POLYMETRIC LAYERING AND TONAL LANGUAGE IN THE PIANO ETUDES OF GYÖRGY LIGETI

by

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Abstract

Polymetric Layering and Tonal Language in the Piano Etudes of György Ligeti

Advisor: Professor Philip Lambert

György Ligeti's eighteen piano etudes were composed over a period of fifteen years, yet they constitute a coherent body of music literature. In this dissertation I explore recurring compositional elements that are significant unifying factors in these works, particularly the following six properties: referential collections, pulsation patterns and rhythmic cycles (including continuum and polymetric layering), *aksak* rhythms, intervallic orientation, melodic structures, and canon (in the later etudes).

After a brief outline of these components in the etudes as a whole, I focus in greater depth on polymetric layering and continuum in "Entrelacs," and elements of continuum, rhythmic cycles, pitch collections, and structural design in "Der Zauberlehrling." My original analytical techniques include rhythmic reductions of continuum layers, mapping of durational rhythmic cycles, and pitch-range graphs.

Preface

Over a long and distinguished career, György Ligeti (1923–2006) explored a variety of compositional styles. He was inspired, in part, by particular concepts, sights, sounds, and indigenous musical practices in different countries where he lived.[1] His materials and techniques changed in interesting ways as he evolved as a composer. In some cases, this evolution is evident even within the different phases of a single composition or compositional set. This idea in particular attracted me to Ligeti's Etudes for piano.

Ligeti's eighteen piano etudes (1985–2001) rank along with Debussy's two books of Preludes (1909–13) and Bartók's six-volume *Mikrokosmos* (1932–39) as the pre-eminent sets of keyboard works of the twentieth century. They carry on a tradition from the century before, in Chopin's sets of Etudes (op. 25, 1835–37) or Preludes (op. 28, 1838–39), or Robert Schumann's great sets of character pieces (e.g., *Carnaval*, 1834–35; *Kreisleriana*, 1838). Like other etudes in the repertoire, Ligeti's etudes each contain at least one unique technical idea. These might involve difficult technical passages requiring great finger dexterity and speed, or layers of sound, or complex polyrhythms, or other logical patterns of various kinds. Not since the etudes of Chopin have we seen such a didactic set of etudes introduced into the piano repertoire—both technically demanding and musically challenging.

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[1] One particular example of Ligeti's personal experiences influencing a later work involve a story from early childhood when he woke up to a policeman screaming in a foreign tongue (Romanian) as the border of his homeland Hungary had just changed during the war. Ligeti did not know any other languages existed and was intrigued yet frightened. This influenced some forth years later him to write two mini operas, *Aventures* and *Nouvelles aventures*, using a nonsensical, hysterical language of artificial phonetic sounds. (Richard Steinitz, *György Ligeti: Music of the Imagination* (Boston: Northeastern University Press, 2003): 6.)

Ligeti's piano etudes are also important because they portray such an immense metamorphosis in the composer's style. They seem to encapsulate his lifelong compositional interests, and relate provocatively to many of his other works of various kinds from the same time period and before. It is worth mentioning here that few composers' music have enjoyed such widespread appeal as Ligeti's has, with virtually all of his middle to late period works being performed today.

My purpose in writing this dissertation stems from a desire to encourage more young musicians to perform post-tonal music. I find that there is a lack of relevant literature about this repertory that is accessible for young artists. I am interested in building a catalog of informative texts that illustrate new concepts in a way that is accessible for a student or for any musician who may not have formal training in music theory, but would like to produce an intelligent reading and performance of a new work.

Chapter 1 gives an overview of Ligeti's biography, highlighting key works that I found to be most important and innovative throughout his career, and provides a commentary on the current state of research regarding Ligeti's piano etudes. Chapter 2 is an overview of the entire set of etudes, focusing on particular compositional elements found throughout the set. This chapter will be useful for young artists looking to research what elements are most important in these pieces so that they may be highlighted in performance. Chapter 3 contains original research and graphs on two etudes from Book Two, "Entrelacs" and "Der Zauberlehrling." These two etudes demonstrate Ligeti's use of continuum as a compositional element and explore his polymetric layering of rhythmic cycles. My

research on “Entrelacs” began as a term project while in graduate school and was the original inspiration for the dissertation. “Entrelacs” and “Der Zauberlehrling” have not been studied in this much detail in other published sources.

I have practiced a number of the etudes, but currently have not performed them in public. I became intensely interested in analyzing the etudes to probe more deeply into the texture of each so that I could better understand the elements Ligeti chose to uniquely utilize in each individual work. Understanding the construction and compositional elements of the individual etudes may provide a foundation for technical practice at the piano and should enrich the pianist’s musical understanding, enabling the performer-interpreter to become more secure in the intellectual understanding and technical execution of the works.

I have assumed that readers will have access to the scores of all eighteen etudes while reading the dissertation.

Acknowledgements

I would like to thank a number of professors at The City University and Graduate Center (CUNY) for their inspiring lectures on modernist analysis. Philip Rupprecht taught a course on the music of Carter, Ligeti and Birtwistle that sparked my interest in the Ligeti etudes, in particular their construction and compositional elements. Joseph Straus and Shaugn O'Donnell who taught 20th century analysis and courses dedicated to current trends in music theory that further inspired me to continue my research on the Ligeti etudes. If not for the tireless, constant communication from my advisor Philip Lambert, I would not have finished this project. His expertise in the subject and his acute eye for detail has left an indelible impression on me. I would also like to thank my piano teachers for their guidance throughout my life and career thus far. People who find the right mentor in life are fortunate and I have been fortunate in this respect a thousand-fold. From the age of 6 or 7 I found the perfect mentor in Jerome Jolles. He prepared me to continue along a path that enabled me to meet some of the greatest musical minds in the world and to be fortunate enough to have studied with them. He always made sure that I researched everything I could about a composer and piece I was working on, even if it was from a child's perspective at the time. This importance of knowledge has always been with me and I teach that to my students. His friends Fiorella and Martin Canin took me under their wing a few years later – first Fiorella at the Manhattan School of Music Preparatory Division. She instilled in me a deep desire to develop a solid technique and strong understanding of both musical styles and compositional construction. Martin Canin remained a silent listener in the other room during my piano lessons with his wife.

I knew that one day if I worked very diligently that he might take me on as a student. This eventually happed when I became a DMA student at the Graduate Center. I cherish all the musical advice he gave me and also that he had what I consider to be the best “pair of ears” on earth. Marty always had advice that he gave through Fiorella for my development as a pianist growing up and I am fortunate to have studied with such a wonderful family of musicians. Throughout college for about 6 or 7 years I studied with Dr. Thomas Sauer (their son-in-law). Tom made a great impression on my piano playing as well as on my character. As a mentor he guided me and taught me to develop a strong technique and insisted that I make the proper connections between my theoretical knowledge (as a double major at Mannes in performance and music theory) and my piano performance. The most important lesson Tom taught me was that humility and patience were just as important as a meticulous piano technique and sensitive musicality. Tom was one of the younger members of the piano faculty, who in particular who played a lot of new music, and it is through him that I became aware of the Ligeti etudes with all of their splendor (and difficulty!). Lastly, I would like to thank my family for their patience throughout the dissertation process. Throughout everything my mother Barbara and my husband Tom were supportive and kind, always encouraging my “timely” completion of the project. To my late father Andrew I owe the fact that I ever went back to school to get a DMA. I promised him that I would go as far as I could with my musical education and swore I would nott be one-dimensional. He insisted that I get a strong foundation in music theory besides a great education in piano performance. Through all the teachers and professors acknowledged here I feel I have received that education and I am forever grateful.

To the memory of my father

Andrew Romanik Podgurski

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Chapter 1

Introduction

Biographical sketch

György Ligeti was born Ligeti György Sándor to a Hungarian-Jewish family living in Transylvania (Dicsőszentmárton), Romania on May 28, 1923.[1] He grew up in a place where the border was frequently changing because of political and social unrest. Ligeti's first experience with foreign languages occurred as a small boy hearing foreign police yelling at the townspeople. The prevailing language could change from day to day. Passports could suddenly become invalid. Taxes had to be paid to a new government. Everyone had the "wrong" papers and there was nothing to be done. It seemed like a hopeless and unfair situation, even to the young Ligeti. This political unrest was to continue throughout his youth and young adult life, lasting into and throughout World War II, after which he would continue to be artistically "edited" or limited by the Hungarian communist government.

At the age of six Ligeti and his family moved to the city of Cluj. Here he was to receive his first musical training. By age fourteen he had started piano lessons and wrote his first waltz. In the summers he studied with Pál Kadosa, a pianist and composer in Budapest. By 1940, Ligeti's home (Transylvania) was returned to Hungary and tensions were starting to rise. He desperately wanted to be admitted to the university to study physics and math, but Jews were not allowed. Instead, he was admitted to the Kolozsvar Conservatory in 1941, where he studied

[1] Richard Steinitz, *Music of the Imagination,* 3. Steinitz is the main source for the biographical sketch that follows.

composition with Ferenc Farkas, a pupil of Respighi. In 1945 he travelled to Budapest and studied composition with Sandor Veress at the Franz Liszt Academy. Here he met his classmate and colleague György Kurtág, a friend with whom he shared similar background and personal experiences.

Ligeti's education had come to a temporary halt in 1944 when he was forced, along with his family, to a concentration camp. He was sent to join the Mauthausen labor brigade and separated from the rest of his family. His parents and brother were sent to Auschwitz. Only he and his mother survived the war.

A few months after the war ended Ligeti resumed his studies, graduating from the Budapest Academy of Music in 1949. While at the Academy he launched into an extensive study of folk music. He studied folk music and made transcriptions from the folk material. Many of his early works were performed at the Academy. Most of his early music was similar in style and intent to that of Zoltán Kodály and Béla Bartók. Ligeti mindfully tried to arrive at a "Hungarian modernity" inspired by Bartok's more traditional folk style, but he could not succeed in a way that was acceptable to his conscience or to the authorities who censored him.[2] Many of Ligeti's works that were acceptable to the authorities were folk-based or traditional-sounding choral works. Ligeti's interests were well beyond creating a catalogue of Hungarian folk music and there was already such a rich vocal folk tradition in Budapest. This was a constant source of frustration for the young composer as it all but stifled his originality and creativity. He was not is a

[2] Stephen Plainstow, obituary for György Ligeti, *The Guardian,* June 14, 2006.

position to rebel and did his best to satisfy his creative genius while appeasing the authorities that judged his work.

In 1950 Ligeti was invited to stay on as a distinguished professor of composition at the Budapest Academy. He remained on faculty there until 1956. His musical language was restricted during this period by the Hungarian communist regime. Beginning in 1949 the newly established, Communist-run entity known as the Composers' Union was required to examine all music scores before allowing them to be performed in public. Oversight of recordings made for radio broadcasts was less oppressive, even if such recordings were not always aired, as was the case with Ligeti's Cello Sonata. During this creatively restrictive period Ligeti was a young professor who was not in a position to be out of favor with the authorities. If the Union decided that they did not like Ligeti's work, he would have been sent to work in a factory and would have lost his university position permanently. The Union criticized many of Ligeti's works for their "clerical reactionism," and "formalistic modernism," banning basically anything that was suspected of showing traces of "bourgeois or modern tendencies."[3]

Many of Ligeti's compositions of the 1950s that were approved and performed were choral works for youth choirs and pieces of folk or militaristic subject matter. The composer was hardly proud of some of this period's output, but they earned him commissions at a time when he needed both political approval and public favor. After his *Old Hungarian Ballroom Dances* (1949) earned him popularity and royalties, he was not stifled intellectually and he produced a few of

[3] Steinitz, *Music of the Imagination,* 51–52.

his most popular works (although they were not necessarily performed publicly).[4] These include *Musica ricercata* (1952–53), Six Bagatelles for Wind Quintet (1953), and String Quartet No. 1: *Métamorphoses nocturnes* (1953–54). *Musica ricercata* became the first of Ligeti's works to enter the mainstream repertory.[5]

Ligeti and his wife Vera fled to Vienna in 1956 to escape Budapest during the Revolution. Between 1957 and 1959, Ligeti started working at and experimenting in the electronic music studio in Cologne. Here he was able to work with Karlheinz Stockhausen and Gottfried Michael Koenig. He composed and produced his first electronic work *Artikulation* for four-channel tape in 1958. This piece would influence his composition throughout the next decade. With his interest in the electronic sound world and exploring the possibilities of technology, Ligeti shifted his focus away from traditional serialism. He began to regard his early works and his interest in serialism as old-fashioned and wanted to become more progressive. He aspired to create a language all his own, using serial techniques of his predecessors yet taking the ideas down new paths to create new sound worlds, pushing the threshold of sound perception, common rhythms and meter.

Working in Stockhausen's electronic studio in Cologne, Ligeti experienced a rapid creative, stylistic, and conceptual development and established new concepts and a unique type of sound. He would continue to be influenced by his years at the Cologne studio until the early 1980s, when he declared he would cease composing

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[4] The works became popular after this period of censorship and are some of his most widely performed works to date.

[5] Steinitz, ibid., 53. *Musica ricercata* had broad appeal because both its concept and texture are basic and accessible. Its composition is Ligeti's modernist response to Schoenberg's "emancipation of the dissonance."

electronic music.[6] His style during this time embraced density, as in *Atmosphères* (1961), sound mass, as in *Continuum* (1968), and treatment of melodic and harmonic layers or fabric as in *Melodien* (1971), and *Monument-Selbstporträt-Bewegung* (1976). It was the success and intrigue of *Atmosphères* that brought Ligeti many invitations to lecture and teach at the university level.

After 1959, Ligeti held a number of professorships at major universities and institutions, including the Stockholm Academy of Music (1959), Stanford University (1972), and the Hamburg Academy, where he taught from 1973 until his retirement in 1989. He spent most of the 1990s revising his opera *Le Grand Macabre* and working on the eighteen piano etudes. It is believed that he was not quite finished with the etudes when he became ill and wheel-chair bound in the last few years of his life. He did, however, work closely in his final years with pianist Pierre Laurent Aimard on the execution and performance of his piano works. Ligeti died in Vienna on June 12, 2006. The city of Vienna dedicated a monument that marks his grave.

Overview of Ligeti's Works

Ligeti's works can be categorized in different ways. Richard Steinitz creates a division between pieces composed in Romania or Hungary and then music composed in the West. Within these two massive lists one can parse further and create subcategories. For instance, most of Ligeti's very early music is considered "juvenilia"; Ligeti did not feel such works were even fit for performance or

[6] Ligeti also spent time at the Darmstadt electronic studios. I focus here on Cologne because much of his earliest inspiration came from working with Stockhausen.

production for distribution. Many were student pieces, but this is not to say that they were poorly written. They just have little to do with his middle to later works (post 1950).[7] In this dissertation Ligeti's works will be categorized into two main groups: music composed before 1957 and music composed in the West after 1957. In 1957 Ligeti's compositional style started evolving, incorporating new ideas and experimentation in sound inspired by his work in the electronic studios, and marks the year when he first experienced a creative freedom from the Communist authorities.

The Romanian and Hungarian works were very early and many of them are student compositions. A resounding number of vocal works and peasant type songs and works for chorus are included in the group. There were reworkings of pre-existing compositions and traditional song melodies that were used as thematic material. Any type of experimentalism, including post-modern ideas about serialism, was censored by the authorities, primarily by the Composers' Union run by the Communist Party. For these main reasons, Ligeti disregarded most of the compositions, considering them trite and merely student works. A few exceptions exist, most notably the Cello Sonata (1948-53), which was censored by the Composers' Union.

Some early compositions that have become part of the mainstream Ligeti repertoire include the *Musica Ricercata* (1951-53) for piano, the *Six Bagatelles for*

[7] Richard Steinitz lists a selective list of pieces under the umbrella of "Music composed in Romania and Hungary." He refers the reader to Ove Nordwell's *György Ligeti: From Sketches and Unpublished Scores 1938-56* (Stockholm: royal Swedish Academy of Music, 1976) and to Friedeman Sallis's *An Intoduction to the Early Works of György Ligeti* (Cologne: Studio-Schewe, 1996) for complete listings of all his compositions and sketches.

Wind Quintet (1953), and the String Quartet #1: *Métamorphoses nocturnes* (1953-54). These works came at the end of a period of stifling censorship, and they display characteristics of Ligeti's Western voice as a composer. These characteristics include a focus on layering sounds, meters, rhythms, juxtaposing rhythms, phasing, experimenting with the obliteration of pitch as a solo entity and focusing more on sound masses, the timbre of solo instruments and the capabilities and limitations of solo instruments and how that translates to sound and perception of the elements of sound, such as timbre, rhythm, articulation, dynamics, and speed. *Musica Ricercata* (1951-53) was a commentary on serialism in which Ligeti treated each pitch as a unique entity and not in the traditional manner of the second Viennese school. This work has eleven separate movements, the first consisting merely of the pitch "A" in many different registers and finally joined at the end by a second pitch. The consequent movements each add one more pitch until all twelve are used in the final movement. In the Six Bagatelles for Wind Quintet (1953) Ligeti re-uses six of the movements from *Musica Ricercata.* Sadly, the Composers' Union censored the piece because the last movement was considered to be too "dangerous."[8] The String Quartet #1: *Métamorphoses nocturnes* (1953-54) did not receive its premiere until after Ligeti had left Hungary. It is considered to be the first piece that represents Ligeti's personal style and demonstrates his use of pastiche and of sections being connected by some significant material or event.[9] He would continue to compose using this method for many years. Ligeti was to become a pioneer in pushing the limits of solo

[8] Steinitz, *Music of the Imagination,* 60.
[9] Ibid., 63-64.

instruments and creating new sound worlds by changing perception, obliterating what was commonly known as meter and changing everything the listening world perceived to be "normal."[10]

The second main grouping of compositions is music composed in the West (after 1957). The conception and articulation of the ideas for the earlier music in this group is attributed to Ligeti's work in the Cologne electronic studios with Stockhausen and his followers. Almost every piece in this second group of compositions is a well-known work. Of the Western works, there are a few from each decade that are considered ground-breaking.

Ligeti's work in the electronic studios of Cologne and Darmstadt influenced his growing interest in *micropolyphony*, a musical texture involving sustained chords that would change slowly over time. This practice could involve many devices and was not exclusive to any one in particular, often involving the mixture of different layers of rhythms, timbres and sounds and how they moved and worked together. Ligeti's fascination with musical layers and their behaviors and characteristics became very intense during the late 1950s and continued throughout the rest of his compositional career. Ligeti's earliest example of the use of micropolyphony is found in *Apparitions* (1957) for orchestra, followed by his next orchestral piece *Atmosphères* (1961), and the first movement of his *Requiem*

[10] In the Piano Etudes in particular, Ligeti tries at times to obliterate meter by using the barlines only to keep track of where the pianist is in the score. The barline commonly serves no real purpose in the majority of the etudes, it is merely a study device.

(1963-65). [11] The *Requiem* was somewhat loosely based on the traditional mass and is an experiment in micropolyphony on a larger scale, where he intertwined his new ideas with the traditional forms of fugue and other historical forms, paying homage to composers of the Renaissance and Baroque periods. *Ramifications* (1968-69) is a string piece for twelve players who are instructed to divide into two groups per part and enter one quarter tone apart from each other. Ligeti uses this piece to demonstrate that inevitably one part will gravitate toward the other and meet somewhere in the middle. *Clocks and Clouds* (1972-73) was named in homage to an essay by philosopher Karl Popper and examines the idea that there are two kinds of processes that occur in nature: one that can be measured exactly, and one that is indefinite and can only be approximated. Ligeti experimented with the fuzzying of harmonies and harmonic layering which become so important later in his piano etudes. *Le grand Macabre* (1974-77) is Ligeti's only large-scale opera and marks the end of this period in his composition. It is the only work where he uses quotes and starts turning to the use of melodic intervals albeit in non-traditional ways.

Another important work from this period is *Melodien* (1971), or "Melodies," which was Ligeti's response to the avant-garde composers of the late 1960s and early 1970s. He wrote fifty-seven short melodies for four instruments; the melodies were treated as unordered sets in pitch space, their order only determined by their

[11] Ligeti often referred to micropolyphony as a "web of sound" and would recall his horror over a nightmare about a gigantic spiderweb as a child. He attributed his fascinationwith webs and complexity of sound to his childhood dream.

starting points.[12] They would move from sections of delicate lyricism to sections of static writing, chordal writing, intervallic unfolding and overlapping scales. The music is structured in "phases," where the first phase or section is stable and firmly grounded, while the second is in a state of turmoil or unrest. *Melodien* demonstrates Ligeti's exploration of the two polar spheres of the orchestral range and stretches the limits of what is audible. Ligeti uses this technique again in at least one of the piano etudes that is discussed in Chapter 3.

Monument – Selbstporträt – Bewegung: Three Pieces for Two Pianos (1976) is a highly regarded work and has been performed and recorded more frequently than most of Ligeti's other works. The second movement is subtitled "A Self-portrait with Reich and Riley (with Chopin in the background)," giving a nod to the three composers who had great influence upon his compositions beginning at this point. In this work Ligeti moves away from his typical treatment of cluster-style harmonies that he practiced in the 1960s. His focus turns to sound density and its fluctuation from one moment to the next. These are three studies in rhythm that are essentially experiments in pattern-illusion and demonstrate the evolution or metamorphosis of interwoven or "interconnected lattices".[13] This latter idea is strongly connected to the fundamental principles of "Entrelacs," one of the etudes discussed in Chapter 3.

After a prolific output in the 1970s it was not until 1982 that Ligeti produced a large work that demonstrated his newest style. The Trio for Violin,

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[12] Jonathan Bernard, "Ligeti's Restoration of Interval and Its Significance for His Later Works," *Music Theory Spectrum* 21/1 (Spring 1999): 1-31 [10].
[13] Steinitz, *Music and the Imagination,* 206.

Horn and Piano (1982) represents a turning point in Ligeti's career. It represents what Ligeti termed a "third way," that is, a style that is neither modern nor postmodern.[14] Ligeti's music during this period is generally more reflective than any of his previous works.[15] The Trio explores tonal language, namely major and minor tonalities, but not in the traditional ways they would work together. In addition to tonal harmonies Ligeti explores the range of the horn and its out-of-tune upper partials, Bulgarian (Balkan) rhythms of his youth, and most importantly the "lament" motif that is so important in his later works of this period.[16] Ligeti also pays homage to his predecessors by returning to the use of old compositional forms: the first three movements are each in ternary form, and the fourth movement is a passacaglia.[17]

There are a number of other notable works in Ligeti's final compositional period spanning from 1982 until his death in 2006. Most notable are the Études for Piano, Book 1 (1985), Piano Concerto (1980-88), Violin Concerto (1989-93), Études for Piano, Book 2 (1988-94), Sonata for Solo Viola (1991-94), and the unfinished Études for Piano, Book 3 (1995-2006). One of Ligeti's favorite metaphors for describing the working of the pieces from the Horn Trio onwards is a "kaleidoscope".[18] The first movement of the Piano Concerto, for example, is considered by Bernard to be one of the most complex and "dazzling" polyrhythmic

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[14] Searby, "Ligeti's Third Way," 17-22.
[15] Steinitz, *Music and the Imagination,* 255.
[16] Taylor, "The Lamento Motif," 22-49.
[17] Steinitz (see footnote 14) notes that the ground bass of the passacaglia movement is reminiscent of the opening of Beethoven's op.81a "Les Adieux," which is essentially a horn call.
[18] Bernard, "Restoration of Interval," 25.

pieces ever written.[19] The five-movement Concerto explores many of the ideas that Ligeti worked out in the Études but in an orchestral context.

Current State of Research

Richard Steinitz devotes the thirteenth chapter of his masterful biography to Ligeti's piano etudes. He provides a brief analytical commentary on each, and an explanation of pertinent social and incidental information that influenced their composition.[20] Steinitz's other publications discuss the influences of science on Ligeti's later piano works, Ligeti's profound interest in the true meaning of chaos theory, the consequences of chaos theory on dynamic systems, and Ligeti's response in musical terms to natural phenomena that cause deviations in such systems.[21] Steinitz also discusses Ligeti's interest in normal, pedestrian objects and in processes that have slight deviations occurring naturally, as in the formation of snowflakes or the veins of a leaf. Ligeti became interested in musical portrayals of slight deviations that might seemingly go unnoticed but could and would eventually produce something with catastrophic results. The eventual result would be complete chaos, losing all functionality and not even closely resembling the original model. Each of his etudes uniquely demonstrates these natural deviations in seemingly normal compositional processes and forms.

Steinitz could give insight into the life and music of Ligeti because of his relationship with the composer and their documented conversations. Ligeti

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[19] Ibid.
[20] Steinitz, *Music and the Imagination,* 277-314.
[21] Steinitz,"The Dynamics of Disorder," 7-14.

expressed to Steinitz in an interview that "somewhere underneath, very deeply rooted, there was a common place in our spirit where the beauty of mathematics and the beauty of music meet."[22] Steinitz's research along with his personal relationship and friendship with the composer have enabled Ligeti scholars to grasp the connections between many of the composer's works in addition to better understanding Ligeti's reasoning for his musical and compositional choices and how they fit together as a complete set of works over the course of the composer's lifetime.

There are a number of theorists who have made notable contributions to Ligeti research in the past two decades. Jane Piper Clendinning discusses pattern-meccanico in great detail, "meccanico" being Ligeti's own term for certain of his compositions and taking its name from the idea of a constant ticking of different clocks out of sync with one another. The meccanico pattern characteristically starts vigorously and is consistent in pitch content at the outset, and ultimately through a number of unexpected yet tiny changes in pitch and number of pulsations evolves into something either increasingly complex or something that hardly resembles its former state. Clendinning further discusses Ligeti's avoidance of a traditional harmonic language, instead choosing to avoid any usage that might seem tonal and taking harmonic intervals and using them as "signals" throughout the works.[23] These signals served the purpose of sometimes partitioning sections and sometimes announcing the start of a new compositional idea. Clendinning's

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[22] Ligeti's interest in mathematical ideas deepened around the year 1985, the same year he began the Etudes.

[23] Jane Piper Clendinning, "Pattern-Meccanico Compositions of György Ligeti," *Perspectives of New Music* 31/1 (Winter 1993): 192-234 [201].

research sparked my interest in the meccanico elements in "Entrelacs" and "Der Zauberlehrling" including Ligeti's use of continuum and his use of a predetermined set of polymetric layers and mathematical models, as well as his treatment of formal processes in these two etudes.

Miguel Roig-Francoli has written about the compositional techniques Ligeti used to create net-structures. Net-structures are defined by Roig-Francoli as "webs of finely-woven interacting lines or repeated patterns in constant process of transformation."[24] He discusses the behavior of intervals in these structures and focuses on the expansion, contraction and constant transformation of interval in these works, and what the implications are for the particular intervallic treatment on the larger scale. He further demonstrates through analysis that harmonic and textural transformations are the generating elements of the large formal design and sectional as well as proportional relationships of Ligeti's later works. Roig-Francoli's work provides insight into the significance of interval and the behavioral of intervals and intervallic relationships in Ligeti's later works, particularly in the etudes. Ligeti's treatment of interval in the etudes bears significant resemblance to the treatment of interval found in Roig-Francoli's analyses of Ligeti's other works from this period. My analyses of Ligeti's treatment of interval, particularly the transformation of interval throughout the continuum layers of the two etudes discussed in Chapter 3 are influenced in part by Roig-Francoli's research.

Jonathan Bernard is another theorist who has focused on Ligeti. In an article in *Music Theory Spectrum* Bernard explores the significance of Ligeti's restoration

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[24] Miguel Roig-Francoli, "Harmonic and Formal Processes in Ligeti's Net-Structure Compositions," *Music Theory Spectrum* 17/2 (Fall 1995): 242-67 [243].

of interval in works spanning the 1970s.[25] Bernard explains that Ligeti was at one time being classified with a group of composers including Penderecki and Xenakis, a group that used sound masses with pitch aggregations that basically deemphasized pitch. The group of composers liked to confine pitch into small spaces and at times as densely as possible. The result was that definable pitch all but disappeared. Ligeti admitted to disrupting intervals by inserting so many minor seconds that even chromaticism would disappear in the traditional harmonic sense, therefore also resembling electronic music as much as possible.[26] Ligeti aimed to eradicate as much pitch and interval as possible as early as 1959 when he was working on *Apparitions.* Bernard examines intervallic transformations in several of Ligeti's works, and examines the composer's use of interval and intervallic relationships and transformations and their structural, compositional and stylistic implications. Bernard's work with pitch-range graphs demonstrating intervallic transformation and sound density in some of Ligeti's middle to late works was an influence on my decision to explore sound density and intervallic behaviors and intervallic transformation in "Entrelacs" and "Der Zauberlehrling" in Chapter 3.

There are also two articles by Bernard from the late 1980s and early 1990s dealing exclusively with Ligeti's music: one analyzing voice leading and its special function in Ligeti's music, the other discussing the inaudible large-scale (global) relationships in Ligeti's music and their importance in the large-scale formal

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[25] Jonathan Bernard, "Ligeti's Restoration of Interval and its Significance for His Later Works," *Music Theory Spectrum* 21/1 (Spring 1999): 1-31.
[26] Péter Várnai et al, *Ligeti in Conversation* (London: Eulenberg, 1983), 94.

structure.[27] Bernard also translated an article by György Ligeti titled "States, Events, Transformations," where Ligeti discusses his orchestral work *Apparitions* (1958-59).[28] Ligeti explains how interval is used in the oscillations that create the continuum in *Apparitions* and discusses which intervals are favored and his compositional technique of stacking intervals to create pitch-space density.

There have been several important contributions to Ligeti scholarship more recently, including a number of articles and dissertations devoted to some of the piano etudes. Several analysts have studied *Désordres* and *Automne à Varsovie*, and Denys Bouliane wrote a detailed analysis of the first six etudes.[29] Bouliane also discusses at length the "cultural" impact of some of the techniques Ligeti uses and demonstrates the impact certain musical choices will make on the surrounding music in the piece – what the "cultural" or global impact of certain choices by the composer might have on the entire piece. Beside the works of Bouliane we can consider the article by Michael Hicks on interval and form in Ligeti's *Continuum* (1968) and *Coulée* (1969) to be a solid contribution to research on intervallic relationship and pattern-meccanico, as Hicks further contributes to study of meccanico elements featured in the writings of Roig-Francoli and Piper-

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[27] Jonathan Bernard, "Inaudible Sctructures, Audible Music: Ligeti's Problem and His Solution," *Music Analysis* 6/3 (Oct. 1987): 207-36; "Voice-Leading as a Spatial Function in the Music of Ligeti," *Music Analysis* 13/2-3 (Oct. 1994): 227-53.
[28] Bernard, Jonathan. "States, Events, Transformations." *Perspectives of New Music,* 31/1 (Winter 1993): 164-171.
[29] Denys Bouliane, "Les Six Études pour piano de György Ligeti: ou, l'Art subtil de créer en assumant les referents culturels," *Canadian University Music Review* 9/2 (1989): 36-83; "Ligeti's Six *Études Pour Piano*: The Fine Art of Composing Using Cultural Referents," transl. Anouk Lang, *Theory and Practice* 31 (2006): 163-179.

Clendinning.[30] The writings of Bouliane and Hicks were fundamental in providing information on Ligeti's treatment of certain compositional elements found in his middle to late works that are discussed in Chapter 2.

There have been a few articles written exploring how the musical practices of different cultures influence Ligeti's music. Stephen Taylor wrote a compelling article on the influence of sub-Saharan African drumming and Caribbean drumming on Ligeti's later works and his use of polymetric layering and polyrhythms.[31] Taylor attributes Ligeti's affinity for complex drumming techniques with his cultural heritage in the rhythms of Balkan music. These Balkan rhythms, known as *aksak* rhythms, are a vital component of a number of the etudes. Taylor's work was an important guide to understanding the rhythmic components found in Ligeti's later works and provide an informative text on the importance of these rhythmic relationships which we find in many works including the etudes. Last but certainly not least are a group of compelling works that are doctoral dissertations written by theorists on different aspects of Ligeti's compositional processes and include those by Amy Bauer, Jane Piper Clendinning, and Stephen Taylor.[32]

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[30] Michael Hicks, "Interval and Form in Ligeti's *Continuum* and *Coulée,*" *Perspectives of New Music* 31/1 (Winter 1993): 172-90.
[31] Stephen Andrew Taylor, "For György Ligeti on His 80th Birthday: Ligeti, Africa and Polyrhythm," *The World of Music* 45/2: 83-94.
[32] Amy Bauer, "Compositional Process and Parody in the Music of György Ligeti" (Ph.D. diss., Yale University, 1997). Jane Piper Clendinning, "Contrapuntal Techniques in the Music of György Ligeti" (Ph.D. diss., Yale University, 1989). Stephen Taylor, "The Lamento Motif: Metamorphosis in Ligeti's Late Style" (D.M.A. diss., Cornell University, 1994).

Scholarly Context of This Dissertation

Richard Steinitz has remained the consummate authority on Ligeti scholarship and on Ligeti's music for many years. He worked closely with Ligeti prior to the publication of the biography (and other articles dedicated to Ligeti's music and aesthetic). Steinitz's concise analysis of the etudes, found in chapter 13 of his Ligeti biography, offers insightful points and some general analyses of the etudes, particularly of those etudes that have been heavily favored by analysts and theorists. Many of the writings I have perused quote and reference Steinitz extensively.

This dissertation draws inspiration from Steinitz and other writers while probing more deeply into the etudes. Chapter 2 provides a concise assessment of common compositional elements found throughout the entire collection. No other source presents this information in this manner. Chapter 3 presents extensive, original analyses of the pitch and rhythmic structure of two of the etudes, "Der Zauberlehrling" (#10) and "Entrelacs" (#12). The goal of both chapters is to provide information for performers who are hoping to enrich their understanding of the structure and compositional elements of the etudes.

Chapter 2

Tonal Language and Compositional Elements in the Piano Etudes

The piano etudes were an opportunity for Ligeti to try his hand at producing the same sorts of aural landscapes that he had created in earlier compositions of the previous three decades, now using the piano. Ligeti likely chose the piano as his main instrument for composition at the start of the 1980s because he finally had a piano in his home, and he had begun playing the instrument daily, focusing on the piano music of Scarlatti, Chopin, Schumann and Debussy - composers who, in Ligeti's opinion, thought the most pianistically; composers who wrote music that not only sounded well, but provided great physical pleasure to play given the pleasant tactile shape of the lines and phrases.[1]

Initially Ligeti set out to compose two books of six etudes each, modeled after Debussy's two books of piano preludes. Ligeti, like Debussy, would wait until finishing one composition before attributing a title. Unlike Debussy, Ligeti had lists of different titles that he was interested in using, and often he would start composing an etude with a certain title in mind, only to change his mind and assign a new title after completion. The composition of the etudes grew addictive for Ligeti, and he kept writing beyond the planned twelve.[2] He eventually wrote a total of eighteen: six in Book 1, eight in Book 2, and four in the unfinished Book 3. The titles in the complete set are as follows:

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[1] Ligeti, liner notes from CD3, "The Ligeti Project" (1996), 9.
[2] Steinitz, *Music of the Imagination,* 277.

Book 1: (1985)	1. Désordre [Disorder] 2. Cordes à vide [Open Strings] 3. Touches bloquées [Blocked keys] 4. Fanfares 5. Arc-en-ciel [Rainbow] 6. Automne à Varsovie [Autumn in Warsaw]
Book 2: (1988–94)	7. Galamb Borong 8. Fém [Metal] 9. Vertige [Dizziness] 10. Der Zauberlehrling [The Apprentice Magician] 11. En Suspens [In Suspense] 12. Entrelacs [Interlacing] 13. L'escalier du diable [The Devil's Staircase] 14. "Columna infinită" [The Infinite Column]
Book 3: (1995–2001)	15. White on White 16. Pour Irina [For Irina] 17. À bout de souffle [Out of Breath] 18. Canon

Ligeti also wrote two other etudes that are related to this group. "Coloana fara sfârsit" ("Column without end") was originally planned as #14, but had proven at the time to be too difficult to play. "L'arrache coeur" ("Heart-snatcher") was supposed to be etude #11 but never became part of the set because Ligeti thought of it as an over-simplification and felt that it would not fit well into entire collection.[3]

Three folders of materials pertaining to the etudes are housed at the Paul Sacher Foundation in Basel, Switzerland. These include many notes and lists regarding titles for the etudes.[4] Ligeti changed titles and orderings many times during the compositional process and before publication. For instance, his idea for a "Warsaw" study, reflecting the political plight of Poland, became "Automne à

[3] Steinitz, *Music of the Imagination*, 305.
[4] Steinitz, ibid., 279.

Varsovie" (#6).[5] On a more general level the etudes reflect Ligeti's fascination with "puzzles, paradoxes and illusion," and with "rhythmic and metrical exploration."[6] Among the materials at the Sacher Foundation are numerous polymetric grids, grids of durational cycles, rhythmic matrixes, and specially constructed scales.[7]

In a 1988 article, Ligeti claimed that there were two influences on his composition of the etudes: the Romantic-era piano music of Chopin, Schumann, and their contemporaries, and the rhythms of sub-Saharan African music.[8] He described the appeal of the "shimmering effect," what he describes as the division of the bar simultaneously into two and three by using rubato and hemiola, as is common in the music of Chopin, Schumann, Liszt, and Brahms. The "shimmering effect" essentially blurs the meter and the bar line a bit, but in a "seductive" or attractive way, not in a way that will obliterate meter.[9] A different type of metric ambiguity is found in Central African polyphonic music. There are no measures as in European music to help define the "downbeat" in each bar, as there is no real hierarchy of beats, just a pulse or pulsations that occur regularly. There are, however, two rhythmic levels: a ground layer of quick, even pulsations that are felt rather than counted, and a

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[5] Steinitz, ibid., 279.
[6] Steinitz, ibid., 278.
[7] The Paul Sacher Foundation in Basel was formed in 1973 and is dedicated to the preservation and research of 20th and 21st century music, housing materials, scores and musical materials belonging to the Foundation as well as to estates of collectors, performers and composers. The Ligeti collection includes sound recordings, personal copies of scores, fair copies of scores, sketches, photographs, reviews, concert programs and letters. There are no known facsimiles of these materials but they can be perused at the Foundation library in Basel, Switzerland.
[8] Ligeti, "On My Etudes for Piano," 3-7, and Taylor, "Ligeti, Africa and Polyrhythm," 83-94.
[9] Ligeti, "On my Etudes for piano," 3.

second layer on top that is sometimes symmetrical, but usually asymmetrical and made up of patterns of different lengths.[10]

When referencing the Romantic-era piano compositional traditions, Ligeti took the traditional 2:3 rhythms so common in this music and transformed them into complex combinations of 3:5, 5:7, and sometimes even complexities such as 3:4:5:7.[11] Romantic-era rhythmic complexity such as this can be found in "Cordes à vides" (2:3 and derivations of 4:3 rhythms) and "En suspens." (2:3 and 4:3 rhythms and 2:3 ratio of meter signatures). The latter rhythmic complexity could exist only in compositional techniques where Ligeti used layers of polyrhythms as he did in "Entrelacs" (#12). One other particular Romantic-era hemiola that Ligeti was very fond of was the 3:8 ratio, which he could easily translate to the *aksak* rhythm 3+2+3 commonly found in music of his ethnic background, traditional Balkan music. He used *aksak* rhythms in many of his compositions from the 1980s onward, including "Désordre" (#1) and "Fanfares" (#4). In "Fanfares" the score makes the *aksak* rhythmic pattern very clear and the accents make the pattern audible throughout the piece.

Although most of Ligeti's scores from the 1980s onward include bar lines, they are there purely as visual aids and serve no metric purpose in the traditional sense.[12] Instead, Ligeti used a "quick pulse" (pulsations) as a "common denominator" upon which "various patterns can be polyrhythmically superimposed," and the texture could therefore become even more "rich" or dense

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[10] Ligeti, "On my Etudes for piano," 4-5.
[11] Taylor, "Ligeti, Africa and Polyrhythm," 84.
[12] Taylor, "Ligeti, Africa and Polyrhythm," 85.

than the formal Romantic-era European tradition.[13] Ligeti achieves density in some of his etudes, such as "Entrelacs" (#12), by layering rhythms and attacks of different lengths atop one another. As Schoenberg is credited with the "emancipation of dissonance," it would be fair to say that Ligeti helped contribute to the emancipation of meter.

Recurring Compositional Elements in Ligeti's Etudes

The elements of composition that Ligeti chose to use for each etude generally come from Western tonal music, placed in a new context. Often he used one of these traditional elements in a multi-functional way, as when he used melody to demonstrate certain Balkan rhythms in "Fanfares" (#4) and "En Suspens" (#11), or used a presentation of a melodic idea (the *Lamento* motif) to generate rhythmic cycles in "Automne à Varsovie" (#6). Ligeti also formed his own conceptions of certain twentieth-century techniques.

The following discussion of recurring compositional elements in the etudes is organized into six sections: 1) referential collections; 2) pulsation patterns and rhythmic cycles (including continuum and polymetric layering); 3) *aksak* rhythms; 4) intervallic orientation; 5) melodic structures; and 6) canon in the later etudes.

1) Referential Collections

The following discussion is based on set theory, a categorization that identifies musical groupings of pitch classes. The system is based on the twelve

[13] Ligeti, foreword to Arom, "African Polyphony and Polyrhythm."

tones and can be applied to both tonal and atonal music. With respect to referential collections, the etudes may be placed into three categories: 1) etudes that use diatonic collections; 2) etudes featuring whole-tone collections; and 3) etudes that use more than one type of collection or scale.[14] Ligeti rarely stayed strictly in one scale or collection throughout one piece, but often chose to fuzzify the landscape so that we might not settle in and consider the work to truly be in one camp or another.

Diatonic Referential Collections. The most basic example of Ligeti's use of diatonic referential collections can be found in "Désordre" (#1). Throughout this etude, the right hand uses an all white-key collection while the left hand uses only black keys (pentatonic collection). The two complementary scale collections essentially create a third type of tonality which Steinitz calls "combinatorial tonality," indicating the "illusion" of a third or resultant tonality produced by the interaction of two different modes.[15] To clarify, the term "tonality" is being used in "combinatorial tonality" in a broad sense of the term, not implying a key or tonal center, but referencing the resultant collection and sound that is produced by combining the two collections found in both hands. The hands may or may not stay

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[14] The referential collections include the categories of diatonic, whole-tone and non-diatonic hexachords. Diatonic simply means "progressing through tones" or "of the scale" and can be thought of as any of the tonal scales we use in Western music. Whole-tone collections feature the whole-tone scale, comprised of whole steps and exists in one of two forms, either including C or C# (known as WT_0 if C is used, or WT_1 is C# is in the scale). Lastly, hexachordal collections are made of 6 pitches and usually have some property associated with them that allow for transposition or inversional relationships to be highlighted, often having a partner hexachord which completes the twelve tones. Diatonic hexachords would include 6-pitch collections that can be found in the diatonic scale (such as the Major scale which is set-class 7-35). Non-diatonic hexachords would include 6-pitch sets that are not found in any diatonic collection.

[15] Steinitz, *Music of the Imagination,* 281.

in the same collection throughout the work and the resultant "combinatorial tonality" may come in and out of phase or may stay as such throughout the work's entirety. I believe that Ligeti used simple scale collections (pitch materials) in "Désordre" in order to create a rhythmically complex environment out of seemingly mundane material. "Désordre" is essentially a pulsation study that mimics chaos theory, showing the eventual breakdown of a seemingly normal and consistent process of consecutive eighth notes by creating irregular entrances of the accents and irregular numbers of pulsations for each iteration of the material.[16] The process starts to break down as early as the end of the first line of the score, where the barline seems to have been moved and comes earlier in the right hand than in the left. We will return to this matter below, in the section on pulsation and rhythmic cycles. The performer should take care to accent as many of the accents as physically possible to show the movement of the barline throughout the etude. The accents will highlight the note groupings (which are discussed in another section below) and will showcase the rhythmic juxtapositions that occur when one hand is playing a consistent meter and the other hand has a moving barline.

In "Fanfares" (#4) Ligeti created what he called "consonant atonality," a result of juxtaposing consonant chords that do not belong together in traditional

[16] Ligeti admitted in many interviews and through his own writings that he had a great interest in chaos theory and the gradual breakdown of dynamic and mathematical systems through tiny, imperceptible tears in the structure. Prevented from attending college to become a physicist because of his religious affiliation during World War II in Nazi occupied territory, Ligeti was admitted into the conservatory and as a composer learned to incorporate many of his mathematical interests into his music.

Western tonality.[17] The ostinato of the left hand, which begins with the collection [4568TE02], a member of set-class 8-25 (0124678T), parses into two diatonic tetrachords, (C,D,E,F) and (F#,G#,A#,B). The right hand material at the opening consists of dyads that increase in complexity and number as the section progresses. Immediately at measure 10 the hands switch roles and the ostinato moves to the right hand, while the left hand takes the melody. As the hands continue to switch roles throughout the etude, the ostinato remains exactly the same. The material in the non-ostinato hand consists of small gestures that I call chord modules. There is no scale associated with the chord module layer. In the first forty-five measures of "Fanfares," Ligeti creates "consonant atonality" by juxtaposing tonal materials such as "consonant" intervals (as traditionally defined) or triads in the modules against the diatonic scale segments in the ostinato. Understanding the pitch content assigned to the hands along with understanding the construction of the two separate ideas given the two hands allows the performer to learn the notes methodically, listening for chords and simultaneities that result between the hands. The two ideas given to the separate hands should be understood as two independent streams, enabling the pianist to learn the notes more easily as the ostinato figure does not change (although it does trade back and forth between the hands). Inevitably the two independent streams will be heard as both separate ideas and a one unified idea. That may seem ambiguous, but as the melodic ideas stretch over the barline, increasing in complexity, the listener will start to hear the two

[17] Steinitz, ibid., 291.

streams between the hands as one musical entity rather than two separate layers as was introduced at the outset.

"White on White" (#15), as the title suggests, features the collection of white keys (set-class 7-35 (013568T)). The notes are presented not as a scale, or in combinations making tonal harmonies, but in various non-traditional juxtapositions. The opening section, which is the most gentle and beautiful of the etudes, is a two-voice canon at the octave, all in half notes. After that, an agitato section of very fast eighth notes with interspersed accents starts furiously but lulls to a soft dynamic while maintaining its rhythmic vitality (without the accents after bar 36). This etude is representative of Ligeti's gradual "retreat from chromaticism" in his later years.[18] It is also one of several in book three that are canonic. From my perspective as a pianist, the canons in three of the etudes in Book 3 are easily heard and the pianist should take care to highlight the use of canon in those parts of the etudes, focusing on the phrasing and harmonic relationships created between the two lines in the different hands.

"En Suspens" (#11) demonstrates Ligeti's use of diatonic hexachords, members of set-class 6-32 (024579). At the beginning, the right hand collection contains the quasi-black key collection of pitches [D ♭ E ♭ , F, G ♭ , A ♭ , B ♭] while the left hand contains its tritone transposition (or inversion at I5), [G,A,B,C,D,E]. At bar 21 the hands switch collections and again at bar 27 and 31 switch back and forth. Usually Ligeti will have the hands switch collections only once and given the brevity of this etude it is highly concentrated with such shifts. The pianist might

[18] Steinitz, *Music of the Imagination,* 312.

consider bringing out the collections in the hands when they switch places as they add interest to the beauty and texture of this short etude.

In "Entrelacs" (#12) we find the two hands separated into inversionally equivalent members of the hexachord 6-33 (023579). The right hand starts the piece with an incomplete white key collection [D,E,F,G,A,B] and the left has a mostly black key collection [G ♭ , A ♭ , B ♭ , C, D ♭ , E ♭]. The hands switch collections once halfway through bar 54 and remain that way until the end. In chapter 3 we will look at pitch range graphs of "Entrelacs" that show Ligeti's deliberate exclusion of the pitches F and C throughout the work in at least one hand at a time. The interval of a perfect fifth created by these two pitches becomes significant in the superimposed fifths of the etude's final harmonies.

Whole-Tone Collections. In "Galamb Borong" (#7) we find a juxtaposition of the two whole-tone collections, odd in the right hand [13579E] and even in the left [02468T]. Ligeti used unusual key signatures to keep the collections consistent. The etude is built upon a continuous pulsation layer of sixteenth notes. Within the pulsation layers there emerge accented and held tones notated as double-stemmed eighth notes, quarter notes, or half notes. These double-stemmed notes come out of the pulsation layer and create an additional melodic layer in each hand. The two melodic layers function either as two sonorous melodies following the same path or as simultaneities. The intervals that are most often used in these simultaneities—minor thirds and major sixths—are intended to mimic the sound of a Gamelan. The melodies produced by the double-stemmed notes in the pulsation layers remain consistent regarding the whole-tone collection assigned each hand. This means that

the right hand melody created by the double-stemmed notes are created from intervals available to the odd whole-tone collection, and the left hand plays melodies that are comprised of intervals available to the even whole-tone collection. With the creation of this etude, Ligeti aspired to push the limits of what the listener could perceive as traditional and non-traditional tuning. Aptly titled, "Galamb Borong" is a made-up title of nonsense words meant to sound like Javanese, although it actually sounds like Hungarian words meaning "melancholic pigeon."[19] I recommend for the performer to listen to some recordings of traditional Javanese Gamelan music prior to learning the notes of "Galamb borong". This will provoke the pianist to seek out the sounds of the gamelan and the intervallic relationships between the hands that recall the exotic sounds that Ligeti creates with such juxtapositions of tones to assimilate gamelan tunings.

Multiple Referential Collections. "Pour Irina" (#16) has three clearly defined sections, each with a new tempo indication and new material. The first section (first two pages) employs a hexachordal subset of the D ♭ major collection (omitting A ♭) in both hands. The middle section (the next two pages plus the top system of the fifth page) uses the D ♭ major key signature but includes many notes outside this collection, frequently emphasizing half steps. The third and final section accentuates neighboring semitones and whole tones in the melodic structure, generally mixing chromatic and diatonic. The information on the changes in collections agrees with the sectional nature of this brief etude, allowing the performer to highlight the differences in character for each section.

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[19] Steinitz, *Music of the Imagination,* 300.

The shortest of all the etudes, "Canon" (#18), starts with a white-key collection in both hands. At the eighth pulsation we find a B ♭, the first indication that the collection will evolve into something different. Progressively more accidentals are added until the diatonic character is abandoned and the language is fully chromatic. The final eleven chords, continuing in canon, combine trichords of stacked fourths or fifths with triads to create a series of dissonant hexachords, concluding with A minor triads in both hands.

2) Pulsation Patterns and Rhythmic Cycles

In most of the etudes Ligeti uses pulsations of eighth- or sixteenth-notes rather than meter to govern the rhythmic flow of the music. Traditional meter can be defined as the number of "beats" (syllables) and the arrangement of those "beats" into long and short, accented and unaccented (stressed or unstressed) entities in recurring measures. Ligeti redefines the traditional Western use of meter in the etudes, experimenting with meter in each of the etudes, making it necessary to identify a new way of measuring time and durations - which we can call pulsations. Pulsations are most commonly the smallest durational unit used consistently throughout a Ligeti etude. Pianists can use pulsations as a guide (rather than using "beats" as are found in most music pianists perform) when learning the complex rhythms and patterns that Ligeti frequently chose for his rhythmic material, as Ligeti does not necessarily use "meter" in the most traditional sense in his etudes. Eight of the etudes have no meter signature at all; the others have meter signatures, but this is often purely for orientation, as Ligeti sometimes indicates in the

performance instructions. As a result, the measures in these etudes do not generally suggest an emphasized downbeat or hierarchy of beats. Ligeti also sometimes confuses the issue by notating irregular note groupings, contrary to the implications of the notated meter.

Metric regularity. "Fanfares" (#4) and "En Suspens" (#11) have the most consistent established metric patterns in all of the etudes. "Fanfares" is the more regular of the two. The ostinato pattern in this etude establishes the 8/8 or (3+2+3)/8 pattern from the start and remains the same throughout. This is supported by the material in the opposite hand. The score for "En Suspens" indicates two separate meters for the two hands: 6/4 for the right hand and 12/8 for the left hand. The two meet metrically at the downbeat and mid-bar, thereby maintaining a 3:2 ratio in each half-bar. The pianist should bring out the ostinato (3+2+3) pattern throughout the etude as it is a defining compositional (metric) element and clearly accentuates Ligeti's use of *aksak* rhythm (which will be discussed below).

Metric irregularity. "Automne à Varsovie" (#6) and "Galamb Borong" (#7) begin with metric regularity but then evolve into irregular groupings that obscure the notated meter. In "Automne à Varsovie" there is a fairly regular metric sixteenth-note pulsation that exists until bar 9, where Ligeti creates a 3-note rather than 4-note grouping. By creating an irregularity in the regular metric groupings he causes the beamings/groupings to go over the barline. From bar 9 and throughout the rest of the piece (except for a slightly different section in bars 98 through 104), the metric groupings stay irregular and are beamed over the barlines. It is enough

for the pianist to know that the phrase groupings are irregular. This should instruct the performer to bring out the phrasing and to feel comfortable with the choice to accentuate the changes in groupings as they come. “Galamb Borong” similarly starts with regular metric groupings which stop at the eighth bar where Ligeti groups the pulsations in irregular numbers of pulsations. These pulsation groupings extend over the barline as we observed in “Automne à Varsovie” and again the addition of the melodic accented tones at irregular numbers of pulsations obscure the 12/16 meter. “Galamb borong,” by contrast, contains material that is different in the two hands. The hands play similar lines of continuum-based material, but each hand also plays accentuated melodic material that is part of the continuum but is accented at different numbers of pulsations between each attack. The two hands rarely have simultaneous melodic attacks after the first nine bars. The pianist should accentuate the emphasized notes and try to highlight the juxtaposition of accents between the two hands as the accents create an exciting rhythmic texture in an already interesting harmonic landscape.

“L’escalier du diable” (#13) is notated in 12/8, but as Ligeti explains in a performance note, the “meter actually consists of thirty-six quavers (three ‘bars’), divided asymmetrically.” He means that one rhythmic cycle of thirty-six eighth-note pulsations occurs every three bars. In other words, the meter is actually 36/8 meter, subdivided (by broken lines) into three bars of 12/8.

Polymeter. “Désordre” (#1) is the etude that best exemplifies “polymeter.” Its opposing metric streams are defined by different, and constantly changing, measure lengths in the two hands. It begins with measures of eight eighth-note pulsations,

subdivided into 3 + 5, but then in bar 4 the right hand shortens its duration to seven pulsations while the left hand remains with eight. Shifting barlines demonstrate the same sorts of metric opposition throughout the etude. In a middle section, the third through fifth pages, the measure lengths are inconsistent in both hands, and in the third and final section the shifts resemble those of the beginning. A musical representation of chaos theory, "Désordre" represents how very tiny tears or changes in the structure can eventually result in confusion.

Non-Metric Pulsation Patterns. Several etudes feature pulsation patterns without a strong sense of metric regularity. They may have meter signatures and/or barlines, but these are purely for orientation. Regularly spaced barlines are used in "Cordes à vides" (#2), "Fèm" (#8), "Vertige" (#9), "Der Zauberlehrling" (#10), "Entrelacs" (#12), and "White on White" (#15), for example, to help the performer keep track of pulsation groupings, not to provide any sort of "meter" in the conventional sense.

The barlines in "Touches bloquées" (#3) are irregularly spaced, reflecting changing lengths of pulsation groupings. The etude is set up using the basic pulsation of the eighth note. The previously mentioned alternation between sounding pitch attacks and silenced or depressed tones creates "holes" in the pulsation stream that gradually become more numerous, from single silent tones in the beginning, to two consecutive silent tones starting in m. 20, three in a row starting in m. 50, and so forth. By the end, we hear only one pulsation per measure. The process is interrupted by a middle section (mm. 71–91) that contains no silenced pitches but is characterized by violently accented pulsations of octaves,

semitones, and combinations of both. This section is representative of Ligeti's sense of humor and is supposed to sound like a pianist trying to hit successive octaves but hitting wrong notes throughout.[20]

As Steinitz observes, "Galamb borong" (#7) has a loosely applied additive pulsation structure.[21] This causes a more flowing and perhaps impressionistic sound than one would find in true Gamelan music. Throughout the etude the sixteenth-note pulsations remain constant, creating a momentum that pushes forward until the last bar. Superimposed over this are accented melodic tones in both hands. As the etude progresses, the stressed notes fall into and out of phase, never in a consistently regular pattern.

As Ligeti acknowledges, "Fém" (#8) has "no real meter," despite its notation in 12/8 throughout.[22] The final section (starting in m. 58) is clearly structured in four dotted-quarter beats per bar. Prior to this, however, non-metric rhythmic cycles work against each other. Each hand presents single notes (or dyads) or groups of notes beamed together separated by eighth rests. At the beginning, as shown in Example 2.1, the right hand presents cycles of eighteen pulsations, subdivided by notes and rests into a pattern of 211232, while the left hand has cycles of sixteen pulsations in a pattern of 31132. The right hand plays its rhythmic cycle eight times, the left hand nine, before returning to alignment at the beginning of bar 13. These same patterns continue, with slight changes in the pitch material, and the hands realign again at bar 25.

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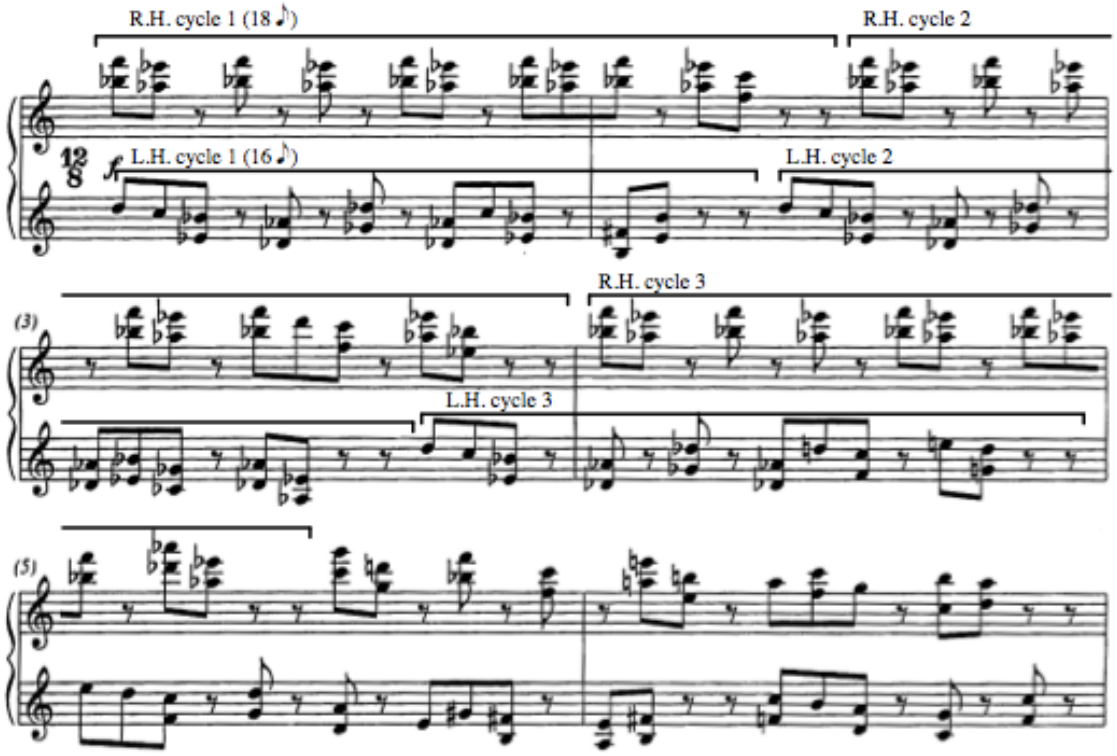
[20] Steinitz, *Music of the Imagintion,* 288.
[21] Steinitz, ibid., 300.
[22] Schott, "Études pour piano: deuxième livre," 12.

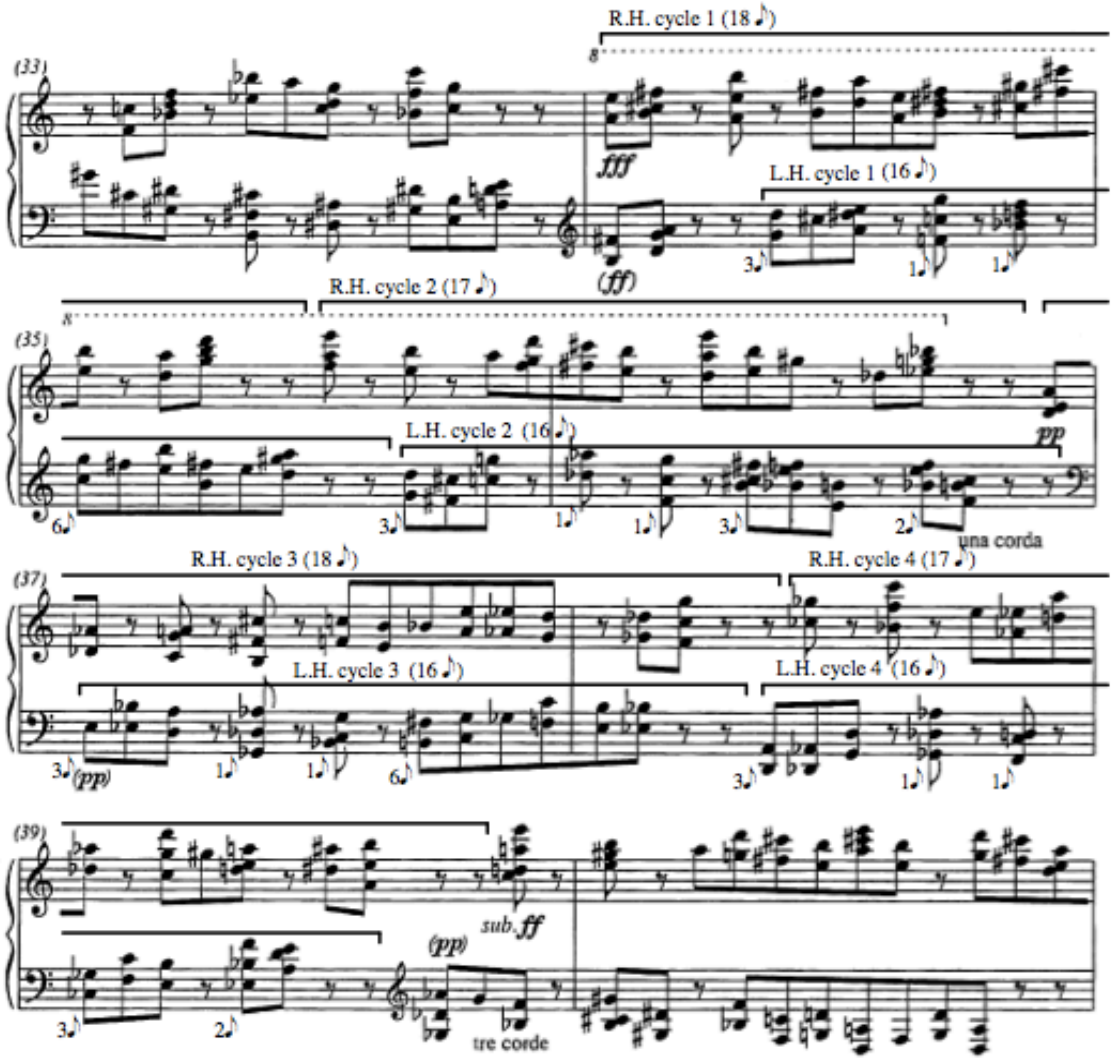
Example 2.1 – "Fèm," rhythmic cycles (bars 1 – 5)



At bar 34 the rhythmic cycles change in each hand; see Example 2.2. While the right hand alternates patterns of seventeen and eighteen pulsations, the left hand presents patterns of sixteen pulsations. For the next eight bars, the left hand rhythmic pattern alternates between 3116 and 31132, while the right hand pulsates irregularly. The rhythms become less and less patterned, and by bar 57 the cycles have all but disintegrated. This makes the regularity of the soft, sustained ending, starting with the slower tempo in bar 58, even more dramatic. The final section is in direct contrast to the rest of the etude, written in a clearly defined meter of 12/8. The examples above should demonstrate to the performer that the etude is built upon certain rhythmic cycles. This understanding allows for the performer to identify the beginnings of the cycles and to look for any changes that may occur,

taking care to bring out the start of the rhythmic cycle in each hand as well as any changes that may occur to the structure of any of the rhythmic cycles.

Example 2.2 – "Fèm," rhythmic cycles and left hand modules (bars 34 – 39)



"Vertige" (#9) is an example of a pulsation study (written entirely in eighth notes) that was intended to represent a continuum.[23] It consists of descending

[23] Schott, "Études pour piano. Deuxième livre," 18-19. The tempo indication *Prestissimo sempre molto legato* is accompanied by an asterisk referring to Ligeti's performance instruction that the pianist is to play "so fast that the individual notes – even without pedal – almost melt into continuous lines."

chromatic scales layered over each other, entering at inconsistent and unpredictable distances. The effect is that we keep hearing the same starting point of descent for some time before it makes a small incremental change. A sort of "spiral" is created as the scalar material creates waves that do not seem to ever end, as the entrances of descending scale modules continue to overlap one another. Ligeti uses mostly prime numbers of pulsations between module entrances to contribute to the asymmetrical structure of the spiral so that no portion of the music ever appears the same way twice. The pianist should accentuate the beginnings of all the descending modules as much as is physically possible.

"Columna infinită" (#14) is a pulsation study containing irregular numbers of pulsations and written in a 16/8 meter for orientation. The hands start together but immediately begin to work independently of each other, presenting modules of single notes broken up by dyads or trichords, most commonly alternating between single notes and dyads. The texture becomes increasingly complex as dyads and trichords become more frequent than single notes. This etude is particularly challenging and requires the pianist to enter an almost automated state of being in order to process the vast numbers of pitches and difficult texture throughout. Ligeti used a calculated mathematical model to construct the work, and while it is not perceptible to the listener it does confirm that the level of technical difficulty is due to the mathematical system Ligeti set in place.

3) *Aksak* Rhythms

Ligeti was heavily influenced by the Balkan folk music of his youth, especially *aksak* rhythms, or irregular beat groupings such as 3+2+3 in 8/8 meter. *Aksak* is the

Turkish term for certain rhythmic patterns based on binary and ternary units, found in African drumming rhythms and in the music of Turkish, Balkan, Caribbean and Persian cultures.[24] Ligeti had noticed the similarity between *aksak* and African music after studying ethnomusicologist Simha Arom's recordings of Banda polyphony. Ligeti had a strong interest in the rhythmic complexities of the music of the Banda-Linda and pygmy people of the Central African Republic.[25] The four etudes that show a distinct use of the *aksak* rhythm are "Désordre" (#1), "Fanfares" (#4), "L'escalier du diable" (#13), and "Columna infinită" (#14). "Columna infinită," mentioned in the previous section, makes use of the *aksak* patterns towards the end, along with the increasingly complex pulsation pattern. The pianist should accentuate the 2-note and 3-note groupings of the *aksak* patterns as much as possible in all of the following etudes, as long as the emphases agree with the musical surrounds of the work. The *aksak* patterns create a rhythmic vitality and most importantly they connect the works to the traditional music of Ligeti's ethnic background.

"Fanfares" (#4) begins with a mechanical, repetitive occurrence of 3+2+3 articulated in every bar by the same notes (C-D-E | F-F# | G#-A#-B). This pattern occurs as an ostinato 208 times in the etude. The accompanying melodic material at first conforms to the same rhythms as the ostinato but eventually develops separate stress patterns and syncopations, causing an ambiguity or struggle for the music to

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[24] Fracile, "The 'Aksak' Rhythm,"197–210.
[25] Steinitz, *Music of the Imagination,* 361. Consequently Ligeti along with Arom and Pierre Laurent Aimard met the tribes at a concert given in Paris in 1999, following Arom's recording project with the African groups. Ligeti wrote the forward to Arom's book on Central African Polyphony.

establish regularity. The strands do line up at times, as when both hands play the ostinato figure in octaves (mm. 137–140, 198–200), but never as consistently as in the beginning.

For "Désordre" (#1), Ligeti mapped out a rhythmic matrix for presenting *aksak* rhythms.[26] The matrix contains of groupings of two, three, and five eighth notes. As noted above, the groupings change to establish conflicting polymetric streams in the two hands.

"L'escalier du diable" (#13) makes more subtle use of *aksak* patterns. The etude begins with units of two and three, irregularly grouped, and later has groupings of three and five (interrupted by fours). These beat groupings come together to create modules of five, seven, nine, and eleven pulsations, all built from the twos and threes of the *aksak* rhythms.

4) Intervallic Orientation

Ligeti's work began to demonstrate an orientation around specific intervals, or intervallic combinations, in the late 1960s and early 1970s. Jonathan Bernard describes this trend as Ligeti's "restoration of interval."[27] After roughly a decade of working in electronic studios, the composer wanted to demonstrate that he could use intervals in innovative ways, creating new significance for intervals. He began using specific intervals to signify important formal events. He called them "Ligeti signals."[28] These signals could be harmonic entities or could be featured in whole

[26] Steinitz, *Music of the Imagination,* 280.
[27] Bernard, "Ligeti's Restoration of Interval," 1-31.
[28] Bernard, ibid., 2.

sections of "pattern meccanico."[29] In other instances he simply focused his attention on one interval or another for entire sections or complete etudes.

Perfect Fifths. As the title suggests, "Cordes à vide" (#2), meaning "open strings," features perfect fifths, the intervals between open strings in an instrument from the string family. Ligeti makes exclusive use of the perfect fifth throughout the etude, melodically and harmonically. He builds sweeping arpeggiations of these intervals, starting from an upper register and descending for at least two or three octaves. He also relates arpeggiations by semitone, creating a highly chromatic harmonic landscape throughout. The arpeggiation and half-step relations make "Cordes à vide" one of the most pianistic of the etudes, recalling works of Chopin and Liszt.

The perfect fifths in "Fém" (#8) relate more as members of the same diatonic collections. In some instances Ligeti adds an adjacent whole step above or below. Later in the piece he adds thirds. In the final section the texture changes to block chords of stacked fifths. Indeed, Ligeti had originally planned to name this etude "Quintes" before changing it to "Fém," the Hungarian word for "metal." In Steinitz's words, the title indicates a "hard-edged" music, both "brilliant and metallic," to be played "with rigorous and resolute precision."[30]

*Semitones. "*Touches bloquées" (#3) appears to feature chromatic lines, but their audibility is concealed by the manner of performance. Performance indications in the score denote three types of attack: 1) notes to be struck normally; 2) notes to be played and then held down until the next note value of the same type and

[29] Clendinning, "Pattern Meccanico Compositions," 203.
[30] Steinitz, ibid., 300.

instruction appears; and 3) notes to be silently depressed until instructed otherwise. While one hand silently depresses certain keys, the other is often instructed to play those same keys, creating the illusion that the pianist is unable to play all the keys and that the music is stumbling, breaking up the deliberate continuum that is visible in the score. As a result, actual melodic adjacencies can vary from strict semitones to whole tones. Steinitz notes that the "bumpy irregularity" in the *moto perpetuo* creates a result where the music sounds as if it is "peppered with holes like a pianola roll."[31] Bars 72 through 91 are a comical depiction of what is supposed to sound like a flurry of very fast octaves that the pianist keeps missing. To create this impression Ligeti inserts semitones into the melodic lines and into many of the octaves to create trichords which sound like sloppy octaves.

"Vertige" (#9), or "Dizziness," explores irregular chromatic combinations at a very high speed. It consists of sixteen-note "modules" of descending chromatic scales in a regular, eighth-note pulsation. The first seventeen modules (through measure 13) all start on B^4 ($C\flat^4$) and descend to $A\flat^3$. Ligeti alters the rate of entrance of the modules in no particular pattern, generally favoring five or seven pulsations between entrances up through measure 27. Later in measure 84, Ligeti starts to introduce new modules by accenting the first note, once again using seven pulsations between entrances, changing briefly to six pulsations before the texture becomes more complex and Ligeti stops using the accented tones (starting at bar

[31] Steinitz, *Music of the Imagination*, 287.

91). The overlapping chromatic lines throughout the etude are intended to be a musical-pianistic equivalent of "spirals."[32]

5) Melodic Structures

As explained in Chapter 1, Ligeti's composition of the orchestral work *Melodien* in 1971 marked the moment in his compositional evolution when he began a conscious effort to bring "melody" back into his work. Some of the etudes exemplify the same focus. These can be categorized as follows:

- *Accented Melodic Tones Emerging from the Continuum or Pulsation Layer.* As described above, Ligeti creates separate melodic layers within a steady pulsation in "Désordre" (#1), "Cordes à vide" (#2), "Galamb borong" (#7), "Vertige" (#9), "Der Zauberlehrling" (#10), "Entrelacs" (#12), and "À bout de souffle" (#17).
- *Melodies Supported by Repeating Interval Types or Chords*. In Fanfares" (#4) "En Suspens" (#11), "White on White" (#15), "Pour Irina" (#16), and "Canon" (#18), melodic lines emerge from the upper parts of intervallic and chord structures.
- *Independent Melody*. The Chopinesque etude "Arc-en-ciel" (#5) features an upper melody that is at times rhythmically different from the accompaniment underneath. In "Automne à Varsovie" (#6), an independent melody repeats the *lamento* motif more than eighty times, recalling other uses of this figure in Ligeti's work, such as the Horn Trio (1982).

[32] Steinitz, *Music, Maths, Chaos,* 17-18.

6) Canon in the Later Etudes

The etudes in book 3 are generally gentler in character than the earlier fourteen, constructed entirely of fluid, unbroken melodic lines, without any of the tonal and rhythmic complexity of the etudes of book 2.[33] Three of the four etudes in book 3, "White on White" (#15), "À bout de souffle" (#17), and "Canon" (#18) are written in strict canon. In the previous books only one etude, "Vertige" (#9), includes canonic elements, in its stretti of canonic descents. In book 3, "White on White" starts with a canon in the right hand beginning one half note before the left, and the second section is built almost exclusively upon the eighth-note pulsation. The title and decision to restrict the harmonic palette to all white notes represents Ligeti's gradual retreat from chromaticism and recalls some of the techniques used in *Musica ricercata* (1951-53).[34] "À bout de souffle" is in canon at the octave, in two voices one eighth note apart. This piece is also governed by an eighth-note pulsation. Finally, "Canon" is also in canon at the octave, with the left hand trailing by two eighth-note pulsations, until the last line, where the pulsation and canonic distance both change to the half note.

[33] Steinitz, *Music of the Imagination,* 313.
[34] Steinitz, ibid., 312.

Chapter 3

Order and Disorder

"To find the 'single right way'? Not a bit:
I cannot understand the idea of you have avant garde,
and you have this postmodern neo-tonal stuff,
as if these were the only two possibilities,
there could be no third way.
There are always a hundred ways.
You have to find them."……Ligeti

In this chapter I focus on two of the etudes that use pulsation patterns within rhythmic continuums. "Entrelacs" (#12) and "Der Zauberlehrling" (#10) both fit this description, although they create different sorts of continuums. "Entrelacs" consists of a continuum with multiple polymetric layers of accented durational cycles. "Der Zauberlehrling" features multiple sections of contrasting rhythmic material while maintaining the momentum and pitch organization of a continuum layer throughout. Both etudes use compositional elements involving order, such as predetermined rhythmic cycles and rhythmic organization. And yet Ligeti corrupted most of these elements after establishing them, creating disorder within the order he originally conceived.

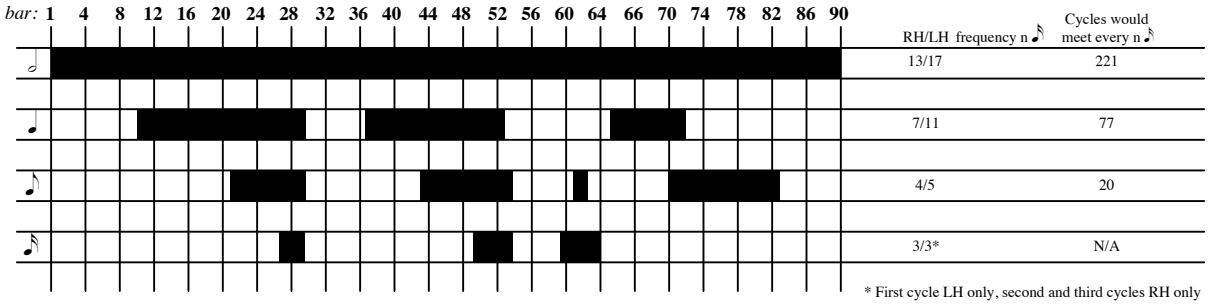
Polymetric Layering and Continuum in "Entrelacs"

Metrical patterning and the concepts of continuum and rhythmic layering are the foundations of "Entrelacs" (#12). The title translates to "interlacing," a reference to the interwoven or interlaced design and ornament found in certain types of art

and architecture.[1] In "Entrelacs" Ligeti interweaves durational cycles that produce layers of patterns unequal in length, yet existing simultaneously as part of a sixteenth-note continuum. His layering of rhythmic strands is more complex than in any other etude in the collection.[2]

Within a continuum of sixteenth notes, Ligeti uses double stemming and dynamic accentuations to bring out four rhythmic streams. In order of entrance, the streams are notated with half notes (starting in m. 1), quarter notes (m. 10), eighth notes (m. 21), and sixteenth notes (m. 27).[3] It is specified in the score that the pianist must hold down double-stemmed tones for as long as physically possible, preserving their proportional relations.[4] Example 3.1 depicts the four streams and their locations on the continuum.

Example 3.1 – Durational rhythmic cycles in "Entrelacs"



The rhythmic streams also separate into individual cycles in each hand. In all there are seven separate cycles that comprise the layers of the piece. In the half-note

[1] The interlacing idea refers to the passing of individual strands like threads over and under one another in the manner of producing lace, which is a prevalent aspect of Medieval art and architecture in particular.
[2] Steinitz, *Music of the Imagination,* 306.
[3] Although an eighth note appears in the left hand in bar 19, this is unrelated to the eighth-note stream that begins in m. 21.
[4] In other words, the half note should be held a bit longer than the quarter note, the quarter longer than the eighth, and the eighth longer than the sixteenth.

stream, the right hand plays a double-stemmed half note every thirteen sixteenths, while the left hand plays a half note every seventeen sixteenths. In Example 3.1 this is notated as the ratio 13/17, calculating that the two cycles would come into alignment every 221 sixteenths. The graph demonstrates that the half-note stream is the only one to be continuous throughout the piece. Only in the left hand does the continuum continue without disruption, with the exception of the final chord. The right hand continuum remains uninterrupted until the end of bar 30. Shortly after, in bar 35, melodic fragments are introduced, but only in the right hand. The right hand melodic fragments occur twice: once in bars 35–46, and again in bars 64–71, and can be considered disruptions in the right-hand continuum.

In the quarter-note stream, the right hand cycle plays a quarter every seven sixteenths, and the left plays a quarter every eleven sixteenths (starting two bars after the right hand, in m. 12). The two cycles would meet every seventy-seven sixteenths if they began together. Since the cycles start at different times it is clear that Ligeti was not interested in the cycles' intersections for purely mathematical purposes, but rather for the aural effect of layering. Were Ligeti to construct the rhythmic cycles to exclusively display mathematical proportions and relationships, all of the cycles would have started simultaneously to avoid discrepancies in the resulting alignments.

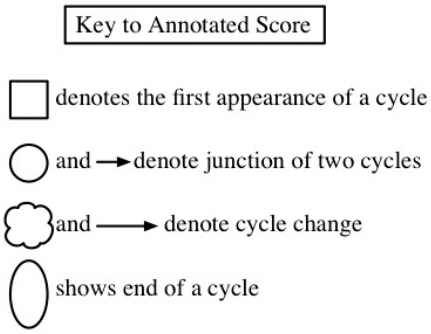
In the eighth-note stream, the cycles are one eighth every four sixteenths (right) and one eighth every five sixteenths (left). The brevity between iterations produces a more noticeable relationship between these two cycles, with a junction every twenty sixteenths. By the time the eighth-note stream begins, its component

cycles intermingle with the other streams and cannot be heard as a discrete element in the texture.

The cycles in the sixteenth-note stream occur in only one hand at a time, at a rate of one double-stemmed note every three sixteenths.

The intermingling of the streams of different note-value cycles that occurs when the eighth note streams enter, essentially absorbing the eighth note cycles into the existent texture, represents the general musical problem for the performer, that is, what exactly is the performer to do to highlight the structural layers in the piece? The technical and physical demands of playing the piece are already great because of the high speed, and part of the difficulty is because of the many polymetric layers that make up the fabric of the continuum. Ligeti was specific about the system he set in place for the durational cycles with accented tones at the start of each layer, level, and cycle. It is therefore the responsibility of the performer to execute as many of the accents as is physically possible, preserving the integrity of the music and of the mathematical system in place, but at the same time understanding that individually the layers and cycles may be imperceptible to the listener.

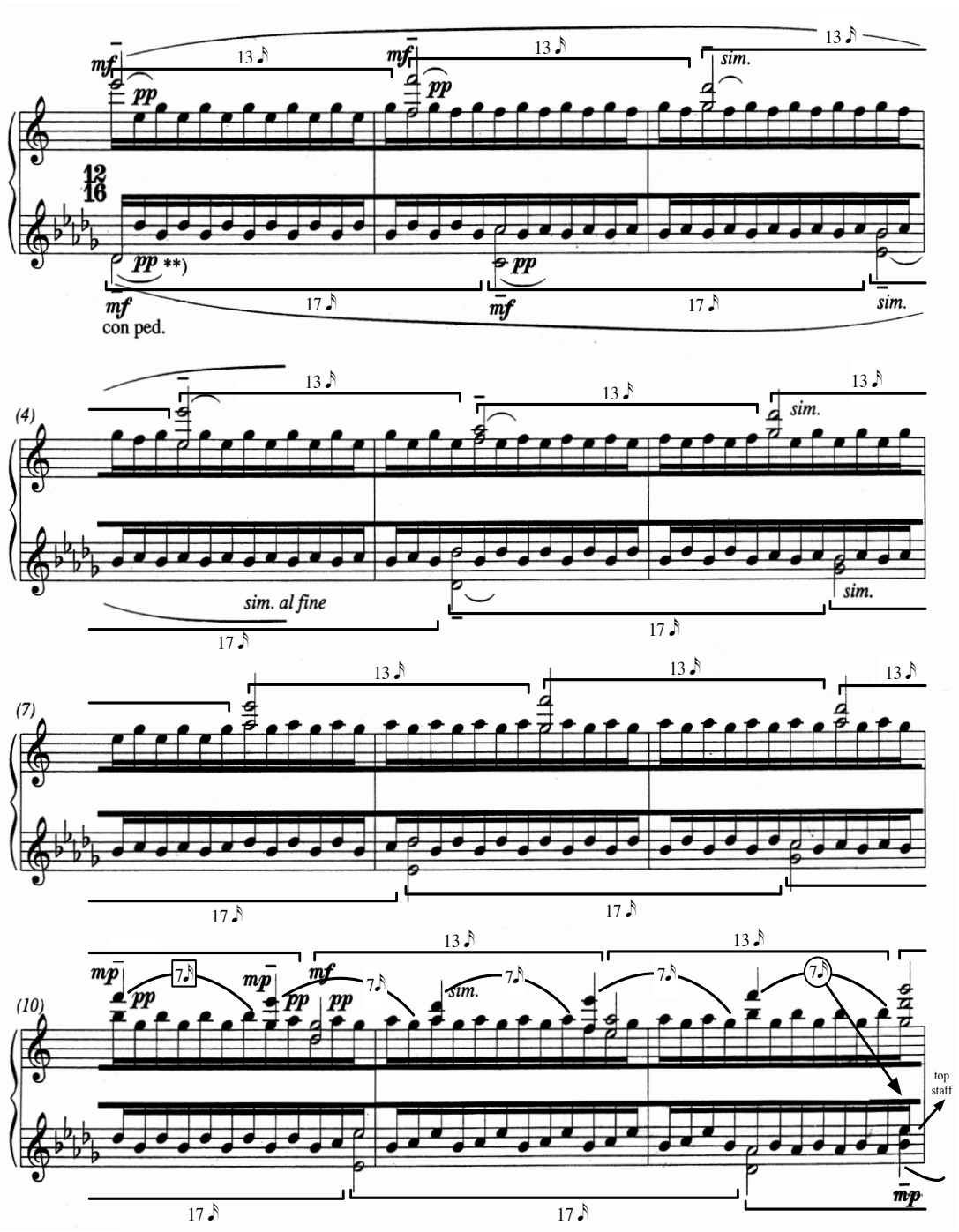
As shown in Example 3.1, the stream of the longest durational value, the half note, lasts the longest, while the stream of the shortest value, the sixteenth, is the most brief. The annotated score in Example 3.2 marks the articulation of each cycle using these symbols:

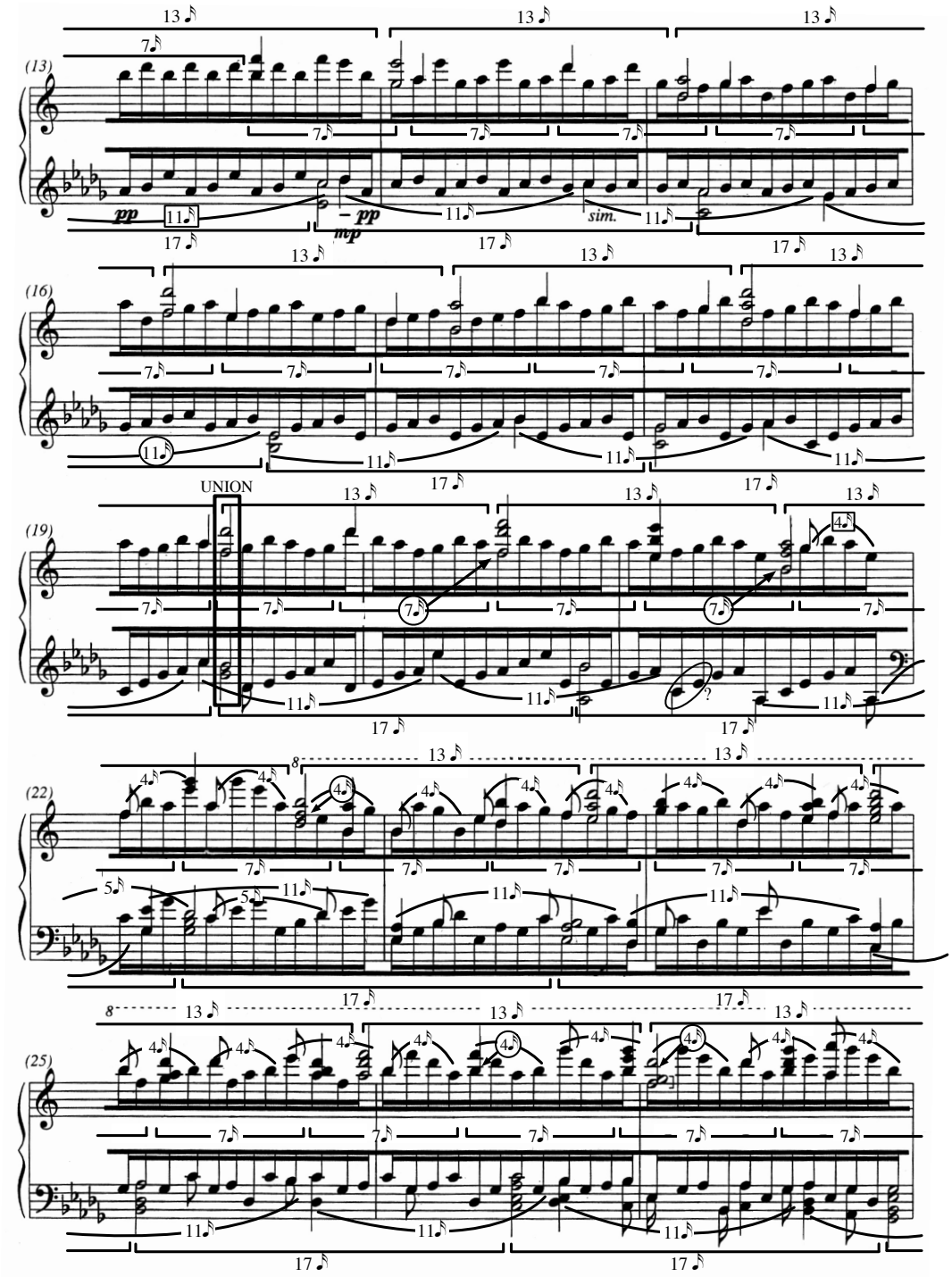


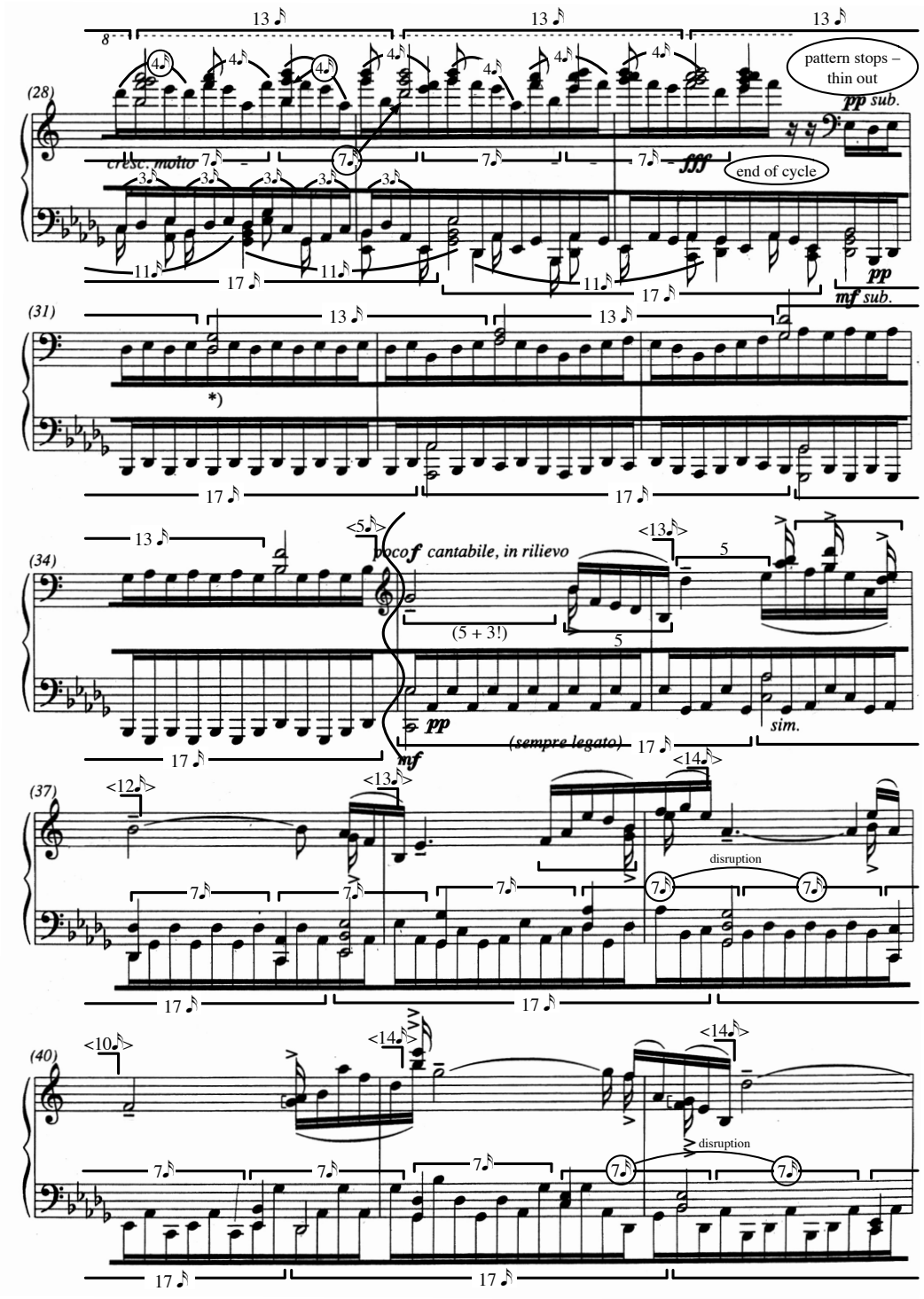
At times, as in the final eighth-note cycle beginning in bar 72, the left hand undergoes changes in the double-stemmed durations from three, to four, to two sixteenths, and so forth. Irregularities of this nature allude to Ligeti's interest in chaos theory, particularly when small irregularities introduced within an established structure cause either 1) the eventual breakdown or 2) progressive evolution of the structure into something else either entirely different, or something that only resembles its former self.

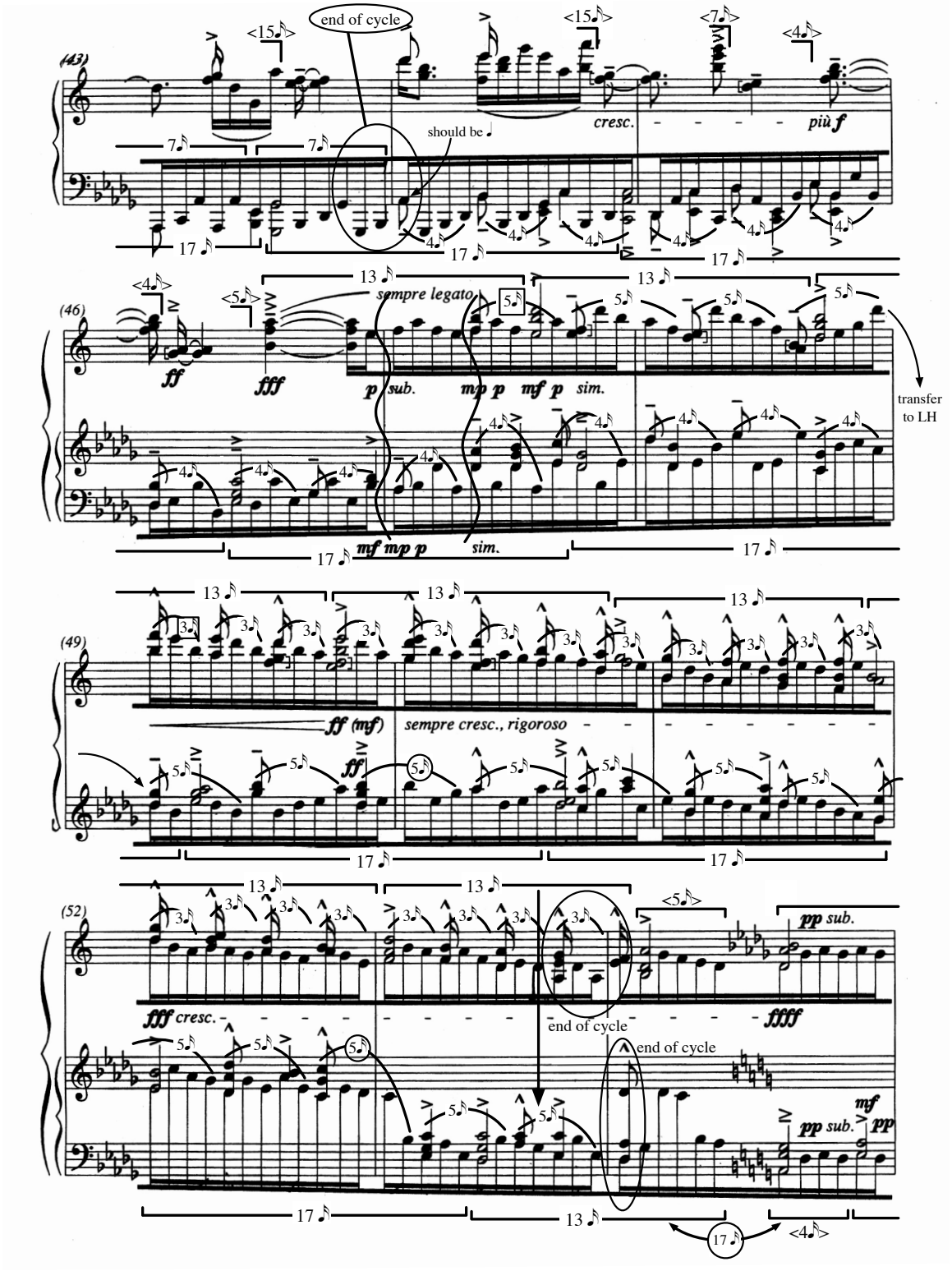
The cycles meet infrequently. Because most of the cyclic durations are based on prime numbers, Ligeti assures few moments of cyclic alignment. One exception is the final sixteenth of bar 27, where the half-note and quarter-note cycles coincide, and Ligeti chooses to make the double-stemmed note a half note.

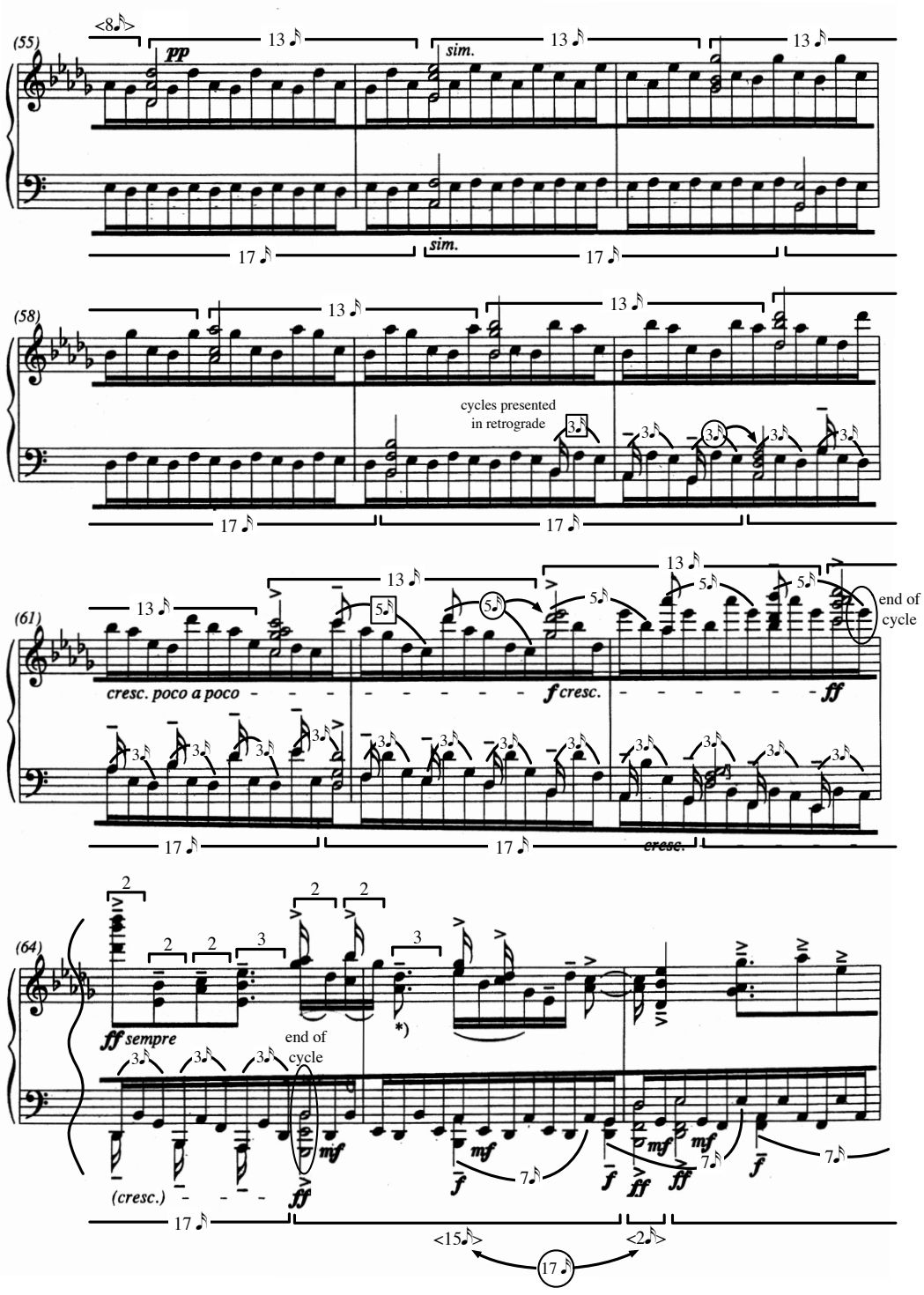
Example 3.2 – Annotated Score Mapping Rhythmic Cycles in "Entrelacs"

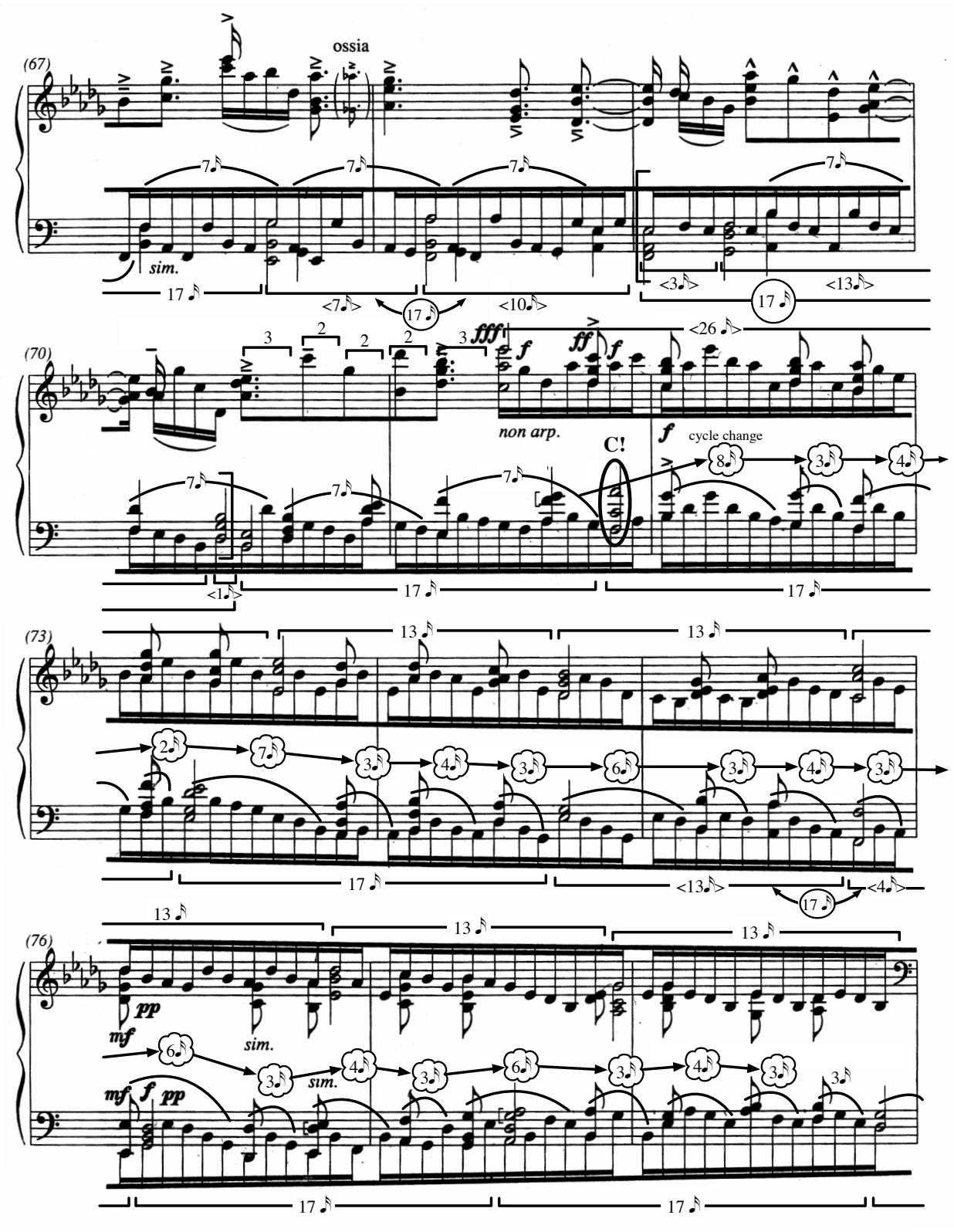


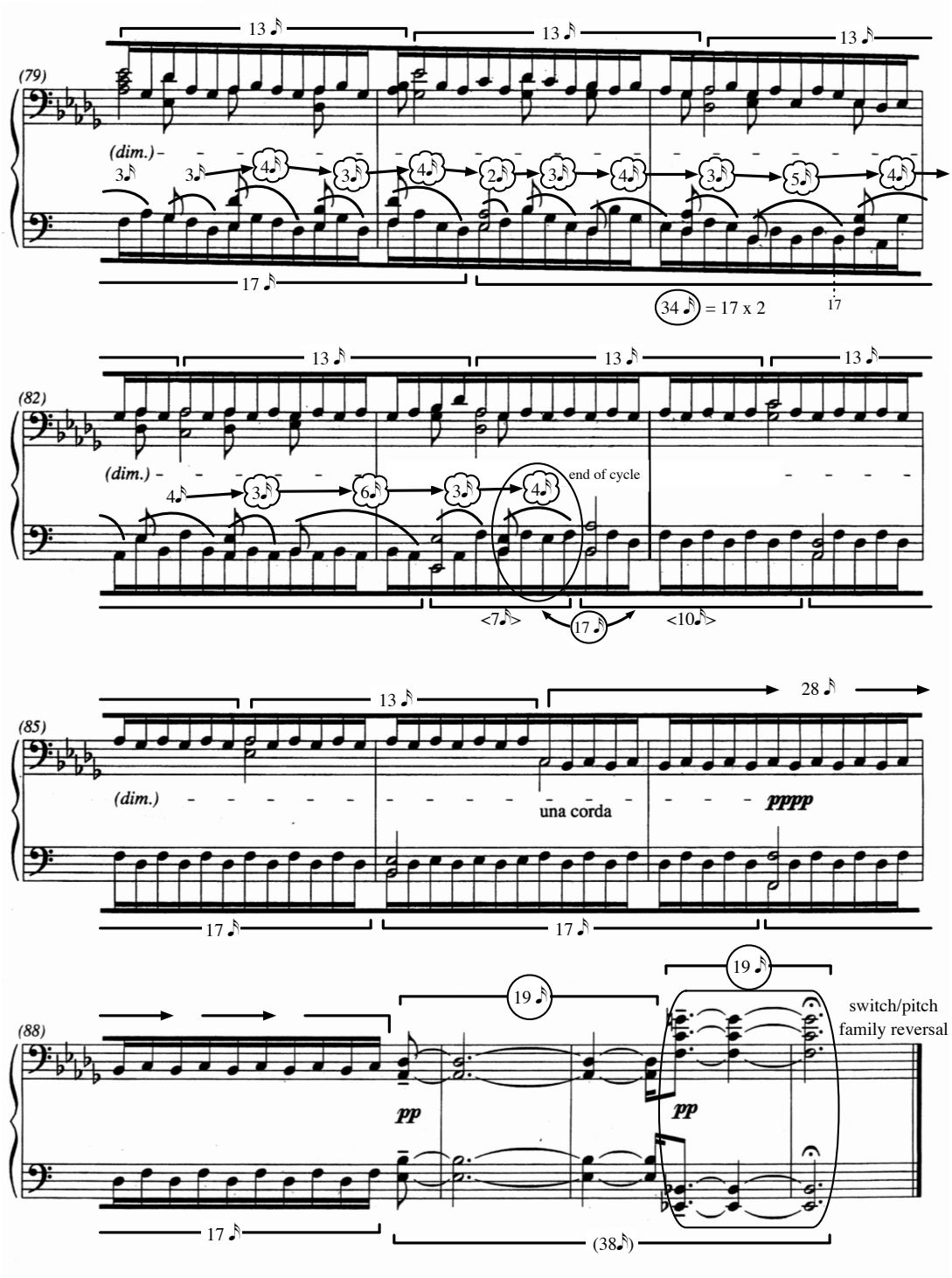

(13)
pp
– pp
mp
sim.
(16)
UNION
(19)
(22)
(25)


pattern stops – thin out
pp sub.
cresc. molto
fff
end of cycle
pp
mf sub.
(28)
(31)
(34)
(37)
(40)
poco f cantabile, in rilievo
(5 + 3!)
pp
mf
(sempre legato)
sim.
disruption
disruption


(43)
end of cycle
should be
cresc.
più f
(46)
sempre legato
transfer to LH
(49)
ff (mf)
sempre cresc., rigoroso
(52)
fff cresc.
end of cycle
end of cycle
pp sub.
ffff
mf
pp


(55)
<8>
pp
13
sim.
17
(58)
cycles presented
in retrograde
(61)
cresc. poco a poco
f cresc.
ff
end of
cycle
(64)
ff sempre
(cresc.)
mf
f
ff
<15>
<2>
17


(67)
ossia
sim.
(70)
non arp.
C!
cycle change
(73)
(76)
sim.
sim.


(79)
13
13
13
(dim.)
17
34 = 17 x 2
17
(82)
13
13
13
(dim.)
end of cycle
<7>
17
<10>
(85)
13
28
(dim.)
una corda
pppp
17
17
19
19
switch/pitch
family reversal
(88)
pp
pp
17
(38)

The pitch content of the continuum in “Entrelacs” juxtaposes repeating intervals and short motives. Examples 3.3 and 3.4 plot the pitches for mm. 1–55, while Examples 3.5 and 3.6 show pitch graphs for mm. 55–91.

Ligeti uses two hexachordal modes in the piece, one in each hand; halfway through bar 54 the hands switch collections. The right hand begins the piece using the white-key collection minus C, or [24579E], a member of set-class (023579). The left hand has the five-flat collection minus F, or [68T013], also a member of (023579). The hexachords are inversionally equivalent at I5. My view is that one pitch was omitted from each collection to avoid one of the two semitones in the diatonic collection, thereby drawing attention to the only semitones remaining, the E-F in the right-hand collection and C-D ♭ in the left. Also, the exclusion of C and F from the two collections draws attention to these notes when they do appear. For instance, there is a C in the left hand of bar 71 as well as an F in the final right hand chord that ends the piece.

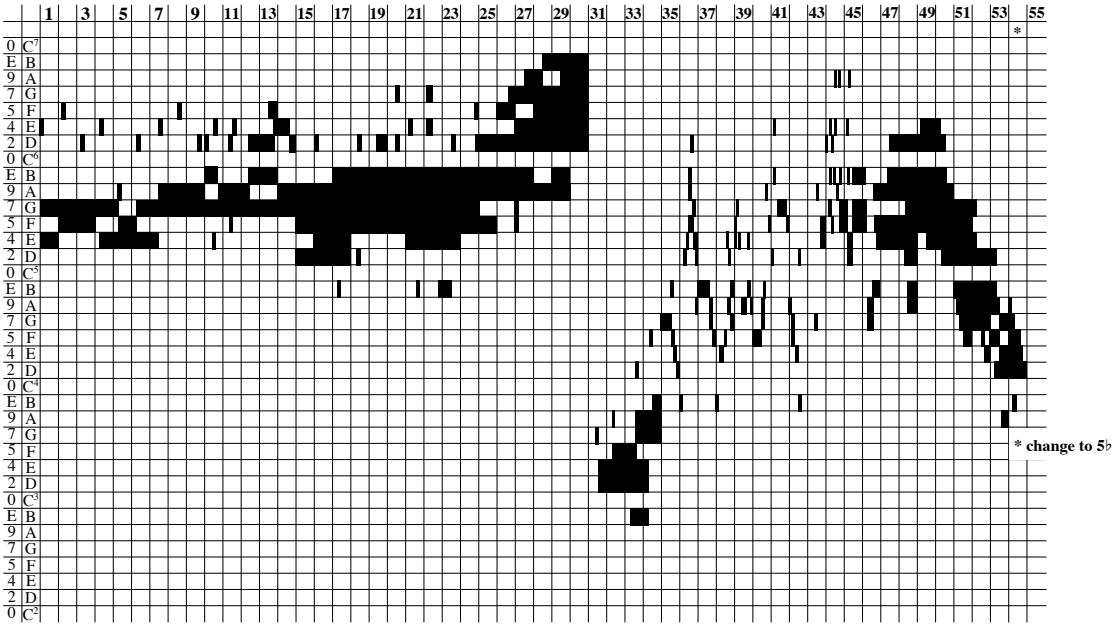
There is a performance indication in bar 71 to accent the chord that has the C and it becomes an accented element of the loudest portion of music at that point, but the absence of these pitches is not perceptible to the listener. They are fascinating to observe in the pitch-range graphs, but there is no real way to convey to the audience that they are missing throughout portions of the music. It would be enough to include this information in the performance notes. Musically and formalistically Ligeti is prone to using elements like the absent pitches, most usually using them together to create a “Ligeti signal” or “super-signal” to represent a change in texture or form at a specific point in the piece. Bar 71 happens to represent a change in

texture in the piece (as is easily visible in example 3.5). The appearance of C in the left hand can be highlighted by the performer to represent a "signal" announcing the change in the musical texture that follows.

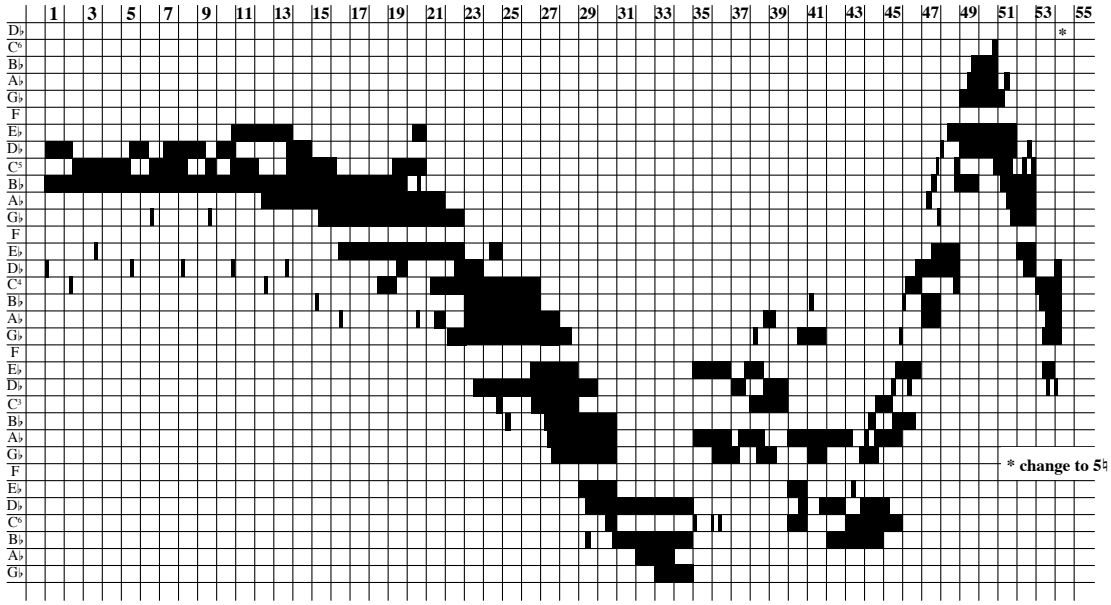
Why do these inconsistencies in pitch occur? I believe that the C in m. 71 represents Ligeti's demonstration of the inevitability of error in any system. His interest in math and physics, particularly chaos theory, may have heightened his awareness of systemic flaws. It is therefore fitting to disrupt the regularity of the pitch collection just as the regularity of the eighth-note stream is disrupted in bar 72. Structurally, the appearance of C at bar 71 functions almost as a signal, representing the cycle change that occurs in the eighth-note layer starting in bar 72 and lasting for the remainder of the piece. Example 3.2 illustrates the fluctuation within the left hand eighth-note layer from bars 72 through 83, with a change in number of pulsations between each eighth of the cycle. Another inconsistency in the pitch collections is created by the F in the final right-hand chord. The F is part of a stacking of perfect fifths, a pentachordal subset [357T0] of the prevalent hexachords.

Ligeti uses additive and subtractive (reverse additive) techniques to create his continuum. At the beginning, the continuum starts with two pitches in each hand. When one of the two pitches moves while the other stays the same, as in the left hand of m. 2, I call this a *glide* technique. The pitch that was abandoned in a glide will sometimes reappear almost immediately, as happens often in the right hand in bars 1 through 14.

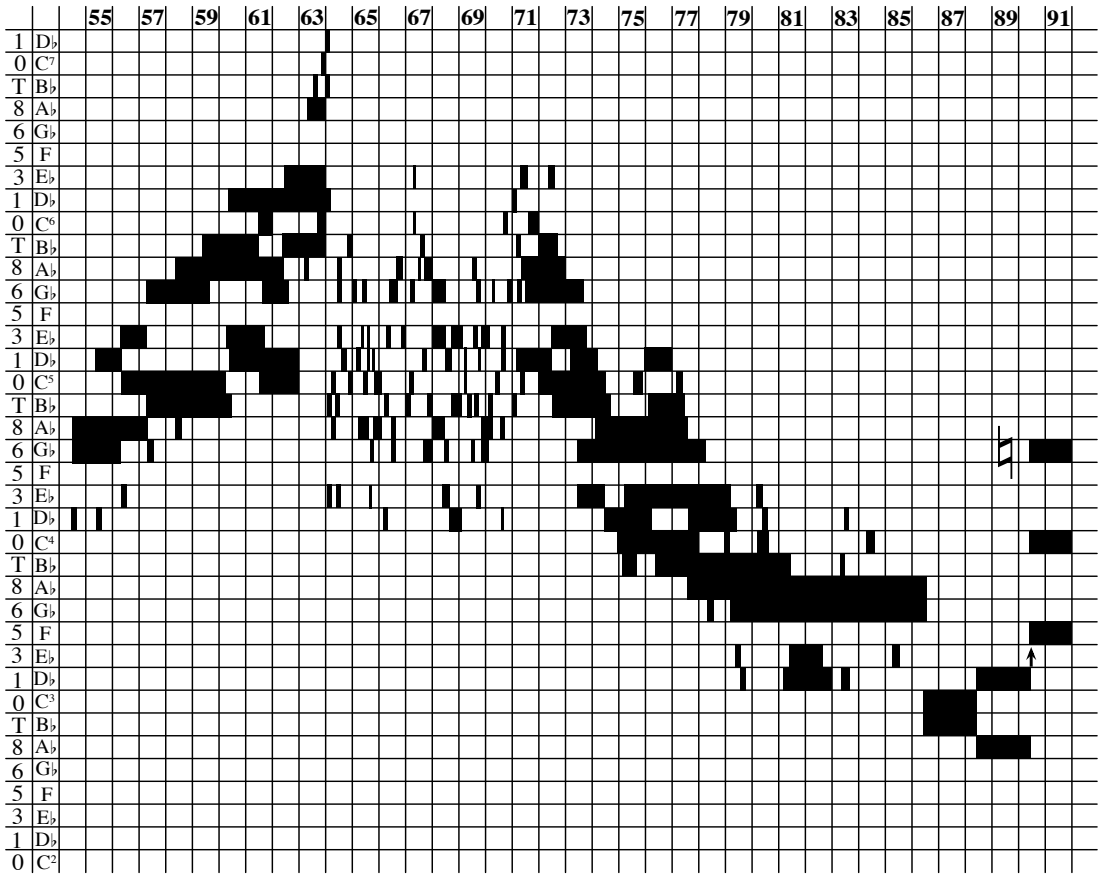
Example 3.3 – "Entrelacs," Pitch-Range Graph, right hand, bars 1 – 55



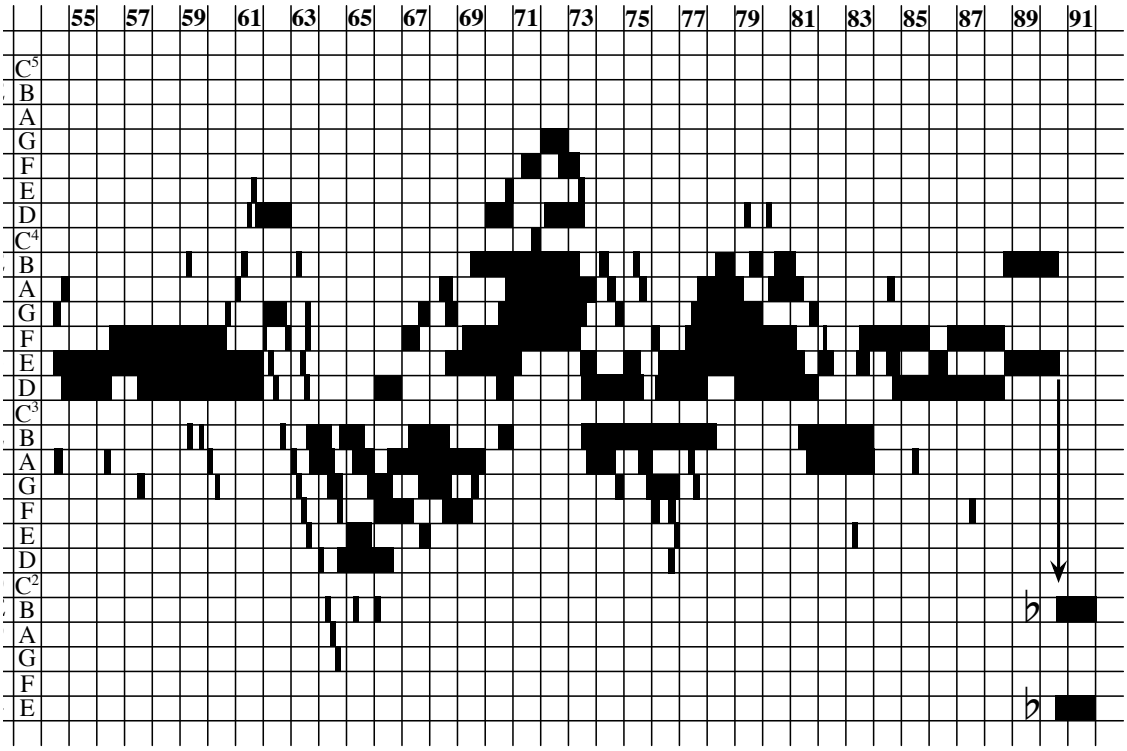
Example 3.4 – "Entrelacs," Pitch-Range Graph, left hand, bars 1 – 55



Example 3.5 – "Entrelacs," Pitch-Range Graph, right hand, bars 55–91



Example 3.6 – "Entrelacs," Pitch-Range Graph, left hand, bars 55–91



As more and more accentuation streams enter, Ligeti adds pitches, thickening the continuum. Double-stemmed notes begin to appear with additional notes of the same duration. They also become buried within the texture, rather than standing out at the extremes. Then as the etude begins to wind down, the texture thins. The subtractive elements starting in m. 78 are a natural complement to the additive elements of the opening.

These processes are evident in the graphs of Examples 3.3–3.6. For example, Example 3.3 shows the right-hand continuum remaining fixed in the register that rises from E^5. It uses additive techniques as it approaches bar 31, followed by an abrupt shift down approximately two octaves, preparing for the first disruption of the right-hand continuum. This disruption removes the continuous element of the

sixteenths but keeps the sixteenth as the unit of subdivision. With the appearance of the first disruption comes a series of waves in mm. 31–55. The amplitude of the waves is equal and centered around the absent pitch C^5. The upper and lower boundaries of the amplitude of the upper and lower waves are symmetrical, one note above C and one note below C respectively, the overall range being approximately two octaves. The second disruption in the right-hand continuum, found in bars 64 through 71 (Example 3.5), involves a thicker texture and an even larger set of waves. The graph shows thicker blocks of sound and longer durations, the longest durations owned by the E ♭ and G ♭ , which further draw attention to the absence of F. This particular disruption in the right-hand continuum is slightly longer than one-half the length of the first disruption, although the vertical boundaries in amplitude are approximately the same.

Meanwhile, the left hand maintains a constant continuum of sixteenths (Examples 3.4, 3.6) that assist in the continuity of the two right-hand disruption sections, allowing for the sixteenth to be the value of subdivision throughout. During the disruption sections, the left hand replicates its first three rhythmic streams from the beginning, but at a condensed pace. Considering the spacious nature of the introduction of rhythmic cycles at the opening (left hand), the cycles are relatively closer together in the two disruption sections (bars 35–46 and 64–71). Example 3.2 shows that starting in bar 59, leading up to the second disruption section (bar 64), the left hand rhythmic cycles occur much closer together and also appear in retrograde order. The smallest cycle, the sixteenth, appears first, followed by the eighth (which appears in the right hand in bar 61), then finally the quarter-note

cycle. The reversal of rhythmic cycle entrances along with the melodic motives in the right hand creates a very dense texture both rhythmically and spatially in bars 59 through 84.

Ligeti chose the concepts of order and disorder to be his focus for "Entrelacs." His rhythmic streams and cycles are orderly, and yet layering and textural thickening masks their perceptibility. In choosing mostly prime numbers as governing factors, he has created an order where it is mathematically impossible for the convergence of attacks to be frequent. The pitch collections in the hands are consistent, except when disrupted by the C in bar 71. And the irregularity of the left-hand cycle in the eighth-note stream beginning in bar 72 upsets the regularity of the durational cycle. Ligeti mixes elements of disorder into his predetermined, organized concepts to show that perfection is not the goal of the piece, but rather that perfection is an unobtainable ideal. "Entrelacs" is perfect in its imperfections.

Continuum, Rhythmic Cycles, Pitch Collections, and Compositional Techniques in "Der Zauberlehrling"

According to Richard Steinitz, Ligeti's composition of "Der Zauberlehrling" (#10) was influenced by his introduction to a colleague's recording of the balafon music of the Malawi tribe.[5] The balafon is a type of xylophone that can be traced back to the 1300s in certain regions of Africa. The instrument has between sixteen and twenty-seven keys and is often tuned in relation to either the language spoken

[5] Steinitz, *Music of the Imagination*, 305.

by the particular tribe, or to the scales associated with the songs of the tribe.[6] The title of this etude is taken from a 1797 poem by Goethe—"Zauberlehrling" or "The Magician's Apprentice," also the inspiration for Dukas's *Sorcerer's Apprentice*.[7] The poem, which recalls ancient Greek folklore, tells the story of a magician's apprentice who grows tired of being the assistant yet is not skilled enough to control his magic. This story matches the music of Ligeti's etude, with its wild episodes.

The creation of "Der Zauberlehrling" was also inspired by the main compositional element in an earlier work, aptly named *Continuum* (1968). "Der Zauberlehrling" has a metric pattern that remains consistent for the first thirty-six bars of the piece, at which point the rhythmic groupings change and new rhythmic cycles begin. Example 3.7 demonstrates the rhythmic groupings and deviations from the continuum that occur throughout the etude. Examples 3.8 and 3.9 are pitch-range graphs for the entire work.

Like *Continuum*, "Der Zauberlehrling" starts with a narrow band of pitches (see Example 3.8). The pitches are repeated numerous times until new pitches are gradually introduced, usually one at a time, into the existing continuum texture. Eventually it undergoes wild waves of motion, exploiting the full range of the keyboard (see Example 3.9) and representing, as Steinitz observes, the magician's "sleight-of-hand."[8]

The initial continuum is established consistently throughout the first thirty-five bars (Example 3.7). The 12/8 meter maintains twelve pulsations per bar,

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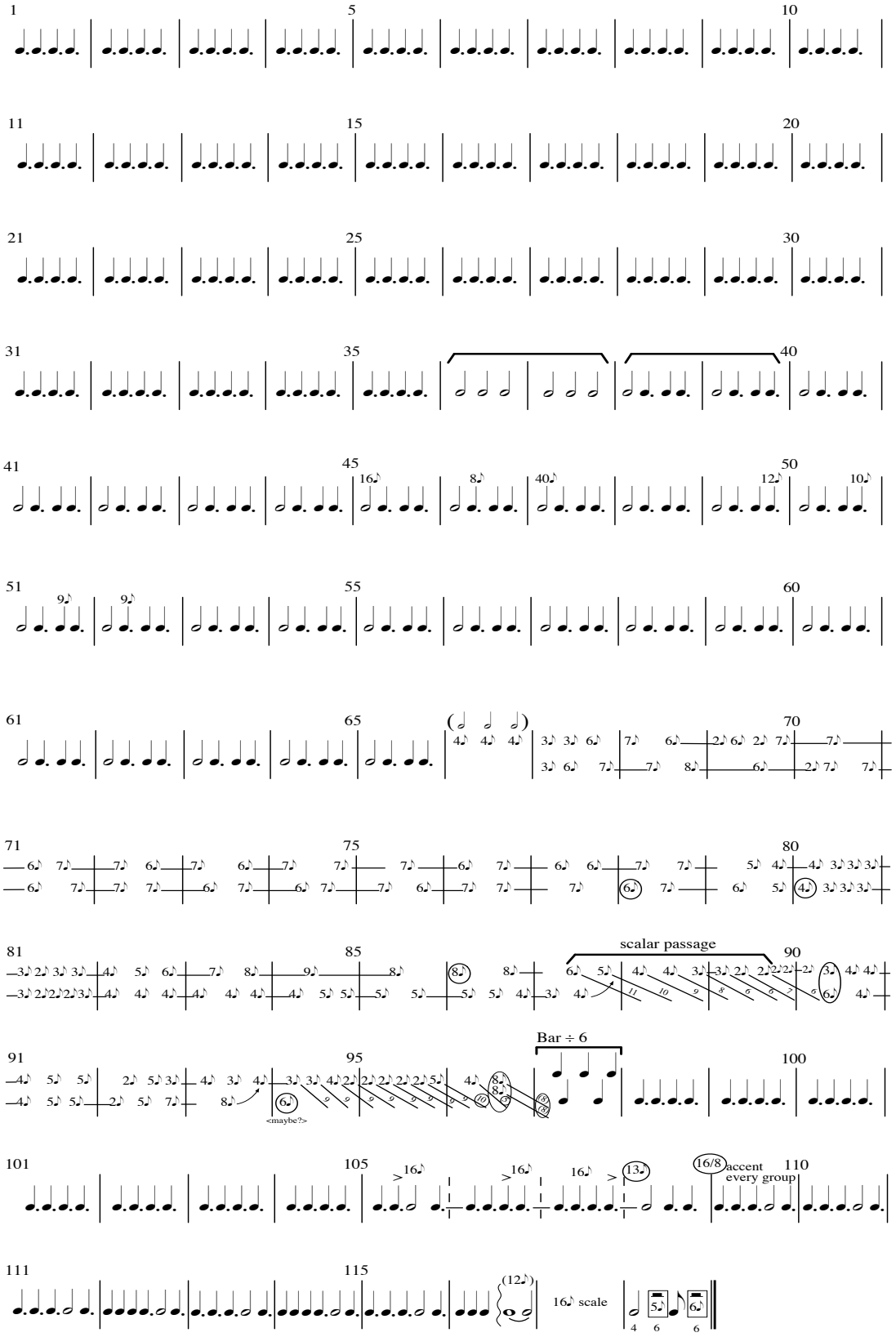
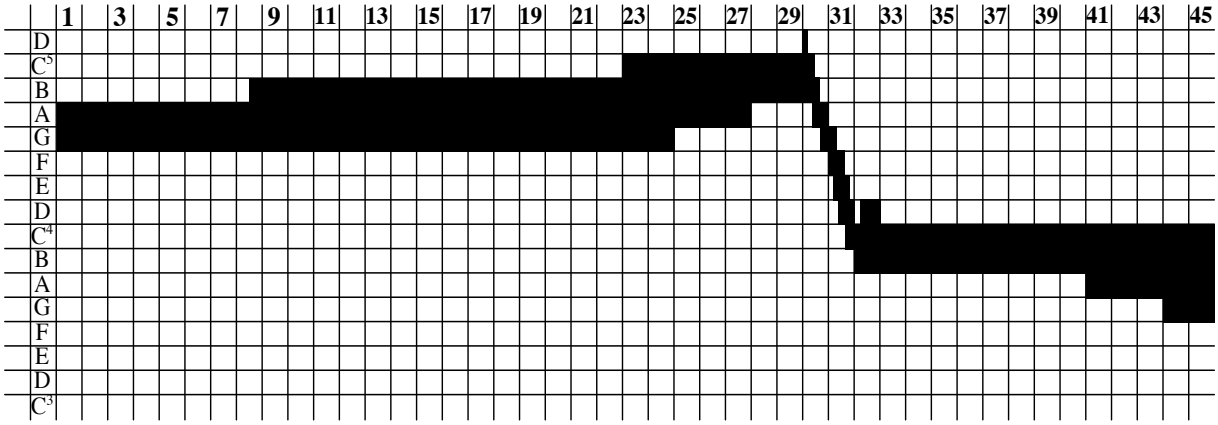
[6] Kenneth A. Gourlay and Lucy Duran, "Balo [bala, balafo, balafou, balafon]," *The New Grove Dictionary of Musical Instruments*.
[7] Manuela Schwartz, with G. W. Hopkins, "Paul Dukas," *Grove Music Online*.
[8] Steinitz, *Music of the Imagination*, 305.

divided into four modules of three pulsations each. The unflagging rhythmic drive enables small changes in the pitch content of the continuum to become highlighted in the sound mass, such as the introduction of B^4 at m.8 and C^5 at m. 23. At m. 36 the grouping changes to three units of four pulsations, followed by a new rhythmic pattern starting in m. 38. Bar 38 is also the place where double-stemmed notes are first introduced, and they remain throughout the etude with the exception of bars 97 through 108, when the basic continuum of the opening section briefly returns. This section also features the first new layer, introduced by the sustained tones starting in m. 45. This melody has no durational relationship to the continuum layer or to any of the sections that come later in the etude, although I have designated the duration and point of attack for each melodic tone in bars 45 through 52 of Example 3.7.

Example 3.7 – "Der Zauberlehrling" Rhythmic Reduction of Continuum Layers



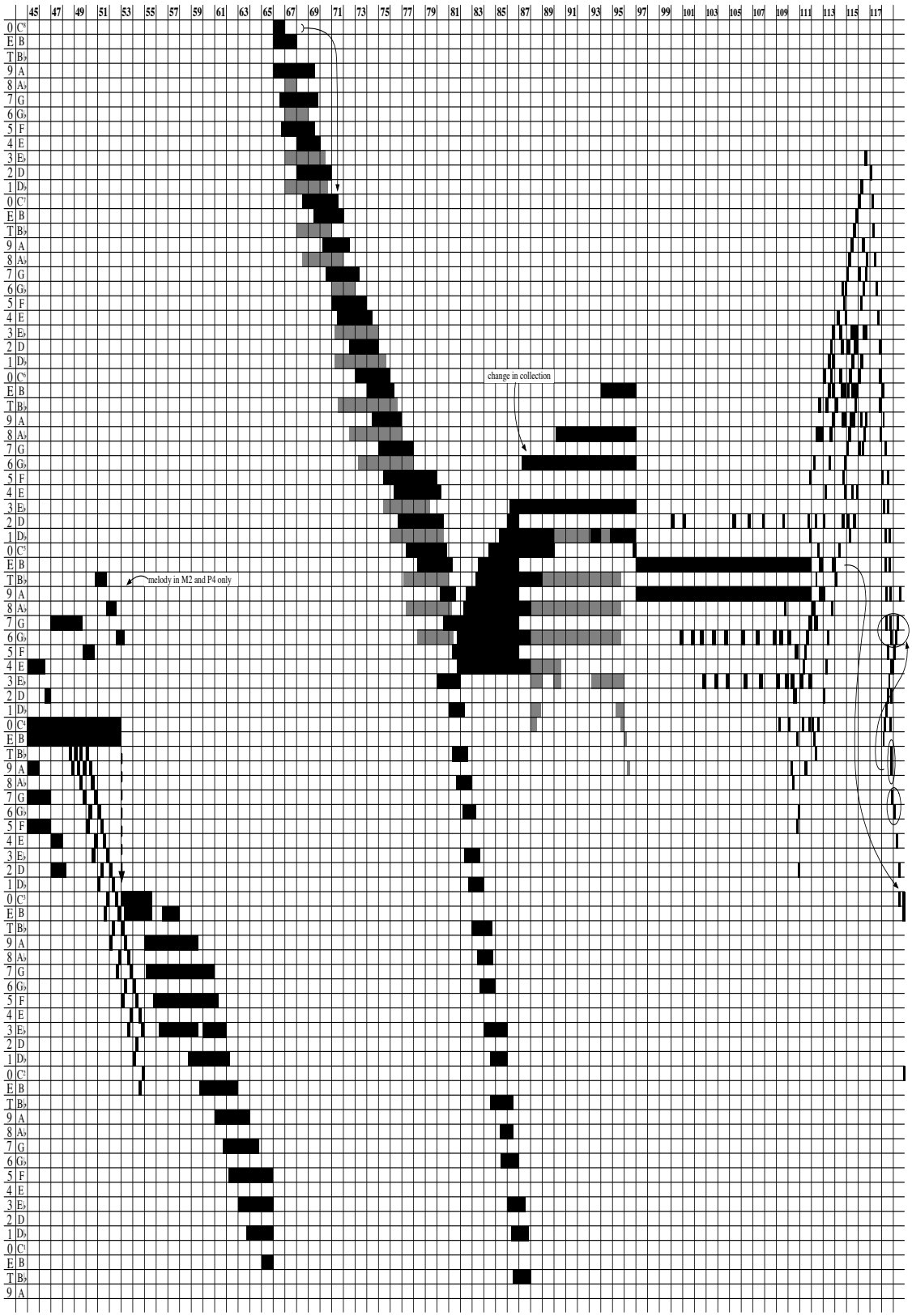
Example 3.8 – "Der Zauberlehrling," Pitch-Range Graph, bars 1 - 45



Collection: set-class 7-35 (white key collection)

The next big change after m. 45 is m. 67, where the hands begin separate patterns through m. 96, defined by accented, double-stemmed tones. These modules are shown as separate layers in Example 3.7, with groupings that include all notes and rests before a new attack occurs. Unlike earlier sections, many of these modules extend across barlines (although any sense of 12/8 meter that may have been established in the first thirty-five bars has already been obscured by the different groupings in bars 36–65). Ligeti does not use a strict rhythmic cycle in these bars but generally favors durations of six or seven pulsations between attacks while avoiding simultaneities between the hands.

Example 3.9 – "Der Zauberlehrling" Pitch-Range Graph, bars 45-118



The pitch material starting in m. 66 consists of descending overlapping scale segments. These are crowded together to produce an increase in density in m. 81, and then in mm. 87 and 94, even denser sound masses result from overlapping scalar descents. The upper layer shown in mm. 87–89 and 94–97 of Example 3.7 notates the durations between new attacks (new descending scales), while the diagonal lines show the number of pulsations per scale module. In bars 87–90 Ligeti unfolds a reverse additive rhythmic cycle by removing one pulsation per attack and one pulsation in length from each module, although not consistently. In bars 94–97 he does something similar but with few deviations between accented attacks and no change in the number of pulsations in each descending scale module (until the very end).

After a one-measure transition, the original continuum returns at bar 98. It is a kind of rhythmic condensation of the opening but with slightly different pitch content. After only seven bars (starting in m. 105), the modular groupings begin to extend over the barline (as indicated with broken barlines in Example 3.7). This section serves as a coda because: 1) there is a change in bar structure and a notated change of meter in the score (to 16/8 in m. 109); 2) there is a change in pitch material; and 3) new material not previously introduced or alluded to in the etude is combined with the continuum element. This final section serves more as a grand gesture than an exercise in rhythmic relationships, and the musical shape and flow created by the material seem to represent the great magic trick being practiced by "The Magician's Apprentice".

Pitch collections, relationships and behaviors. To organize the discussion of pitch content and pitch behavior throughout the etude, I have parsed the work into five sections as follows: 1) Bars 1–44; 2) Bars 45–65; 3) Bars 66–87; 4) Bars 88–96; and 5) Bars 97–end. The charts in Examples 3.8 and 3.9 contain two colors. Because the two hands share in creating the continuum in mm. 1–45, Example 3.8 uses only black. When the hands follow separate paths in Example 3.9, however, the black color shows right hand notes while gray shows the left hand.

In bars 1 through 44, a narrow band of pitches from the white-key collection (013568T) creates the continuum layer. This collection remains prominent through bar 48, although the rhythmic structure of the etude changes in bar 45. The narrow band of pitches used to generate the continuum stays consistently compact. The G^4 and A^4 of the opening accept B^4 into the texture at bar 8, and the C^5 joins the pitch band at bar 23. At bar 25 the continuum layer starts to remove one pitch at a time from the texture, narrowing the band again, but not until it has established the semitone relationship of B-C in m. 28, which is found frequently throughout the etude. The stepwise unfoldings of the G and A of the opening (bars 1 through 8) into the B and C of bars 23 through 30 are mirrored after the octave transfer of the B-C cell at bar 32. Examples 3.8 and 3.9 show an inversional contour relationship between the opening continuum in bars 1–30 and its counterpart in bars 32–52. Bars 30–32 represent a miniature version of the grand, sweeping motions up and down the keyboard we find later on, representing the magician's "sleight-of-hand" tricks (see Example 3.9).

The completion of the inversional contour relationship at the beginning of the next section consists of double-stemmed notes moving first by descending half steps, then by a -3/+1 pattern (mm. 48–54). (Ligeti revisits this voice-leading idea in the final section of the etude; see below.) At the same time, the layer of sustained tones unfolds a -2/+5 pattern in mm. 45–52. Then in the last part of this section, starting in bar 55, a descent (recalling mm. 30–32) moves downward almost to the bottom of the keyboard on the odd whole-tone collection.

Beginning at bar 66 the collections change. The right hand continues with the white-key collection through bar 81, while the left hand contains the five-flat collection until bar 87. At this point in Example 3.9 the left hand is represented by the gray color. As Ligeti often used irregular key signatures to correspond to unusual pitch collections, the regularities of the two key signatures here imply order. A discrepancy in the collection in either hand may signify a change to come in the texture, a "Ligeti signal." For example, the white-key collection in the right hand is disrupted by the G♭ in bar 81, the same spot where the rhythmic cycle of the right hand changes (see Example 3.7). Later, in bar 87, the F-E dyad suddenly disappears from the right-hand pattern, again signaling a change as this section comes to an end.

The section beginning in bar 88 has both hands in the same five-flat key signature, presenting mostly notes of the black-key pentatonic collection. Exceptions are the F ♭ ^{4} in the left hand and the C^{5} in the right hand in bars 87–89, later the C in both hands at the end of bar 96. The latter abnormality in the pitch collection occurs just before a major structural change in the texture at bar 97.

Bar 97 begins the final section by reestablishing the continuum from the beginning of the etude, this time using A^4-B^4 as the repeating tones rather than the G^4-A^4 of the opening. The left hand begins a descent under the continuum starting in bar 100, using the collection [9E236], a member of set-class 5-32 (01469). A pattern of accented tritones starts in the left hand of bar 109. The pitch classes of these tritones combine with the previous left-hand [9E236] to complete the $OCT_{2,3}$ collection. Then in bar 112 the continuum patterns stop, and in the final measures of the etude we find a mixture various collections heard earlier. Bars 112–113 recall the whole steps of the whole-tone collections. Bars 116 to the end have a descending scale initially containing the odd whole-tone collection, switching to the even whole-tone collection briefly in bar 117, and then back again to the odd collection to complete the scale passage. The left hand at the second half of bar 117 enters playing an ascending chromatic scale that stops on C. The final accented interval, the conspicuous B-C that appeared throughout the piece, abruptly cuts off the motion to end the etude. A successful performance of this etude would involve the pianist emphasizing the accented tritone passages and changes in scale collections as they represent the pitch collections used earlier in the piece.

Chapter 4

Conclusion

Ligeti's eighteen piano etudes represent a monumental contribution to the repertoire and offer a unique assortment of musical concepts for theoretical analysis. This dissertation has explored six recurring compositional elements that I have found to be most relevant in unifying the etudes as a group. The most important factor that I have explored is Ligeti's use of pulsation as a unit of measure (generally speaking) throughout all of his works. Pulsation is fundamental to a number of the unifying compositional elements explored in Chapter 2 and is an important factor in my analyses of continuum and rhythmic cycles in Chapter 3. At the point of the completion of my dissertation, I have still not found any scholarly work exploring the basic, fundamental compositional elements of Ligeti's complete piano etudes.

From my own pianistic viewpoint, learning the etudes, particularly those in the first two books, appears a monumental task requiring far more time and understanding of the pianist than than is true of almost any other works in the piano literature. The principal difficulties associated with the Ligeti etudes are their rhythmic complexity and extreme velocity as determined by the indicated tempi. Chapter 2 of this dissertation provides information on technical compositional aspects of many of the works. As a pianist, I find having information about form, compositional elements and cultural influences of a work I am studying to be particularly vital to an intelligent reading of it. Information like this gives the

performer the advantage of being able to search for relevant material within the piece that supports the topic or reference associated with the etude while learning the notes.

Essentially the eighteen etudes are all character pieces somewhat influenced by the piano miniatures of Debussy, Chopin, Schumann and Bartók. The character piece became popular throughout the Romantic period with the collections of shorter piano works of Schumann (as mentioned in the preface) as well as the shorter works of Chopin including his Nocturnes, Waltzes and Mazurkas. Bartok remained a solid influence on Ligeti's compositional output throughout his formative years as a student in Budapest, not only for his folk influences, but also for his demonstration of interesting rhythmic juxtapositions as well as developing new contexts for folk material in many of his works. The tonal language used throughout the etudes is Ligeti's own reconstruction of elements found in both Western and Eastern cultures, heavily influenced by the rhythmic complexity of Central African drumming cultures.

Some of the etudes like those discussed in chapter 3 are further influenced by the sound Ligeti experimented with in his time spent in the electronic studios in his earlier years. The Stockhausen years contributed to Ligeti's development of a continuum or at least his interest in exploring how to reach the point of a continuous sound played by a human hand. This is a particularly difficult aspect of performance for some of the etudes, as these require a lightning fast, clear finger technique and equally fast hand-eye coordination. The one clear difficulty in playing Ligeti's etudes is that the pianist must in some sense turn into a machine, removing

themself from the musical nature of the pieces so that the technical execution of the notes (mostly at excessively high speeds) can take place. In many ways this music appeals more to the performer than to the listener as much of the work involved in learning the pieces is lost on the audience. The pianist feels a sense of victory and empowerment having successfully learned and performed any one of the Ligeti etudes (particularly any from Book 1 and Book 2).

As a general observation, many pianists don't attempt to perform Ligeti's etudes because they require far more work and intellectual understanding than most pieces in the standard repertoire. Despite their technical and musical difficulty, these pieces have become part of the repertoire in a way that few pieces written post WWII have done. The most rhythmically complex etudes involve layering of rhythmic cycles with Ligeti's further instruction to hold down certain tones as long as is physically possible. This creates a situation where Ligeti is very specific about the number of pulsations between accented tones and at the same time the tones are to be highlighted as a separate melodic level. The number of pulsations between accented tones frequently changes, making it difficult to execute the music accurately and almost impossible to memorize. Pianists are also most familiar with learning rhythmically complex pieces where meter can be used as a guidepost. Ligeti's ideas about meter are unique. Meter in the etudes is sometimes regular, sometimes evolving, and at other times completely absent. There are also etudes where the rhythmic cycles create polymeter. Adding to the complexity involved with learning to play one of these etudes, Ligeti often engages in irregular groupings of pulsations and very often beams groupings over the barlines.

It was my intention that this dissertation provide some useful analytical information for pianists who have decided to undertake learning some or all of the Ligeti etudes. I hope that the rhythmic concepts discussed in chapters 2 and 3 may serve as helpful guides for making musical choices that contribute to an intelligent reading and understanding of the works. An advanced piano technique and the intellectual capacity to understand the concepts found in each etude will most certainly ensure a confident and successful performance of the Ligeti piano etudes.

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