arises as to their importance in actual perception of musical sounds. If the combination tones cannot be heard, does the listener use them to develop a hierarchy as Hindemith suggests? Series 2, then, is not based so much on the audibility of the combination tones, but rather on the physical relationship of the combination tones to the original tones.

Hindemith's Theory of Harmony

The rationale for Series 1 and Series 2 comprises a large portion of Craft I. Of more importance are Hindemith's theories of harmonic and melodic organization. Hindemith identifies three alternative criteria for chord analysis:

---

[27] Victor Landau, "Hindemith the System Builder: A Critique of His Theory of Harmony," Music Review 22 (1961): 141.

[28] Hindemith, Craft I, 59.

[29] Apel, Willi, s.v. "Combination tone," 185-186.

1. Construction in thirds must no longer be the basic rule for the erection of chords.
2. We must substitute a more all-embracing principle for that of the invertibility of chords.
3. We must abandon the thesis that chords are susceptible of a variety of interpretations.[30]

Neumeyer also lists several factors from The Craft series which help identify the root of a chord.[31]

From Craft I:

1. The chord root is determined by locating the best interval nearest the bass (the root of this interval is the root of the chord);
2. Doubled notes count only once;
3. If two intervals of the same type appear, the one whose lower note is nearer the bass has the chord root;
4. Chords in which the bass and root are the same are stronger than those of the same type in which the bass and root do not coincide;
5. Series 2 determines the root of the best interval;

From Craft III:

1. Doubling of the root makes the chord stronger and more clearly defined than the chord class might suggest;
2. If two or more intervals share the same root, emphasis on that note is greatly increased and may overrule the best root;
3. If the chord root is also a member of a tritone interval in the chord, the possible functions of the tritone determine the true root;

From an unpublished manuscript of a proposed fourth volume of The Craft:

1. For certain chords, the appearance of a familiar sonority in the lower voices can change the chord root.[32]

The chord is then found to belong to one of six groups divided into two types: those with and those without tritones (Table 3). Those without tritones are considered the most stable. Several subgroups of chords involve those containing

---

[30] Hindemith, Craft I, 94-108.

[31] Neumeyer, The Music of Paul Hindemith, 56-58.

[32] Hindemith, "Übung 21," from an incomplete Übungsbuch für den vierstimmigen Satz. Photolithographic copy in the Yale Hindemith Collection. See also Andres Briner, Paul Hindemith, (Mainz: B. Schott's Söhne, 1971).

TABLE 3

Table of Chord Groups

Hindemith, The Craft of Musical Composition, Book 1: Theory, overleaf.

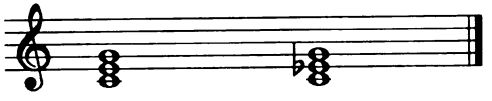
Table 3

Table of Chord Groups

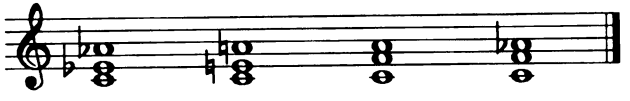
A. Chords Without Tritone

I. Without seconds or sevenths

1. Root and bass are identical

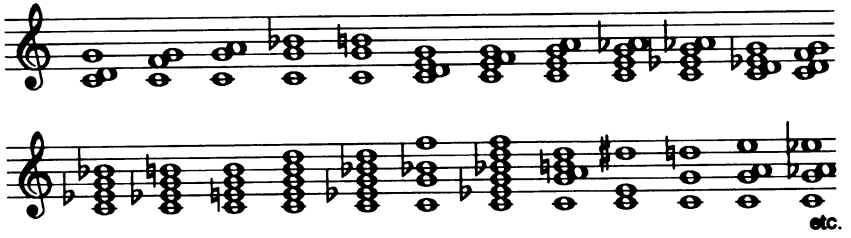


2. Root lies above the bass tone

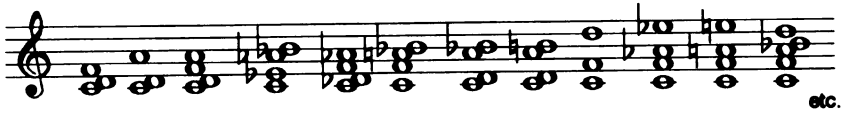


III. Containing seconds or sevenths or both

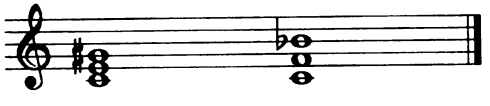
1. Root and bass tone are identical



2. Root lies above the bass tone



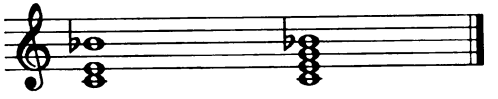
V. Indeterminate



B. Chords containing Tritone

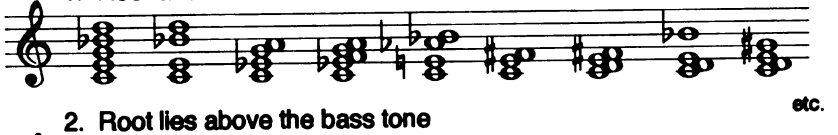
II. Without minor seconds or sevenths, the tritone subordinate

a. With minor seventh only (no major second)
Root and bass tone are identical

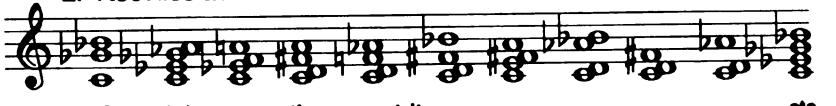


b. Containing major seconds or minor sevenths or both

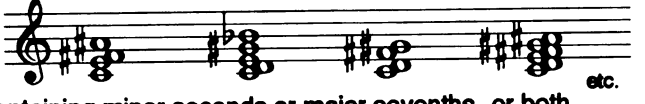
1. Root and bass tone are identical



2. Root lies above the bass tone

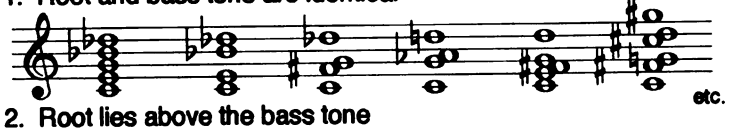


3. Containing more than one tritone

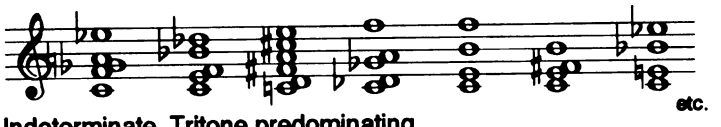


IV. Containing minor seconds or major sevenths or both
One or more tritones subordinate

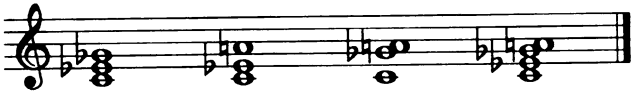
1. Root and bass tone are identical



2. Root lies above the bass tone



VI. Indeterminate, Tritone predominating



seconds and sevenths. Hindemith leaves an "indeterminate" group in each category for those chords which lack strong root identity.

Sometimes two voices appear to form an interval instead of a chord. Intervals can also assume a value according to the table. Fifths and thirds belong to group I_1, fourths and sixths belong to group I_2, seconds belong to group III_2, sevenths belong to group III_1, and the tritone to group VI.

In addition to the root of the chord, a guide-tone pitch must also be identified in chords which contain one or more tritones.[33] The guide-tone is one pitch of the tritone interval "which stands in the best relationship to the root." If the root contains one of the pitches, then the other is the guide-tone. Also, in successive chords which contain tritones tension may be increased by not resolving them. When a tritone does resolve, however, the guide-tone should move by a good interval to the root of the chord of resolution.

Hindemith introduces three concepts that assist the composer in setting tones: the two-voice framework, the degree progression, and harmonic fluctuation.

The two-voice framework results from the contrapuntal interplay of the bass voice and the most important upper voice. Hindemith described the two-voice framework as a type of scaffolding which guides the composer in constructing an effective harmonic progression derived from Series One and Two.[34] These two voices are to be written with strict adherence to Hindemith's contrapuntal guidelines presented in Craft II, yet they are not to become more prominent than the remaining voices.

The degree progression helps determine larger harmonic sections. A good degree progression emphasizes intervals of the fifth and fourth and avoids the

---

[33] Hindemith, Craft I, 104-105; 126-131

[34] Hindemith, Craft I, 113-115.

tritone, broken chords other than major or minor, minor seconds, and melodic treatment. Series 1 controls the root movement of the degree progression.[35] The degree progression governs the long span of chord progressions and key relationships; it presents the background organization of the harmony. It simply states the roots of the chords and identifies the tonal centers of the music. This simple "melody" created by the root succession represents the background harmonic structure. It has no melodic or rhythmic relationship to the surface of the music.

> The degree-progressions formed by the tonics of successive tonalities do indeed combine to make a melodic line; but this line is so remote from any directly melodic effect that it hardly enters our consciousness as a linear formation. Similarly, the rhythmic structure of such a degree-progression of tonics (consisting of the proportions of the lengths of its members) remains vague and obscure, since it belongs to the too distant background.[36]

In Hindemith's theory, the tonal center can change at any time in a composition. A cadence at any specific point in the composition defines the key of that section. A change in tonal center occurs when a tone usurps its control over all others by the cadence, its favorable position, the recurring appearance of a tone, and support by its most closely-related tones in Series 1.[37]

Hindemith states that in the cadence the three primary elements of music (harmony, melody, and rhythm) work in cooperation to create a full sense of closure. In the conclusive nature of the cadence,

> the rhythm confines itself to a few clear and unmistakable time-divisions, the melodic steps proceed directly to their goals, the two-voice framework employs the simplest intervals, and the harmonic fluctuation exhibits the most unambiguous progression....[38]

---

[35] Hindemith, Craft I, 142-48.

[36] Hindemith, Craft III, Translation, 78.

[37] Hindemith, Traditional Harmony II, 39.

[38] Hindemith, Craft I, 138-139.

Cadence formulas consist of either three chords of Group A or one chord of Group B and one of Group A. Hindemith categorizes the cadence types according to the interval relationships of the chord roots according to Series 1 and 2. The four categories are rated from the strongest types to the weakest and are listed in Figure 8. The strongest cadences are formed by the intervals made up entirely of a fourth and fifth or a fourth or fifth plus the step of a second. A milder cadence formula consists of the fifth preceded by an interval other than the second or fourth from the tonic. An interval other than the fifth preceding the tonic greatly diminishes the strength of the cadence. The weakest of all cadences consists of the tritone preceding the tonic.

Cadences define points of tonal stability and are one type of harmonic pillar chord.[39] During passages where the harmony is indeterminate or unstable, the tonality may be built upon these pillar chords which are placed at "wisely calculated-out places" in the structure of the composition. Pillar chords, or „harmonische Hauptstützpünkt," provide orientation for the harmonic structure by providing a resting point for melodic activity and support for the two-voice framework. Pillar chords also help define the form of the composition and the flow of motion from phrase to phrase.

In terms of harmonic motion, Hindemith defines harmonic fluctuation as the increase of tension in the chords as they proceed from those of Group A, including subgroups, to those of Group B, including subgroups (See Table 3). It is the increase and decrease of tension by gradually moving between chord groups.[40]

---

[39] Hindemith, Craft III, 202-203. See also Neumeyer, The Music of Paul Hindemith, 14, 36, 39. Hindemith borrowed the idea of the pillar chord from Ernst Kurth's book Die Romantische Harmonik und ihre Krise in Wagners "Tristan" (1920). Kurth used the term Grundpfeiler, or "basic pillars", to explain the harmonic progression in a series of chromatic passing chords in Wagner's Tristan. The first and last chords in the progression become the basic pillars of the harmony. Lee Rothfarb, Ernst Kurth as Theorist and Analyst, 181-185.

[40] Hindemith, Craft I, 115-121.

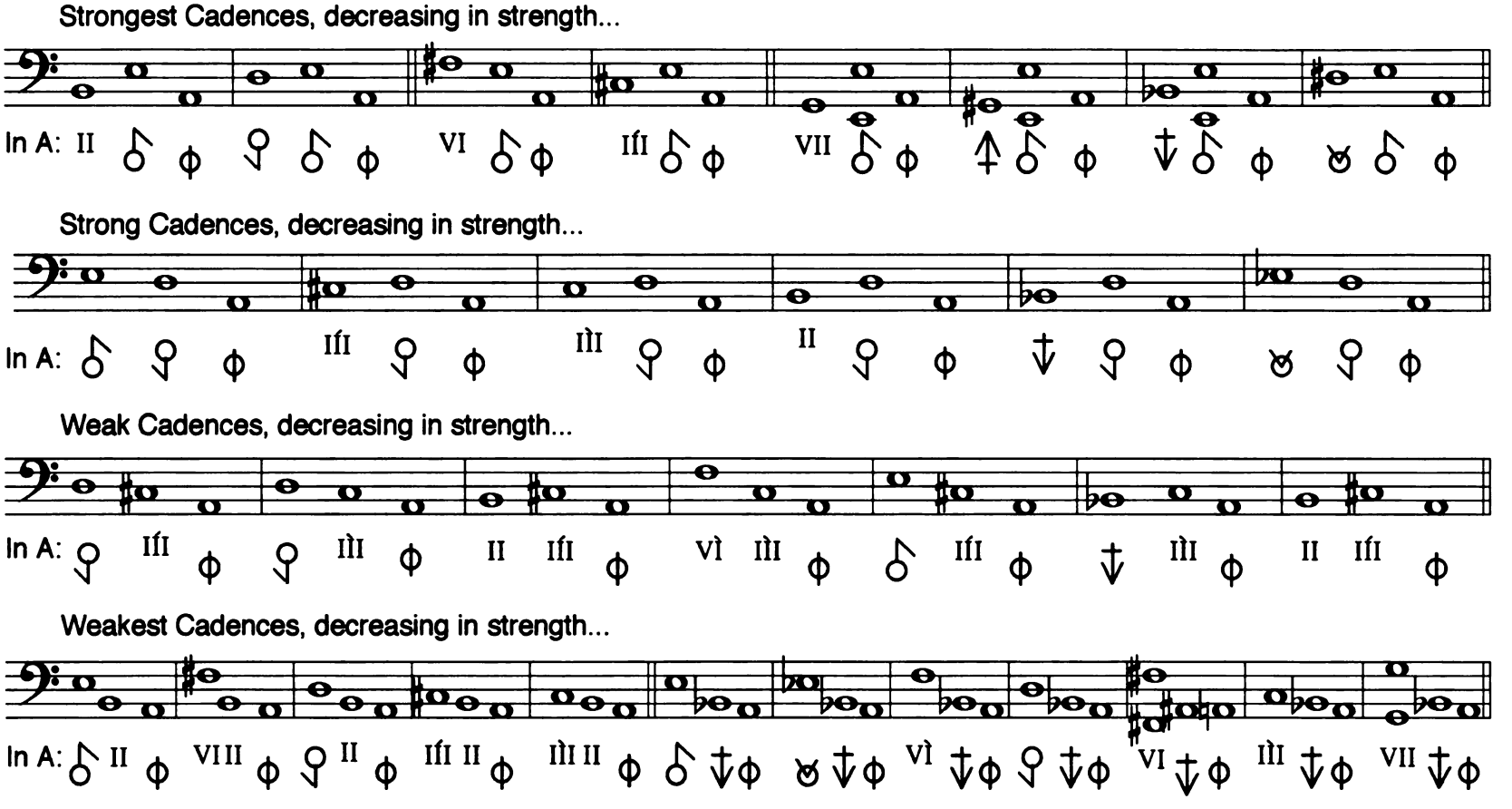


Figure 8: Cadence Formulas. Hindemith, The Craft of Musical Composition Book I: Theory,98-107. ©1942 Schott & Co., Ltd., London. Copyright renewed. All Rights Reserved. Used by permission of European American Music Distributors Corporation, sole U.S. and Canadian agent for Schott & Co., Ltd., London.

The best application of harmonic fluctuation is one which permits a gradual dissonant crescendo and diminuendo. Hindemith dismisses the idea of harmonic motion based on traditional triadic root movement. A series of chords of similar quality such as occur in the diatonic system have only harmonic relationships but not harmonic fluctuation. The increase in tension is more important in creating motion than the root movement or degree progression.[41]

But the harmonic fluctuation and tonality often remain independent even though they coexist in a composition.

> Fluctuation and tonal ordering never influence one another. The intimate tonal relation of harmonies may be very conspicuous, and yet they may show great differences of value in their fluctuation. On the other hand harmonies of the same fluctuation value may be very distant from one another so far as tonal relation is concerned.[42]

Hindemith describes how harmonic fluctuation in a composition can be planned to include the smallest detail, so that every detail can be prearranged in reference to the two-voice framework and degree of harmonic fluctuation. Even though a composer can control the degree of harmonic fluctuation,

> "the principle of harmonic fluctuation is analytic and not prescriptive. Hindemith did not clearly recommend specific practices in the fluctuation of chord values; neither did he disapprove others....In short, it hinges completely on expressive purpose, which can conceivably justify any plan of fluctuation no matter how haphazard or arbitrary it may appear to be."[43]

The importance of the two-voice framework and harmonic fluctuation cannot be understated. In Craft III he elaborates on the relationship of these to the degree progression and musical composition:

---

[41] Landau, "Hindemith the System Builder," 151.

[42] Hindemith, Craft III, 49-50, (Translation, 40).

[43] Victor Landau, "Paul Hindemith, A Case Study in Theory and Practice, The Music Review 21 (1960): 42.

> Voice-leading, two-part framework, and harmonic fluctuation, although they are wonderfully helpful in regulating the flow of harmony, nevertheless provide no absolute guarantee that music constructed according to their laws will be from the harmonic point of view perfectly convincing. They can truly perform their functions of organization only when a harmonic principle on a still higher level regulates their relations with one another and arranges them with reference to a common denominator that embraces them all. This common denominator is tonality, and the principle which organizes all other means in subordination to tonality is to be found in the relations of the tones....In doing this we relied on a line of single tones, which consisted of the roots extracted from all the harmonies in a piece—the degree-progression. The degree-progression will continue to serve us in the future as the most obvious and most easily applicable means for handling the relations of the tones and achieving tonal organization....[44]

The concept of harmonic fluctuation and the table of chord values is one of Hindemith's most important contributions. It provides an alternative method of defining chord progressions distinct from conventional Roman numeral analysis. Based on the degree of dissonant tonal relationships within a chord, it gives criteria for judging the strengths and weaknesses of a chord progression other than those of conventional root movement. However, Searle observed that Hindemith's table of chord values can be as arbitrary and inflexible as the system it replaced in that it is difficult to consistently apply his principles to highly chromatic and strictly non-tonal music.[45] Hindemith would classify these atonal and highly chromatic types as poorly constructed music because they do not conform to the preconceived strictures of Series 1 and 2.

---

[44] Hindemith, Craft III, 85, Translation, 76.

[45] Humphrey Searle, Twentieth Century Counterpoint (Great Britain: Williams and Norgate, Ltd., 1954), 69.

Hindemith's Theory of Melody

The analysis of melody in Hindemith's system is also dependent on Series 1 and 2. Two aspects of melodic motion are important. First, Hindemith believed that melodies have roots, determined by the interval content of a specific section of melody in much the same way that the degree progression determines root movement (Figure 9). Certain melody notes "which can be heard without effort as a harmonically related group" are enclosed in brackets.[46] Unfortunately he gives no further criteria for determining these melodic segments.

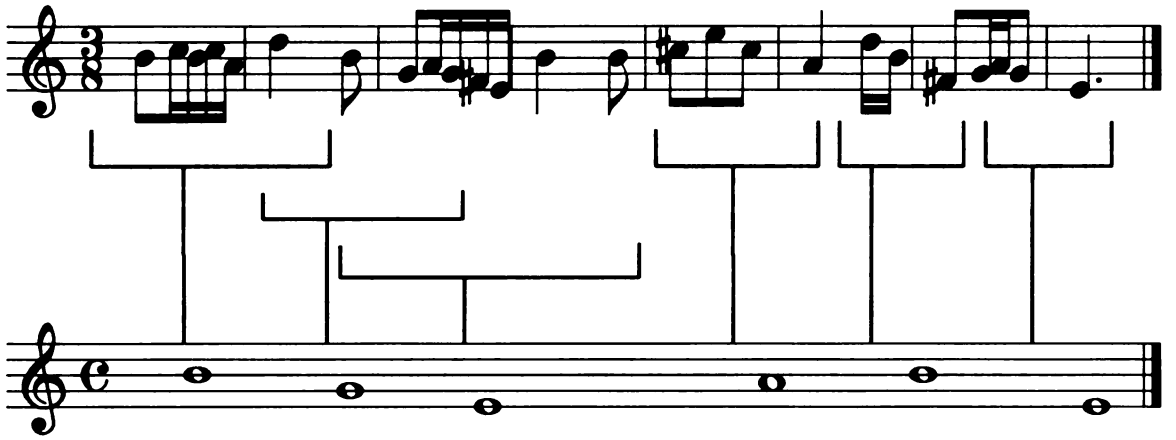
In addition to determining the Degree Progression of a melody, the Step Progression is also important (Figure 10). The step progression identifies step-wise connections in the melody. Major and minor seconds are linked together to show melodic contour and motion.[47] Brackets indicate stepwise motion within a section of melody. Hindemith declares that intervals of the second in melodies measure the content of "brief melodic sections" and also "larger melodic sections."[48]

---

[46] Hindemith, Craft I, 183.

[47] The step progression has been compared to Schenker's idea of the Urlinie in the "delayed linkeage [sic] by steps throughout total melodic life" yet without the imposed stepwise descent. (Thomson, "Hindemith's Contribution," 67). A stronger connection, however, can be made to the theory of Ernst Kurth in his idea of the *Zug*, or "line," proposed in 1917 in the treatise Grundlagen des linearen Kontrapunkts. Lee A. Rothfarb, Ernst Kurth as Theorist and Analyst. (Philadelphia: University of Pennsylvania Press, 1988): 185; 226; 233fn. See also Neumeyer, The Music of Paul Hindemith, 47-48n, 67.

[48] Hindemith, Craft I, 187.



Degree Progression

Figure 9: Melodic Degree Progression. Hindemith, The Craft of Musical Composition Book 1: Theory, 184. ©1942 Schott and Co., Ltd., London. Copright renewed. All Rights Reserved. Used by permission of European American Music Distributors Corporation, sole U.S. and Canadian agent for Schott & Co., Ltd., London.

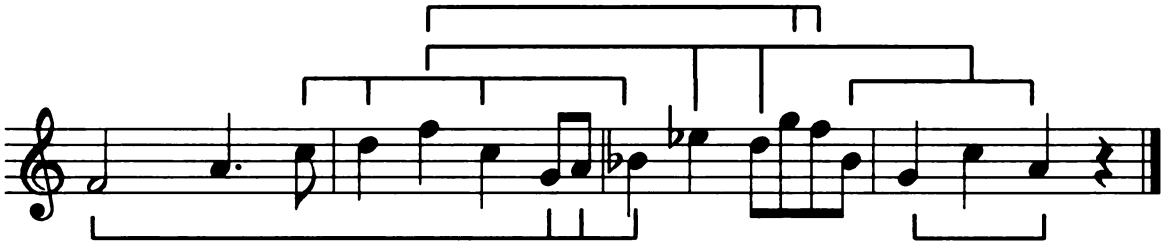


Figure 10: Melodic Step Progression. Hindemith, The Craft of Musical Composition Book 1: Theory, 194. ©1942 Schott and Co., Ltd., London. Copright renewed. All Rights Reserved. Used by permission of European American Music Distributors Corporation, sole U.S. and Canadian agent for Schott & Co., Ltd., London.

Stepwise connections of pitches are used on a single level. A tone can belong to several different step progressions and may occur in immediate succession or over a longer time span. "The primary law of melodic construction is that a smooth and convincing melodic outline is achieved only when these important points form a progression in seconds."[49] The "important points" he defines as being "guide-posts" of the melody, usually consisting of the highest and lowest notes, and metrically prominent notes. While the intervals between the guide-posts are often filled in with major or minor seconds, the guide-posts themselves should also form seconds. Hindemith uses the melodic degree progression and step progression to formulate criteria for a well-composed melody, which should contain a logically developed degree-progression and clear line in the step progression. He recognizes the existence of non-chord tones and develops a set of symbols for their identification (Table 4).[50] Non-chord tones are determined by "normal accented rhythm." A problem of interpretation can occur, however, in a highly chromatic tonal language. Hindemith admits that it is often difficult to distinguish chord tones from nonchord tones.[51]

The two-voice framework, degree progression, and step progression provide harmonic and melodic organization. By introducing these concepts, Hindemith gives the analyst tools to increase the listener's awareness of the musical line. Thomson argues that these are "positive contributions" to musical thought, even though there are similarities with the concepts of other theorists.[52]

---

[49] Ibid., 193.

[50] Ibid., 164-74.

[51] Ibid., 174. See also Craft III, 60, Translation, 70.

[52] Thomson, "Hindemith's Contribution," 66-68.

TABLE 4

Non-chord Tones

Name	Symbol	Definition
Changing Tone (Returning Tone)	W [Wechselton]	occurs when one member of a chord moves from its place in the chord by step or skip to another tone for a short time and then returns
Passing tone	D [Durchgang]	a stepwise transition from one chord tone to another
Suspension	¯V [Vorhalt]	in a succession of two intervals or chords, part of the first is held over into the second, where it creates a tension with the other chord-factors, and is resolved during the existence of the second interval or chord
Unprepared Suspension or neighboring tone	¯N [Nebenton]	a tone occurring in a relatively strong rhythmic position, at the interval of a second above or below a chord-tone and resolving to the latter while the rest of the chord remains
Neighboring tone left by leap	N˘	on the final rhythmically weak fraction of the time-value of a chord, one of its tones moves up or down a second, then leaps to a chord tone in the subsequent chord
Neighboring tone approached by leap	˛N	a tone standing at the interval of a second from one of the tones of the second chord, but sounding during the time-value of the first chord which it leaves by leap
Anticipation	V¯ [Vorausnahme]	one or more tones of the second chord of a progression are introduced too soon, so that they occur during the duration of the first chord
Unaccented Free Tone	F	a tone of slight rhythmic value, in unstressed position, which is not part of either of the chords between which it occurs, similar to ˛N
Accented Free Tone	F	a tone in a rhythmically stressed position which is not part of either of the chords between which it occurs, similar to ¯N without resolution

Example of Hindemith's Analysis

Hindemith ends Craft I with several analyses based upon his theory of degree progression, chord values, two-voice framework, and harmonic fluctuation.[53] He contends that his method of analysis is practical for all styles and forms of music and includes examples ranging from medieval chant to nineteenth and twentieth century opera.

In Figure 11, measures 1-4 of the first movement of Hindemith's Piano Sonata No. 1 (1936) are given as an example of Hindemith's analytical technique.[54] The analysis, completed by this writer, is divided into two sections: immediately under the piano score are three staves for the melodic analysis and four for the harmonic analysis. The most prominent voice, in this case the top line, is notated as it appears in the score on the first staff. The melody is divided into harmonically related groups by brackets, the root of each group becoming the degree progression which is notated on the second staff. The third staff then shows the melodic step progressions located by brackets.

The harmonic analysis consists of identifying the two-voice framework, fluctuation, degree progression, and tonality. The two-voice framework is notated on the fourth and fifth staves and serves the purpose of isolating the bass and melody so that the contrapuntal interplay of these two lines may be examined.

---

[53] Hindemith, Craft I, 202-223.

[54] It is difficult to draw definitive conclusions about Hindemith's musical style from such a brief excerpt; my purpose is to demonstrate the procedure involved in Hindemith's analytical method and his application of the theory to analysis.

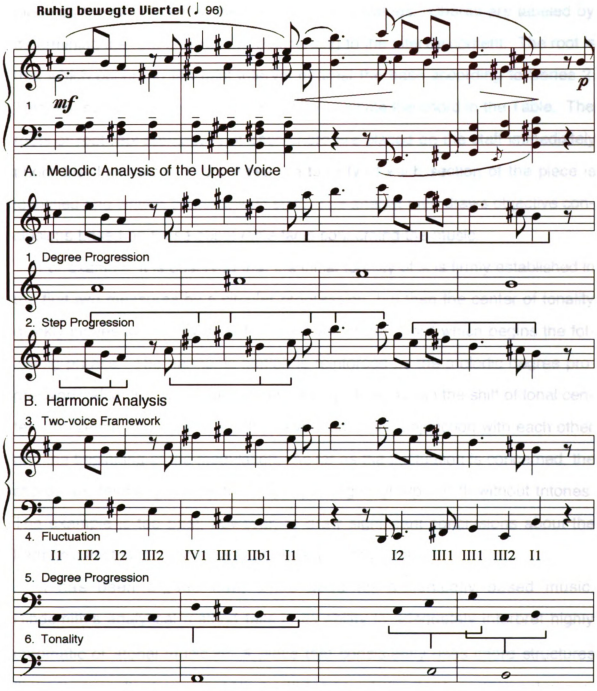


Figure 11: Hindemith, Erste Sonate fur Klavier 1936.© B. Schott's Soehne, Mainz, 1936 © renewed. All Rights Reserved. Used by permission of European American Music Distributors Corporation, sole U.S. and Canadian agent for B. Schott's Soehne, Mainz.

The harmonic fluctuation occurs under this and identifies the chords of the piece as they are found in the Table of Chord Values. Chords are labeled by determining the root of each chord according to the interval content. The root is that which occurs in the best interval nearest the bass according to Series 2. Tritones, seconds, and sevenths then further locate the chord in the Table. The roots or root representatives of each chord are placed on the staff immediately under the fluctuation. From these the tonality of each section of the piece is identified and written on the lowest staff. The analyst then draws objective conclusions based on these observable facts concerning the music.

For example, it is observed that the initial tonality of A is firmly established in the first two measures by a circular progression, but then the center of tonality quickly moves to the key of B, the dominant of the chord which begins the following phrase. The harmonic motion is reinforced by the melodic degree progression. Also, the two-voice framework helps to establish the shift of tonal center: the zenith and nadir of the framework occur in conjunction with each other and the beginning of the modulation. As far as the fluctuation is concerned, the chords are relatively stable, the majority being of group I or III without tritones. The example is too brief, however, to draw significant conclusions about the harmonic fluctuation and tonality of the entire movement.

It has been argued that, while good for diatonically based music, Hindemith's analytical method fails in its ability to adequately interpret highly chromatic or atonal music.[55] A piece that consistently uses chord structures that appear on the low end of Hindemith's table of chord values does not necessarily mean the music is poorly constructed, as Hindemith suggested. The analytical examples which Hindemith provided at the end of Craft I are intended to

---

[55] Searle, Twentieth Century Counterpoint, 63.

demonstrate the applicability of his theory to a wide range of musical styles.[56] The rules he applied to various styles of composition are not convincing in every instance.

One might think Hindemith's method of analysis best serves his own music, but he wrote relatively few pieces which were directly based on The Craft theory of composition. Landau has shown that he was inconsistent in applying his own rules.[57] However, the inconsistency is because Hindemith considered his theory as a starting point for the composer to learn basic techniques of composition. After the rudiments are learned, the composer is free to choose his own way. Furthermore, Hindemith was attempting to show the common ground between all styles of music with a consistent method of analyzing music.[58] Hindemith's analyses at the end of Craft I are little more than descriptions of the musical events based upon his premises from Craft I. In that, his theory is no better nor worse than the one it seeks to replace. The analyses in Craft I were intended only to demonstrate the applicability of his theory of harmony rather than to be definitive interpretations of the music, as is suggested by his acknowledgement of differing opinions.[59] He suggested that analysis is merely an aid to listening, giving "pleasure in the recognition and judgment of the impressions received."

---

[56] Hindemith, Craft I, 197-223.

[57] Landau, "Paul Hindemith, "A Case Study," 38-54.

[58] Neumeyer, The Music of Paul Hindemith, 45.

[59] Hindemith, Craft I, 203.

The Role of Rhythm in Hindemith's Theory

The Craft of Musical Composition is both a theoretical treatise on the nature and order of tones as well as a method of teaching composition. Hindemith emphasizes the role of harmony and melody in his theory. Only scattered references to rhythm occur throughout the literature.[60] When rhythm is mentioned it is usually linked in some way to its interaction with melody and harmony.

Hindemith was aware of earlier works on rhythm by such theorists as Westphal, Riemann, and Wiehmayer.[61] Even though Hindemith's views on rhythm echo the theory of Riemann in the metrical determination of accent, he veers from Reimann's theory in the use of asymmetrical structures and long-range formal design.[62] Hindemith felt that Riemann's explanation of the principles of rhythm was inadequate.[63] He consistently criticizes the world of music theory for being unable to adequately explain rhythm.[64]

Hindemith chose not to deal with rhythm in The Craft for pedagogical reasons.[65] By isolating the individual elements in order to treat each in detail, the beginning composer would not be encumbered by unnecessary problems. In keeping with his chosen method of instruction, the species exercise,

---

[60] William Thomson, "Hindemith's Contribution," 66, 69.

[61] Neumeyer, The Music of Paul Hindemith, 2-3.

[62] David Neumeyer, "Tonal, Formal, and Proportional Design in Hindemith's Music," Music Theory Spectrum 9 (Winter 1987-88): 95-96.

[63] Hindemith, "Methods of Music Theory," 24.

[64] Hindemith, Craft I, 179; Elementary Training for Musicians, 157; Craft III, 30, Translation, 21-22.

[65] Hindemith, Craft I, 110.

Hindemith confines rhythm to specific applications which gradually expand as the student learns to set tones against a cantus firmus. Hindemith recognizes this and subsequently omits rhythm from the beginning stages of his theory, only discussing it as necessary for an understanding of the interaction of the three elements of music. Hindemith sought the simplest method by which a student could learn to create music. He was looking for a compositional theory of rhythm, not an analytical theory.[66] He stated that he would attempt an explanation of rhythm at a later time.[67]

While an analytical method is one by-product of The Craft, music analysis is not the sole purpose of the theory either. Hindemith stresses the compositional method throughout his writings. In Traditional Harmony I and II, meant to be used as theory textbooks for the "historical" music written between 1600 and 1900, the student is lead into more advanced exercises of composition, for one goal of studying music theory is understanding the historical resources of musical composition.[68] The specific aim of Traditional Harmony I is to make the study of music theory swift and practical for the general music student. Students complete part-writing exercises demonstrating the harmonic materials of tonal music. More advanced compositional exercises which reinforced the same harmonic materials are provided in Traditional Harmony II.

The final chapter of Traditional Harmony II is of interest to the present study. In this chapter Hindemith sets forth a working procedure which demonstrates certain ideas about the interaction of the elements of music on rhythmic formal structures.[69] The student is to complete a four-movement suite for orchestra,

---

[66] Hindemith, Elementary Training, 157.

[67] Hindemith, Craft I, 179. See also Elementary Training for Musicians, 159; "Methods of Music Theory," 23-24.

[68] Hindemith, Traditional Harmony I, iv.

[69] Hindemith, Traditional Harmony II, 37-53.

the melodic materials of which are supplied. Hindemith presents five representational graphs for the first movement, plotting out the melodic formal scheme, the tonal plan, harmonic fluctuation, harmonic density (harmonic rhythm), and texture. The student merely follows the plan to complete the exercise. Hindemith taught his students to define the formal characteristics of a new composition first. Neumeyer has demonstrated the application of a similar model of composition which Hindemith seemed to follow consistently.[70]

The graphs of the formal and tonal plans of the first movement of the suite have been duplicated in Figure 12 (combining the two for purposes of space).[71] The themes of the composition are identified as A, B, and C and require unambiguous tonal areas, in this case the keys of C♯, F, and C moving through A to F♯.

Theme areas D, E, and F are transitional in character and therefore require much less tonal stability as they move from one key area to another. Other graphs which have not been duplicated here show the harmonic fluctuation, harmonic rhythm, and texture. Using such a procedure, the composer can effectively plan the growth of each section of the composition. The compositional design includes four steps: 1. determining the general character and function of the piece; 2. the formal divisions including rhythmic character, tempo, melodic phrasing, and texture; 3. the overall harmonic plan with areas of tonal stability and instability; 4. the specific thematic material.[72]

---

[70] David Neumeyer, "Tonal, Formal, and Proportional Design," 97.

[71] Hindemith, Traditional Harmony II, 38, 40.

[72] Neumeyer, "Tonal, Formal, and Proportional Design," 97; Idem, The Music of Paul Hindemith, 35-38.

Figure 12: Graph of Formal/Tonal Design
Hindemith, The Craft of Musical Composition, Book 2: Exercises in 2-Part Writing, 38. ©1939 by B. Schott's SoehneSchott. English translation ©1941 by Schott & Co., Ltd. Copyright renewed. All Rights Reserved. Used by Permission of European American Music Distributors Corporation, sole U.S. and Canadian agent for Schott & Co., Ltd.

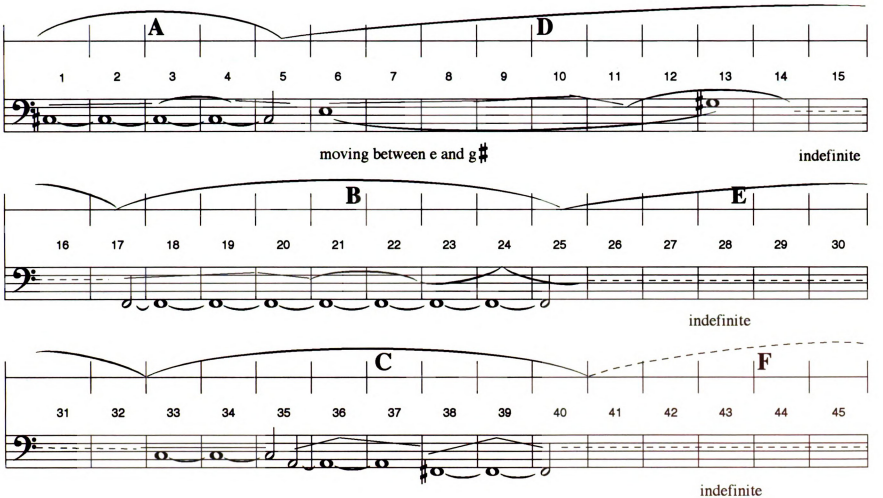
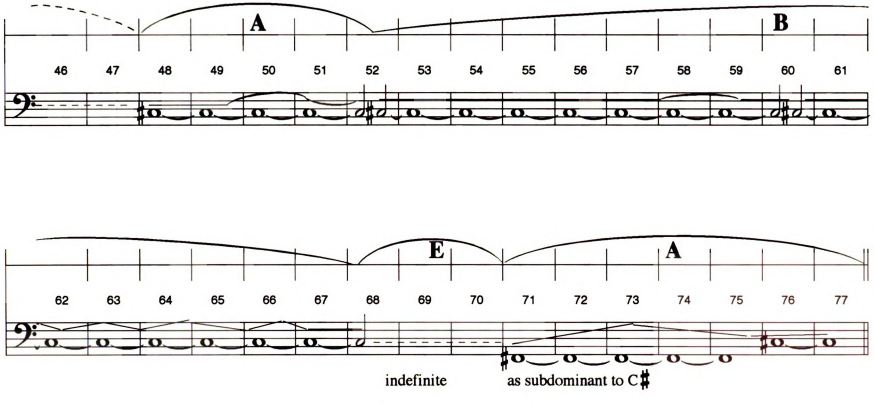


Figure 12: Graph of Formal/Tonal Design



(Fig. 12 continued)

Other references to rhythm include chapters from Elementary Training for Musicians, sections of Craft I-III, notes from a lecture given at the Cleveland Institute of Music in 1949, and an incomplete chapter from a proposed volume 4 of The Craft called Übung 19.

In the Cleveland lecture, Hindemith proposes that a theory of music needs to address both the individual elements of music and their interaction. For a theory of rhythm, Hindemith emphasizes that meter is the organizational force of music and that the basic units of meter are two's and three's and their compounds. He suggests that a possible theory of form might include accents in some way and that the establishment of measurements in the temporal proportion of lengths needed to be formulated.[73]

In the same lecture, Hindemith recognizes that rhythm influences melody by the placement of accents at specific points and the division of melody into motives, phrases, and sections. What he needs to define more completely are the speed of the development of melody and the comparative lengths between specific melodic points. In the relationship of harmony to rhythm, Hindemith tries to develop a theory of form by comparing the lengths of composite sections in the overall tonal plan of the composition.[74] Elsewhere, he stresses that the three elements of music each have a different function which are combined in various ways to create a musical composition:

> Rhythm determines the duration of the chords, and groups them by division into stressed and unstressed members of the structure. Melody in voice-leading regulates linear expansion, and in the two-voice framework sets the pitch limits. In the placing of the harmonic center of gravity and in the regulation of relationships we see harmonic energy at work.[75]

---

[73] Hindemith, "Old and New Problems of Music Theory," lecture given at the Cleveland Institute of Music, March 3, 1947. (Notes from the Paul Hindemith Institute, Frankfurt am Main.): 9-10.

[74] Ibid., 13-14.

[75] Hindemith, Craft I, 109.

In the preface to Elementary Training Hindemith discusses two distinctions of rhythm: the length of notes with their placement in a metrical context, and as the generator of musical form.[76] Two primary concepts in rhythmic organization on the foreground level, then, are metric placement of the accent and durational patterns of the tones. Hindemith considers rhythm to "represent everything that takes place in the medium of time: beats as well as the durations of extended musical forms and their proportions."[77]

Note values and tones of different length are "the most primitive form of temporal action."[78] The exercises in Elementary Training gradually introduce the different note values and basic principles of notation that affect durational values, including augmentation dots, ties, and slurs. When the student progresses to a more advanced level, Hindemith describes rhythm as

> ...the boundless and continuous stream of time intervals in which our actions follow one another, the duration of each determined only by its character, purpose, speed, and intensity. This corresponds to musical rhythm, which has countless possibilities of combining tones of various lengths with melodic lines and harmonic combinations. What characterizes musical rhythm is infinite variety, ruled by higher laws of construction and determined by the power of esthetic [sic] judgement [sic] and choice.[79]

Hindemith expresses the idea that durational values are combined in various ways to create rhythm patterns depending upon the skill and artistic purposes of the composer. These patterns are dependent upon pitch for melodic and harmonic identity. The "higher laws of construction" are what remains incomplete in Hindemith's explanation.

---

[76] Hindemith, Elementary Training for Musicians, xii.

[77] Hindemith, "Methods of Music Theory," 23.

[78] Hindemith, Elementary Training for Musicians, 3.

[79] Ibid., 93fn. Hindemith might agree with Creston's working definition of rhythm: "the organization of duration in ordered movement." Paul Creston, Principles of Rhythm, (New York: Franco Columbo, Inc., 1964), 1.

In Craft I Hindemith did not emphasize the role of rhythm, but he did say that it determines the duration of the chords, and "groups them by division into stressed and unstressed members of the structure."[80] Meter is the factor that organizes the durational values into identifiable units. "Every step from one tone to the next involves a durational relationship, and consequently depends on a regular metric beat as a unit of measure."[81]

Hindemith recognizes the interaction of rhythm and meter. He defines meter as the "divisions of time into distinct and proportionally related intervals."[82] The notational values interact with the divisions of the meter, either reinforcing the metric accent or opposing it.

Meter is dependent upon accent for its perception. Hindemith defines two types of accent: the metric accent which is based upon the perception of pulse, and the dynamic accent which is caused by the application of increased force.[83] The metric accent divides the basic pulse into either duple or triple groupings. The barline has one primary function, to mark the place of the primary metric accent.

The duple and triple groupings form the basis for larger structures. He related these "smallest particles," or rhythmic motives of a basic rhythmic grouping, to larger formal functions.[84] Like Riemann before him, Hindemith recognized that form is created by "the accumulation of the effects of smaller constituent parts," but the effects of rhythmic units longer than the basic two- or three-beat groupings are only realized in retrospect upon the completion of the

---

[80] Hindemith, Craft I, 109.

[81] Ibid., 178.

[82] Hindemith, Elementary Training, 93fn.

[83] Ibid., 93-99.

[84] Ibid., 157-158.

longer musical form. In Craft I Hindemith recognized the need for the student composer to "know as much about the form and inner dimensions of motives as about their number and duration."[85] In the same paragraph Hindemith discussed rhythm as the regulator of larger formal units of unequal lengths.

Hindemith was unable to formulate ideas for the measurement of the larger formal units. He did, however, begin to set down some basic principles in the investigation of rhythmic form. Four factors which influence rhythm, melody, and harmony in formal constructions are duration, tempo, relative speed of unfolding, and closeness of texture.[86]

Hindemith defines the relative speed of unfolding as the "proportional interrelationships of the constituent parts," while the closeness of texture refers to the "degree of complexity" of the musical elements. Duration and tempo can be measured by a clock and metronome, but unfolding and texture lacked any means of measurement at the time of his writing. Proportional schemes of measurement may be useful in comparing phrase structure, length, and overall formal design.[87]

A theory of proportions was not completely worked out by Hindemith. A few works from the 1930's use proportional relationships as an element of compositional design; however, the problem he faced was to connect smaller rhythmic units such as motifs and meter to the longer formal structures.[88]

Hindemith identifies the effects of repetition, variation, and change in the construction of formal units.

---

[85] Hindemith, Craft I, 178-179.

[86] Hindemith, Elementary Training, 158-159.

[87] Neumeyer, "Tonal, Formal, and Proportional Design," 93-116.

[88] Neumeyer, The Music of Paul Hindemith, 41. Works which Neumeyer cites as using proportional designs are Angelic Concert from Mathis der Maler and the Second Piano Sonata (1936).

The principles by which the compound effects are achieved when the sounding material is cast into molds of temporal construction are three:
(a) Repetition (re-use of one constituent part of the formal entity, on the same pitch level, or in transposition).
(b) Variation (some of the elements of a constituent part are changed while others remain unchanged. For instance, the melodic line may be retained but with different harmonic and rhythmic treatment; or the rhythmic shape of a motive—or melody, etc.—may be retained, but with changed melodic outline and new harmonies)
(c) Change (one constituent part gives place to an entirely different one.)[89]

These three common techniques of composition provide an unlimited range of possibilities for the composer to create musical forms. The techniques are combined in various ways to create the melodic, harmonic, and formal/rhythmic elements of a composition.

In many of his references to rhythm, Hindemith emphasizes the relationship between melody, harmony, and rhythm. All three combine to create the effect of motion or flow in the composition. The "subordinate elements," such as dynamics, tone-color, articulation, etc., are for decorative purposes and affect only the listener's impression of the work but not the substance of its construction.[90]

A survey of Hindemith's views of rhythm reveals several basic tenets.

1. Meter is the basic organizational factor in Hindemith's music.
2. Accent groups pulses into basic units of two's and three's.
3. Durational patterns make up motivic structures which are the basic units of form.
4. The process of composition begins with determining the rhythmic form and rhythmic character of each section, then the tonal relationships and finally the specific melodic material is written.
5. Shorter rhythmic units undergo repetition, transformation, or change as they are combined to create longer structures.
6. Rhythm will influence melodic and harmonic structures.
7. Rhythmic form can be determined by a comparison of the lengths of the sections of the tonal framework.

---

[89] Hindemith, Elementary Training, 158-159.

[90] Hindemith, "Methods of Music Theory," 21.

Hindemith's combined references to rhythm do not constitute a well-developed theory in comparison to his theory of melody and harmony from The Craft. But they do show that while he was somewhat conventional in his viewpoints on rhythm, he was trying to find a connection between the beat-to-beat patterns of the surface rhythms and the long-range patterns of formal structures. One must turn to his music to try to formulate stronger conclusions about Hindemith's application of rhythmic principles.

Chapter 3

Analytical Procedures

The analytical procedure presented by Hindemith in Craft I demonstrate a practical application for his theories of melody and harmony. Although it provides a consistent method of analyzing music in terms of the harmonic and melodic content, the theory is compositional rather than analytical in nature. Hindemith did not prescribe a method of analysis for rhythm, stating elsewhere that

> the temporal material in music, if it is to be used rationally, must be subjected to measurement, as was the spatial element, harmony....No scientist's research, no musician's intuitive genius, no layman's common sense has ever been able to find ways of measuring rhythm, in an attempt to establish a rational basis for the construction of temporal musical forms...[yet] some rational, discoverable, and understandable law of construction must exist which could be put into effective operation.[1]

Perhaps an adequate method of measuring rhythm did not exist at the time Hindemith wrote The Craft of Musical Composition, but much recent research has been done on the rhythmic element of music. The purpose of this chapter is to explore a method of analysis which tries to answer Hindemith's concerns of measuring rhythm.

Hindemith mentions in Craft III that rhythmic organization involves three elements: the tempo of the succession, the durations of the individual

---

[1] Paul Hindemith, "A Composer's World", 86, 88, quoted in David Neumeyer, "Tonal, Formal and Proportional Design in Hindemith's Music," 95.

combinations, and the position of the accent in relation to the barline.[2] These three properties of rhythm (tempo, duration, and metric accent) provide the basis for understanding the relationships between the individual components of the composition as well as its formal construction. Hindemith viewed the study of rhythm as a "top-down" principle, moving from the large to the small in keeping with his method of composition discussed in Chapter Two.

According to Hindemith, a musical composition is like a sentence that is made up of individual words, the meaning of the sentence determining which words are used. Individual tones, or even musical motives, are the words of the sentence; they are not understood separately but as a part of the context in which they occur. The musical form therefore cannot be fully understood until its conclusion.

> As we have already seen, even among the few successive tones contained in two or three successive melodic intervals, relations develop which cannot be explained simply as sums of individual tones or of the intervals between two tones. The lowest form of these melodic entities, superior to the individual tones and intervals and essentially different from the mere sum of their effect, we have already recognized in the harmonic cells and fields of melody on the one hand and in the step-progression on the other. These superior form-constituents in turn combine to build up still more comprehensive forms, to which they are related just as their own constituents were to them; here too the aesthetic effect of the entire form is in no way equal to the sum of the individual effects of the formal constituents. The latter always produce a new and superior structural element indispensable to the understanding of the complete form....It is the whole, then, that determines the part and in no way the part whose appearance and special forms determine or develop the form of the whole."[3]

It would seem, then, that in order for a rhythmic analysis to be compatible with Hindemith's theory, the analysis would have to take into account note-to-note relationships and how these are built up to create the musical form. An understanding of temporal relationships is achieved by comparing the

---

[2] Hindemith, Craft III, 30 (Translation, 20).

[3] Ibid., 20.

individual rhythmic components and approximate performance times of each component. These components include note durations, motives, phrases, periods, and sections.

Rhythm in this analysis will be separated from the other elements of music as much as possible, just as Hindemith separated rhythm from his theory of melody and harmony. However, it is recognized that all musical elements are controlled by rhythm, and therefore the study of rhythm is equivalent with the study of music.

> The study of rhythm is the study of the flow in time of sounds and silences. If this seems to be a definition of music itself, it may serve to remind us that the study of rhythm involves some consideration of all the aspects of music. Duration is the special province of rhythm, but the ordering and organization of temporal units is the vital core of rhythmic analysis, and where pitch, harmony, texture, dynamics, and timbre may play as significant a shaping role as the durations themselves.[4]

Various writers have proposed several models of analysis that explore the relationship of rhythm to the various elements of music.

Development of the Model of Analysis

One purpose of music analysis is "the understanding of musical style."[5] Analysis identifies differences between style periods, between different composers, and even between different works by one composer. Music analysis should give the musician assistance in making stylistic performance judgments.

---

[4] Allen Winold, "Rhythm in Twentieth-Century Music," Aspects of Twentieth Century Music, ed. by Gary Wittlich. (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1975): 209.

[5] John D. White, The Analysis of Music, 2nd ed. (Metuchen, New Jersey: The Scarecrow Press, Inc., 1984): 1.

White has proposed one model of analysis. The procedure includes descriptive analysis of the musical events and synthesis of the data. After general background information about the music, composer, and time period are researched, the descriptive analysis consists of three levels.[6]

The microanalysis identifies the details of melodic, harmonic, and rhythmic events. It also includes details of orchestration, texture, timbre, dynamics, and accent. Specifically regarding the rhythmic element of music, the microanalysis consists of identifying pitch durations, accents, rhythmic motives, harmonic rhythm, and text setting. The second level, or middle-analysis, involves description at the phrase and section level. The rhythmic elements included in the middle-analysis are the metric and rhythmic structure of phrases and the relationships of other formal units. One important aspect of middle-analysis is identifying repetition of musical material, development of motives or figures, variation on original material, and the use of new material.[7] Finally, the macroanalysis consists of describing how the events develop into the total time span of the composition: the broad harmonic changes of tonality, meters and tempos, the overall rhythmic style, durations of large sections, and rhythmic and proportional relationships between movements. Identifying formal structures is one result of macroanalysis.

Lester presents a more detailed model of rhythmic analysis. The model is broken down into four categories: durational patterns, accent and meter, grouping or segmentation, and musical continuity (Figure 13).[8] The durational patterns consist of individual note values that combine to create the rhythms of the melody and other independent parts. Also studying the composite rhythm

---

[6] Ibid., 13-18.

[7] Hindemith simply called these repetition, variation, and change.

[8] Lester, 5-12.

identifies changes in texture, density, and combined rhythmic events which help define formal divisions from phrase level to the entire composition. The rhythm created by changes in other parameters of music are also noted.

The harmonic rhythm helps establish meter in tonal music. Important points of harmonic change include cadences, phrase beginnings, and the overall pace of the harmonic changes. Other musical parameters which can create rhythmic events include regular changes in texture, timbre, articulation, and dynamics.

I. Durational patterns
   A. of individual parts (the rhythm of a part)
   B. of textures (composite rhythm)
   C. of changes in
      1. harmony (harmonic rhythm or rhythm of harmonic change)
      2. texture
      3. timbre
      4. articulation
      5. dynamics
      6. other aspects
II. Accent and Meter
   A. of note-to-note and measure-to-measure
   B. of larger levels
      1. phrase accentuation and hypermeter
      2. accent, meter, and musical form
III. Grouping or segmentation (motives, phrasing, form)
IV. Musical continuity and flow

Figure 13: Lester's Model of Rhythmic Analysis

Lester places much emphasis on accent and meter. He defines accent as a "point of initiation."[9] Different types of accent include metric, dynamic, long duration (agogic), harmonic, and textural. A noticeable change in any musical parameter can create the effect of an accent; however, accents should not all be considered equal in strength. Familiarity with the music is needed to properly identify the importance of different types of accent.[10] Furthermore, in music of the common practice period accents occur within a metric context.

Meter is dependent upon accent for its identification. In the analysis, it is important to identify the factors that help establish the metric pulse and how the flow of the music either supports the pulse or conflicts with it. The accent gives organization to the pulses that are measured into groups of two or three pulses.[11]

According to Lester, pulses can be established in a number of ways. Two of the most common are the use of a recurring note value or the subdivision of longer note values. The subdivision of durations into equal parts establishes the metric hierarchy. For example, a whole note is subdivided into two half notes, a half note is subdivided into two quarter notes, and so on. It is quite common for subdivisions to change in tonal music, as in an eighth-note accompaniment pattern changing to triplets.[12] Also, regular changes of harmony help establish groups of pulses into metric divisions.

The principle factor in establishing form is grouping, Lester's third level of analysis. The form of the music is built up from smaller segments, from motives to phrases, to periods and sections. An important part of the analysis is to

---

[9] Ibid., 16.
[10] Ibid., 40.
[11] Ibid., 45.
[12] Ibid., 48.

determine how notes are grouped on the various levels of organization and how the music flows continuously from one part to another.[13] "Grouping is the operation whereby we organize differentiated notes into units consisting of several notes (or, at higher levels, several groups of notes)."[14] Factors that influence grouping are proximity of the musical events, similarity or contrast in the patterns of notes or other musical elements, and duration of the passage. Generally, groupings are made out of the shortest patterns; the longer the passage the less likely it will be perceived as a single group.

Unified groups can also be formed by identifying repeated patterns of pitch. Two common types are ostinatos and melodic sequences. Other factors include patterns of repeated note values or durations, and patterns caused by changes in articulations.[15] A unified group, then, is a series of notes that is understood as a single unit. The unified group as a generator of formal structures causes an accent of longer duration than the metric or dynamic accent. Lester's final level of analysis synthesizes the existing data from previous levels into an explanation of how the various elements of music work in cooperation to create a sense of musical continuity and flow.

Epstein's model of rhythmic analysis offers a slightly different explanation of rhythm than the previous two (Figure 14).[16] The general properties of time are identified as duality, hierarchy, demarcation, and motion. Duality refers to what Epstein calls the "chronometric" and "integral" aspects. Chronometric time is the clock-like organization of time into recognizable divisions; integral time is the specific events or experiences within chronometric time.

---

[13] Lester, 218-19.

[14] Ethan Haimo, "Rhythmic Theory and Analysis," (In Theory Only 4/1): 18.

[15] Smither, "Rhythmic Analysis," 61.

[16] Epstein, "Shaping Time," 11.

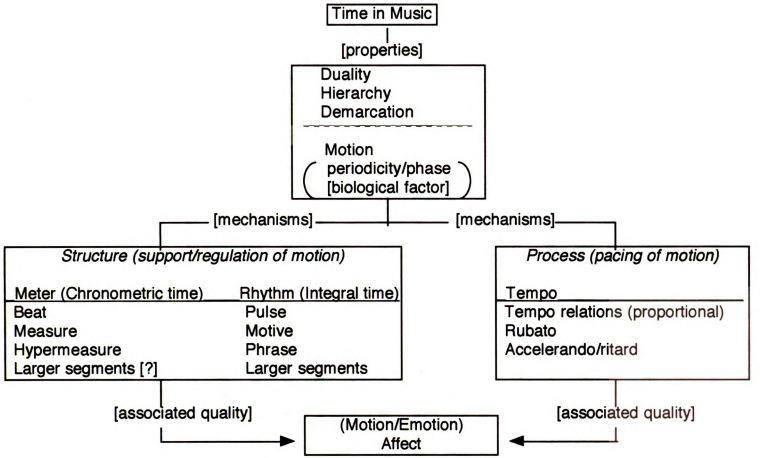


Figure 14: Epstein's Model of Time Structure in Music

Specifically regarding the mechanisms of music, duality refers to the difference between meter and rhythm, meter being the equivalent of the chronometric time and rhythm the integral aspect of music.[17] A hierarchy of time is explicit in the many divisions and subdivisions of chronometric time. In music the mechanisms of the hierarchy are displayed by the various levels of meter: the beat or pulse, measure and motive, hypermeasure and phrase.[18]

Demarcation refers to the segmentation of time into recognizable units, such as days, hours, and minutes, or other boundaries of segmentation. In music demarcation refers to the events which create grouping or segmentation of the music. Epstein stresses the importance of accent as the most significant method of demarcation. He refers to Cooper and Meyer's classic definition of accent as a point of emphasis that is more prominent than the encircling events.[19] Accent must exist within a hierarchy of structural events. It differs from stress in that it is structural and vital to the organization of the music, whereas stress is often ornamental, creating varying levels of dynamic intensity on the surface of the music but not necessary to its underlying structure.

Epstein divides the mechanisms of music into two categories. On the one hand are those elements which define structure and organization. These include the various aspects of meter and rhythm: beat and pulse, measure and motive, hypermeasure and phrase, and larger segments. On the other hand are the processes of performing music, the elements of tempo such as proportions of speed, rubato, accelerando and ritardando. All create the sense of motion or pacing. All affect the listener's perception of the music.

---

[17] Ibid., 10-11.

[18] Ibid., 28-37.

[19] Ibid., 24ff. Epstein refers specifically to the definition of accent presented by Cooper and Meyer as "a stimulus which is marked for consciousness in some way." (Cooper and Meyer 1960, 8).

Epstein recognizes that tempo helps establish the pacing of musical events as they unfold in time. Correct and proper tempo is based partly on the interpretation of the performer, the directions in the notated score, and the tradition of the music.[20] From the notational directions the performer receives information regarding how the piece is to be played. Tempo, then, refers specifically to how all the elements of a work "unfold" and develop into the total whole. Only referring to the metronomic speed in measuring the tempo of a piece may be inadequate because other factors are left out, such as environment, technical ability, and maturity of the performer.

Tempo is one of the most subjective of performance parameters. No two performers will play in exactly the same tempo and no two performances by the same person will be the same, either. Rubato, ritardandos, and accelerandos also cannot be taken under consideration, as these are left to interpretation. Of course an exacting metronomic performance would be considered unmusical as well and would leave out the elasticity of rhythm that the earliest definition of the word requires.[21] Therefore only approximate calculations of duration can be given from the information in the score. Furthermore, the tempo markings in the score should be considered the extreme fast or slow speeds.[22] In choosing a slower or faster tempo than that indicated in the score, one should keep the sections and movements in proper proportions. Nonetheless, the theorist can gain an understanding of the proportional structure of a piece of music from the durations of movements and sections measured by the tempo indications.

---

[20] Ibid., 100. Epstein refers to the performer's interpretation as personal authority (maturity and reputation) and intuition (musicianship).

[21] Refer to Chapter 1 of this paper for a historical study of the word "rhythm."

[22] Epstein, 99.

Two primary emphases can be deduced from these three models of rhythmic analysis. The first is the identification of patterns of surface elements that define stylistic features. Some of the features to identify are the relationships of durational values of notes to metric placement, prominent pitch classes, and grouping of durational values into rhythmic and melodic motives. Other surface elements that play a prominent role in rhythm are changes in harmony, articulations, and dynamics. Durational values of pitches and the patterns created by the composer's grouping of different note values is an element of style analysis. Winold and Smither have each developed tools to help identify consistent uses of durational values and their grouping into motives and phrases.[23]

Winold divides rhythmic structure into the foreground and background elements. The background rhythm is the regular, on-going metric structure upon which the durational patterns of the foreground are placed.[24] The background controls time and tempo; it provides regularity for the individual patterns of pitch durations. The rhythmic analysis, according to Winold, must explain the background rhythmic structure, the foreground durational patterns, and the relationship between the two.[25]

Metric structure is measured by the pulse of the meter. There may be several simultaneously occurring levels of pulse in a composition. The beat level is given as the pulse that is the basic unit of measure usually identified by the meter signature or the most common durational value. Pulses can occur on

---

[23] Smither, "Rhythmic Analysis," 54-88; Allen Winold, "Rhythm in Twentieth-Century Music," in Aspects of Twentieth Century Music, ed. Gary Wittlich. (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1975): 208-269.

[24] Winold's concept of background metric structure and foreground rhythm patterns are similar to many other theorist's views. Refer specifically to the chronometric and integral divisions of time described earlier by Epstein and Hindemith's discussion from Elementary Training, 93fn.

[25] Winold, 211.

different levels, however. For example, the beat may be subdivided into faster pulses known as division levels. Conversely, pulses may incorporate two or three beats. These are called multiple levels. Pulses are distinguished and grouped by different types of accents. Winold's description of common practice metric structures has been cited in Chapter 1. He continues to define the differences of twentieth-century metric structures. A more concise method of identifying metric structures has been offered by Smither (Figure 15).[26]

Like Winold, Smither identifies the beat, the basic unit of measure, as the "primary level." His secondary level is the duration of two or several beats. Accent plays a particularly strong role in Smither's analysis (not unlike those previously cited), as accent helps define grouping of notes.

In addition to the metric structure on the beat level, division levels, and multiple levels, Winold has also proposed a method for analyzing durational patterns in twentieth-century music.[27] The number of individual durational values are identified and counted in the duration scale. These are then ranked from shortest to longest values in the duration complement. The duration range then compares the length of each durational value to the shortest value listed at the top of the duration complement. The frequency of use of each durational value is counted in the duration hierarchy. All of the data are then organized in a table.

---

[26] Smither, 73-83. Smither gives the following as examples of his metric classifications: IA. Schoenberg, Third String Quartet, molto moderato; IB. Bartok, Fifth String Quartet, Alla bulgarese; IC Orff, Catulli Carmina, vive; Webern, String Quartet, Op. 28, Gemächlich; II. Stravinsky, L'Histoire du Soldat; III. Messiaen, L'Ascension, Quatre Meditations Symphoniques; IVA. Copland, Short Symphony No. 2; IVB. Blacher, Ornamente für Klavier, Op. 37; IVC. Carter, Second String Quartet.

[27] Winold, 235-241.

I. Metrical rhythm.
   A. Equal beats with regular accentuation at the secondary level.
   B. Unequal beats with regular accentuation at the secondary level.
   C. Equal beats predominating with vague or no accentuation at the secondary level.

II. Polymetrical rhythm.
   Two or more independent patterns of regular accentuation used simultaneously.

III. Metrical-nonmetrical rhythm.
   Equal beats with irregular accentuation at the secondary level.

IV. Nonmetrical rhythm.
   A. Unequal beats with irregular accentuation at the secondary level.
   B. Unequal beats predominating with vague or no accentuation at the secondary level.
   C. Free accentuation which defines neither primary nor secondary levels.

Figure 15: Smither's Classification of Metric Structures

For example, Figure 16 presents measures one through four of the second movement from Hindemith's Erste Sonate für Klavier (1936).[28] Table 5 shows the duration scale, complement, range, and hierarchy for the melody of this section. The scale in the left column of Table 5 shows the 7 different durational values used in the melody arranged from shortest to longest. Note that Hindemith used a very limited number of note values.

[28] For comparison purposes, Winold analyzed measures 1-25 of Hindemith's Piano Sonata No. 2 to demonstrate his method of rhythmic analysis.

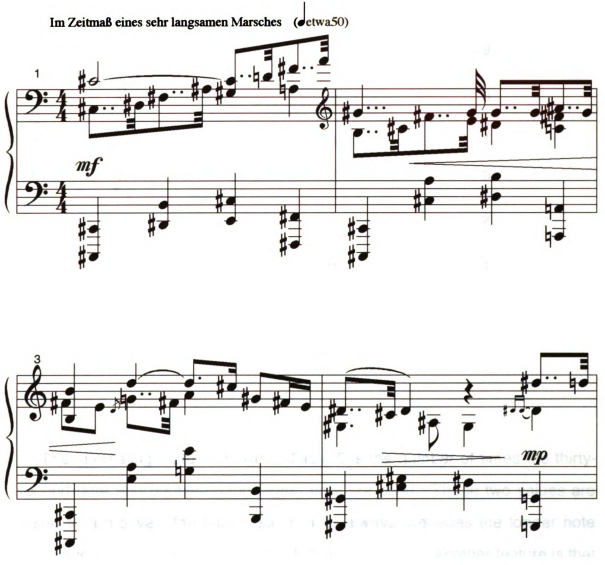


Figure 16: Hindemith, ERSTE SONATE FUR KLAVIER (1936), Movement 2, m. 1-4 (©B. Schott's Soehne, Mainz, 1936 ©renewed. All Rights Reserved. Used by permission of European American Music Distributors Corporation, sole U.S. and Canadian agent for B. Schott's Soehne, Mainz.)

TABLE 5
Duration Complement, Range, and Hierarchy

	Complement	Range	Hierarchy
SCALE		1	9
		2	3
		4	1
		7	9
		8	2
		15	1
		23	1

The interesting feature shown in Table 5 is the number of times the thirty-second note and double-dotted eighth note are used. These two values are linked to a motive; the thirty-second note always precedes the longer note which occurs directly on a beat at the first multiple level. Another feature is that the longest note values, the tied half-note/double-dotted eighth and the double-dotted quarter note, stand in a unique tonal and rhythmic relationship. They both agogically accent the tonality of the piece. The first represents $c^{\#1}$ on the opening pitch of the melody and the $g^{\#1}$ exactly one measure later clearly establishes $C^{\#}$ as the tonality.

It might seem pointless to identify each durational value in a melody or texture of a composition, but the analyst uses such information to provide concrete data for style analysis. By identifying the most frequently used durational value in a melody, one can identify the rate of motion of the music, comparing it to the metric structures at the beat level, multiple, and division levels. The data can also be compared to the rate of motion in other parameters of the music, such as the harmonic rhythm. The frequency of certain durational values can be related to melodic motion, pitch class, dynamic intensity, etc. Certain stylistic features of the rhythm of a composition are identified for comparison to other sections, movements, or pieces.

Winold continues the analysis of surface rhythms by identifying rhythmic units and gestures. A rhythmic unit "occupies a period of time equivalent to a given unit of the underlying metric structure."[29] Rhythmic units are more traditionally termed motives, but Winold is primarily concerned with the rhythmic values rather than the pitch relationships of the units. The rhythmic units can also be placed in a table showing the unit complement, the ratio of durations from shortest to longest in each unit, and the number of times, or frequency, that the unit is used.

Rhythmic units are categorized according to their relationship with the underlying metric pulse. Units either reinforce the meter or conflict with it. Four categories define the relationship of rhythmic units to the pulse:

1. Metric or even-note patterns. The durations of the pattern are identical with pulses on a given level of the metric structure.
2. Intrametric or confirming patterns. The durations of the pattern are based upon pulse groups within the metric structure but are not identical to the pulses of the metric structure.
3. Contrametric, nonconfirming, or syncopated patterns. The durations of the pattern are identical to or based upon the pulses of the metric structure like types 1 and 2, but unlike these, the accents of the pattern do not confirm or support the accentuation of the metric structure;

[29] Winold, 237.

4. Extrametric or irregular patterns. The durations of the pattern are based upon pulse groups which are outside the normal pulse groups of the metric structure and are nonsynchronous with them.[30]

Winold also proposes a method of labeling longer rhythmic units. Rhythmic gestures, more commonly referred to as phrases, are identified by common features in successive units and are subject to the grouping parameters mentioned earlier. Gestures are labeled according to the beginning and ending of the gesture, i.e. strong, weak, anacrustic, etc. The three types of beginning gestures are thetic (strong pulse beginning), anacrustic (weak pulse beginning), and initial rest (beginning after a rest or tied note). The three types of endings are strong (usually ending on the first beat of a measure), weak (not ending on the first beat of a measure), and upbeat (ending on the final beat of the measure).[31]

The second focus of attention from the three models of rhythmic analysis previously discussed is the identification of background rhythmic elements. We have already discussed the background metric structures identified by Winold and Smither that occur just below the surface of the music. Background rhythm includes patterns which are not readily identified on the metric surface of the music and involve longer groupings or phrase structures. The relationships of formal divisions to one another is a prominent consideration of background structure. The elements that help define the background structure are the tonal relationships of sections and movements, length or time-span of longer sections, changes in composite rhythm and meter from section to section, texture changes including number and instrumentation of voices, polyphonic vs homophonic writing, registral changes, and density or thickness.

Hindemith's compositional diagrams that he demonstrated in Traditional

---

[30] Ibid., 238.

[31] Ibid., 239.

Harmony II may be used as a starting point to understanding background structures of his music.[32] The background structure of the music can be charted by diagraming the phrases onto a graph representing measure numbers (see Figure 10). In this technique one can readily see the durational relationships of one section to another. A similar approach has been presented by Neumeyer.

Neumeyer has developed a model of analysis for Hindemith's music based on a hierarchy of five stages:

Stage I: Controlling Structure: tonal areas and formal design
Stage II: Pillar chords with voicings and cadential progressions
Stage III: Interpretation of events between pillar chords
Stage IV: Harmonic Activity: Analytic symbols, chord roots, harmonic fluctuation, tonal relations
Stage V: Melodic Activity- "step progression" and "arpeggiation"

These stages are derived from Hindemith's theory in Craft I-III as well as other writings. The stages differ from Schenkerian techniques in the lack of a continuous hierarchy of levels.[33] Because Hindemith's music is non-functional in terms of traditional harmony, certain adaptations were made: there is no compliance to a strict background structure, or Ursatz, since Hindemith's music does not conform to traditional harmonic patterns anyway; it admits the element of form in Stage I; the Schenkerian principle of "composing out" is ineffectual since there is no strict background level; each stage of the graph can be considered independent of the others. Furthermore, more than one graphic representation and interpretation is possible.[34]

The primary emphasis in Stage I is to identify formal divisions in the music.

---

[32] See my description of Hindemith's compositional method from Traditional Harmony II in Chapter 2 of this study.

[33] A description of Schenker's terminology and methodology as well as developments based on Schenker's theory for an understanding of rhythm is addressed in Appendix B.

[34] Neumeyer, The Music of Paul Hindemith, 49, fn1.

These can be considered rhythmic divisions in the sense that they span a certain length of time. The Stage I graph includes the degree progression of the cadential and other pillar chords and may include the proportional scheme of each section.[35] Other rhythmic principles such as meter and foreground durational values have been omitted.

In the Stage II graph, the full pillar chords with the voice-leading progression are represented. Neumeyer suggests that pillar chords outline phrases in shorter compositions, but in longer compositions may consist primarily of the boundaries of periods or sections. Hindemith did not give clear instructions in determining pillar chords, nor does Neumeyer's graphing procedure give specific criteria for identifying pillar chords other than harmonic and tonal relationships.[36] Certainly cadential formulae are important determinants, as suggested by Hindemith, but other criteria from melodic and rhythmic principles may exist as well.[37] Again, the Stage II graph omits the element of foreground rhythmic patterning that is crucial to the stylistic interpretation of the music.

Even though each graph of Neumeyer's five stages can be considered separately, there is also a link between them. Stages I and II provide the tonal background upon which Stages III, IV, and V are based. These three graphs show details of tonal relationships nearer the surface of the music. Stage IV provides a detailed analysis of the harmonic activity of the composition. It fills in the harmonic progressions between the pillar chords with the degree progression, voice-leading, and other harmonic activity.

---

[35] Ibid., 39, 50.

[36] David Neumeyer, Bloomington, Indiana, personal letter via electronic mail correspondence to the writer, January 3, 1996.

[37] Other criteria may include the recurrence of a given harmony, rhythmic placement, support from surrounding harmonies, and melodic goals. See Hindemith, Traditional Harmony II, 39.

Melodic activity independent of the harmonic field is measured in the Stage V graph. Specific melodic configurations, especially the linkage of the various step progressions, arpeggiations, and harmonic cells inherent in the melodic voices, are connected in a graph similar to a Schenkerian middleground reduction.[38] While this type of graphing technique reveals relationships in certain melodic motions, once again specific foreground rhythmic patterns are not readily defined. Finally, Neumeyer's Stage III graph pulls all the preceding information together in an interpretation of the most important relationships of the events in the musical composition.

The Derived Model of Rhythmic Analysis

It would be difficult if not impossible to determine precisely what analytical method Hindemith would prescribe for the study of rhythm in his music. He felt very strongly at the time he wrote much of his theory that his understanding of rhythmic principles was incomplete. At best, one can hope to apply a model of analysis which is in agreement with much of Hindemith's understanding of rhythm.

The three models presented by White, Lester, and Epstein each emphasize to some extent the relationship of rhythm to the other elements of music. Musical events do occur within a temporal boundary, and Hindemith himself recognized the partnership of melody, harmony, and rhythm. However, in keeping with the tradition of The Craft, it may be beneficial to separate the rhythmic element from the other elements of music, at least in an initial analysis.

---

[38] Neumeyer, 39, 66-71.

The three models also recognize the hierarchical element of rhythm. A hierarchical understanding of rhythm is compatible with Hindemith's prescribed method of composition. (Hindemith understood rhythm to take place on two basic levels: the events of the note durations on the surface of the music, and the overall structure or form created by melodic and harmonic goals) Using a top-down approach, the background formal structure will be identified first, then the temporal relationships of the proportions of each movement and section will be analyzed and compared. Proportional relationships and tempos between movements and sections will also be explored using the durations of the tempo markings indicated in the score. The graphic notation tool to be used will be similar to Hindemith's method of planning the rhythmic structure of a composition. Sectional divisions of the movements will also be identified in the graph.

For surface rhythms, Hindemith believed rhythm to take place in a metrical context with pulses organized in two- or three-beat groups organized around the metric accent. The barline determines the metric accent. Therefore, the analytical model for foreground patterning to be used will use the metrical accent as a determinant of structure from the smallest motive to the longest phrase. The analytical methods presented by Winold and Smither appear to be compatible with Hindemith's understanding of meter and rhythm. Tables for comparing durational values will be used where appropriate. The principles laid forth by Winold and Smither will be used to label and identify metric structures and grouping in the foreground rhythmic patterns. These will then be compared to Winold's list of rhythmic elements of the common practice period discussed in Chapter 1. The types of metrical structures will be added to the metric graphs showing the relationship between the type and quality of surface rhythms to the overall background structure.

Chapter 4

Demonstration of the Method of Analysis

Hindemith's work in the genre of the sonata seems to address the general definition of the term sonata, "to sound." Rather than following the "classical" formula for sonata form movements (i.e. allegro with exposition/ development/recapitulation, adagio, minuet/trio, allegro) Hindemith seems more concerned with non-compliance to standard structures.[1] The resulting compositions are extremely individual in character and design. Hindemith said

> I want to compose a whole series of sonatas. Each of them is to be completely different from the preceding ones. I want to see whether I can't, in a whole series of such pieces, increase the potentialities (which are not very great in this type of music and this combination) and extend the horizon.[2]

In his series of over forty sonatas for virtually all the orchestral instruments, Hindemith wrote three for piano solo. In this chapter the relation of the first piano sonata to Hindemith's other works for piano will be explored. The form of the first piano sonata will be analyzed in reference to the tonal scheme of the composition. A comparison of the proportional lengths of the large formal sections will be made. The first movement will then be analyzed in detail to reveal characteristic uses of rhythm.

---

[1] Hindemith, Elementary Training, 159.

[2] Paul Hindemith, quoted in Melvin Berger, Guide to Sonatas: Music for One or Two Instruments (New York: Anchor Books, 1991), 111.

Hindemith's Piano Music

Hindemith wrote many pieces for piano, beginning with a lost sonata from his student years. His first published piano music is a set of five Dance Pieces for Piano, Opus 19, completed from 1920 to 1922 and published in 1928. A better known piece from this period is the 1922—Suite for Piano. Paul Wittgenstein commissioned a piano concerto for the left hand in 1923 but never performed the unpublished manuscript.[3] The famous Kammermusik Number 12, Opus 36 Number 1, features an obbligato piano part with twelve solo strings and winds that was featured at the 1924 Donaueschingen festival. Earlier compositions in this genre show an increasing reliance on a tonal framework as Hindemith rejected the extreme influences of his experimental period.[4]

The Klaviermusik, Opus 37 Number 1 and 2 from 1926-7, are a set of three etudes and thirteen short piano pieces that show the development of a new reliance on tonal organization that eventually developed into The Craft theory.[5] Also from this period are his Opus 40 Number 1 Toccata, the Kleine Klaviermusik (five-note teaching pieces), and his Opus 49, Concert Music for Piano, Ten Brass Instruments, and Two Harps. The three piano sonatas of 1936 represent that instrument in his series of sonatas, but also in this type are the Sonata for

---

[3] Neumeyer, 260.

[4] Melvin Berger, Guide to Sonatas: Music for One or Two Instruments, (London: Anchor Books, 1991), 111. See also Peter Evans, "Hindemith's Keyboard Music," The Music Times 97 (1956), 573.

[5] Denis Matthews, ed. Keyboard Music, (Great Britain: Penguin Books, 1972), 331-332.

Piano, Four Hands published in 1939 and the Sonata for Two Pianos from 1942. The Ludus Tonalis from 1942 is a set of fugues and interludes written specifically to demonstrate his theory of tonal organization from The Craft. A concerto for piano and orchestra published in 1948 completes his most important works for piano.

Hindemith's musical style, which is highly contrapuntal in nature and "dependent on clear articulation of the rhythmic pulse," is clearly reflected in his piano music.[6] Much of the piano music represents his philosophy of Gebrauschmusik. It is often not technically challenging compared to other composers, but it is musically challenging to create a convincing performance.[7] Hindemith regarded writing for the keyboard as a compact and concise means of expression, with the individual lines of contrapuntal activity being organized by the harmonic progression.[8]

The Erste Sonate für Klavier (1936) is no exception. Hindemith is concerned more with creating a well-designed formal structure that emphasizes craftsmanship over expression.[9] The sonata was influenced by the poem Der Main by Friedrich Hölderlin. The poem speaks of a singer who is left without a homeland. The singer is traveling the world on a noble quest represented by the temples of Athens, but the thought of the homeland expressed by the river is always in the mind of the traveler. Hope is regained as the traveler finds solace in the company of others as the River Main also joins forces with The Rhine:

---

[6] Matthews, 331.

[7] Evans, 574.

[8] Hindemith, Craft I, 111.

[9] F. E. Kirby, A Short History of Keyboard Music, (New York: Schirmer Books, 1966), 402.

The River Main[10]

True, on this living earth there are many lands
I long to see, and over the hills at times
My heart runs off, my wishes wander
Seaward, and on to those shores which more than

All others that I know have been glorified;
But far away not one is as dear to me
As that where now the sons of gods lie
Sleeping, the mournful, the Hellenes' country.

O once I long to land there, on Sunium's coast
Once ask my way to your columns, Olympion,
And soon, before the northern gale can
Bury you too in the scattered rubble

Of temples Athens raised, and their imaged gods;
For long now desolate you have stood, O pride
Of worlds that are no more! And O you
Lovely Ionian isles, where breezes

Waft coolness to warm shores from the open sea
While under potent sunbeams the grape matures,
And, oh, where still a golden autumn
Turns into songs the poor people's sighing,

Now that their lemon grove, their pomegranate tree
That bends with purple fruit, and sweet wine and drum
And zither to the labyrinthine
Dance have allured them, however troubled—

To you, perhaps, you islands, yet one day shall
A homeless singer come; for he's driven on
From stranger still to stranger, and the
Earth, the unbounded, alas, must serve him

In place of home and nation his whole life long,
And when he dies—but never, delightful Main,
Shall I forget you or your banks, the
Variously blessed, on my farthest travels.

Hospitably, though proud, you admitted me,
And, smoothly flowing, brightened the stranger's eye
And taught me gently gliding songs, and
Taught me the strength that's alive in silence.

O calmly as the stars move, you happy one,
You travel from your morning to evening,
Towards your brother, Rhine; then, with him,
Joyfully down to the greater ocean.

---

[10] Friederich Hölderlein, Poems and Fragments, trans. by Michael Hamburger (Ann Arbor: University of Michigan Press, 1967), 94-97.

Hindemith was traveling extensively at the time he wrote the three piano sonatas, spending several months at a time in Turkey to organize a national music school there. Perhaps the poem about the River Main in Germany inspired his sense of nationalism. Hindemith may have been reflecting upon his conflict with the German government over freedom of musical and artistic expression. He eventually left Germany along with many other artists and musicians preceding the advent of the second world war.

Form-Defining Rhythms of Hindemith's First Piano Sonata

The First Piano Sonata of 1936 by Paul Hindemith has been closely associated with the compositional procedures of The Craft.[11] The proximity of publication of the sonatas and the German edition of The Craft (1936 and 1937 respectively) might suggest that Hindemith demonstrated the new theory of composition in concise forms through the genre of the piano sonata. However, the set of fugues and interludes in Ludus Tonalis from 1942 more specifically demonstrates the theory.

The first piano sonata is in five movements. Figure 17 shows the tonal plan of the sonata. The overall tonality is in A (the first and last movements). Movement one is a binary form with Section A in the tonality of A, followed by Section B in the contrasting key of E. Movement two, a ternary form, uses C♯ as the tonal center. The third movement, the longest of the five, is in B♭. This movement has been described as a "hybrid" rondo form with five main divisions

[11] Flood, 4-5.

followed by a coda.[12] The fourth movement repeats the binary structure of movement one by reversing the two sections, modulating through the tonality of D and eventually ending in E at the coda. The last movement, a six-part rondo form, begins and ends in the tonality of A with the other formal sections in contrasting keys.

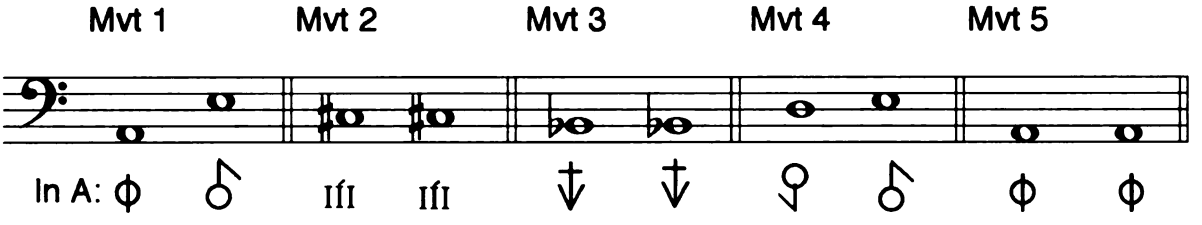


Figure 17: Tonal Plan of Piano Sonata Number 1

The controlling force of Series 1 plays a significant role in the tonal organization of the sonata. The tonality of each movement sets up a goal of motion which leads directly into subsequent movements. The three tonalities of the opening two movements outline an A major sonority. Movement 1 begins in A and closes in E, the dominant. The second movement begins and ends in C♯, a third relationship to both tonal areas of the preceding movement. The third relationship clearly reinforces A as the tonal center of the composition by completing an A-major triad. Movement three is harmonically the furthest removed from

[12] Flood, 84.

the tonic; the key of B♭ functions as the upper leading tone of A. It also functions in the tritone relationship to the dominant E which closes the first and fourth movements. The tritone/upper leading tone relationship creates the greatest tonal tension midway through the composition.

In movement four the tension created by the remote key area of movement three is relaxed. The melodic material from the first movement is restated in different keys and in reverse order. Movement four begins in D, the second-most stable key to the A. In a similar association of movement one to movement two, movement three and four are related harmonically: the tonality of D stands in a third relationship to the preceding movement, balancing the tonal motion of the first four movements. The fourth movement ends in the dominant key E which prepares for the return of the original tonic in movement five.

The approximate durations of each movement have been measured by charting the metric structure and comparing the tempos.[13] The estimated duration is then calculated by determining the number of metric pulses in each section and dividing by the number of beats per minute. The remainder is figured as the percentage of the metronome marking which is multiplied by 60 to give the remaining time in seconds. For example, movement one has a tempo marking of quarter note=96. The total number of quarter note pulses in movement one is 172 at 96 per minute. 172 divided by 96 is 1 with a remainder of 79. The remainder 79 beats is 82% of 96 beats per minute. 82% of one minute (sixty seconds) is 49 seconds. The approximate performance time or duration of movement one is 1' 49".

A comparison of the approximate durations of each movement is given in Table 6. The movement, section, measure numbers, metronome marking, and the number of beats or pulses in each section are given in the first five columns.

---

[13]The metric structure of each movement is given in Appendix C.

The estimated performance times and percentages of the total are given in the last three columns of the table.

Table 6

Estimated Durations of the First Piano Sonata

Movement	Section	Measure #	MM	Pulses	Est. Time	%	% Total
Mvt 1	A	1-22a	96	78	0' 49"	45%	
	B	22b-39a	"	61	0' 39"	36%	
	Coda	39b-51	"	33	0' 21"	19%	
					1' 49"		8.49%
Mvt 2	A	1-26a	50	99	1' 59"	32%	
	B	26b-59a	72	131	1'50"	29%	
	A'	59b-89	50	118	2' 22"	39%	
					6' 11"		28.91%
Mvt 3	A	0-59	168	179	1' 05"	20%	
	B	60-112	"	163	0' 59"	19%	
	C	113-216a	72(216)	310	1' 27"	27%	
	Retrans.	216b-255a	168	110	0' 40"	12%	
	A'	255b-296	"	124	0' 45"	14%	
	Coda	296-321	"	74	0' 27"	8%	
					5' 23"		25.17%
Mvt 4	B'	0-23a	96	60	0' 38"	35%	
(Mvt 1)	A'	23b-46a	"	81	0' 51"	46%	
	Coda	46b-58	"	33	0' 21"	19%	
					1' 50"		8.57%
Mvt 5	A	1-27	120	79	0' 40"	11%	
	B	28-45a	"	49	0' 25"	7%	
	C	45b-94	"	121	1' 01"	16%	
	D	95-155	112	172	1' 33"	25%	
	B'	156-192	120	103	0' 52"	14%	
	A'	193-237	"	125	1' 03"	17%	
	Coda	238-280	168	100	0' 36"	10%	
					6' 10"		28.83%
				Total:	21' 23"		

The durational relationship of the individual movements to the entire structure of the sonata is revealed in the estimated performance times. A comparison of all five movements reveals a well-proportioned compositional plan for the entire sonata.

The two shortest movements, one and four, are of nearly equal length: 1' 49" and 1' 50" respectively. The similarity is not surprising as they have the same basic structure: movement four repeats the transposed melodic material from movement one in reverse order. However this equality is odd seeing that the total number of measures is 51 for the first and 58 for the second.

The disparity arises from the second theme. In movement one, the B theme consists of sixty quarter note pulses within 17 measures. Movement four has the same material with sixty quarter note pulses in 23 measures. The additional measures are due to the B' theme stated in alternating 3/4 and 2/4 measures (creating eight hypermeasures of 5/4). This would normally add eight additional pulses to the section, however these are offset by omitting nine pulses from the restatement of the thematic material. (Measure 31-32 and the last beat of measure 39 from movement one are omitted in movement four.) The result is an equal number of pulses for the restatement of the B theme in movement four.

Movements one and four are linked to the subsequent movements with the performance direction nach kurzer Pause anschließen: "continue after a slight pause." They serve as preludes to the much longer second and fourth movements. The linking of the outer movements emphasizes the balanced structure of the sonata. The two pairs of outer movements each have a combined approximate duration of 8' 00" taken in the strictest metronomic measurement. Movement three, the middle of the five movements, is 5' 23", almost exactly 33% shorter than each of the combined outer movements, giving a ratio of 1.5: 1: 1.5 (323 seconds into 480 seconds yields 1.486, or 1.5.) In terms of duration, this

creates an arch-type temporal structure that should be clearly represented in performance.

The estimated durations of Table 6 also reveal objective criteria for interpreting or evaluating a performance of the sonata. Even considering Hindemith's original markings to be the extreme ranges of tempo, Glenn Gould's times are greatly out of proportion with those indicated by the original tempo markings.[14]

Table 7 compares the estimated durations from the score with the durations of three recordings. It is seen that Gould's recording is over seven minutes slower in total performance time than that required by the score (25' 40" compared to Gould's 32' 31"). Badura-Skoda[15] and Roberts[16] are within reasonable performance times.

An extreme example of the disproportionate interpretation of Gould's performance is in movement three. The marking Etwas ruhiger (more quietly) at the beginning of the second theme does not necessarily mean a change of tempo as much as a change of mood (one is neither inclusive nor exclusive of the other). Hindemith is following the classical rondo form where a lively and brisk first theme is followed by a more lyrical and melodic second theme. The quietness is achieved by the smoother rhythm of the new melodic line. A slight change of tempo may be called for, but Gould allows too much contrast of tempo between the two themes.

---

[14] Paul Hindemith, Hindemith, The Three Piano Sonatas, Glenn Gould, piano, Sony Classical CD SMK 52670. Performance date October 13, 1966.

[15] "Paul Badura-Skoda Plays Hindemith, Piano Sonatas nos. 1 and 3," Westminster XWN 18200, 1956.

[16] Bernard Roberts with David Strong, "Hindemith, Music for One and Two Pianos," Nimbus Records, compact disc NI 5459/60, 1996.

Table 7

A Comparison of Performance Times
of the First Piano Sonata

Mvt	Section	Measure #	Est. Time from MM	Gould	Badura-Skoda	Roberts
Mvt 1	A	1-22a	0' 49"	1' 22"	0' 51"	0' 51"
	B	22b-39a	0' 39"	1' 05"	0' 39"	0' 46"
	Coda	39b-51	0' 21"	0' 45"	0' 28"	0' 29"
		Total:	1' 49"	3' 42"	1' 58"	2' 06"
Mvt 2	A	1-26a	1' 59"	3' 20"	2' 15"	2' 13"
	B	26b-59a	1'50"	2' 33"	1' 51"	1' 45"
	A'	59b-89	2' 22"	3' 37"	2' 42"	2' 56"
		Total:	6' 11"	9' 30"	6' 48"	6' 54"
Mvt 3	A	0-59	1' 05"	1' 30"	1' 10"	1' 12"
	B	60-112	0' 59"	0' 96"	1' 13"	1' 18"
	C	113-216a	1' 27"	1' 54"	1' 37"	1' 41"
	Trans.	216b-255a	0' 40"	0' 55"	0' 41"	0' 44"
	A'	255b-296	0' 45"	1' 03"	0' 51"	0' 57"
	Coda	296-321	0' 27"	0' 54"	0' 38"	0' 44"
		Total:	5' 23"	7' 52"	6' 10"	6' 36"
Mvt 4	B'	0-23a	0' 38"	1' 10"	0' 40"	0' 48"
	A'	23b-46a	0' 51"	1' 15"	0' 54"	0' 56"
	Coda	46b-58	0' 21"	0' 58"	0' 28"	0' 31"
		Total:	1' 50"	3' 23"	2' 02"	2' 15"
Mvt 5	A	1-27	0' 40"	0' 44"	0' 45"	0' 47"
	B	28-45a	0' 25"	0' 25"	0' 27"	0' 28"
	C	45b-94	1' 01"	1' 13"	1' 13"	1' 16"
	D	95-155	1' 33"	2' 04"	1' 44"	1' 58"
	B'	156-192	0' 52"	1' 21"	0' 58"	1' 01"
	A'	193-237	1' 03"	1' 21"	1' 12"	1' 20"
	Coda	238-280	0' 36"	0' 56"	0' 48"	0' 50"
		Total:	6' 10"	8' 04"	7' 07"	7' 40"
		Total:	21' 23"	32' 31"	24' 05"	25' 31"

The disregard for Hindemith's tempo and proportional indications may be one reason Gould's performance has been called into question:

> Such performances exchange the vigor, interest, and lyricism of detail within a broadly proportioned, readily understandable formal frame for placidness, aridity, and a sad predictability that is entirely at odds with Hindemith's conception of music.[17]

The meters and durational lengths of the individual movements need to be addressed as these provide the background upon which the surface rhythms are placed. Formal divisions in the sonata are clearly defined. In addition to cadences, other parameters of music such as changes of tempo, texture, and registration help distinguish formal divisions. The strongest cadences occur at the ends of the larger sections.

In movements one and four the basic pulse is 96 quarter notes per minute. No time signature is given in the score, but there are four strict quarter notes per measure in the accompaniment pattern of the first four measures of movement one, clearly establishing 4\4 time (See Figure 11, page 50). In addition, the performance direction Ruhig bewegte Viertel calls for a strict quarter note emphasis. The performance direction for movement four calls for a return to the same tempo and pulse as movement one (Ruhig bewegte Viertel, wie im ersten Teil). The quarter note pulse is retained throughout both movements; the alternating 2\4 and 3\4 meter has been previously discussed. Also, 2\4 and 3\4 measures are inserted occasionally during the restatement of the A' theme. The coda in movements one and four contains two measures of 1\4 which serve as anacrusis beats. These measures could easily have been notated as beat four of the preceding measures or beat one of the subsequent measures. The one-beat measures help clearly define the three phrases of the coda, however.

The total estimated durations of movements two and five are nearly identical.

---

[17] Neumeyer, The Music of Paul Hindemith, 17.

The differences between them arise in the tempos, thematic material, harmonic organization, and form. Movement two is a slow march in ternary form with contrasting sections in 4\4 and 12\8 meters; movement five is a fast rondo in compound triple and simple triple meters. Both of these movements use changing meters on a limited basis but always in keeping with the over-riding meter. In this sonata Hindemith never changes from compound to simple meters within a section although contrasting sections may do so.

The first theme of movement two, measures 1-26a, retains a quarter note pulse but the tempo is slowed to 50 beats per minute. The meter is designated as 4\4. There is one measure of 2\4 inserted about midway through the section. The B theme from measures 26b to 59 is in 12\8 meter throughout except for the last measure of the section which is in 6\8. The tempo is marked as dotted-quarter note = 72 beats per minute. The contrast between the two themes comes in a change of mood to a livelier melody and compound meter. With 99 pulses for the first theme and 131 pulses for the second theme, the estimated performance times are 1' 59" and 1' 50", a ratio of almost 1:1.

The return of A extends from measure 59b to measure 89 and completes the ternary form. A' is 118 pulses instead of 99, an increase in duration of 16%. The increase is due to the avoidance of the expected cadence in the ninth bar of the return, the phrase extended by repeating the opening motive of the theme with variation. Hindemith also attaches an additional coda to the end of the A' section.

Movement three is perhaps the most interesting of the five movements. It has four main thematic sections. Since transitional material relies extensively on motives from the themes, these have been included as part of the total duration of the themes. The A theme extends from measure 0 to 59 and consists of 179 pulses of quarter notes at 168 beats per minute. The meter of A is

3\4 throughout the section. The estimated time of performance is 1' 05".

The B theme of movement 3 retains the quarter note pulse and tempo as discussed above and extends from measure 60 to measure 112. The 163 pulses give an estimated performance time of 0' 59". There are also several changes of meter from 3\4 to 4\4 and back again. Once again, the ratio of A to B is almost exactly 1:1.

The third theme of movement three is more complex than A or B. In the C theme the dotted-half-note pulse of 72 beats per minute increases the tempo to 216 quarter notes per minute. The pulse, however, should be felt in compound time. The theme spans measures 113 to 216 and is the longest section of the movement, being an estimated 1' 27" in duration. The fast tempo is interrupted by two short sections with the performance directions of Ein wenig breiter in measures 146 to 160 and einleiten...Breiter in measures 195 to 197. These terms "more broadly" and "directly...broader" call for highly subjective changes of tempo, but in all likelihood could increase the estimated performance time of this section by as much as 30 seconds or more. This specific section with its temporal ambiguity lies just beyond the halfway point of the entire sonata in terms of the total estimated time. After a short retransition based upon theme A, the true reprise of A begins in measure 255 and is shortened considerably to 124 pulses, or 0' 45". A short coda recalls earlier material from sections B and A.

Movement five is a six-part rondo form. As stated earlier, the total estimated time for the fifth movement is 6' 10". Sections A, B, and C each use a compound triple meter of three dotted-half notes per measure at 120 beats per minute. The estimated performance times for each of these sections are 0' 40", 0' 25", and 1' 01" respectively. Each section also changes meters from triple compound to duple compound for only one or two measures at a time, but

Section C has 11 meter changes.

In contrast, section D of movement five, from measure 95 to 155, is in 3\2 meter. It is also the longest section of the movement with 172 pulses at 112 beats per minute for an estimated time of 1'33", or 25% of the movement. B' and A' restate earlier material. In the return, however, each of these is considerably longer in duration.

In reviewing the durations of larger formal units of the sonata, several factors become apparent. First of all, Hindemith presents a durational arch form with the outer movements linked to create a 1.5: 1: 1.5 relationship to the middle movement. This interior movement is also metrically the most interesting as it presents a certain level of temporal ambiguity just beyond the midpoint of the sonata. Hindemith's use of meters in this sonata is somewhat traditional. He maintains the same type of pulse within sections (as in compound and simple beat divisions) but does allow limited changes of meter within sections. Some of the meter changes give actual meter signatures but most rely only on durational values within the measures to identify the change. Finally, the tempos given in the score as metronome markings seem to be on the extreme fast or slow setting. Relationships of durational proportions of each movement and sections should be maintained throughout for the best interpretation of the sonata.

Analysis of surface rhythms can explain the differences in durations of each section and how each section is extended or shortened upon restatement. Analyzing the surface rhythms also explains the use of motivic material in specific rhythmic gestures.

The following analysis will present a detailed examination of the surface rhythms of movement one, which will demonstrate the proposed method of analysis. Four areas will be addressed in performing the detailed analysis of

the first movement. The movement will be segmented using the grouping parameters discussed in the previous chapter. Longer groups such as sections and phrases will be identified by length and the tonal centers of each phrase will be identified. Secondly, note durations used in each phrase unit will be tabulated. The third area will identify how the pitch durations are grouped into characteristic rhythmic units and how these are used within the longer sections. Patterns will be described according to Winold's criteria as Metric (even-note patterns), Intrametric (confirming patterns), Contrametric, (nonconfirming, or syncopated patterns), or Extrametric (irregular) patterns.[18]

The Phrase Rhythms of Movement One

Movement one is a binary form. The tempo is 96 quarter notes per minute. Measures 1-22a constitute Section A, measures 22b-39a Section B, and measures 39b-51 form a coda. The phrase durations are given in Table 8. It is noticed that Section A lasts 0' 49", Section B is 0' 39", and the coda is 0' 21", totaling 1' 49" in duration. The entire movement with harmonic analysis is reproduced in Appendix D.

[18] These are cited previously and explained in more detail in Chapter 3.

Table 8

Phrase Durations of Movement 1

	MM	Measure #	Beats	Est. Time
Section A				
Phrase a	96	1-4a	15	0' 9"
b	"	4b-10	22	0' 14"
a'	"	11-16a	20	0' 13"
a"	"	16b-22a	21	0' 13"
			78	0' 49"
Section B				
Phrase d	"	22b-26a	16	0' 10.2"
d'	"	26b-30a	16	0' 10.2"
d"	"	30b-39a	29	0' 18"
			61	0' 38.4"
Coda				(0' 39")
Phrase e	"	39b-42	10	0' 6"
e'	"	43-46	10	0' 6"
e"	"	47-51	13	0' 9"
			33	0' 21"
		Total		1' 49"

Figure 18 plots the tonal plan of Movement 1. The A section begins with a period structure comprised of two phrases. The antecedent starts on the down-beat of measure 1 and ends in a cadence on B on the third beat of measure 4. The total length of the a phrase is 15 beats. Phrase b, the consequent, begins with the anacrusis to measure 5 and ends in measure 10 with a cadence on D♯, resulting in 22 beats. Following this cadence, the melodic material from measure 1 is restated an octave lower in measure 11 beginning phrase a'.

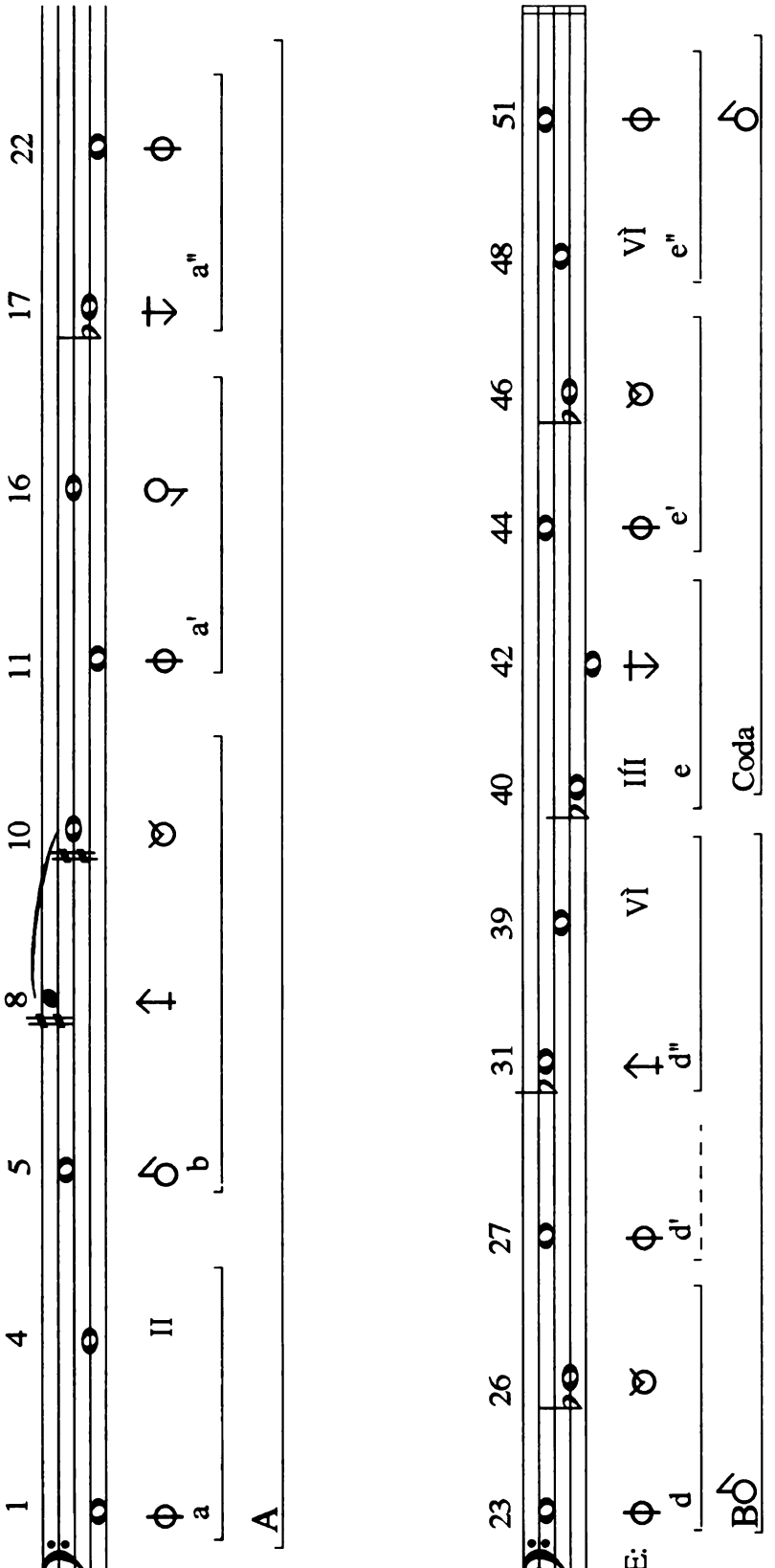


Figure 18: Tonal Plan of Movement 1

This restatement is less conclusive but comes to a partial closure on beat 2 of measure 16 with the subdominant pitch in the bass voice after 20 beats. The final phrase, a", extends from the anacrusis to measure 17 to the cadence in the tonality of A on beat 4 of measure 21.[19]

Section B consists of a three-phrase group that reiterates the same melodic material in varied form. The first phrase, labeled d, is 16 beats long, from the anacrusis to measure 23 to measure 26a. The tonality begins on E minor and moves to its tritone B♭ in measure 26. Phrase d' moves the same melodic material one octave higher in measures 27-30 with a slight change at the end of the phrase. The ending of the phrase is altered slightly to be less conclusive by repeating the motive f♯2, e♯2, a♯2 three times. The b♭ from measure 25 is spelled as A♯ in this phrase. The d' phrase is 16 beats long.

The third phrase of Section B, d", begins with the anacrusis to measure 31. The third phrase is 29 beats, being extended to measure 31 with a cadential rhythmic pattern that diverges from the previously established rhythms of the section. The coda twice repeats a 10-beat phrase in transposition, ending the movement in measure 51 with a cadence in E major.

The durational values of the upper voice of the two-voice framework of movement one are listed in Table 9. Hindemith is very consistent in using individual durational values. As a general rule in this movement, durations are metrically organized; longer note values occur on the first and third beats of the measure, shorter notes in groups of two on the second and fourth beats.

---

[19] A different interpretation of the phrase structure is that the a" phrase serves as a different consequent to a', maintaining the basic period structure of the opening. However, the inconclusive nature of a' may provide an alternative interpretation . This second phrase might be heard as an extension of a' rather than a new phrase because of the weak conclusion of a' in measure 16. In my opinion the grouping of the larger phrases lends itself to calling a" an entirely new phrase that is based on the same motivic material.

Table 9

Durational Values of Movement 1
Upper Voice of Two-Voice Framework

Section A				Section B and Coda			
Complement	Hierarchy	Range	Type	Complement	Hierarchy	Range	Type
	3	--	extrametric subdivision		21	--	extrametric subdivision
	42	1	confirming subdivision		66	1	confirming subdivision
	1	1.5	confirming subdivision	--	--	--	
	23	2	metric division		29	2	metric division
	11	3	confirming multiple		10	3	confirming multiple
	2	4	confirming multiple		1	4	confirming multiple
--	--	--			2	6	confirming multiple
	6	--	extrametric multiple	--	--	--	

Extrametrical note values (triplets, in this case) also occur only in unaccented metric position, although the longer quarter-note triplets in measure 19 contribute to the opposition of the metric pulse in phrase a'' of Section A.

The eighth note is the predominant note value used in the upper voice of the two-voice framework of movement one and helps to confirm and maintain the quadruple simple meter. Of the forty-two eighth notes, 24 occur in pairs. Three of those pairs are on a metrically strong beat of the measure and six are in a metrically weak position. Single eighth notes occur as anacrusis beats following a rest 7 times while 10 occur after a dotted quarter note. One occurs with a quarter note syncopation. The eighth notes of Section B and coda are more frequent, 66 as opposed to 42. The greater frequency of shorter note values creates a faster rate of melodic motion in Section B than Section A, even though the metric tempo remains constant. The eighth notes in Section B always occur on beats two or four in a similar fashion to Section A. They are always grouped in pairs or singly follow dotted quarter notes. The coda uses three eighth-note values following an eighth rest in the three measures of 1\4 meter. These are construed as anacrusis beats that divide the coda into three distinct phrases.

The second most frequent note value is the quarter note, occurring 52 times in movement one (23 in A and 29 in B plus the Coda). As mentioned earlier, the meter is established in the first phrase by the strict quarter notes of the accompaniment and the duple division of the beat in the melody of measure one.

The meter is also confirmed by the longer note values that occur on metrically accented beats. Of the longer note values in the movement, in the upper voice of the two-voice framework 37 quarter notes occur on metrically accented beats while 11 are on weaker beats. Only one of the half notes occurs in a metrically weak position. Fifteen of the dotted quarter note values occur on strong beats while 6 are metrically unaccented.

In this movement, Hindemith uses note values in a very regular way. Longer note values tend to occur on strong beats while shorter note values are on weaker beats. Analyzing the surface rhythms gives detailed explanations of the similarities and differences between unified groups and how a composer uses unified groups to expand and enlarge the rhythmic structure. Hindemith uses metric dissonance in several ways and for different purposes in the first movement of the piano sonata.

The Unified Groups of Section A

Figure 19 identifies the rhythmic units of measures one through ten and compares them to the metric structure. It is important to note that the rhythmic units are organized around the barlines. Most of the rhythmic units in this phrase help establish and confirm the basic metric pulse of the movement by agogic accents on the downbeats of the measures. The seven confirming units, in measures one, three, four, five, six, and seven, use dotted quarter notes, quarter notes and eighth notes. The longer note values occur on the strong beats of the measures except for the paired eighth notes in measure three. Two predominantly metric groups occur in measures two and nine.

The most interesting rhythmic group in Section A occurs in measure eight. Measure eight is identified as a contrametric pattern with extrametric subdivision at the first subdivision level: the change of meter and the syncopation work against the established quadruple pulse and the triplet eighth notes alter the normalized duple subdivision of the pulse. It was discussed previously that the downbeat of measure eight would be the traditional place for the cadential chord to end this phrase. The deceptive cadence at this point arises by the

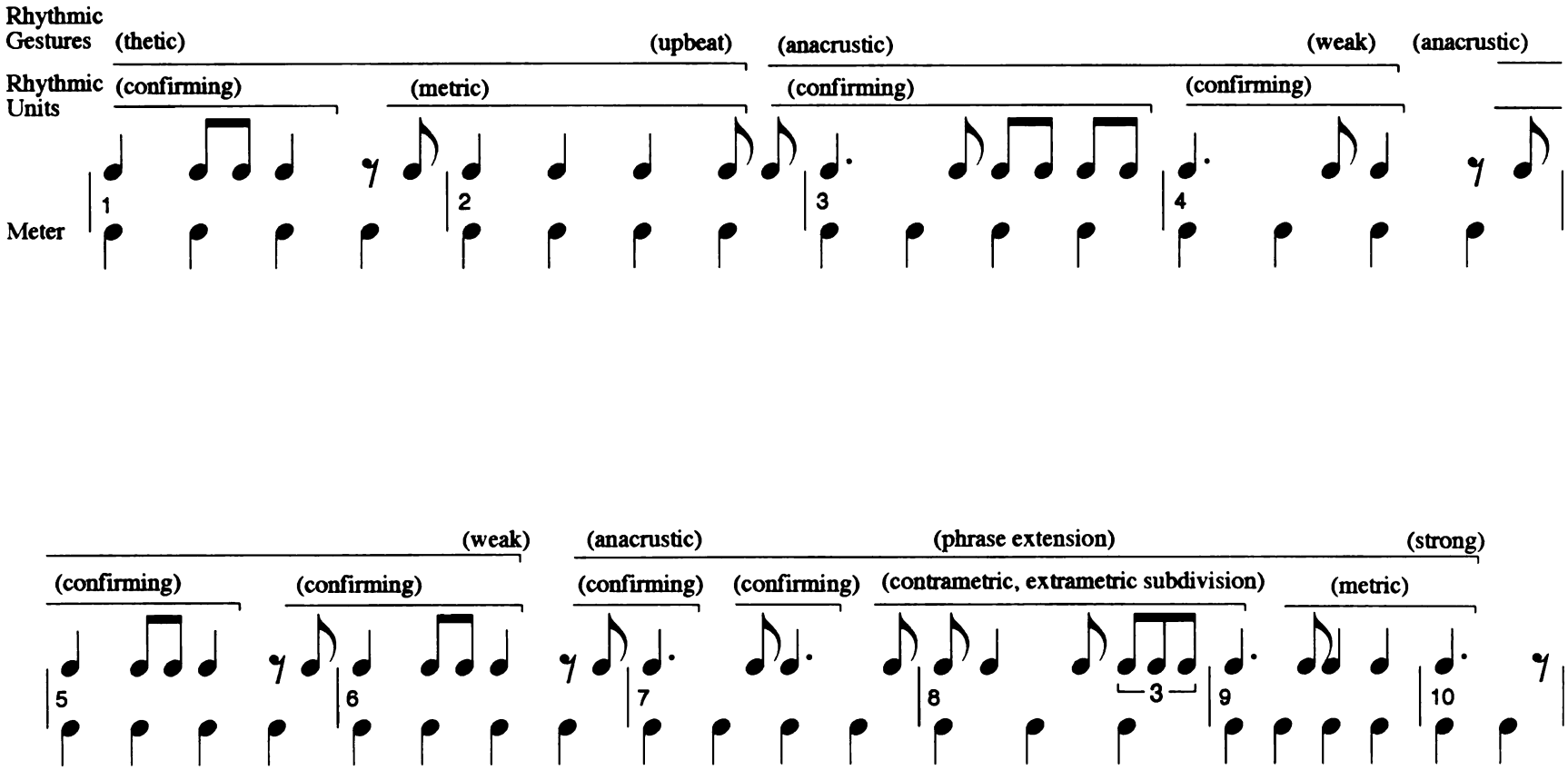


Figure 19: Unified Groups of Section A, mm 1-10

tension of the tritone chord of Group IIb_1 on the downbeat of measure eight. The syncopation of the rhythm and change to triple meter also creates effective motion away from a cadence. A tonic accent by leap upward to b_2 as well as a thinning of the texture to a single melodic line continues to emphasize measure eight. Hindemith then adds a two-bar extension to the regular eight-bar structure to end the phrase.

Two patterns in the rhythmic groups stand out as more prominent than the others. These two patterns help to unify the first part of Section A, and also become motives for expansion in the second part of Section A. The two patterns are given in Figure 20. The opening figure of measure one, identified as Pattern N, occurs later in measures five and six. Pattern O with the characteristic dotted quarter note, is also present in measures three, four, seven, and nine. It also occurs in the lower voice of the two-voice framework in measure three. This pattern is also varied (Pattern O-1) in measure eight to become the contrametric rhythmic group of the deceptive cadence.

The rhythmic units are combined to make up the four rhythmic gestures of measures one through ten. The first rhythmic gesture has a thetic or strong-beat beginning and closes with an upbeat ending in measure two. The second rhythmic gesture has an anacrustic beginning and weak-beat ending, although the ending might also be construed as strong because it ends on the secondary metric accent, the third beat. The remaining two rhythmic gestures both have anacrustic beginnings, the first ending on another secondary metric accent in measure six. The final rhythmic gesture closes with a strong downbeat ending.

The harmonic rhythm of measures one through ten is quite rapid. The harmonic fluctuation consists mostly of non-tritone chords of Group A, Subgroup III (refer to the analysis in Appendix C). The roots and quality of the chords

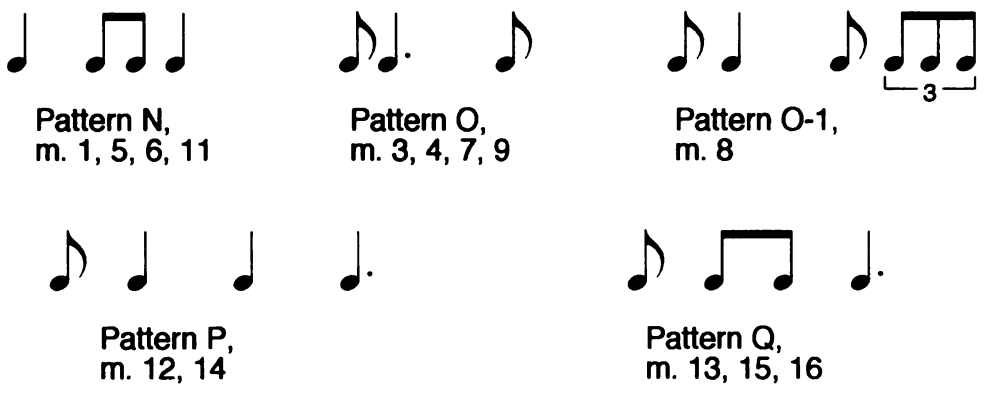


Figure 20: Unifying Patterns of Section A

change on almost every beat. The few tritone chords of Group B that occur in this section do so on accented beats: beat one and three of measure two and beat one of measure eight. The least dissonant chords of Group I are also metrically accented as they occur in successions of more dissonant chords.

Measures 11-22 comprise the restatement of the opening and consists of two phrases: a' and a". Exact duplication is avoided and development or extension of the opening phrase is achieved by repetition and variation, two of the compositional procedures Hindemith identified in Elementary Training for Musicians.[20] A salient characteristic of Hindemith's style is the organic nature of the musical development. Later phrases grow from previously heard material at least in the first movement of this piano sonata.

Figure 21 identifies the rhythmic units of measures eleven through twenty-two and compares them to the metric structure. Phrase a' in measures eleven

[20] Hindemith, Elementary Training, 158-159.

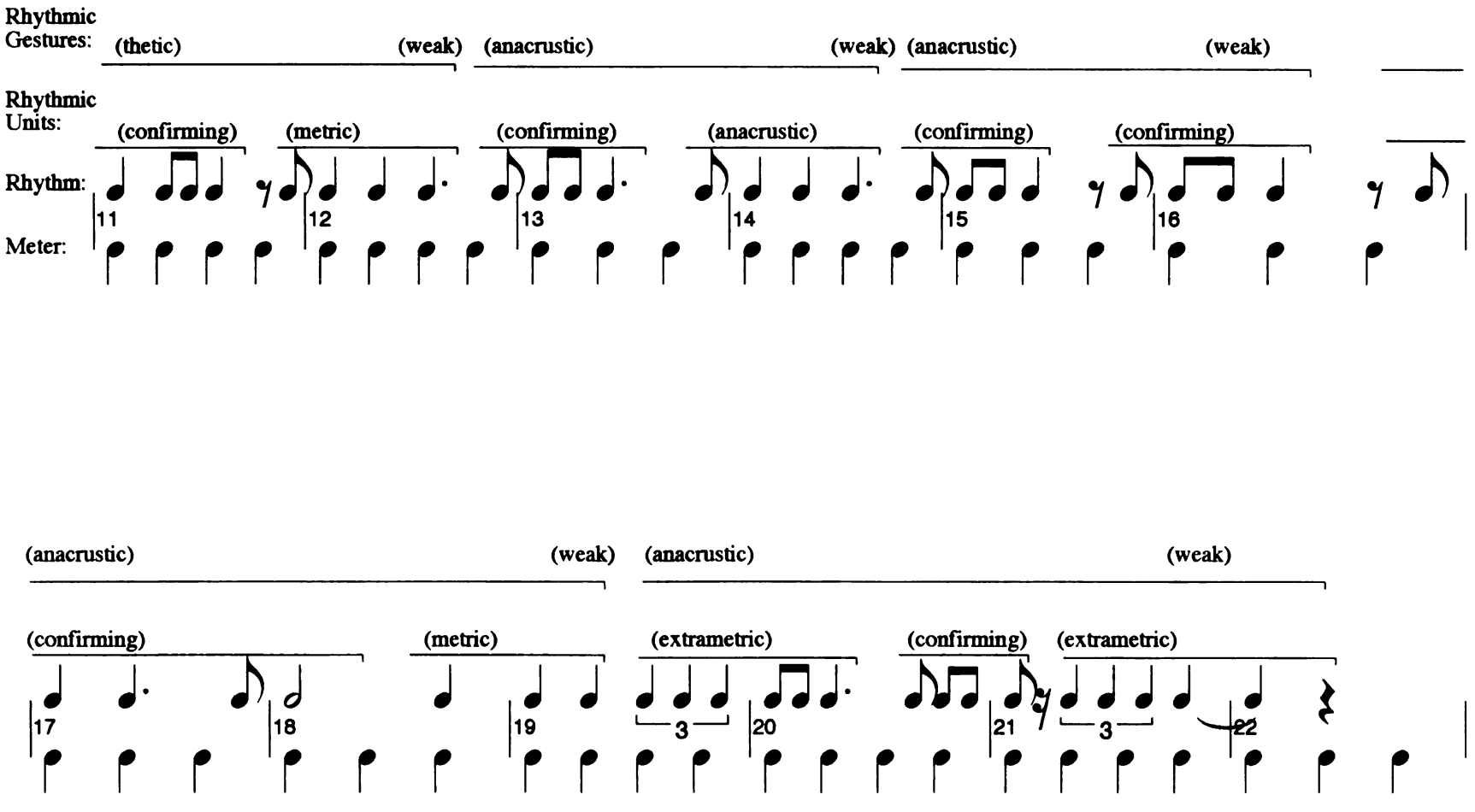


Figure 21: Unified Groups of Measures 11-22

to sixteen consists of six rhythmic units using three different patterns. Pattern N, the confirming pattern from measure one, begins the restatement of the opening theme in measure eleven one octave lower than measure one.

Pattern P in measures twelve and fourteen is a varied form of the metric pattern from measure two of the original statement (see Figure 20). It is four beats long and emphasizes the last note of the pattern. This agogic accent falls on the third beat of the quadruple meter in measures twelve and fourteen. Pattern P alternates with a new rhythm pattern (three eighth notes followed by a dotted quarter or quarter note) identified as pattern Q. In contrast, pattern Q is three beats long and also emphasizes the last note of the pattern which falls on the second beat of a triple-beat measure each time. The alternation of P and Q combined with the rising pitch of the melody in a sequential repetition of Q in measures creates momentum which leads to a tentative resting point on the subdominant on beat two of measure sixteen. The repetition of P and Q also extends the phrase to six bars instead of four.

Measure seventeen begins the final phrase of Section A. In phrase a", pattern N is varied rhythmically while retaining the melodic interval content of measure one. The motive $c\sharp_2$ - e_2 - b_1 - a_1 in measure one is duplicated as d_2 - f_2- c_2- $b\flat_1$ in measures seventeen and eighteen. This final statement of the motive changes to triple meter which emphasizes the second note of the group and adds two beats to it. Phrase a" continues with the metric Pattern P followed by two extrametric patterns of quarter note triplets divided by Pattern Q.

The varied repetition of phrase a as a' and a" creates the form of Section A. While the restatements of the thematic material unify the section, especially Patterns N, P and Q, the compositional devices of repetition and variation are used to extend the phrases and move the musical ideas forward. The strong

quarter-note pulse of the movement is obscured in the last two phrases of the section. Metric ambiguity arises in the alternation of quadruple and triple meters in phrase a' and the change from triple to quadruple meter in phrase a''. The accent is shifted to the second and third beats of the measures as the rhythm patterns carry through the barlines. Extrametric groups at the first multiple level (the quarter-note triplets in measures nineteen and twenty-one) help to slow the momentum and blur the metric pulse. Finally, the conclusion of the section on a weak beat in measure twenty-one further obscures the strength of the meter.

The Unified Groups of Section B

The unified groups of Section B are built around Pattern N, the same pattern which organizes the groups of Section A (Figure 19). The primary difference is the use of an anacrusis beat before each occurrence of Pattern N (See Figure 22). The anacrusis consists of confirming eighth notes in five occurrences and an extrametric subdivision in the other three; otherwise the pattern confirms the metric pulse on the first subdivision level, the beat level, and the multiple levels of the half measure and measure. The addition of the upbeat disguises Pattern N by dividing the unified groups into two balanced parts aligned so that the longer notes fall on the strong beats of the measures.

An interesting feature of the first two rhythmic gestures of Section B is the interaction between the pitch content of the upper voice of the Two-Voice framework and the unified groups. The melody is linked to the second beat of each measure in an ascending step progression beginning on d_1 in measure

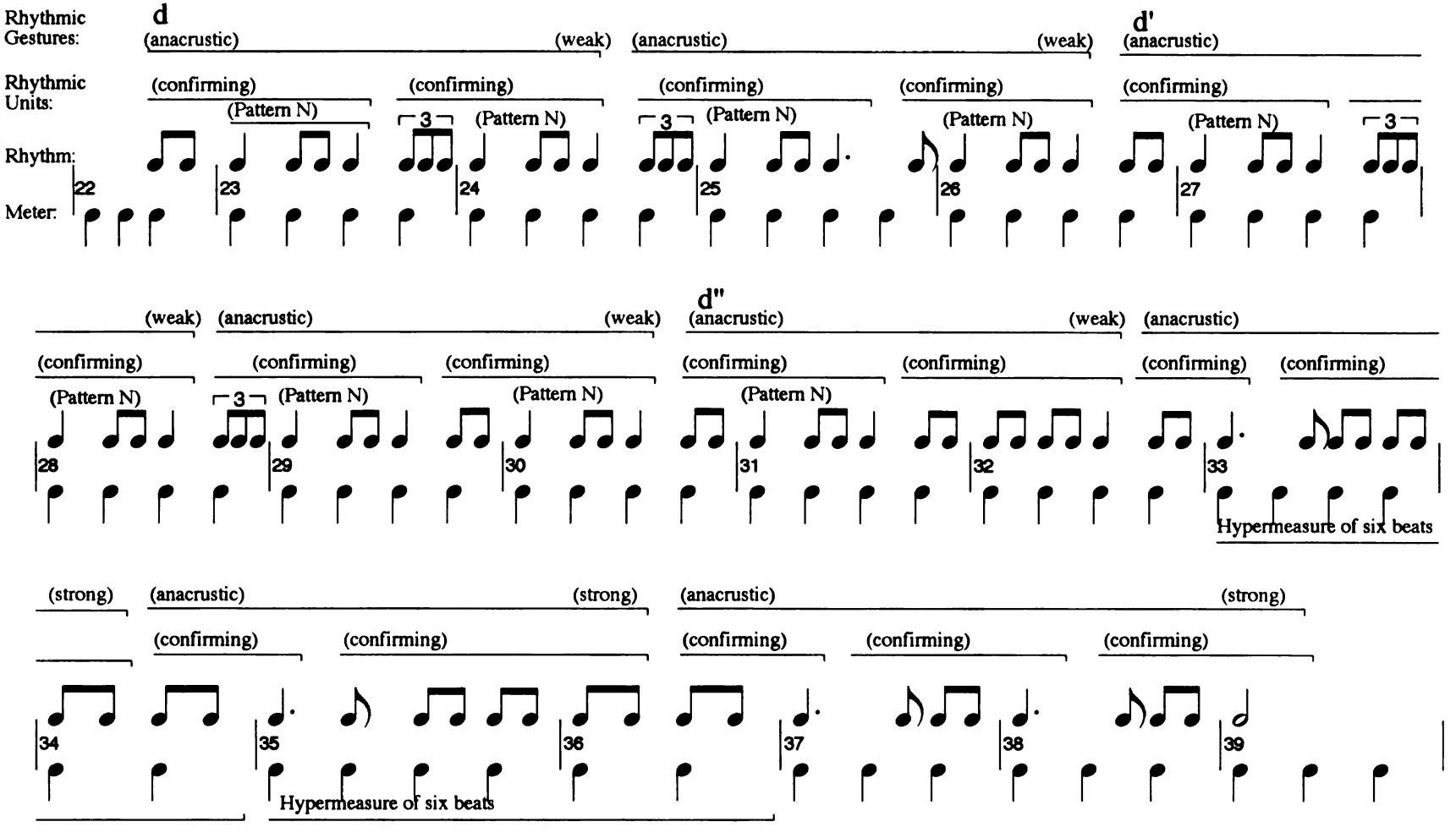


Figure 22: Unified Groups of Section B

twenty-three. (The music is reproduced in Appendix C.) Each repetition of Pattern N sees a rise of a major second at the same point in the rhythmic group: beat two of measure twenty-four has e_1 and beat two of measure twenty-five has $f\sharp_1$, the melodic high point of phrase d. The rise in the melodic contour is counterbalanced by static motion created by alternating b and $b\flat$ on beats one and three of these measures.[21] Phrase d' in measures twenty-seven through thirty repeats these melodic features one octave higher. The pitch $a\sharp_1$ on the third beat of measure twenty-nine substitutes for the $b\flat_1$ on the third beat of measure twenty-five. Also, a change of rhythm in the last two bars of phrase d' increases the momentum by three consecutive statements of the last half of Pattern N (the eighth-eighth-quarter note figure on $f\sharp_2$. $e\sharp_2$. and $a\sharp_1$ in measures twenty-nine and thirty).

The key of E is firmly established by the lowest voice with a pedal point E_1 on the fourth beat of measures twenty-two, twenty-three, and twenty-four and measures twenty-six, twenty-seven and twenty-eight. The bass voice also creates a metric cross rhythm in measures twenty-three through twenty-five and on octave higher in twenty-seven through twenty-nine. Beat 2 is emphasized with agogic and pitch accents in an ascending minor second step progression of c, $c\sharp$, and d that is paired with similar motion in the upper voice on d_1, e_1, and $f\sharp_1$. The linear motion of the two-voice framework obscures the chord progression of the harmonic fluctuation in phrase d and d', which mostly consists of chords of groups I and III.

---

[21] Neumeyer identifies similarities between measures one through four and measures twenty-three through twenty-six in a structural analysis. The background structure reveals a similar neighbor-note motive used in both opening phrases of Sections A and B of this movement. See Neumeyer, The Music of Paul Hindemith, 200-203.

Phrase d" is almost twice as long as the two previous phrases. The lengthening of the rhythmic gesture is caused by the addition of a new rhythm pattern—a series of eighth notes in contrary motion in parallel thirds and fifths. This pattern creates two hypermeasures of 6 beats that begin with the anacrusis to measure thirty-three.[22] Along with this new rhythm pattern the harmonic fluctuation here is the most active in Section B, which causes the greatest area of harmonic tension in the movement. The phrase closes with a repeated cadential pattern over a pedal point on C.

The Unified Groups of the Coda

The coda consists of three statements of a three-stage sequence of a closing theme. (Figure 23) Each stage of the sequence begins a diminished fourth or major third lower than the previous statement which gradually moves the tonal center to the key of E. The ending of the last phrase is altered to provide two cadential chords. The last motive is changed to a dotted-half note and an additional measure added for the cadential chord in measure fifty-one. The total duration of 33 pulses or approximately 0' 21" is achieved by exact repetition of the rhythm. This accounts for the similar durations of each phrase shown in Table 8 on page 104. Change occurs, however, in the pitch level and harmony. The harmony consists primarily of chords of Group A subgroup III, but the final chord of the first two phrases are tritone chords of Group B subgroup IV and II.

The first phrase of the coda begins in A♭ and closes in F. The harmonic fluctuation increases through the second phrase with three tritone chords, two of

[22] Flood, 77.

Figure 23: Movement One, Coda.
(Hindemith, Erste Sonate für Klavier, 1936. ©B. Schott's Soehne, Mainz, 1936. © renewed. All Rights Reserved. Used by permission of European American Music Distributors Corporation, sole U.S. and Canadian agent for B. Schott's Soehne, Mainz.)

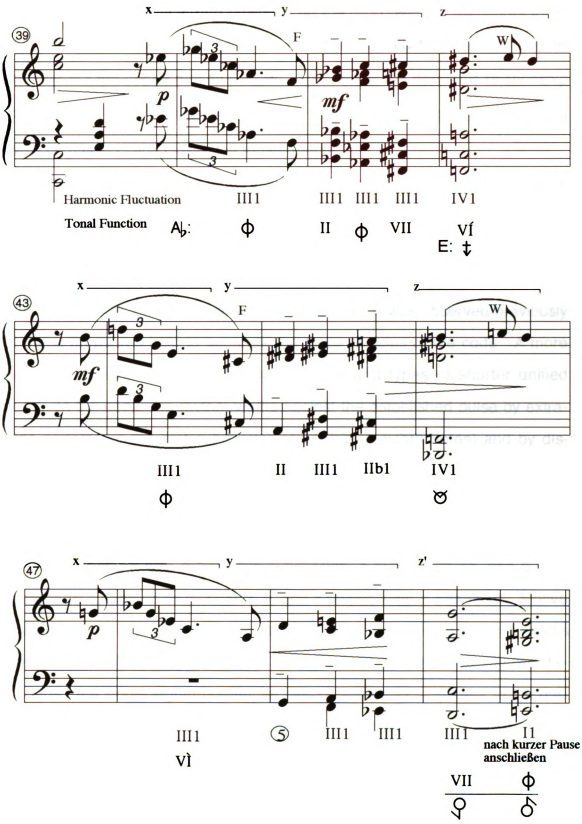


Figure 23: Movement One, Coda

which occur in metrically strong positions on the downbeats of measures forty-five and forty-six. The second phrase is also harmonically the most unstable as it emphasizes the tritone motion E to B♭. This recalls the harmonic relationship in Phrase d in Section B which begins in E and ends on B♭ also. The third phrase begins in C and closes the movement in E.

The predominating meter of the coda is 3\4, but the question is raised as to why Hindemith chose to notate measures forty-three and forty-seven in 1\4 meter. (The final beat of measure thirty-nine serves the same function as measures forty-three and forty-seven.) It should also be noted that there is no change of meter signature to identify the one-beat measures. It was observed previously that these measures help to separate the three phrases of the coda. A more conclusive explanation lies in the combination and types of shorter unified groups. In the coda, the rhythm works against the established pulse by extrametric patterns at the first subdivision level (triplet eighth notes) and by displaced accents at the beat level to establish a change of meter from triple to duple and back.

At the primary beat level, the sequential phrase of the coda is comprised of a contrametric pattern with extrametric subdivision, a metric pattern, and a confirming pattern, labeled as motives x, y, and z respectively in Figure 24. Motive x, the contrametric pattern in measures forty, forty-four, and forty-eight, works against the established triple meter. The motive can be separated into two distinct parts: the single eighth-note/triplet pattern serves as an upbeat to the dotted-quarter note, creating the agogic accent on beat two of the notated measure. This longer note is also harmonically accented. It is the root of the descending melodic degree progression (A♭, E, and C in measures forty, forty-four, and forty-eight). The off-beat syncopation caused by the displaced accents

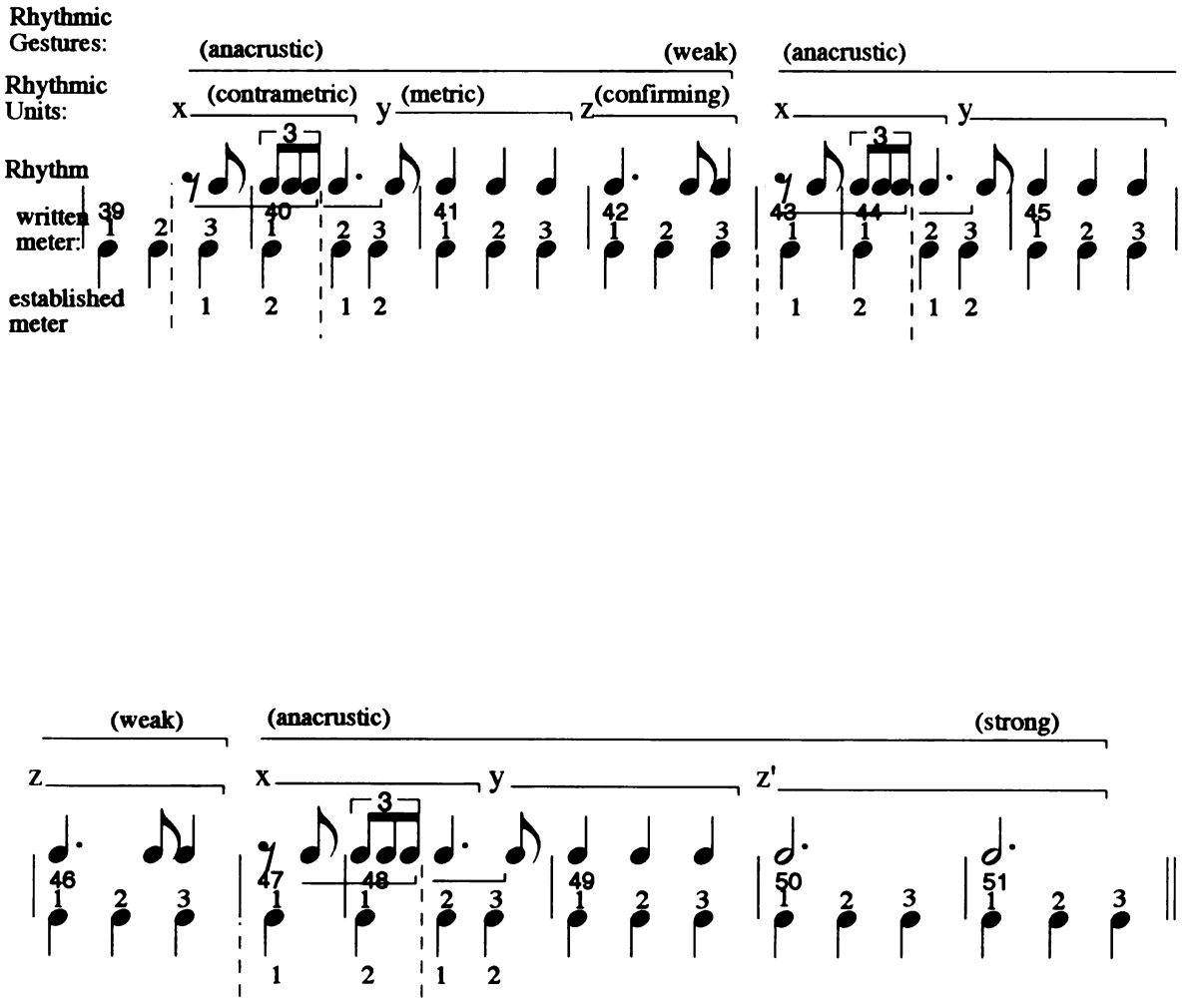


Figure 24: Unified Groups of Movement 1, Coda

creates the feeling of 2 + 2 beats instead of 1 + 3 beats in motive x. The contrametric pattern of motive x functions as an upbeat to motive y which reaffirms the triple meter with its even quarter notes. The additional length of the final phrase is caused by the cadence, which continues the expected melodic motion at the beginning of motive z but is replaced by a dotted half note value over a chord from group III_1 moving to a chord from group I.

Chapter 5

Summary of the Research Findings

In this paper, I have presented the necessary information to answer the research questions and research problem presented in Chapter One. Chapter Two presented Hindemith's theories of melody and harmony from The Craft. Hindemith's views of rhythm were taken from primary sources written by Hindemith. In Chapter Three, five models of rhythmic analysis were reviewed for comparison to Hindemith's views. A model of rhythmic analysis was demonstrated in Chapter Four. Finally, in this last chapter I will provide answers to the stated research questions presented in Chapter One. I will also discuss areas of continuing research related to the current topic. I will begin with the collateral questions first, then answer the primary research question: Does Hindemith's use of rhythm in his musical compositions reflect his explanations of rhythm in the theoretical writings?

Answer to Collateral Question 1

What is the relationship of melody, harmony, and rhythm in The Craft of Musical Composition and Hindemith's other writings?

Hindemith identified melody, harmony, and rhythm as the three primary elements of music. According to him, dynamics, tone-color, articulation, timbre,

and the other parameters of music do not affect the construction of the music, only the listener's perception of it.[1] As such they are subordinate to melody, harmony, and rhythm.

In terms of the pitch content, Hindemith's appeal to a natural order in The Craft of Musical Composition helped him arrive at the basic premise of his theory: the necessity of tonal centricity.[2] This allowed the development of Series One and Two as the organizational forces of the pitch content and so the Two-Voice Framework, Degree Progression, Harmonic Fluctuation, and Step Progression became the tools for planning the harmonic and melodic forces of a work. Unfortunately, the temporal aspect of music did not lend itself to the same natural justifications as the tonal aspect. This may be one reason for the lack of a well-defined theory of rhythm on Hindemith's part. The pedagogical reasons for the omission of rhythm in his theory do not excuse his criticism of other theorists for the same fault.[3]

It was discovered that Hindemith's interest in developing a theory of rhythm was in teaching composition.[4] While he stressed the interaction of the three elements, each has a different function in the compositional process. I cite Hindemith once again:

> Rhythm determines the duration of the chords, and groups them by division into stressed and unstressed members of the structure. Melody in voice-leading regulates linear expansion, and in the two-voice framework sets the pitch limits. In the placing of the harmonic center of gravity and in the regulation of relationships we see harmonic energy at work.[5]

---

[1] Hindemith, "Methods of Music Theory," 21.

[2] Hindemith, Craft I, 9.

[3] Hindemith, Craft I, 110, 179; Elementary Training for Musicians, 157; Craft III, 30, Translation, 21-22.

[4] Hindemith, Elementary Training, 157.

[5] Hindemith, Craft I,109.

The two distinctions of rhythm which Hindemith recognized are duration and form.[6] The primary organizational factor of rhythm itself is meter, which is grouped in units of two's and three's and their compounds. Grouping is determined by the metric accent. In organizing surface rhythms, meter governs the placement and duration of individual pitches and harmonies. It also determines the divisions of melody into motives, phrases, and sections.

It was stated in Chapter Two that Hindemith's combined references to rhythm do not constitute a well-developed theory in comparison to his theory of melody and harmony from The Craft. Hindemith made a rather modest contribution to rhythmic theory.[7]

Answer to Collateral Question 2

What are the similarities and differences between Hindemith's concept of rhythm and other theories of rhythm?

Hindemith was dissatisfied with the general theories of rhythm that he knew. He understood the analytical emphasis of theories presented by Hauptmann and Riemann, but he wanted to develop a compositional method of rhythm.[8] Even though Hindemith's theories of harmony and melody provide new insights into the organization of those elements, his understanding of rhythm is quite conventional, even orthodox.

The surface rhythms are organized around the meter and metric accent, and

---

[6] Hindemith, Elementary Training for Musicians, xii; Craft I, 13-14.

[7] Neumeyer, "Tonal, Formal, Proportional Design," 93.

[8] Hindemith, "Methods of Music Theory," 24.

so Hindemith follows Weber, Hauptmann, and Reimann in the organizational use of the barline.[9] The metric background helps organize the durational values used in the rhythmic groups. Longer note values tend to fall on the accented beats of the measures. Shorter note values tend to follow longer notes except when used as upbeats.

Hindemith was able to present some useful ideas concerning musical composition and the construction of musical forms. He tried to make a connection between the surface elements and the longer formal sections. Making compositional decisions and creating a compositional map in the charts and diagrams of the elements of music was an important step in defining the rhythmic elements of form. It helps the composer to apply other procedures such as repetition, variation, and change within the context of the larger forms. Also, knowing the tonal relations in advance allowed him to plot the areas of greatest harmonic tension and harmonic fluctuation.

As for formal constructs, Hindemith tried to make each composition unique and individual. He experimented with the use of proportions but did not apply the principle consistently in his music.[10] Balance in his music is achieved through organic development of melodic and rhythmic material and precise control of harmonic fluctuation. The insistence upon balanced forms is one reason Hindemith's music has been labeled neoclassical.

Hindemith's separation of rhythm from the other elements of music in The Craft gives an incomplete description of the importance of rhythm to his theory. The Cleveland lecture notes presented a more complete idea of the interaction of all the elements of music. He may have anticipated recent developments in

---

[9] Morgan, 439.

[10] Neumeyer, The Music of Paul Hindemith, 41. Works which Neumeyer cites as using proportional designs are Angelic Concert from Mathis der Maler and the Second Piano Sonata 1936).

rhythmic theory by calling for a comprehensive understanding of music at a time when music theory was incapable of providing such a solution.

Answer to Collateral Question 3

Can a method of rhythmic analysis be developed which supports Hindemith's concept of rhythm?

The difficulty in developing a method of analysis that Hindemith would approve lies in assumptions made about what the composer would have done. Decisions regarding the method of analysis presented here were based on traditional ideas of rhythm using Hindemith's theory as a starting point. In the compositional planning, Hindemith was concerned with a top-down approach which identifies large formal structures first, then the elements which combine to create the larger structures, and finally the individual durational values and how they are grouped into the patterns of the rhythm. I have attempted to follow this procedure in the analysis of the First Piano Sonata. At best, one can develop a model which does not conflict with the presuppositions of Hindemith's theory. We cannot know if Hindemith would approve or not approve of the proposed method, but the success of any analytical method lies in the insights into the music gained from that method.

Answer to Research Question

Does Hindemith's use of rhythm in his musical compositions reflect his explanations of rhythm in the theoretical writings?

From the foregoing discussion of the collateral questions, it is evident that Hindemith's views on rhythm were quite standard in nature. He did not break new ground in his thinking. We have addressed Hindemith's theoretical writings about rhythm, so in order to answer this question, rhythmic characteristics of Hindemith's music need to be identified. Through the analysis of his music and the survey of his theory, we may conclude that Hindemith's application of rhythm does support his explanations of rhythm.

In this movement, meter and the barline are two determinants of rhythmic grouping at both the primary beat level and subsequent multiple levels. The quarter note is perceived as the basic pulse, or beat level in Section A, established in measure one by the two-voice framework. The majority of opening rhythmic gestures fall into a metrical organization of equal beats with regular accentuation at the secondary metrical level. However, as the phrases develop, ambiguities of accentuation are introduced by changes of meter, syncopation, and variation of rhythmic elements. Other elements of music such as changes in texture and harmony reinforce the metric patterns of accentuation.

Table 10 compares Hindemith's rhythmic style as found in the first piano sonata with the general characteristics of tonal rhythm identified by Winold.[11] A discussion of each comparison is given following the table.

---

[11] Allen Winold, "Rhythm in Twentieth-Century Music," in Aspects of Twentieth Century Music, ed. by Gary Wittlich. (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1975): 216-17, 244.

TABLE 10

A Comparison of Rhythmic Styles

Hindemith's Style	Tonal Rhythmic Style
YES	1. Regular pulses are clearly heard or implied and are equal-timed;
	(Table 10, continued)
YES	2. Pulses are grouped into two's or three's;
NO	3. Pulse groups are maintained throughout most of the composition;
YES	4. Pulse groups on various levels coincide with pulse groups on higher or lower levels;
YES	5. Constant tempo predominates throughout an entire composition or section;
NO	6. Meter signatures remain constant throughout an entire composition or section;
YES	7. One duration predominates as the basic unit of movement, and very short durations are rare except in special localized circumstances;
YES	8. Motivic ("rhythmic") units are primarily based on metric patterns; the barline often determines the accent
YES	9. A limited number of rhythmic units combine to create longer "rhythmic gestures";
YES	10. A strong tendency toward upbeat, or anacrustic, begin nings;
YES	11. Repetition and variation of rhythmic gestures is quite common as well as rhythmic gestures in ternary patterns;
YES	12. The composite rhythm generally confirms the metric structure.

#1-3) In movement one, performance directions specify a strong quarter note pulse which is retained throughout the movement. Pulse is established by the descending quarter notes of the lower voice. Duple groupings predominate in movement one, although there is some change to triple meter in repetition of phrases and extrametrical hypermeasures in Section B and the coda. Hindemith occasionally uses extrametrical subdivisions. More common are extrametrical multiples such as triplet quarter notes which obscure the metric pulse. Shifted accents occur at points of climax and harmonic tension which sometimes work against the established meter.

#4) The grouping of rhythmic units confirms the pulse on the primary metric level and the first multiple level. Hypermeasures are created from unequal parts (4 + 2 in Section B of Movement One and 3 + 2 in Movement Four).

#5) There is only one area of tempo change within a movement or section in first piano sonata—movement three just after the middle of the piece. Tempos change between sections but proportional relationships of each section and movement must be maintained for the most satisfying performance. Interpretation must be based upon proper reading of the score.

#6) Meter signatures are often not given, so the performer must rely on notation and grouping. Sections begin with stable metric pulses but often change in repetitions. (For example, phrase a" of section A changed to 3\4 meter giving expressive use of meter changes.) In the first piano sonata Hindemith never changes from compound to simple meters within a section although contrasting sections sometimes do.

#7) The quarter-note pulse is retained throughout the first movement; other movements establish one basic duration as the pulse of each section In movement one, the most frequently used note value is the eighth note, followed by the quarter note and dotted quarter note. Each of these confirms the metric

pulse.

#8) The majority of rhythmic units confirm the established meter. Agogic accents often fall on the first beat of the measure.

#9) Longer rhythmic gestures are built up from shorter rhythmic groups. In movement one, Pattern N is used in both section A and Section B as an organizing motive. There is a tendency to use one principle rhythmic pattern per section, with a new pattern occurring at crucial points in the structure (the deceptive cadence in Section A, measure 8, and the end of Section B).

#10) Eighteen of twenty rhythmic gestures identified in movement one have anacrustic beginnings.

#11) Hindemith rarely repeats the same gesture exactly. There is always some form of variation or change, although rhythm is sometimes the least changed parameter. Section B uses the same rhythmic gesture twice in a row with only slight modifications. Shorter rhythmic groups are used to extend phrase lengths through repetition.

#12) The outer voices of the Two-voice framework are written together and emphasize similarities of construction.

Some generalizations about Hindemith's style from his writings also have been deduced.

1. Meter is the basic organizational factor in Hindemith's music.
2. Accent groups pulses into basic units of two's and three's.
3. Durational patterns make up motivic structures which are the basic units of form.
4. The process of composition begins with determining the rhythmic form and rhythmic character of each section, then the tonal relationships and finally the specific melodic material is written.
5. Shorter rhythmic units undergo repetition, transformation, or change as they are combined to create longer structures.
6. Rhythm will influence melodic and harmonic structures.
7. Rhythmic form can be determined by a comparison of the lengths of the sections of the tonal framework.

The basic question to ask regarding this piece is does the sonata "work?" Sections, phrases, and musical ideas are easily recognized and traced through the piece. The aesthetic value of the sonata is based partly on the craftsmanship of the composition rather than memorable musical ideas.

Areas of Further Research

Four areas of specific research stand out regarding the topic of rhythm in Hindemith's music. First of all, more of his music needs to be analyzed regarding rhythmic structure. The process could be done in stages, finishing the piano music first, then moving on to other genres. A broader sample of music will give a better picture of the consistency or changes of Hindemith's style throughout his lifetime. His early music from the 1920's can then be compared to music from the middle period music and his last works. If his application of rhythm is consistent throughout his lifetime then it supports the thesis that Hindemith's musical application of rhythm and his writings about rhythm are consistent.

A second area is the expansion of the analysis to include other aspects of music. This study concentrated on specific details of rhythm and only addressed melody and harmony as needed. There is a need to relate rhythm more definitely to pitch in both melodic and harmonic analysis, perhaps using the parameters of contour theory and motion as a starting point. Appending a rhythmic element to Neumeyer's method of structural analysis discussed in Chapter Three might also be beneficial.

A third area that needs further attention is the importance of pillar chords as unifying and structural elements. Hindemith did not develop criteria for their use

or identification. Neumeyer's five stages are also based upon the identification of pillar chords but his analytical method also does not define how pillar chords are identified.[12] Hindemith understood the two distinctions of time as the universal, continuous passage and the chain of events within that passage.[13] Hindemith's introduction of pillar chords may have been an attempt to formulate the boundaries of composition, what the Greeks called the semeia, or time-points that defined structure, but he left no clear method for determining or identifying specific pillar chords. Some parameters for identifying pillar chords may be cadential points of repose, important points of harmonic intensity, and the outer boundaries of the two-voice framework.

The fourth area of continuing research regarding Hindemith's theory is his pedagogical method of composition. What are the implications of the rhythmic concepts for teaching composition? The graphing technique and compositional planning outlined in Traditional Harmony give practical tools for the beginning composer. A parallel study would be to look more closely at Hindemith's adaptation of the species method. One apparent problem in Hindemith's use of species is the brevity of the exercises: he seems to move from first species to a type of fifth species with little progression of difficulty. So the question is raised, "How does he make the connection from species to free composition?" Neumeyer's proposed restructuring of the sequential method of Hindemith's primary texts may provide a better understanding of the pedagogical implications.

A more general area of continuing research is a comparison of recent rhythmic studies. What are the innovations each new analytical methodology presents? Finding common ground in the terminology, definitions, and concepts would propel research in rhythm forward extensively.

---

[12] Personal letter from Neumeyer to the writer.

[13] Hindemith, Elementary Training, 93fn.

APPENDICES

APPENDIX A

APPENDIX A

Cooper and Meyer's The Rhythmic Structure of Music

The Rhythmic Structure of Music by Grosvenor Cooper and Leonard Meyer is one of the first modern works to develop a method of rhythmic analysis. The authors claim a partial influence of Schenker on their work, using limited melodic and rhythmic reductions to assist in the analysis of longer rhythmic patterns of phrases, periods, and sections.[1] Their reductions are limited to foreground structures that are dissimilar to Schenkerian structural graphs, however.[2]

The basic premise from which Cooper and Meyer work is that rhythm is essentially hierarchic; it exists simultaneously on many different levels. They call these levels "architectonic," which means that individual tones become grouped into motives, motives into phrases, phrases into periods, etc. The small rhythmic motives which exist on the "primary rhythmic level" may also function as integral parts of the larger organization of the piece. Groupings may change from one level to the next.[3]

The shortest rhythmic group that is considered complete in itself is said to be the primary rhythmic level, but these may be subdivided into partial or incomplete rhythmic motives called inferior rhythmic levels. (These may be

---

[1] Grosvenor W. Cooper and Leonard B. Meyer, The Rhythmic Structure of Music, (Chicago: The University of Chicago Press, 1960), 146.

[2] Ibid., 70, 84.

[3] Ibid., 2, 60.

further subdivided into subprimary levels.) When groups of the primary rhythmic level are combined into longer units they form "superior rhythmic levels" consisting of phrases, periods, sections, and even whole movements.

Cooper and Meyer identify three types of organization of musical time: pulse, meter, and rhythm.[4] A pulse is defined as "a series of regularly recurring, precisely equivalent stimuli" which continue in the mind after being established. Pulses are not considered beats unless they are in a metrical context.

Meter occurs when accents differentiate regular numbers of pulses, or beats. Cooper and Meyer also believe meter to be architectonic in nature although the dominant or primary meter tends to remain regular on the primary level.[5] Certain principles may work against the regular pattern of the meter, such as a hemiola ("three groups of two played against two groups of three") or asymmetrical accentual patterns (i.e., 3 + 2) within a symmetrical context (i.e., common time).

Rhythm is defined by Cooper and Meyer as "the way in which one or more unaccented beats are grouped in relation to an accented one."[6] Rhythm is considered to be independent of meter as it can occur without metric pulse and any rhythmic organization can occur in any given meter. Furthermore, the bar lines serve only to indicate metric grouping and do not indicate the rhythmic organization, although accents of rhythm and meter usually coincide.

Cooper and Meyer identify rhythmic groups according to poetic feet.[7] Of the seven groups identified, the first five show the relationship of accented to unaccented beats while the last two are considered unaccented and therefore

---

[4] Ibid., 3.

[5] Ibid., 4.

[6] Ibid., 6.

[7] Ibid., 6.

incomplete rhythms. The accented groups divide themselves into three types, the iamb and anapest which are end accented, the trochee and dactyl which are beginning accented, and the amphibrach which is middle accented. The spondee and pyrrhic are unaccented.

The poetic feet are used to chart the rhythmic relationships in a piece of music. Cooper and Meyer claim that all levels of the rhythmic structure exhibit these basic patterns, from the short primary levels to longer structures such as phrases and periods. Cooper and Meyer identify the dactyl, anapest, and amphibrach in both duple and triple meters.[8] Williams, however, labels the dactyl and anapest as duple and the trochee and iamb as triple.[9]

The determination of accent is crucial to the rhythmic interpretation according to Cooper and Meyer's scheme. Accent is defined as "a stimulus (in a series of stimuli) which is marked for consciousness in some way."[10] This gives a variety of rhythmic interpretations for each of the poetic feet. Earlier writers regard note length as well as accent as determining the poetic foot of a rhythm.[11]

While a beat can be accented in a number of ways, according to Cooper and Meyer stress is primarily one of dynamics. Stress can indicate the beginning of a group and may in some way modify its character. However, the organizational effect of a stressed group usually lasts no more than two measures. The effect of a stressed beat or group diminishes on higher levels of structure.[12]

---

[8] Ibid., 18-26,

[9] C. F. Abdy Williams, The Rhythm of Modern Music, (London: Macmillan and Co., Ltd., 1909), 79-82.

[10] Cooper and Meyer, 8.

[11] Williams, 79.

[12] Cooper and Meyer, 8, 20, 61, 120.

The purpose of The Rhythmic Structure of Music is both prescriptive and analytic. Cooper and Meyer attempt to formulate a theory of rhythm based on the principle of accent in poetic meters. They devise a set of symbols for the analytical procedure. Brackets are placed under the score to identify the grouping of the rhythm pattern at each level. The primary rhythmic level is labeled with a numeral 1. Subprimary levels are identified with lower case Roman numerals while superior levels receive a 2, 3, 4, etc. Other symbols are placed in the brackets to indicate various characteristics of the rhythmic structures. (Table 11).[13]

The Rhythmic Structure of Music has provided the basis for one study of Hindemith's Piano Sonatas of 1936.[14] In her study, Flood used the higher rhythmic structures identified by Cooper and Meyer to investigate the harmonic fluctuation at the phrase, period, section, and movement levels. She concludes that the choice of harmonic fluctuation as determined by Hindemith's theory set forth in Craft I is a planned compositional procedure, and that the musical climax always immediately follows the point of greatest harmonic tension. Flood did not study the surface rhythmic patterning of durations nor long-range harmonic connections. Flood's study concentrated on pedagogical implications for the piano teacher.

Several problems hinder the application of Cooper and Meyer's theory of rhythm to musical analysis. First of all, there is some divergence from common definitions in the concepts they discuss. One must learn a variety of new terms

---

[13] Ibid., 204.

[14] Dorothy Anne Flood, "The Role of Rhythm in Paul Hindemith's Concept of Harmonic Fluctuation as Revealed in the Piano Sonatas of 1936," (Ed.D. diss., Columbia University Teachers College, 1976).

in order to apply their principles.[15]

Table 11

Cooper and Meyer's List of Analysis Symbols

Accent
Weak beat or group
Felt but unperformed beats or groups
Initially presumed accent but retrospectively weak
Initially presumed weak beat or group retrospectively accented
Accent fused to a weak beat or group
Weak beat or group fused to an accent
Fused weak beats or groups
Extended anacrusis
Extended anacrusis at first presumed to be accented
Stress
Grouping, manifest or dominant
Grouping, latent
Grouping without a definite conclusion
Grouping without a definite beginning
Overlapping or pivoted rhythmic groups
Splitting of one rhythmic level into two

[15] Ellis B. Kohs, "Review of The Rhythmic Structure of Music, by Grosvenor W. Cooper and Leonard B. Meyer," Journal of Music Theory 5/1 (April, 1961): 131-132.

Secondly, they admit that no hard and fast rules exist for grouping rhythms into the various structures, leaving the rhythmic structure open to differing interpretations.[16] Nonetheless, they try to determine some general principles of grouping, such as similarity and difference, proximity and separation, and repetition. The other elements of music such as orchestration, dynamics, texture, etc., may also play a role in determining rhythmic groups.

Lastly, there may be a weakness in the comparative analogy between language and music.[17] Music is considered to be more regular than speech, therefore the rules of one do not readily apply to the other. The limited choice of the five basic rhythms (iamb, anapest, trochee, dactyl, and amphibrach) adapted from poetic feet leads to complications in analyzing difficult rhythm patterns. They also do not address the nature of musical perception.

---

[16]Cooper and Meyer, 9, 11, 23.

[17]Lewis Rowell, "The Subconscious Language of Musical Time." Music Theory Spectrum 1 (1979): 105.

APPENDIX B

APPENDIX B

Structural Theories and Rhythmic Analysis

In 1959, Allen Forte published the article "Schenker's Conception of Musical Structure." Forte's purpose was three-fold: to introduce the concepts of Schenker's theory of musical structure to American musicians, to encourage serious musicians to use Schenker's theory, and to challenge music theorists with five musical problems which the new theory could help solve.[1] The first problem is stated simply: "Constructing a theory of rhythm for tonal music."

In Schenkerian analysis the fundamental organization of tonal music is represented by the projection of the tonic triad over the temporal span of a musical composition.[2] This "fundamental structure" is known as the Ursatz, or background. The background consists of two parts in a contrapuntal relationship. The first is the melodic content of the upper voice which consists of a descending stepwise descent beginning on a pitch of the tonic triad and ending on the first scale degree. This Urlinie, or fundamental line, works in conjunction with the bass voice which outlines the tonic and dominant triads represented by the interval of a perfect fifth. This span of the bass interval is called the

---

[1] Allen Forte, "Schenker's Conception of Musical Structure," Journal of Music Theory 3/1 (April, 1959): 1-30. Reprinted in Yeston, Maury, ed. Readings in Schenkerian Research. (New Haven: Yale University Press, 1977). References are from the original article.

[2] A more detailed introduction to Schenker theory can be found in Forte's article mentioned above as well as his book Introduction to Schenkerian Analysis. (New York: W.W. Norton, 1982). See also other articles and books mentioned in the bibliography.

Bassbrechung, or broken bass. The Ursatz represents the total harmonic conception of the music in the relationship of the tonic and dominant triads. Structural accents occur at the points where the pitches of the Urlinie coincide with the pitches of the Bassbrechung.

Two other levels of structure are important to an understanding of Schenkerian analysis. The foreground sketch contains the major surface events of the composition that are most readily tangible in the music itself. The foreground is not the actual durational values of the notes of the composition but rather represents the important relationships of the surface events. The foreground contains the closest association to the metrical and rhythmic patterns of the surface of the music, that which we identify as "the music."

The middle-ground sketch is a further reduction of the foreground relationships. It identifies longer-ranging tonal connections and relationships. These relationships are called prolongations in that the content of the melodic and harmonic material extends the influence of the tonal area. Each sketch also identifies certain embellishments or diminutions such as neighboring tone and passing tone motion, and arpeggiations.

Forte asked two basic questions regarding the rhythmic structure of a tonal composition which he believes Schenkerian analysis could answer.[3] The first addresses the issue of structural levels and the perception of rhythmic events at each level. How far back do the rhythmic and tonal patterns of the foreground reach to determine the tonal structure? The second question deals more specifically with the relationship of each level of the structure. How does the rhythm at each level help to define each subsequent level, either working in conjunction with or in perceived opposition to each other?

The answer to the first question begins with the identification of foreground

---

[3] Forte, Schenker's Conception, 21.

patterns of motives, phrases, and sections and how they extend into the background.[4] Rhythmic durations tend to give meaning to the tonal relationships, but they do not define them in terms of the structure. The durations of the pitches at each level are the rhythmic events of the composition.

Pierce claims that the answer to the second of Forte's questions lies in the determination of the structural accents at each level.[5] Structural accents occur at the points where the pitches of the Urlinie coincide with the pitches of the Bassbrechung to form the fundamental structure, or Ursatz. The structural accents determine the harmonic rhythm of each level, which becomes gradually slower with subsequent stages until the Ursatz is understood. The durations of the harmonic rhythm at each level can then be compared to the tonal organization of the piece defined by the structural accents. A structural accent may have a different meaning or emphasis at each stage of the analysis.

Pierce recommends determining how the structural accents divide the composition into temporal segments. The metric accents are compared to the structural accents to see where they coincide or conflict. The structural accents are characterized by their specific duration and the duration of the group which they define.[6]

Morgan claims that Schenkerian analysis is effective in analyzing formal units. Schenkerian analysis may provide insights into the rhythmic organization that traditional analysis cannot achieve. He says that,

---

[4] Anne Alexandra Pierce, "The Analysis of Rhythm in Tonal Music," (Ph.D. diss., Brandeis Universtiy, 1968): 7, 129-130.

[5] Ibid.

[6] Ibid, 58.

> Schenker's theory, by placing all tonal motion within a structural frame supplied by background pitch elements, supplies a method for locating the points at which structural motions originate and terminate and thus for defining the temporal extent of any motion that is complete on some structural level.[7]

Morgan goes on to describe three advantages of Schenkerian analysis over conventional roman numeral analysis. The first is that it identifies a definite relationship between structural accents and pitch events. Secondly, criteria for defining accents are precisely defined in reference to the tonal framework. Finally, accents occur at specific locations at different levels of the rhythmic structure. The rhythmic structure, then, is dependent on the metric pulse of the foreground patterns. Morgan establishes criteria to develop a hierarchy of accents dependent upon their structural weight. The structural weight is determined by rhythmic goals of the harmony, points of departure and return (opening and closing accents), and the location of the structural accent in the Ursatz, among others. Schenkerian analysis claims to identify different organizational structures of tonal music that neither metric nor poetic analysis of the music can provide.

The question arises as to the usefulness of Schenkerian analysis in the study of Hindemith's music. A student of Schenker, Felix-Eberhard von Cube, analyzed two works of Hindemith according to strict Schenkerian principles: the song Das Ganze, nicht das Einzelne, and Movement One from the First Piano Sonata of 1936.[8] His conclusion regarding both works is that they cannot be designated as "musical artworks" because they do not adhere to strict tonal theory as set forth by Schenker. In order to use Schenkerian structural analysis to

---

[7] Robert P. Morgan, "The Theory and Analysis of Tonal Rhythm," The Musical Quarterly 64:4 (October, 1978): 444-45.

[8] von Cube, Felix-Eberhard. The Book of the Musical Artwork: An Interpretation of the Musical Theories of Heinrich Schenker, translated by Neumeyer, Boyd, and Harris. (Lewiston, New York: The Edwin Mellin Press, 1988), 353.

study non-tonal music, adjustments in the system need to be made as the music does not conform to the rules of tonal music. Hindemith's music is based upon different presuppositions about the organization of tonal forces.

Structural Levels After Schenker

In two articles describing linear reduction techniques, Schachter demonstrates a method of rhythmic reduction based upon metric organization.[9] In Chopin's Prelude, Opus 28, No. 3, the rhythm is represented by five graphs. The quarter-note represents one bar of music. The foreground and third middleground graphs are very similar to a Schenkerian voice-leading graph. In fact, Schachter used Schenker's original analysis of the piece as the basis for his own study. With each subsequent graph of the middleground, certain details are stripped away to show the basic underlying elements of composition; only essentials remain. For example, bar 11 of Schenker's original analysis is recognized as an extension of the phrase and is omitted from the lower middleground graphs. Other omissions are the two-bar introduction and the six-bar coda. What remains in the first middleground graph, which comes closest to the fundamental structure of the piece, are two eight-bar phrases, indicating that the "asymmetrical proportions [of the piece] grow out of an underlying symmetry."[10] Barlines are used to indicate measure groups, or hypermeasures. The technique of "interruption" of the fundamental structure is also indicated in each

---

[9] Carl Schachter, "Rhythm and Linear Analysis: Durational Reduction," in The Music Forum, Vol. V, ed. by Felix Salzer (New York: Columbia University Press, 1980): 197-232.

[10] Ibid, 205.

graph with the appropriate symbol.

In contrast to the underlying regularity of the Chopin Prelude, Schachter demonstrates how the Minuet and Trio from Mozart's Symphony N. 35, K. 385, is developed from a metrically irregular grouping, especially in the Trio. He uses a similar analytical technique of the quarter-note representing one bar of music, each grouped into hypermeasures, but this time the alla breve meter signature indicates subgroupings of the four-bar hypermeasures into two-bar units. In the next analysis, instead of a quarter-note, the eighth-note value equals one bar of Beethoven's Sonata Op. 14. No. 1, Allegretto. Phrases are grouped into hypermeasures of eight bars in common time. He uses eighth-notes to more clearly indicate Beethoven's use of syncopation. In his last example, Schubert's Valse Sentimentale, Op. 50, No. 13, the eighth-note is used in the durational reduction to indicate one measure of triple meter, but a hypermeasure of two bars is represented by a quarter-note.

There is one difference between Schachter's use of durational reduction and Schenker's middleground reduction: Schachter does not go so far as to indicate the fundamental structure of the piece. He believes that "the fundamental structure does have some rhythmic implications, but these arise out of tonal function only and have nothing to do with duration."[11] The meaning of the basic durations rely upon the grouping of bars and the form of the piece. Another difference is Schachter's emphasis on metrical organization. He defines meter as "a pattern composed of strong and weak impulses in some kind of regular alternation." This alternation occurs primarily from bar to bar, but is also apparent between the downbeats of hypermeasures. He doubts, however, that weaker and stronger pulses can be felt over very large divisions of time. He is also concerned more with the pacing of the musical events in their

[11]Ibid., 229.

relationship to the form of the composition.

One problem inherent in Schachter's attempt at rhythmic reduction is the deficiency of the notational system. His use of quarter- or half-notes to represent phrase structure creates ambiguity and confusion in analyzing long sections of compositions. Also, the voice-leading and structural levels in the rhythmic reductions are less clearly defined than in the true Schenkerian voice-leading graph. Finally, Schachter's approach does not concern itself with the note-to-note durational values, those which we identify as "the rhythm" of the piece. Instead, he is interested in broader durational values of the measure, hypermeasure, phrase, and section. Schachter does suggest, however, that the rhythmic reduction approach be used in conjunction with voice-leading graphs where they could reveal important features of the piece.

Another contemporary theory of rhythm based loosely on Schenkerian structural layers is Wallace Berry's Structural Functions in Music.[12] Berry emphasizes the idea of "structural functions." Structure is perceived as a slowly unfolding process defined by motion toward and from the "primary accent" rather than as patterns of melodies and harmonies that are simply repeated. In his rhythmic theory, accent is the force that defines meter, but musical events may not coincide with the barlines. He identifies different types or "classes" of accent, such as metric, dynamic, textural, etc. Metric fluctuation occurs when accents in the music do not coincide with the accent of the meter signature and barline. Berry also argues that meter is not only "a stream of marked pulsations," but that it also determines organization on several different levels. The Schenkerian Ursatz does not identify specific elements of duration.

---

[12] Wallace Berry, Structural Functions in Music, (Englewood Cliffs, New Jersey: Prentice-Hall, 1976; reprint, New York: Dover Publications, Inc., 1987).

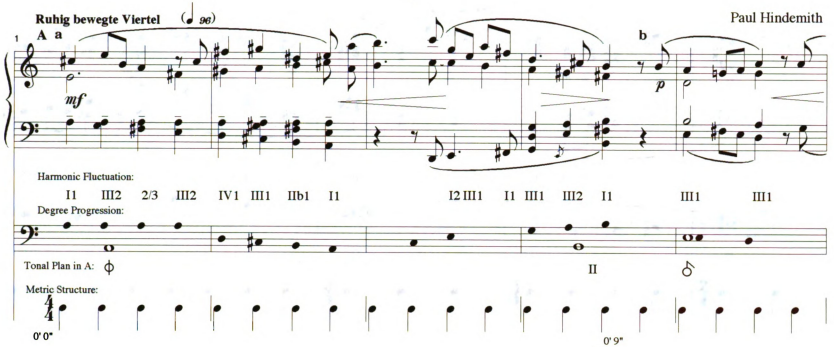
APPENDIX C

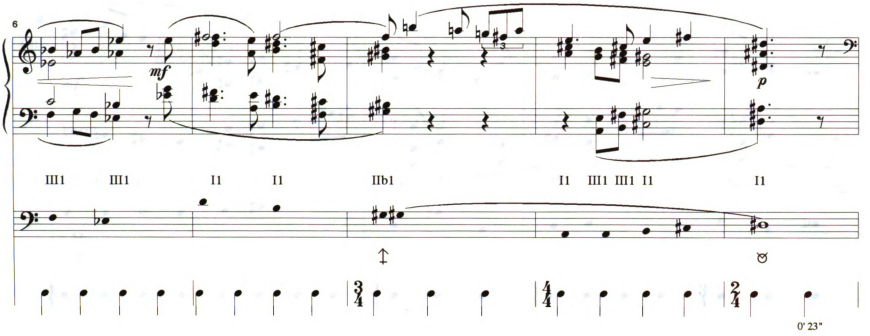
APPENDIX C

Figure 25: Analysis of

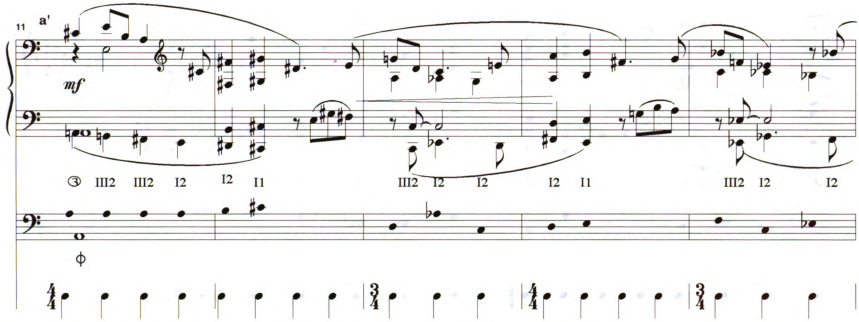
Erste Sonate für Klavier

I

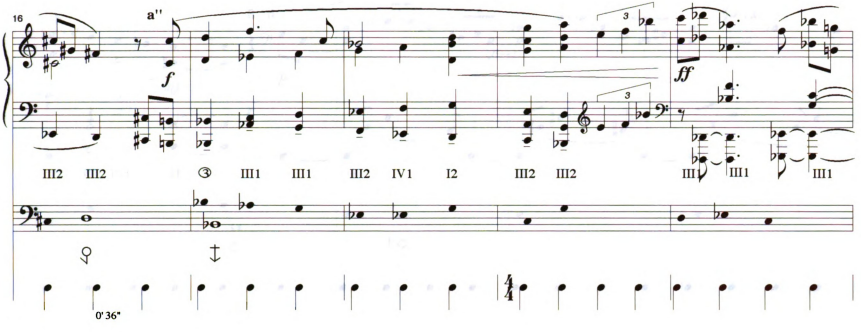




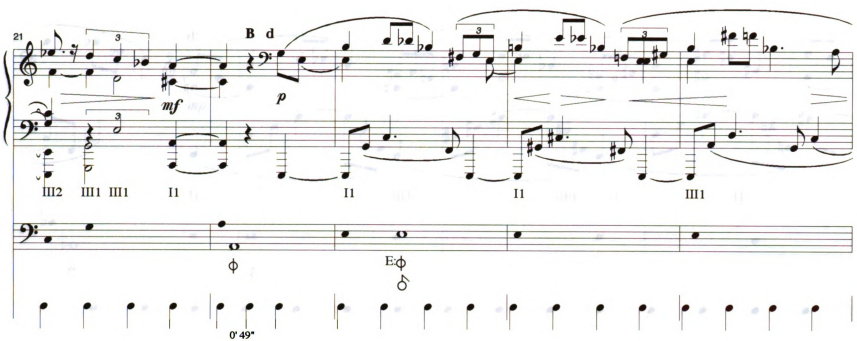
(Figure 25, continued)



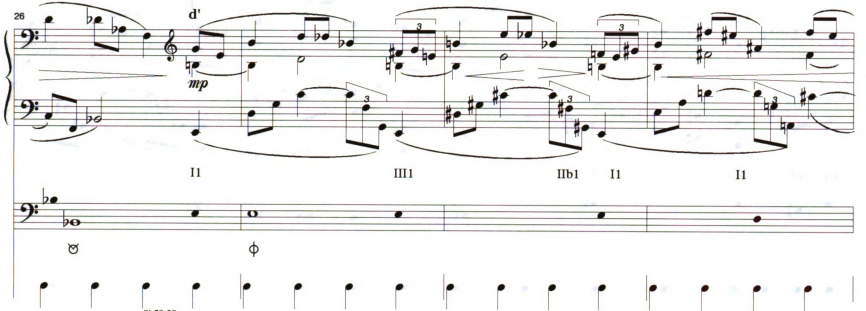
(Figure 25, continued)



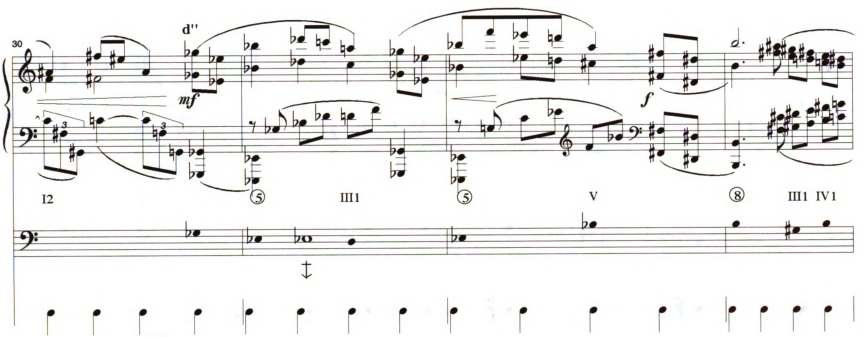
(Figure 25, continued)



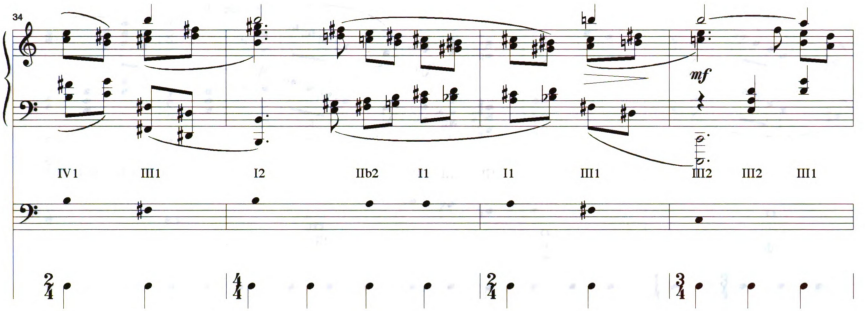
(Figure 25, continued)



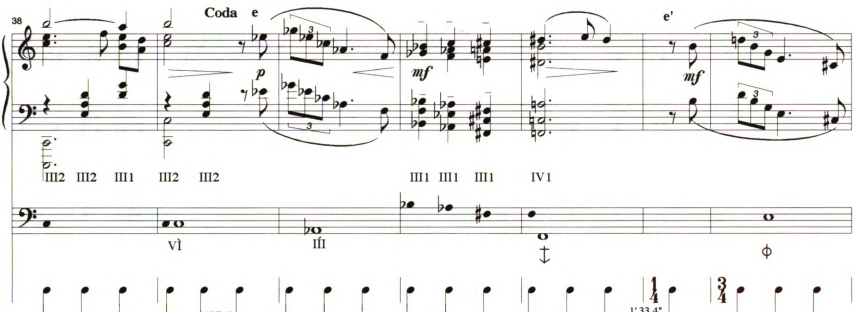
(Figure 25, continued)



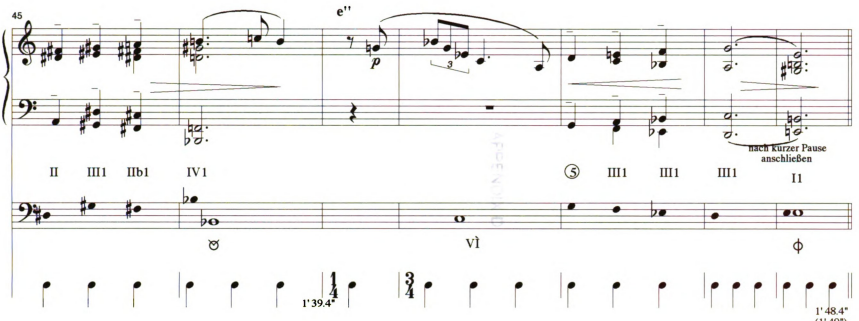
(Figure 25, continued)



(Figure 25, continued)



(Figure 25, continued)



(Figure 25, continued)

APPENDIX D

APPENDIX D

Graphs of the Tonal Structure of Movements 2-5

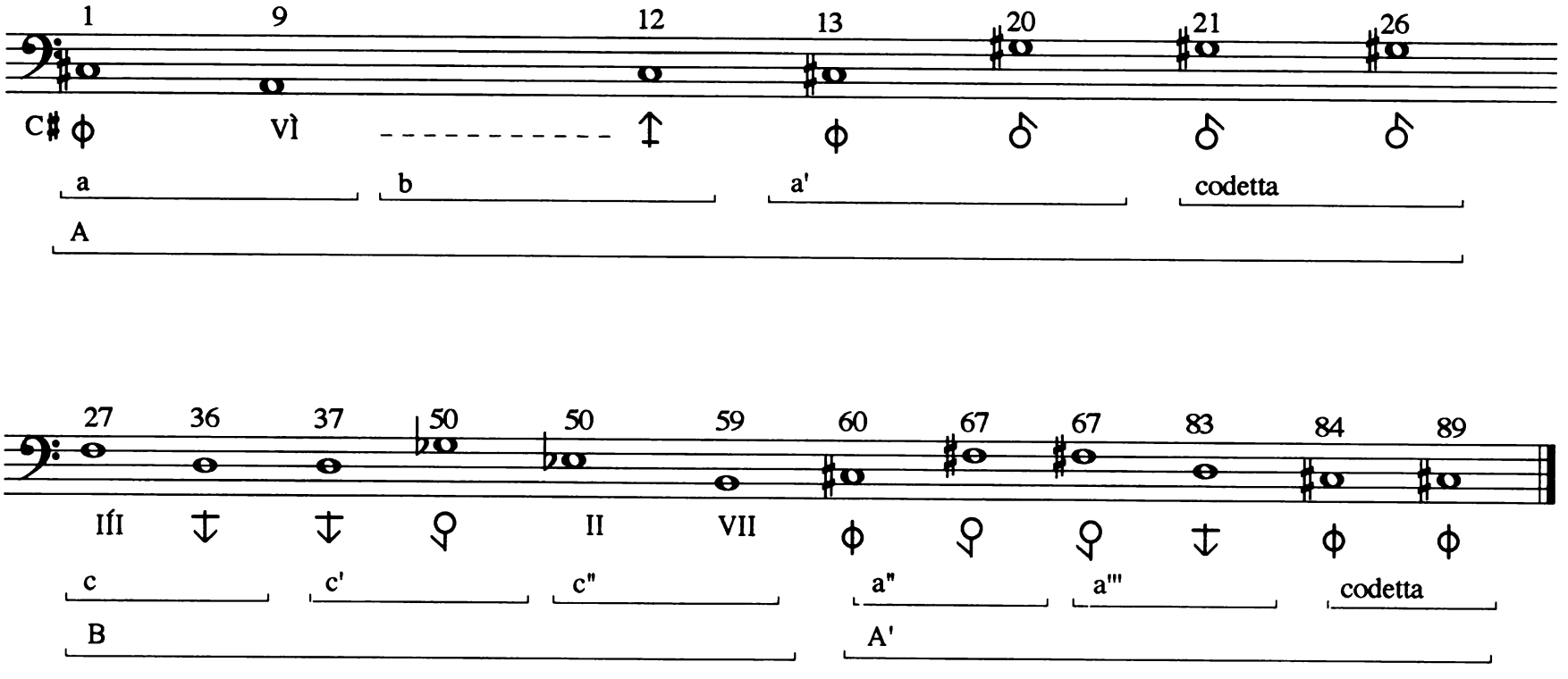


Figure 26: Tonal Plan of Movement 2

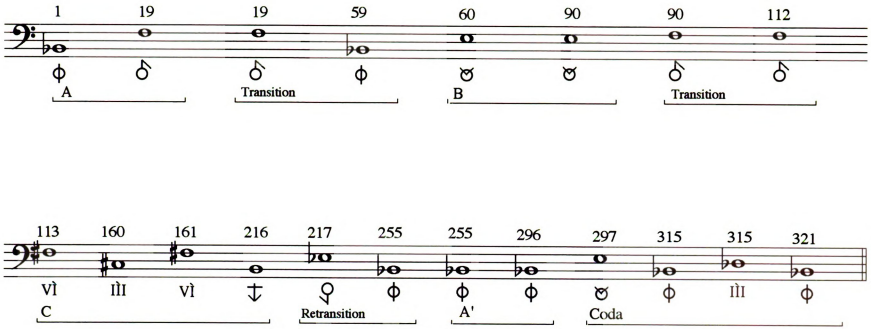


Figure 27: Tonal Plan of Movement 3

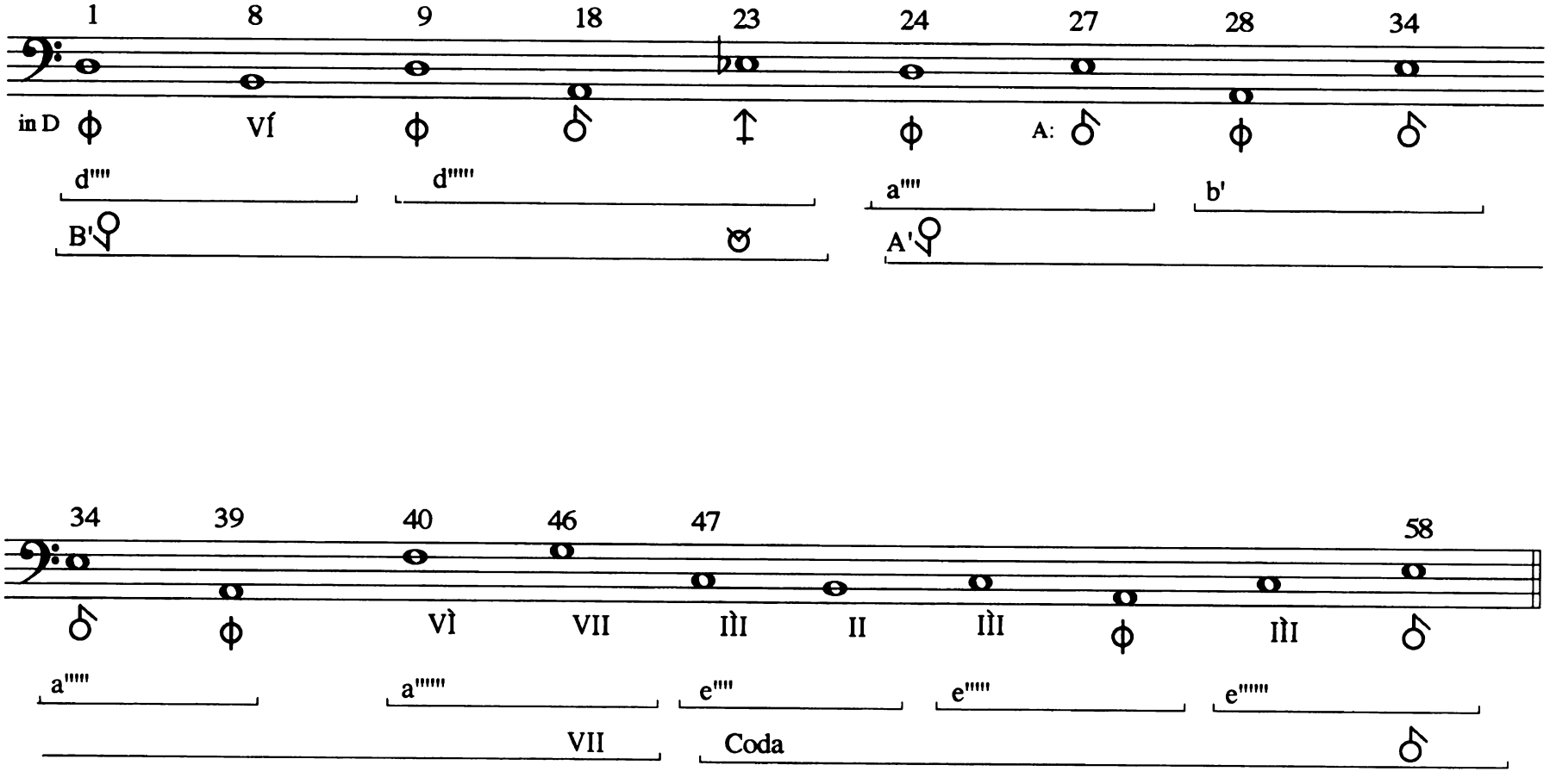


Figure 28: Tonal Plan of Movement 4

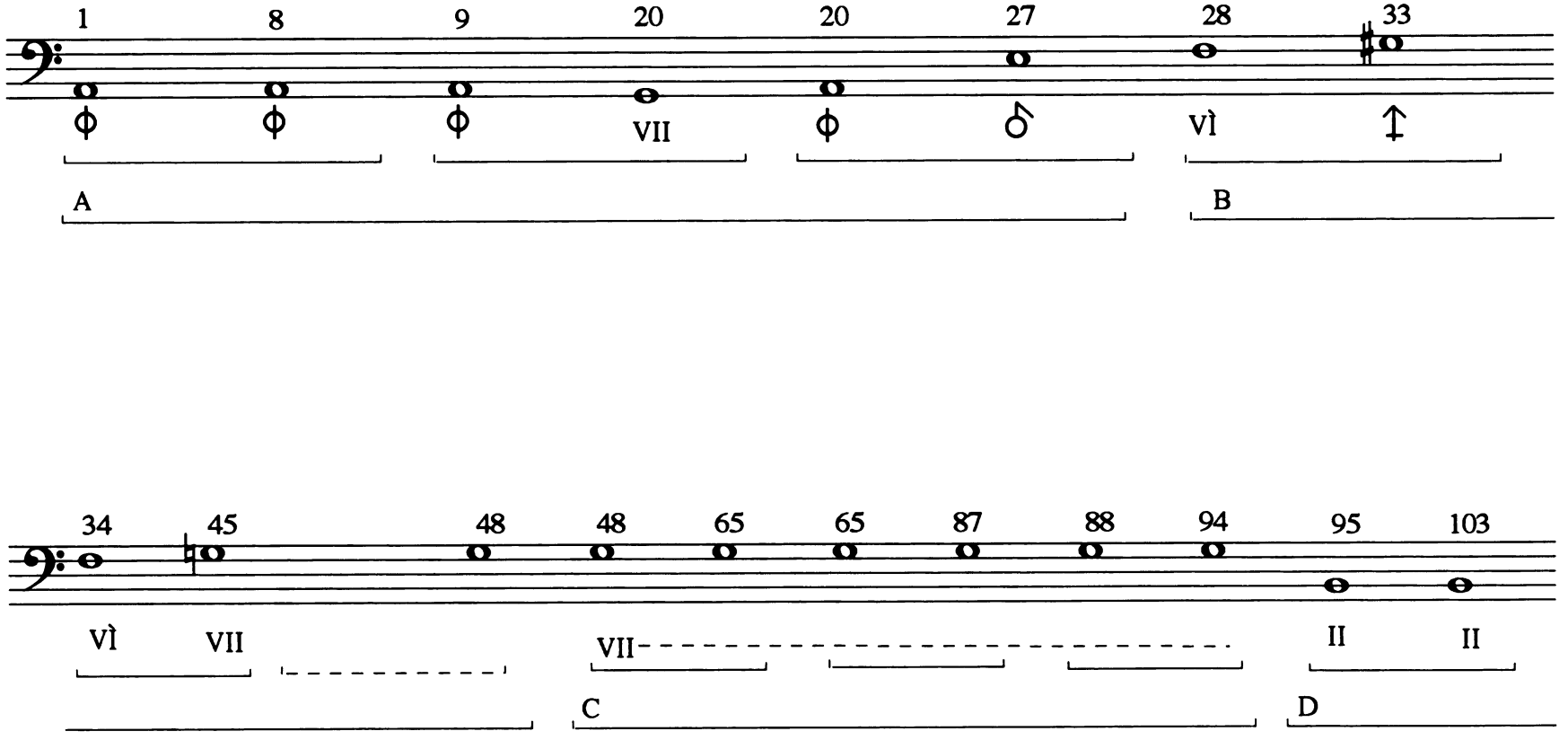
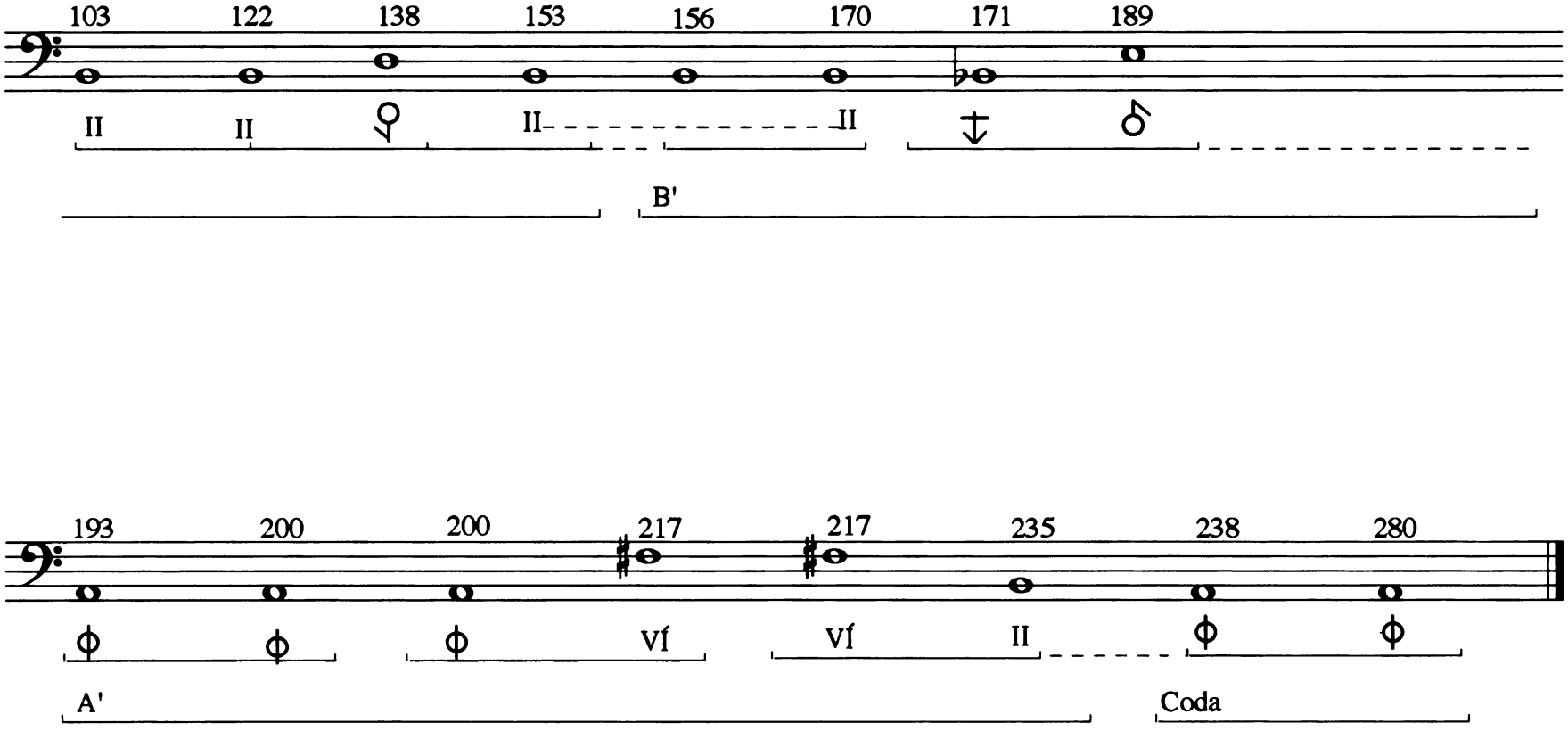


Figure 29: Tonal Plan of Movement 5



(Figure 29, continued)

BIBLIOGRAPHY

BIBLIOGRAPHY

Apel, Willi. The Harvard Dictionary of Music. Cambridge: The Harvard University Press, 1972.

Bent, Ian. Analysis. New York: W.W. Norton and Co., 1987.

_____. Music Analysis in the Nineteenth Century, Volume I: Fugue, Form and Style; Volume II: Hermeneutic Approaches. Cambridge: The Cambridge University Press, 1994.

Berger, Melvin. Guide to Sonatas: Music for One or Two Instrumetns. New York: Anchor Books, 1991.

Bobbitt, Richard. "Hindemith's Twelve-tone Scale," The Music Review 26 (1965): 104-117.

Bolitho, Albert George. "The Organ Sonatas of Paul Hindemith." Ph.D. diss., Michigan State University, 1968.

Briner, Andres. Paul Hindemith. Mainz: B. Schott's Söhne, 1971.

Cazden, Norman. "Hindemith and Nature," The Music Review 15/4 (November, 1954): 288-306.

Cooper, Grosvenor W. and Meyer, Leonard B. The Rhythmic Structure of Music. Chicago: The University of Chicago Press, 1960.

Creston, Paul. Principles of Rhythm. New York: Franco Colombo, Inc., 1961.

Daehn, Sister R. Christine. "Paul Hindemith: Author, Craftsman, Philosopher." unpublished Master's thesis, Michigan State University, 1974.

Dunsby, Jonathan, and Whittall, Arnold. Music Analysis in Theory and Practice. London: Faber Music, Ltd., 1988.

Epstein, David. Shaping Time: Music, the Brain, and Performance. New York: Schirmer Books, 1995.

Evans, Peter. "Hindemith's Keyboard Music," The Musical Times 97 (1956): 572-575.

_____. Review of The Rhythmic Structure of Music, by Grosvenor W. Cooper and Leonard B. Meyer. In Tempo 59 (Autumn, 1961): 32.

Flood, Dorothy Anne. "The Role of Rhythm in Paul Hindemith's Concept of Harmonic Fluctuation as Revealed in the Piano Sonatas of 1936," Ed.D. diss., Columbia University Teachers College, 1976.

Haimo, Ethan. "Rhythmic Theory and Analysis," In Theory Only 4/1: 18-35.

Heiden, Bernhard. "Hindemith's 'System'--A New Approach," Modern Music 19 (January-February, 1942): 102-107.

Hindemith, Paul. A Composer's World: Horizons and Limitations. New York: Anchor Books, 1952, rev. 1961.

_____. A Concentrated Course In Traditional Harmony, Volume I. New York: Associated Music Publishers, 1943. Volume 2: Exercises for Advanced Students, translated by Arthur Mendel. New York: Associated Music Publishers, 1949.

_____. The Craft of Musical Composition, Volume 1: Theoretical Part, translated by Arthur Mendel. New York: Associated Music Publishers, 1942, revised 1945. Volume 2: Exercises in Two-Part Writing, translated by Otto Ortmann. New York: Associated Music Publishers, 1941. Original German editions Unterweisung im Tonsatz. Vol. 1: Theoretischer Teil. Mainz: B. Schott's Söhne, 1937, revised 1940. Übungsbuch für den zweistimmigen Satz. Mainz: B. Schott's Söhne, 1939.

_____. Elementary Training for Musicians. New York: Associated Music Publishers, 1946.

_____. "Hindemith, The Three Piano Sonatas, Glenn Gould, piano," Sony Classical CD SMK 52670.

_____. "Hindemith, Music for One and Two Pianos," Bernard Roberts with David Strong. Nimbus Records, compact disc NI 5459/60, 1996.

_____. "Methods of Music Theory," translated by Arthur Mendel. Musical Quarterly 30 (January, 1944): 20-28.

_____. "Time, Only, Tells," Etude 57 (October, 1939): 629-30.

Hindemith, Paul. "Old and New Problems of Music Theory," lecture given at the Cleveland Institute of Music, March 3, 1947. Notes from the Paul Hindemith Institute, Frankfut am Main.

_____. "Paul Badura-Skoda Plays Hindemith, Piano Sonatas Nos. 1 and 3," Sound recording, Westminster XWN 18200, 1956.

_____. Übungsbuch für den dreistimmigen Satz, ed. by Briner, Meier, and Rubeli. Mainz: Schott and Co., 1970. Typescript translation of Chapters 12-16, Yale University and Indiana University libraries.

Hölderlein, Friederich. Poems and Fragments, trans. by Michael Hamburger. Ann Arbor: University of Michigan Press, 1967.

Hoppin, Richard H. Medieval Music, New York: W.W. Norton, 1978.

Kemp, Ian. Hindemith. London: Oxford University Press, 1970.

Kidd, James C. "Aspects of Mensuration in Hindemith's Clarinet Sonata," The Music Review 38/3 (August, 1977): 211-222.

Kirby, F. E. A Short History of Keyboard Music. New York: Schirmer Books, 1966.

Kohs, Ellis B. Review of The Rhythmic Structure of Music, by Grosvenor W. Cooper and Leonard B. Meyer. In Journal of Music Theory 5/1 (April, 1961): 129-34.

Landau, Victor. "Hindemith the System Builder: A Critique of His Theory of Harmony," The Music Review 22 (1961): 136-151.

_____. "Paul Hindemith, a Case Study in Theory and Practice," The Music Review 21 (1960): 38-54.

Lester, Joel. The Rhythms of Tonal Music. Carbondale, IL: Southern Illinois University Press, 1986.

Matthews, Denis, ed. Keyboard Music. Great Britain: Penguin Books, 1972.

Morgan, Robert P. "The Theory and Analysis of Tonal Rhythm," The Musical Quarterly 64:4 (October, 1978): 435-473.

Neumeyer, David. "Counterpoint and Pitch Structure in the Early Music of Hindemith." Ph.D. diss., Yale University, 1980.

Neumeyer, David. "The Genesis and Structure of Hindemith's Ludus Tonalis," Hindemith Jahrbuch/Annales Hindemith 7 [1978](1980): 72-103.

_____. The Music of Paul Hindemith. New Haven: Yale University Press, 1986.

_____. "Tonal, Formal, and Proportional Design in Hindemith's Music," Music Theory Spectrum 9 (Winter 1987-88): 93-116.

Noss, Luther. Paul Hindemith in the United States. Urbana: The University of Illinois Press, 1989.

Pack, William D. "Paul Hindemith in Turkey: Some Contributions to Music Education," Ph.D. diss., Brigham Young University, 1977.

Pierce, Anne Alexandra. "The Analysis of Rhythm in Tonal Music." Ph.D. diss., Brandeis University, 1968.

Randel, Don Michael, ed. The New Harvard Dictionary of Music. Cambridge: The Belknap Press of Harvard University Press, 1986.

Ratner, Leonard G. "Eighteenth-Century Theories of Musical Period Structure," The Musical Quarterly 62:4 (October, 1956): 439-454.

Redlich, Hans. "Paul Hindemith: A Re-assessment," The Music Review 25 (1964): 241-53.

Reese, Gustave. Music in the Middle Ages. New York: W.W. Norton and Co., 1940.

Rothfarb, Lee A. Ernst Kurth as Theorist and Analyst. Philadelphia: University of Pennsylvania Press, 1988.

Rowell, Lewis.. "The Subconcious Language of Musical Time," Music Theory Spectrum 1 (1979): 96-106.

Sachs, Curt. Rhythm and Tempo: A Study in Music History. New York: W.W. Norton, Inc., 1953.

Sadie,Stanley, ed. New Grove's Dictionary of Music and Musicians, Volume 8. New York: MacMillan Publishing Co., Ltd., 1980. S. v. "Paul Hindemith," by Ian Kemp.

Schachter, Carl. "Rhythm and Linear Analysis: A Preliminary Study," in The Music Forum, Vol. IV, ed. by Felix Salzer, 281-334. New York: Columbia University Press, 1976.

Searle, Humphrey. Twentieth Century Counterpoint: A Guide for Students. London: Williams and Norgate, 1954.

Slonimski, Nicholas, ed. Baker's Biographical Dictionary of Musicians, 7th ed. New York: Schirmer Books, Inc., 1992.

Smith, Charles. "Rhythm Restratified." Review of The Stratification of Musical Rhythm, by Maury Yeston. In Perspectives of New Music 16/1 (1977): 144-76.

Smither, Howard. "The Rhythmic Analysis of Twentieth Century Music, Journal of Music Theory 8 (1964): 54-88.

Taylor, Clifford. "The Hindemith Theories: A Revaluation of Premise and Purpose," The Music Review 4 n3-4 (August/November, 1983): 246-262.

Thomson, William. "Hindemith's Contribution to Music Theory," Journal of Music Theory 9 (1965): 52-71.

Thurmond, James Morgan. Note Grouping: A Method for Achieving Expression and Style in Musical Performance. Camp Hill, PA: JMT Publications, 1982.

Vernazza, Marcelle. "Paul Hindemith—Music Educator," The American Music Teacher (June/July, 1984): 30-32.

von Cube, Felix-Eberhard. The Book of the Musical Artwork: An Interpretation of the Musical Theories of Heinrich Schenker, translated by Neumeyer, Boyd, and Harris. Lewiston, New York: The Edwin Mellin Press, 1988.

Watkins, Glenn. Soundings: Music in the Twentieth Century. New York: Schirmer Books, Inc., 1988.

Westergaard, Peter. "Some Problems in Rhythmic Theory and Analysis," Perspectives on Contemporary Music Theory, ed. by Benjamin Boretz and Edward Cone. New York: W. W. Norton and Co., Inc., 1972.

White, John D. The Analysis of Music, 2nd ed. Metuchen, New Jersey: The Scarecrow Press, Inc., 1984.

_____. Comprehensive Music Analysis. Metuchen, NJ: The Scarecrow Press, 1994.

Williams, C. F. Abdy. The Rhythms of Modern Music. London: Macmillan and Co., Ltd., 1909.

Williams, C. F. Abdy. The Story of Notation. New York: Greenwood Press, 1903, reprint 1969.

Winold, Allen. "Rhythm in Twentieth-Century Music." In Aspects of Twentieth Century Music, ed. Gary Wittlich. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1975.

Yeston, Maury. The Stratification of Musical Rhythm. New Haven: Yale University Press, 1976.

GENERAL REFERENCES

Barry, Barbara R. Musical Time: The Sense of Order. Stuyvesant, New York: Pendragon Press, 1990.

Berry, Wallace. "Dialogue and Monologue," College Music Symposium 21/2 (1981): 84-100.

_____. "Metric and Rhythmic Articulation in Music," Music Theory Spectrum 7 (1985): 7-33.

_____. Structural Functions in Music. Englewood Cliffs, New Jersey: Prentice-Hall, 1976; reprint, New York: Dover Publications, Inc., 1987.

_____. Musical Structure and Performance. New Haven: Yale University Press, 1989.

Beach, David, ed. Aspects of Schenkerian Theory. New Haven: Yale University press, 1983.

Benjamin, William. "A Theory of Musical Meter," Music Perception 1/4 (Summer, 1984): 355-413.

Brown, Helen. Review of The Time of Music: New Meanings, New Temporalities, New Listening Strategies, by Johathan D. Kramer. In Fontes Artis Musica 37/1 (1990): 70-71.

Butler, David. Review of The Time of Music: New Meanings, New Temporalities, New Listening Strategies, by Johathan D. Kramer. In Music Perception 7/4 (1990): 446-50.

Cadwallader, Allen, ed. Trends in Schenkerian Research. New York: Schirmer Books. 1990.

Caplin, William. "Tonal Function and Metrical Accent: A Historical Perspective," Music Theory Spectrum 5 (1983): 1-14.

Carpenter, Patricia. "Aspects of Musical Space," in Explorations in Music, the Arts, and Ideas: Essays in Honor of Leonard B. Meyer, ed. by Eugene Narmour and Ruth A. Solie, 341-374. Stuyvesant, New York: Pendragon Press, 1988.

Childs, Barney. "Poetic and Musical Rhythm: One More Time." Music Theory Special Topics, ed. by Richmond Browne. New York: Academic Press, 1981: 33-57.

_____. "Time and Music: A Composer's View," Perspectives of New Music 15/2 (Spring/Summer, 1977): 194-219.

Clarke, Eric F. "Levels of Structure in the Organization of Musical Time," Contemporary Music Review 2 (1987): 211-238.

_____. "Theory, Analysis and the Psychology of Music: A Critical Evaluation of Lerdahl, F. and Jackendoff, R., A Generative Theory of Tonal Music," Psychology of Music and Music Education 14 (1986): 3-16.

Cone, Edward. "Music: A View from Delft," The Musical Quarterely 47/4 (October, 1961): 439-453. Reprinted in Perspectives on Contemporary Music Theory, ed. by Benjamin Boretz and Edward Cone. (New York: W. W. Norton, 1972)): 57-71.

_____. Musical Form and Musical Performance. New York: W. W. Norton, 1968.

Cook, Kenneth E. "A New Approach to Musical Meter: Contributions Towards a Theory of Metric Perception in Music." Ph.D. diss., Michigan State University, 1990.

Damschroeder, David, and Williams, David. Music Theory from Zarlino to Schenker: A Bibliography and Guide. Stuyvesant, New York: Pendragon Press, 1990.

Edwards, Paul, ed. The Encyclopedia of Philosophy. New York: MacMillan Publishing Co., Inc., 1967.

Erickson, Robert. "Time-Relations," Journal of Music Theory 7/2 (Winter, 1963): 174-193.

Fay, Thomas. "Perceived Hierarchic Structure in Language and Music," Journal of Music Theory 15/1 and 2 (1971): 112-137.

Flew, Anthony, ed. A Dictionary of Philosophy, 2nd ed. New York: St. Martin's Press, 1979.

Forte, Allen, and Gilbert, Stephen. Introduction to Schenkerian Analysis. New York: W.W. Norton, 1982.

Forte, Allen. "Foreground Rhythm in Early Twentieth-Century Music." In Models of Musical Analysis: Early Twentieth-Century Music, ed. Jonathan Dunsby, 132-147. Oxford: Basil Blackwell, Ltd., 1993.

_____."Pitch-class Set Genera and the Origin of Modern Harmonic Species," Journal of Music Theory 32/2 (Fall, 1988): 187-270.

_____. "Schenker's Conception of Musical Structure," Journal of Music Theory 3/1 (April, 1959): 1-30. Reprinted in Yeston, Maury, ed. Readings in Schenkerian Research. New Haven: Yale University Press, 1977.

Fraser, J. T. "The Art of the Audible Now," Music Theory Spectrum 7 (1985): 181-184.

Fricke, Jobst Peter. "Hindemiths theoretische Grundlegung der Kompositionstechnik in seiner „Unterweisung im Tonsatz"," Festschrift Heinrich Hüschen zum 65 Geburtstag. Kassel: Bärenretter, 1980.

Friskin, James and Freundlich, Irwin. Music for the Piano: A Handbook for Concert and Teaching Materials from 1580 to 1952. reprint edition New York: Dover Publications, 1973.

Gauldin, Robert. A Practical Approach to Sixteenth Century Counterpoint. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1985.

Gould, Murray. "Species Counterpoint in Tonal Structure." Ph.D. diss., New York University, 1973.

Graves, William. Twentieth Century Fugue: A Handbook. Washington, D.C. The Catholic University of America Press, 1962.

Graybill, Roger. Review of Phrase Rhythm in Tonal Music, by William Rothstein. In *Notes* 48 (December, 1991): 502-3.

Griffes, Paul. Modern Music: The Avant Garde Since 1945. New York: George Braziller, Inc., 1981.

Hanson, John. "Pedagogy of Sixteenth Century Counterpoint: Selected Examples with Commentary." Theory and Practice IV/I (March, 1979): 5-14.

Hasker, William. God, Time, and Knowledge. Ithaca, New York: Cornell University Press, 1989.

Heath, Louise Robinson. The Concept of Time. Chicago: The University of Chicago Press, 1936.

Hinton, Stephen. The Idea of Gebrauschmusik: A Study of Musical Aesthetics in the Weimar Republic (1919-1933) with Particular Reference to the Works of Paul Hindemith. New York: Garlands Publishing, Inc., 1989.

Hopkins, Robert G. Review of The Stratification of Musical Rhythm, by Maury Yeston. In Notes 34/1 (1977): 77-80.

Jeppesen, Knud. Counterpoint: The Polyphonic Vocal Style of the Sixteenth Century. New York: Prentice-Hall, Inc., 1939.

Jaques, Elliott. The Form of Time. New York: Crane, Russak & Co., Inc., 1982.

Joseph, Charles. Review of Structural Functions in Music, by Wallace Berry. In Notes 33/3 (March, 1977): 600-601.

Jonas, Oswald. Introduction to the Theory of Heinrich Schenker, trans. by John Rothgeb. New York: Longman, Inc. 1982.

Karkoshka, Erhard. Review of Übungsbuch für den dreistimmigen Satz, by Paul Hindemith, ed. by Briner, Meier, and Rubeli. In Die Muzikforschung 28/1 (January/March, 1975): 130-1.

Komar, Arthur J. Theory of Suspensions: A Study of Metrical and Pitch Relations in Tonal Music. Princeton: Princeton University Press, 1971.

Kostka, Stefan. Review of Structural Functions in Music, by Wallace Berry. In American Music Teacher 27/3 (Janusary, 1978): 42-3.

Kramer, Jonathan D. "Studies of Time and Music: A Bibliography," Music Theory Spectrum 7 (1985), 72-106.

_____. The Time of Music: New Meanings, New Temporalities, New Listening Strategies. New York: Schirmer Books, 1988.

Lacey, A. R., ed. A Dictionary of Philosophy, 2nd ed. London: Routledge & Kegan Paul, Ltd., 1986.

LaRue, Jan. Guidelines for Style Analysis, 2nd ed. Warren, MI: Harmonie Park Press, 1992.

Laskowski, Larry. Heinrich Schenker: An Annotated Index to His Analyses of Musical Works. New York: Pendragon Press, 1978.

Lederer, Josef Horst. "Zu Hindemiths Idee einer Rhythmen- und Formenlehre." Musikforschung 29 (1976): 21-36.

Lerdahl, Fred, and Jackendoff, Ray. A Generative Theory of Tonal Music. Cambridge: The MIT Press, 1983.

Lewin, David. "Some Investigations into Foreground Rhythmic and Metric Patterning," In Music Theory Special Topics, ed. by Richmond Browne. New York: Academic Press, Inc., 1981.

Mancini, David. "Using Species Counterpoint in the Undergraduate Theory Curriculum" Journal of Music Theory Pedagogy III/2 (Fall 1989): 205-219.

McGraw-Hill Dictionary of Scientific and Technical Terms, 3rd ed. New York: McGraw-Hill, Inc., 1984.

Morgan, Robert P. Review of The Time of Music: New Meanings, New Temporalities, New Listening Strategies, by Jonathan D. Kramer. In Music Theory Spectrum 12/2 (1990): 247-55.

Nestler, Gerhard. Review of Übungsbuch für den dreistimmigen Satz, by Paul Hindemith, ed. by Briner, Meier, and Rubeli. In *Melos* 38 (April, 1971): 145-6.

Palmer, Caroline, and Krumhansl, Carol. "Mental Representations for Musical Meter," Journal of Experimental Psychology: Human Perception and Performance 16/4 (1990): 728-741.

Rexroth, Dietrich, ed. Paul Hindemith Briefe. Frankfurt: Fischer, 1982.

Rochberg, George. "The New World of Sound," Etude 71 (January, 1953): 19, 50.

Rothstein, William. Phrase Rhythm in Tonal Music. New York: Schirmer Books, 1989.

Rowell, Lewis. Review of The Time of Music: New Meanings, New Temporalities, New Listening Strategies, by Johathan D. Kramer. In Journal of Music Theory 34/2 (1990): 348-59.

Salzer, Felix. Structural Hearing: Tonal Coherence in Music, Volume One and Two. New York: Charles Boni, 1952. Reprint edition New York: Dover Publications, Inc., 1962.

Salzer, Felix, and Schachter, Carl. Counterpoint in Composition: The Study of Voice Leading. New York: McGraw-Hill, Inc., 1969.

Samson, Jim. Review of Structural Functions in Music, by Wallace Berry. In Tempo 122 (September, 1977): 20-24.

Schachter, Carl. "Rhythm and Linear Analysis: Durational Reduction," in The Music Forum, Vol. V, ed. by Felix Salzer, 197-232. New York: Columbia University Press, 1980.

Schubert, Giselher, ed. Paul Hindemith, Aufsätze, Vorträge, Reden. Zurich: Atlantis Musikbuch-Verlag, 1994.

Seidel, Wilhelm. Review of The Stratification of Musical Rhythm, by Maury Yeston. In Muzikforschung 33/2 (1980): 222-4

Shackford, Charles R. Review of Übungsbuch für den dreistimmigen Satz, by Paul Hindemith, ed. by Briner, Meier, and Rubeli. In Journal of Music Theory 16/1-2 (1972): 238-65; In *Notes* 29/3 (March, 1973): 451-2.

Shirlaw, Matthew. The Theory of Harmony, 2nd ed. DeKalb, IL: Dr. Birchard Coar, 1955. Reprint edition New York: DaCapo Press, 1969.

Siegel, Hedi, ed. Schenker Studies. Cambridge: Cambridge University Press, 1990.

Skelton, Geoffrey. Paul Hindemith: The Man Behind the Music. London: Victor Gallancz, Ltd., 1975.

Slatin, Sonia. Review of Übungsbuch für den dreistimmigen Satz, by Paul Hindemith, ed. by Briner, Meier, and Rubeli. In The Musical Quarterly 18 (January, 1972): 141-8.

Solie, Roger. Review of The Stratification of Musical Rhythm, by Maury Yeston. In Journal of Aesthetics and Art Criticism 35/2 (1976): 244-5.

Strobel, Heinrich. Paul Hindemith: Testimony in Pictures. Mainz: B. Schott's Söhne, 1961.

Tischler, Hans. Review of The Rhythmic Structure of Music, by Grosvenor W. Cooper and Leonard B. Meyer. In Journal of the American Musicological Society 16/2 (1963): 270-272.

Urmson, J. O., and Rée, Jonathan, eds. The Concise Encyclopedia of Western Philosophy and Philosophers, new edition. London: Unwin Hyman, 1989.

Williams, David R. A Bibliography of the History of Music Theory, 2nd ed. Fairport, New York: Rochester Music Publishers, 1971.

Yeston, Maury, ed. Readings in Schenkerian Research. New Haven: Yale University Press, 1977.

Wittlich, Gary E. Review of The Stratification of Musical Rhythm, by Maury Yeston. In Journal of Music Theory 21/2 (1977): 355-73.

Zinsser, William, with Ruff, Willi. "Our Far-flung Correspondents: Resonance." The New Yorker 60 (April 23, 1984): 84-105.