rpm Revista Portuguesa de Musicologia
PORTUGUESE JOURNAL OF MUSICOLOGY
nova série | *new series*
3/1 (2016), pp. 57-78 ISSN 2183-8410
http://rpm-ns.pt

Approaching the Analysis of Post-1945 Music: Pedagogical Considerations

Miguel A. Roig-Francolí

University of Cincinnati
College-Conservatory of Music
roigfrma@uc.edu

Resumo

Proponho neste artigo um enquadramento teórico e pedagógico para a organização de um curso de análise de música pós-tonal, pós-1945, no sentido de congregar, por um lado, a perspectiva fenomenológica da música como uma entidade objectiva e, por outro, o contexto histórico e social essencial para a compreensão da obra musical.

A discussão centra-se em sete tópicos gerais que apresento como integrantes da estrutura proposta nesta abordagem: (1) a importância da compreensão da música através da análise; (2) a importância da compreensão, em particular, do contexto histórico e social dos estilos e movimentos artísticos; (3) preferência por uma abordagem genérica da organização cronológica; (4) a multiplicidade de estilos na segunda metade do século XX e início do século XXI; (5) a carência de uma metodologia uniformizada; (6) a necessidade de seguir uma escola teórica e analítica; (7) a necessidade de consciência das abordagens analíticas gerativa e interpretativa. O artigo termina com a análise de duas obras de Augusta Read Thomas e Krzysztof Penderecki, que ilustram as abordagens contrastantes do estudo motívico e espacial da música.

Palavras-chave

Música pós-1945; Pedagogia pós-tonal; Análise espacial; Análise de conjuntos de classes de alturas; Análise gráfica.

Abstract

In this article I propose a conceptual and pedagogical framework to organize a course or a fragment of a course on the analysis of post-1945 post-tonal music, in a way that brings together the phenomenological understanding of music as an objective entity on the one hand, and the historical and social contexts needed to provide the necessary perspective to our conceptual understanding of a musical work on the other.

The discussion focuses on seven general issues that I recommend addressing as part of this organizational framework: (1) the value of understanding the music through analysis; (2) the value of understanding, in particular, the historical and social contexts of artistic movements and styles; (3) preference for a roughly chronological organization; (4) the multiplicity of styles in the second half of the twentieth century and early twenty-first century; (5) the lack of a unified methodology; (6) the need to rely on existing theoretical and analytical scholarship; and (7) the need to be aware of the generative and interpretive approaches to analysis. The article closes with two analyses of pieces by Augusta Read Thomas and Krzysztof Penderecki, which illustrate contrasting approaches to the study of motivic and spatial music, respectively.

Keywords

Post-1945 music; Post-tonal pedagogy; Spatial analysis; Pitch-class set analysis; Graphic analysis.

'History without phenomenology is blind, and phenomenology without history is empty'.[1]

THE PEDAGOGY OF THEORY AND ANALYSIS OF PRE-1945 post-tonal music in the United States has reached a certain level of maturity and stability. Compositions from the first half of the twentieth century, by composers such as Claude Debussy, Igor Stravinsky, Béla Bartók, and Paul Hindemith, are usually studied from the perspective of pitch centricity, with reference to techniques such as use of pedals, diatonic scalar collections (the modes), symmetrical scales (whole tone, octatonic, and hexatonic), other types of symmetrical structures (particularly symmetrical motives and textural symmetry around an axis), and structural use of motives. Pitch-class set theory, at times applied to the study of motivic relationships in the music of these composers, normally becomes the essential technique for the analysis of pitch relationships in free-atonal repertoires by composers of the Second Viennese School (Arnold Schoenberg, Alban Berg, and Anton Webern). Set theory is extended to twelve-tone theory as a means of analyzing music of the classical twelve-tone period by these same Viennese composers.

The pedagogy of post-1945 post-tonal music, on the other hand, is still fraught with challenges and difficulties. First and foremost, we need to face the problem of stylistic multiplicity. This is particularly evident in music from approximately the two decades following the end of World War II, in which we find a great number of different styles which succeed each other in fast chronological sequence, and indeed at times can be found practiced simultaneously by the same composer. This multiplicity of styles brings with it the difficulty of defining theoretical models and analytical methodologies suitable to each of them. The idea of a unified analytical methodology applicable to most music and styles from these decades has to be ruled out. A second essential problem comes from the nature of much of this music. Aleatory and indeterminate musics are by definition not notated in ways that will necessarily make the score indicative of the final auditive result. A variety of experimental and graphic notations, often to be interpreted improvisationally by performers, make it impossible for the analyst to know what the piece is actually going to sound like in concert. Even in cases of recorded versions of such pieces, the sound

[1] Eduardo LOURENÇO, *Tempo da música, música do tempo* (Lisboa, Gradiva, 2012), p. 415.

represents only one possible interpretation of the indeterminate score, and hence cannot be used as a fixed version of the composition. How, then, can the teacher of post-tonal music approach these repertoires analytically, let alone theoretically?

In the present article I will propose a conceptual and pedagogical framework to organize a course or a fragment of a course on the analysis of post-1945 post-tonal music.[2] I will begin by discussing seven general issues that I recommend addressing as part of this organizational framework: (1) the value of understanding the music through analysis; (2) the value of understanding, in particular, the historical and social contexts of artistic movements and styles; (3) preference for a roughly chronological organization; (4) the multiplicity of styles in the second half of the twentieth century and early twenty-first century; (5) the lack of a unified methodology; (6) the need to rely on existing theoretical and analytical scholarship; and (7) the need to be aware of the generative and interpretive approaches to analysis.

Understanding the Music

We cannot force students to like a certain type of music we teach them. For the most part I avoid opening up aesthetic discussions on post-tonal music. A student, or any musician for that matter, is free to like or not like, as well as to perform or not to perform, any particular kind or style of music. How each of us perceives, absorbs, and processes a piece of art, be it modern or not, is part of a subjective process which allows for endless experiential possibilities. This is the 'phenomenological' aspect in Lourenço's statement in the heading to this article. But, as Lourenço further points out, 'the comprehension of music does not end with its absorption, neither does it reside only in the complex of emotions and thoughts that it generates in us'.[3] Our role as teachers of theory and analysis is not to teach students how to 'like' or 'not to like' music emotionally, but rather how to 'understand' music in a deep sense. If in particular cases 'understanding' leads to some level of 'liking' that did not take place before the analytical study of the piece, as it often does, that will be a welcome icing on the cake of understanding. But such a cake is a sufficient, and sufficiently attractive, end in itself. And understanding can, and will, it is hoped, lead to our being better listeners, as well as to better performances of the piece analyzed, should we want to perform it.

[2] The pedagogy presented in this article is the same that generated the organization, philosophy, and expository style of my post-tonal textbook, *Understanding Post-Tonal Music* (New York, McGraw Hill, 2008). The pedagogical principles outlined here can thus be found practically developed in my textbook.

[3] LOURENÇO, *Tempo da música* (see note 1), p. 144.

Understanding in Context

I have found repeatedly that students understand better a piece of music, its style, and the possible motivation of an artist, if they know the social and historical context in which that piece was composed. The context can range from very particular facts about the circumstances of a piece to the general context of a period or a generation of composers in some specific years. Examples of the first type would be the awareness that Luigi Dallapiccola's *Quaderno musicale di Annalibera* was composed as a collection of pedagogical pieces for the composer's young daughter, that Olivier Messiaen's *Quartet for the End of Time* was created while the composer was a World War II prisoner of war to be performed by himself along with three fellow prisoners, or that the erotic poems that Karlheinz Stockhausen included in his 1968 piece *Stimmung* were composed by himself while staying in Sausalito, California, in summer of 1967, often referred to as the 'summer of love'.

Perhaps more important, however, is the understanding of a period's general social context. Students are fascinated by the realization that the two major modernist movements in the twentieth century took place in the years leading to and around World War I, and then in the years after World War II, respectively. This is not a coincidence. The early decades of the twentieth century saw the decadence and dissolution not only of an old historical geopolitical order, but actually of as many as four European empires (the Austro-Hungarian, Prussian, Russian, and Ottoman empires respectively) and of a way of understanding life and social relationships that had permeated the nineteenth century. This cultural and social decadence and dissolution was anything but peaceful, and led to such powerful and certainly violent events as World War I and the Russian revolutions of 1917 and the ensuing civil war. There is no question that this was a painful and traumatic time for Europe, and art could obviously not be oblivious to these developments.[24]

Similarly, the generation of young artists and composers who led the modernist avant-garde movements in the 1950s and 60s was a generation who had lived the painful years of World War II as young adolescents, and for whom the immediate past represented a painful time of violence, death, and destruction. These two generations flourishing in the years around the two World Wars are made up precisely of composers who often did not look back at the past as their point of compositional departure, but rather looked toward a musical future they were building, and which often brought with itself a more or less radical break with the past. Students cannot help but notice the feelings of pain and

[4] An interesting depiction of the crumbling world of the Austro-Hungarian Empire and its effect on art and culture can be found in the book by Allan JANIK and Stephen TOULMIN, *Wittgenstein's Vienna* (New York, Simon and Schuster, 1973).

anguish often transmitted by modernist music from both of these periods, and are more likely to understand and appreciate the expressions of psychological darkness and complexity we often find, for example, in expressionist music of the early years of the century (Schoenberg's *Pierrot Lunaire*, for instance, or such a pedagogically useful song as his 'Angst und Hoffen' no. 7 from *Book of the Hanging Gardens*, op. 15) or in avant-garde compositions of the 1950s and 60s (such as Krzysztof Penderecki's *Threnody* or *St Luke Passion*, Stockhausen's *Momente*, or Luigi Nono's *Il canto sospeso*), as well as the avant-garde emphasis on new and original artistic creation, if they understand the painful and violent social and historical contexts that these generations emerged from. Understanding how the past had been a source of pain and destruction for these generations can help students understand their possible motivation for wanting to break with the past artistically, and for their wanting to project their art toward the future in the form of original new music.

Preference for a Roughly Chronological Organization

Linking theoretical and analytical work with a historical overview of the cultural and social contexts of the corresponding periods reinforces the learning and understanding of post-tonal music. An exact chronological organization of a post-tonal analysis course is not quite possible or necessary. But ordering general topics in a roughly chronological sequence, following what we can call 'stylistic modules', goes a long way toward helping students make sense of the very complex world of both the twentieth century and its post-tonal music. The 'first wave' of post-1945 avant-garde (represented by composers such as Pierre Boulez, Stockhausen and Milton Babbitt) centered around the idea of maximum control of musical materials, or what we usually know as multiserialism or integral serialism. Almost simultaneously with this trend, a parallel and seemingly contradictory approach to composition initiated by John Cage resulted in various styles centered around aleatory compositional procedures. Techniques like serialism and multiplication soon coexisted with chance, indeterminacy, and sound-mass composition, the latter of which was practiced in various ways by Witold Lutosławski, Krzysztof Penderecki, and György Ligeti. And while all of these techniques can be considered modernist in their search for an originality that breaks with the past, very soon a dialogue with the past was established by means of quotation and collage in works by composers such as Mauricio Kagel, Luciano Berio, and George Rochberg. This dialogue with the past signaled the beginning of a series of stylistic movements which we now label as post-modernist, and which bridge the present and the past as well as tonality and post-tonality. These include such neo-tonal and neo-romantic composers as John Corigliano, David Del

Tredici, Ellen Taaffe Zwilich, John Adams, Richard Danielpour, Christopher Rouse, Jennifer Higdon or Aaron Jay Kernis, and minimalist and post-minimalist composers such as Philip Glass, Steve Reich, Michael Nyman, Louis Andriessen, Steve Martland and Michael Torke. A lot of recent music features a return to highly motivic composition in a chromatic, neo-expressionistic style, patent in composers such as Wolfgang Rihm, Oliver Knussen, Thomas Adès, Kaija Saariaho, or Augusta Read Thomas.

This narrative, in summary, leads to a roughly chronological, and pedagogically very effective, grouping of topics in the following sequence of stylistic modules: post-1945 serial techniques (including composers such as Stravinsky, Boulez, Stockhausen, and Babbitt), aleatory and sound-mass composition (including Cage, Penderecki, Lutosławski, Stockhausen, and Ligeti), quotation and collage (well represented by Berio and Rochberg), minimalism (with music by Glass, Reich, Andriessen, and others), post-modernism and neo-tonality (with many recent composers to chose from, including Corigliano, Kernis, Rouse, Danielpour, or Higdon), and the return to motivic expressionism (with possible examples by Adès, Thomas, Saariaho, or Knussen).

The Multiplicity of Styles in the Second Half of the Twentieth Century and Early Twenty-First Century

The chronological organization of topics that we have just outlined allows instructors and students to make some causal sense of the quick succession of compositional styles that takes place in the decades after World War II. Moreover, two essential attitudes toward the past can be seen underlying most of the major stylistic movements in post-tonal music, be it before or after World War II. One trend, which we can term modernist, strives toward creating new art with a projection toward the future, often explicitly seeking a break with the past. The other trend, which includes such styles as neoclassicism, quotation and collage, and post-modernism, establishes bridges with the past by engaging in a dialogue with artistic styles and forms from earlier historical periods. Thinking of the multiplicity of styles after 1945 in the light of these two general creative trends gives students an element of perspective, which allows them to navigate the experimental complexities of avant-garde composers in the 1950s and 60s.

The Lack of a Unified Methodology

This is one of the most common problems that face the instructor and students in a post-tonal course. While set theory (along with its extension, twelve-tone theory) provides a strong and unified methodology with which to study much of the pre-1945 atonal and serial repertoires, no such

methodology exists that can embrace the variety of compositional styles after 1945. This requires the adoption of several solutions to address this problem. In the first place, it helps to be aware of two large categories each of which can include various styles: motivic music, and spatial/registral music. Motivic composition is centered on motives. Motives are generated by collections, and collections can be studied by means of pitch-class sets. A set-theoretical study of motivic music can apply to such stylistically and chronologically diverse composers as Stravinsky, Schoenberg, Webern, Ruth Crawford Seeger, Babbitt, George Crumb, Rihm, Kernis, or Thomas. Spatial music, on the other hand, functions in a musical space in which register is an essential component. We can think of spatial music as moving or developing in space, and hence it functions in pitch space, not pitch-class space. Set theory is thus not suitable to analyze registral or sound mass music by composers such as Edgard Varèse, Ligeti, Penderecki, Lutosławski, or Stockhausen. Whatever analytical system we use for this music, it should represent register in a spatial context.

Secondly, we need to acknowledge and study *ad hoc* compositional techniques used by specific composers in specific pieces or groups of pieces. In other words, we need to be flexible in our use of analytical approaches that will reflect techniques peculiar to specific composers and pieces. Some of these *ad hoc* techniques include, for instance, multiplication as used by Boulez,[5] rotation as used by Stravinsky,[6] a variety of combinatorial arrays used by Babbitt,[7] net structures used by Ligeti,[8] ancient Indian *talas* used by Messiaen,[9] quotation and collage techniques used by composers such as Rochberg or Berio,[10] Elliott Carter's metric modulation,[11] and so on. Students have to be made aware of these

[5] See Stephen HEINEMANN, 'Pitch-Class Set Multiplication in Theory and Practice', *Music Theory Spectrum,* 20/1 (1998), pp. 72-96; and Catherine LOSADA, 'Complex Multiplication, Structure, and Process: Harmony and Form in Boulez's Structures II', *Music Theory Spectrum,* 36/1 (2014), pp. 86-120.

[6] See Claudio SPIES, 'Some Notes on Stravinsky's Requiem Settings', *Perspectives of New Music,* 5/2 (1967), pp. 98-123; and Joseph STRAUS, *Stravinsky's Late Music* (Cambridge, Cambridge University Press, 2001).

[7] See Andrew MEAD, *An Introduction to the Music of Milton Babbitt* (Princeton, Princeton University Press, 1994); and David HUSH, 'Asynordinate Twelve-Tone Structures: Milton Babbitt's Composition for Twelve Instruments', *Perspectives of New Music,* 21 (1982-3), pp. 152-205.

[8] Miguel A. ROIG-FRANCOLÍ, 'Harmonic and Formal Processes in Ligeti's Net-Structure Compositions', *Music Theory Spectrum,* 17/2 (1995), pp. 242-67.

[9] Julian L. HOOK, 'Rhythm in the Music of Messiaen: An Algebraic Study and an Application in the *Turangalîla Symphony*', *Music Theory Spectrum,* 20/1 (1998), pp. 97-120.

[10] David OSMOND-SMITH, *Playing on Words: A Guide to Luciano Berio's Sinfonia* (London, Royal Musical Association, 1985); Michael HICKS, 'Text, Music, and Meaning in the Third Movement of Luciano Berio's *Sinfonia*', *Perspectives of New Music,* 20 (1981-2), pp. 199-224; and Catherine LOSADA, 'Between Modernism and Postmodernism: Strands of Continuity in Collage Compositions by Rochberg, Berio, and Zimmerman', *Music Theory Spectrum,* 31/1 (2009), pp. 57-100.

[11] Jonathan BERNARD, 'The Evolution of Elliott Carter's Rhythmic Practice', *Perspectives of New Music,* 26/2 (1988), pp. 164-203; and David SCHIFF, *The Music of Elliott Carter* (Ithaca, Cornell University Press, 1998).

composers' individuality, of the fact that they invented and developed their own individual musical and compositional languages, and that as such they require analytical techniques appropriate to these languages that, very often, will not apply to music by other composers.

The Need to Rely on Existing Theoretical and Analytical Scholarship

Given the circumstances described in the previous points, reliance on existing published scholarship on post-1945 music is an essential pedagogical need. One cannot expect a single instructor to know firsthand about all the multiple compositional and theoretical systems developed and used by so many major composers in the twentieth century, particularly since 1945. Many books and articles have been published on the music of these composers, and knowing at least the essential analytical literature on music after 1945 enriches our teaching and the classroom experience of our students, helps us teach with better knowledge of the material we are teaching, and saves us endless amounts of time as we do not have to analyze the pieces we teach from scratch, as if reinventing the wheel. We can, rather, use the collective knowledge of so many previous scholars who have already done the work for all of us, and whose studies deserve our pedagogical attention. A sample of scholarly publications, which have an immediate pedagogical value in a course on post-1945 music, can be found in the selected bibliography at the end of this article.

The Need to Be Aware of the Interpretive and Generative Approaches to Analysis

In this context and as an extension of the previous point, being aware of the difference between generative and interpretive analysis is useful for both the instructor and the students of post-1945 music. The aim of *generative* analysis is to show how the composer actually composed a piece. That is, we try to understand how the piece was put together (how it was generated), and what the composer knew and applied when he or she put it together. In order to do this, we must know the compositional process used by that particular composer. Some composers have written extensively on their own work and compositional methods. This is the case, for instance, of Paul Hindemith, Olivier Messiaen, and Milton Babbitt.[12] In cases such as these, we can look at the information provided by the composer, and use it if

[12] See Paul HINDEMITH, *The Craft of Musical Composition*, vol. 1: *Theoretical Part*, translated by Arthur Mendel (New York, Associated Music, 1942-1945), and vol. 2: *Exercises in Two-Part Writing*, translated by Otto Ortmann (New York, Associated Music, 1941); Olivier MESSIAEN, *The Technique of my Musical Language,* translated by John Satterfield (Paris, Alphonse Leduc, 1956); and Stephen PELES, etc. (eds.), *The Collected Essays of Milton Babbitt* (Princeton, Princeton University Press, 2003).

it is pertinent to this composer's piece that we are analyzing.[13]

In many cases, however, we do not know the composer's intentions or method, and we do not know how the piece was put together. Rather than helping us understand what the composer was doing when he or she was composing a piece, the goal of analysis will then be to discover what is in the music, regardless of the composer's intentions. This is the type of analysis we call *interpretive*. That is, we study the score, and we interpret what we see in the music, the best we can and through whatever means are available to us. Our analysis is then an interpretation (with, perhaps, a good dose of subjectivity involved) by an 'outsider', so to speak.

Let us now focus more specifically on the different approaches to motivic and spatial music. The motive has been a unifying force in a lot of the post-tonal music repertoire, from Debussy, Stravinsky, Schoenberg and Webern, to such present-day composers as George Crumb, Thomas Adès, Kaija Saariaho, or Augusta Read Thomas. If upon studying a score we discover the presence of motivic organization of pitch-class materials, it is likely that a pitch-class set analysis may lead to an understanding of pitch and motive relationships in that composition. Pitch-class set analysis, however, presupposes octave equivalence. And octave equivalence neutralizes spatial or registral processes. If such processes do not appear to be essential to a composition, motivic analysis through pitch-class sets is perfectly justified.

Analysis: Thomas, *Spring Song*

Augusta Read Thomas's *Spring Song* (1995) presents a clear example of a recent piece in which motives are featured as an essential compositional element. The work is a free-flowing, rhapsodic piece for solo cello. Typically post-Romantic traits in this composition are its chromatic and motivic character, its improvisatory and rhapsodic nature, and its processes of formal growth in *fortspinnung* style. Changing meters and a variety of rhythmic groupings and figures contribute to the improvisatory, flowing character of this music. Formal relationships are motivic rather than sectional, and motives generate the clearly articulated phrases, which in turn generate the complete composition. Thomas's technique is indeed particularly Schoenbergian in her use of motivic variation as a means of formal growth.

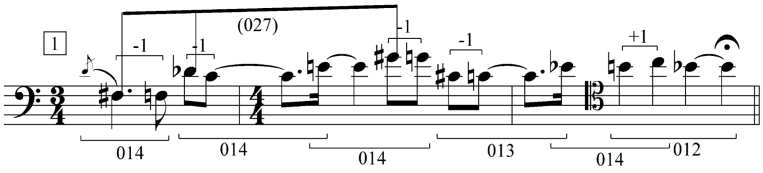
[13] Even in these cases of composers who have written about their music, an interpretation of their writings is very useful as a pedagogical link to the analysis of their music. From this perspective, see David NEUMEYER, *The Music of Paul Hindemith* (New Haven, Yale University Press, 1986); MEAD, *An Introduction to the Music of Milton Babbitt* (see note 7); Harry HALBREICH, *Olivier Messiaen* (Paris, Fayard - SACEM, 1980); and HOOK, 'Rhythm in the Music of Messiaen' (see note 9).

It will suffice to examine the opening two phrases (mm. 1-5) to verify the role of interval and motive as they both generate and provide unity to the music. Despite the brevity of phrases in this composition, each of them is a self-contained short formal unit with a clear beginning and a clear end marked by various ways of slowing down or stopping the motion, normally by means of a fermata, longer notes, or a ritardando. New phrases may also be marked with indications of expression (such as 'delicate and introverted') or by timbral and performance markings ('sul tasto, non vibrato').

Phrase 1 (mm. 1-3)

In just three measures, as shown in Example 1, phrase 1 establishes some of the essential compositional parameters of the piece. In the first place, we note the prominence of the melodic half step, particularly the very expressive, chromatic descending motion, <-1>. This motion appears four times in the phrase, plus a fifth time in ascending form, <+1>. The first three statements of the <-1> motive begin on pitch classes F♯, D♭, and G♯ respectively, which form the (027) [1, 6, 8] set class.

The prominence of the <-1> chromatic, dyadic motive suggests the next analytical step, which is to group the semitonal dyad with one of its adjacent pitch classes, to form a trichord. This exercise reveals that four of the six resulting trichords are members of the (014) set class, including the opening string of three (014) trichords, and the other two are of the (013) and (012) classes.[14] The three trichords can be generated by chromatic linear transformation in the network (014)→(013)→(012).



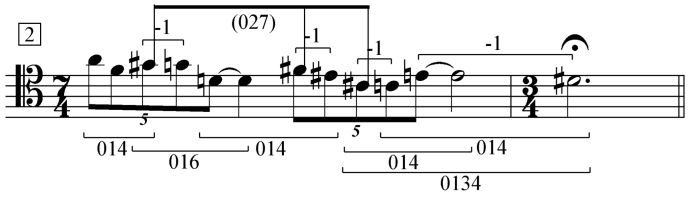
Example 1. Thomas, *Spring Song*, mm. 1-3

Phrase 2 (mm. 4-5)

Phrase 2, reproduced in Example 2, confirms the significance of the <-1> motion (which appears four times) and of the (014) trichord, which also appears four times. Here again, the first three statements of the <-1> motive begin on pitch classes G♯, F♯, C♯, outlining again the same (027) [1,6,8] set class that

[14] Note that as is usually the case with pitch-class set analyses, a variety of segmentations are possible. A different reading of this piece, based on different segmentations, might yield different and also convincing results. The focus in the present analysis is mostly on the half-step motive and the trichords it generates with adjacent notes.

we saw in mm. 1-2 (a relationship that can also be found linking beginning pitch classes of initial motives in some of the subsequent phrases). Two new elements introduced in this phrase are a prominent (016) motive in m. 4, and the tetrachord (0134) made up of two overlapping (014) trichords, which we hear as the closing melodic motion of the phrase, including two <-1> motions (the last of which involves the last two, long notes). In the two opening phrases we can also note the close motivic relationship between the different set classes we have identified. For instance, the (016) set in phrase 2, G♯-G-D, can be seen as a linear extension of the (014) from phrase 1 (m. 2) which also included the G♯-G dyad, E-G♯-G. The (013) in m. 3, C♯-C-E♭, on the other hand, is also a linear transformation of the (014) C♯-C-E in m. 4, which includes the same chromatic dyad C♯-C. Thomas places special emphasis on the particular C♯-C and G♯-G dyads throughout this opening passage.



Example 2. Thomas, *Spring Song*, mm. 4-5

This brief discussion shows that the compositional focus (as well as the main unifying element) of *Spring Song* is the motive and motivic associations. A central chromatic motive, <-1> or <+1>, is the element of cohesion for various trichords which include it.[15]

As we discussed above, as effective as pitch-class sets are for the study of motivic relationships, the method is not applicable to music in which register and space take on a structural role. In his book *The Music of Edgard Varèse*, Jonathan Bernard develops an analytical methodology for the music of Varèse which takes into account the proeminent role of spatial and registral aspects of this music.[16] In such a context, inversional and octave equivalence do not apply: pitches sound in a particular register, and create specific spatial intervallic relationships (and, often, symmetrical spatial structures) with other pitches. Studying this music in terms of pitch-class space rather than pitch space would amount to ignoring one of its most salient aspects (its spatial character). We will now examine a fragment from an

[15] A more complete analysis of a larger segment of this piece can be found in ROIG-FRANCOLÍ, *Understanding Post-Tonal Music* (see note 2), pp. 342-7.

[16] Jonathan BERNARD, *The Music of Edgard Varèse* (New Haven, Yale University Press, 1987).

eminently spatial composition, Krzysztof Penderecki's *St Luke Passion*, using some of the criteria developed by Bernard in his studies of Varèse.

Analysis: Penderecki, *St Luke Passion, no. 13, 'Et Surgens Omnis Multitudo'*

Penderecki's *St Luke Passion* (1965) is widely considered one of the choral masterpieces of the twentieth century. From an orchestral perspective, the Passion includes many of the experimental techniques that Penderecki (born in 1933) had developed in such orchestral works as *Anaklasis* (1960), *Threnody for the Victims of Hiroshima* (1960), and *Polymorphia* (1961). The variety and novelty of the vocal and choral techniques used in the Passion also have precedents in a number of vocal works from the same period. Considering, however, the highly experimental character of many of these instrumental and vocal techniques, the work's length (around 70 minutes), and the fact that it was composed for an occasion that would have seemed to herald a fairly traditional, probably even conservative, musical expression (the celebration of the seven-hundredth anniversary of the Cathedral of Münster, West Germany), it is remarkable that the Passion received immediate acclaim both from the public and the critics, and that it soon became a twentieth-century classic. In our study of movement 13 from this work and before discussing its spatial structure, we will first consider the text and dramatic action in this movement, the notational techniques used, and the compositional, instrumental, and vocal characteristics of each of the sections.[17]

The Text

Penderecki's text for the Passion draws on several sources. The main source is St Luke's Gospel. Other biblical sources include fragments from St John's Gospel, the Psalms, and the Lamentations of Jeremiah. Several non-biblical fragments include passages from liturgical hymns, and the sequence *Stabat Mater*. The complete work is to be performed in Latin.

The text for movement 13, which closes Part 1 of the Passion, is fully drawn from St Luke (23:1-22). The English translation of this fragment from Luke is as follows (the Latin words in brackets indicate the beginning of each significant section in the music):

[17] The main study of Penderecki's Passion is Roy ROBINSON and Allen WINOLD, *A Study of the Penderecki St Luke Passion* (Celle, Moeck Verlag, 1983).

> [Evangelist: *Et surgens*] And the whole multitude of them arose, and led him unto Pilate. And they began to accuse him, saying: [Chorus: *Hunc invenimus*] 'We found this fellow perverting the nation, and forbidding to give tribute to Caesar, saying that he himself is Christ a King'. [Pilate and Jesus: *Tu es rex*] 'Art thou the King of the Jews?' 'Thou sayest it'. 'I find no fault in this man'. [Evangelist: *Et remisit*] And he sent him to Herod. [Chorus: *Herodes autem*] Herod questioned with him in many words; but he answered him nothing. [Chorus: *Sprevit autem*] And Herod set him at nought, and mocked him, and arrayed him in a gorgeous robe, and sent him again to Pilate. And Pilate when he had called together the chief priests, said unto them: [Pilate: *Ecce nihil*] 'Nothing worthy of death is done unto him. I will therefore chastise him, and release him'. [Chorus: *Tolle hunc*] 'Away with this man, and release unto us Barabbas'. [Evangelist: *Iterum autem*] Pilate, therefore, willing to release Jesus, spake again to them. But they cried, saying: [Chorus: *Crucifige*] 'Crucify him, crucify him'. [Pilate: *Quid enim*] 'Why, what evil hath he done? I have found no cause of death in him'.

The passage has great interest from a dramatic point of view. The characters include the Evangelist (who recites some of the action in spoken form), Pilate (bass solo), Herod (who does not speak or sing), Jesus (baritone solo), and the crowd (represented by three SATB choruses). Dramatic tension is created by the opposition between the will of Pilate (who finds no fault in Jesus) and the will of the crowd (which accuses Jesus and wants him crucified), by the handing of Jesus back and forth between Pilate and Herod, and by the listener's knowledge that, in the end, Pilate will be too weak to follow his conscience and will give in to the wish of the crowd. The variety of dramatic situations allows for a variety of text delivery: the Evangelist speaks, Pilate and Jesus sing their dialogue, Pilate sings his statements, and the chorus speaks most of the text in several different ways, and actually sings on pitches in only two brief occasions: the exclamation '*Domine*' (Lord) after Jesus speaks (a word which is not part of Luke's text), and the final, forceful outbursts asking for Jesus's crucifixion.

Notational, Stylistic, and Compositional Elements

Penderecki's notational practices at the time he wrote the Passion require some clarification. In the first place, durational notation in the Passion includes two different systems. Some sections are notated in the traditional metric system, and then a time signature is provided (as in the 2/4 section beginning at 'ecce nihil'). In other sections, however, Penderecki uses what is known as proportional notation. Measures in this type of notation do not refer to metric units, but rather to time spans of a durational length indicated proportionately by the spatial length on the score. The section that opens the movement is written using proportional notation (mm. 1-13).

Some pitch events are also notated by means of non-conventional symbols. A solid black triangle pointing upward (mm. 2-3) indicates the highest note on the instrument, while the same triangle pointing downward (trombones, mm. 24-8) means the lowest note on the instrument. Clusters may be fully notated, as in the string cluster in mm. 4-9, or indicated by means of continuous black bands, as in mm. 45-8. Both of these clusters, moreover, are microtonal. That is, they include quarter-tone accidentals for which special quarter-tone symbols are used. A straight line after a note head indicates that the note must be sustained. A line slanted upward or downward indicates a glissando. The violas in m. 5 and the trumpets in m. 19 perform quick glissandi, while the voices in mm. 10-2 are required to perform slow-moving slides. Dots on a line, as in the trombones in mm. 24-9, indicate the repetition of a note as fast as possible for the duration of the line. Finally, the symbol in cellos and double basses in m. 20 refers to an arpeggio on four strings between the bridge and the tailpiece (that is, indeterminate pitches or sounds will result).

The main compositional elements in this movement are clusters (blocks of sound made up of adjacent chromatic or microtonal steps) and sound masses. In sound-mass composition, or textural composition, individual pitches and lines are integrated into complexes of sound ('sound masses'), which Penderecki often realizes as clusters. In sound masses we do not perceive individual pitches, but rather chromatically-filled complexes of sound. Two particular types of clusters in Penderecki's *Passion* deserve attention. In the first type, the cluster is built progressively beginning on one pitch and adding pitches one by one, as in the cellos and double basses in m. 4. We will refer to this type of cluster as a wedge cluster. In another type of cluster all voices first begin on the same pitch, and then slide progressively to different pitches that will form the cluster. This event, which we will call a sliding cluster, can be heard in the choruses in mm. 10-2. Sound masses are not necessarily made up of clusters. They may be made up of indeterminate pitch groups, as in the passages by the low strings and the trombones and tuba in mm. 21-8, or they may be made up of spoken sounds in a large choral group, as in the choral passage in the same measures (21-8).

Various different techniques are used by Penderecki in his vocal writing. In m. 13 we can hear the Evangelist speaking freely. In the section after m. 24, on the other hand, we hear the chorus repeating spoken phrases in rhythm, and again in m. 46, the tenors speak their text in rhythm. In mm. 50 and following the tenors deliver their text in *Sprechstimme* (as indicated by the cross note heads), a technique which lays between speech and song (the text is 'spoken on a pitch'). Finally, some of the passages by both the soloists and the choruses are sung in the usual way (the 'Domine' passage in mm. 36-8, or the dialogue between the bass and the baritone soloists in mm. 32-44).

A Spatial and Registral Analysis of the Movement's Introduction

The main defining characteristics of sound masses and clusters are their density, width, register, and timbre. These are all elements that function in musical space. That is, we can imagine a three-dimensional space in which sound masses exist and are transformed. We will picture such space by means of the type of bi-dimensional graph shown in Example 3. The vertical axis of the grid in this example represents pitch, going from lowest at the bottom to highest at the top. Each square equals one semitone, and octaves are indicated by their usual numerical labels (C4 equals middle C). Time is read from left to right on the horizontal axis, which, however, has no constant value (that is, length in the horizontal axis does not indicate proportional duration in the actual music).[18] In his spatial analyses of Varèse's music, Jonathan Bernard uses the term 'projection' to refer to the transference of a structure (a pitch, an interval, a complex of pitches, etc.) to a new pitch/registral level. The same concept will be useful in our study of Penderecki's spatial processes.

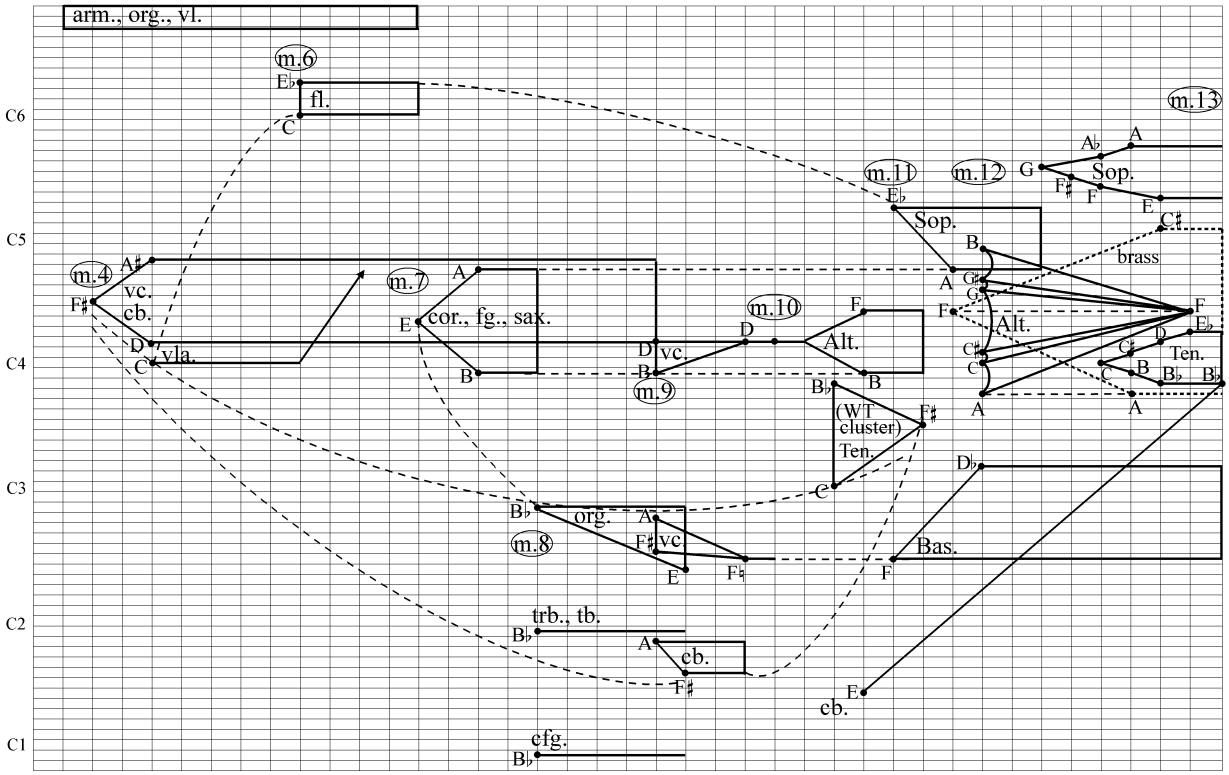
We will now analyze the spatial relationships in the movement's opening section (mm. 1-12, the introductory section leading to the Evangelist's recitation beginning in m. 13), as represented in Example 3. Measure numbers are indicated with circles within the graph.

mm. 1-9

The movement begins with a high-register cluster of indeterminate pitches (the five 'highest notes' in the harmonium and organ, and the 'highest note' in the violins). In mm. 4-5 a microtonal wedge cluster is built in the cellos and double basses. Two additive processes begin simultaneously at F♯4, upward in the cellos and downward in the basses). The cluster's maximum width is reached at the end of m. 4 (from a D4 raised a quarter tone to an A4 raised three quarter tones), at which point the violas play slides beginning on C4 (a tritone away from F♯4). The cluster of cellos and double basses creates a sound band all the way to the end of m. 9, and occupies the central register space. The tritone F♯-C, moreover, takes on an essential role (through projection) in the subsequent registral expansion. The first projection to the upper register takes place in m. 6, where the C4 from the violas is projected up two octaves to C6, generating a cluster in the flutes with a width of a m3 (C6-E♭6). This opening of the

[18] This type of spatial grid graph was first used by Robert COGAN and Pozzi ESCOT in *Sonic Design: The Nature of Sound and Music* (Englewood Cliffs - New Jersey, Prentice-Hall, 1976), and then adopted by Jonathan Bernard in his studies of Varèse's music, and later to represent spatial relationships in the music of Ligeti and Bartók. To consult Bernard's use of this graphic technique, see his article 'Pitch/Register in the Music of Edgard Varèse', *Music Theory Spectrum,* 3 (1981), pp. 1-25, and his book *The Music of Edgard Varèse* (New Haven, Yale University Press, 1987).

upper register is balanced by the opening of the lowest register in this section in m. 9, now by projection of F♯ three octaves lower (from F♯4 to F♯1). F♯1 now becomes the lowest pitch for a cluster in the double basses, also with a width of a m3 (F♯1-A1).



Example 3. Penderecki, *St. Luke Passion*, movement 13, mm. 1-12, spatial reduction

Two subsidiary clusters are built by wedge motions in mm. 7 and 8. In m. 7, a cluster begins at E4 in the horns, bassoons, and saxophones, and opens in wedge motion up and down a P4, to A4 and B3 respectively. A tritone-projection of E4 to B♭2 in m. 8 begins a new wedge cluster in the organ, now opening to the tritone width E2-B♭2. B♭2, moreover, is replicated an octave lower as a B♭1 pedal in the trombones and tuba and, sounding yet an octave lower, in the contrabassoon, the lowest pitch of the whole passage. This opening instrumental passage concludes with two symmetrical sliding clusters in the cellos beginning in m. 9. Both clusters begin with a width of a m3 (F♯-A, microtonally inflected, in the lower cellos, and B-D in the upper cellos), and both converge by sliding motion on single pitches, F2 and D4 respectively (again related by m3). Notice that the D4 in the upper cellos is a continuation of the D4 that we find at the lower boundary of the opening wedge cluster (m. 4).

mm. 10-2

The closing passage of the introduction begins with the entrances of the three choruses in m. 10. A complex pattern of sliding clusters emerges in the following three measures. The altos begin on D4 (continued from the cellos in m. 9), and slide into a tritone cluster, B3-F4), thus restoring again and for the third time the role of B3 as the lower pitch of a mid-register cluster. The tenors perform a closing sliding cluster, beginning with a whole-tone cluster with C3-B♭3 boundaries, and converging onto F♯3 (a tritone away from C3). This cluster restores the registral significance of F♯-F♯3 is an octave projection of the F♯4 that opens the cello/double bass wedge cluster at m. 4. We can also think of this F♯3 as a two-octave projection of F♯1 from the low-register cluster in m. 9. Similarly, an octave projection of the highest pitch in the high-register cluster in m. 6, E♭6, opens the soprano sliding cluster in m. 11 at E♭5. The width of this soprano cluster is A4-E♭5, a tritone. The lower boundary of this cluster, A4, restores the role of this pitch as a cluster boundary (it was the high boundary of the cluster in m. 7). To complete the clusters in all four voice types, the basses begin their own sliding cluster in m. 11 at F2, the same pitch that closed the previous instrumental section in the low cellos.

The final gesture in this section (m. 12) includes four pitch events in the altos, sopranos, tenors, and brass instruments respectively. The central events are two contrary wedge motions taking place in the same register in the altos and brass instruments. The altos begin with a complex symmetrical sonority (not a cluster): A3-C4-C♯4-G4-G♯4-B4, in which a central tritone, C♯4-G4, is framed by minor thirds below and above (A3-C4 and G♯4-B4 respectively). All of these voices slide and converge on F4, creating a closing wedge motion. The brass instruments, on the other hand, perform an opening wedge cluster beginning at F4, and opening to A3-C♯4. The designs of these two pitch groups (altos and brass) are thus complementary and symmetrical from a spatial/registral point of view. Two subsidiary and parallel wedge clusters take place in the sopranos and tenors in m. 12, from G5 opening to the perfect fourth E5-A5 in the sopranos, and from C4 opening to the perfect fourth B♭3-E♭4 in the tenors.

Throughout this final passage in mm. 10-2, a slow glissando in the double basses moves from E1 to B♭3. E1 is not only the lowest pitch in the section other than the contrabassoon's B♭0 in m. 8, but it is equidistant by tritone from the B♭0 and B♭1 pedals in m. 8. The glissando, moreover, covers a compound tritone span from E1 to B♭3, thus connecting the low and middle registers through one of the structural intervals in this section, the tritone (the other structural interval is the m3, which determines so many of the intervallic relationships in the section). A brief extension of the brass cluster into m. 13 functions as a connection with the next section, in which the Evangelist begins reciting the

text for the movement, and the altos sing their lowest possible note (again a cluster of indeterminate pitches in a lower register, which balances the initial cluster of indeterminate pitches in a high register).

Conclusions

The graphic analysis in Example 3 helps us understand the compositional architecture underlying this passage. Sound masses and clusters (the main compositional elements in the section) are used in a coherent way, and we have noticed not only the existence of structural intervals (the m3, the TT, and to a lesser extent, the P4), but also that different passages and clusters are connected among themselves by projection of pitches or intervals, by symmetrical and balanced spatial designs, and by restoration of pitch registers which had already been established in previous pitch events.

The analysis of music can be considered a phenomenological endeavor. Our perception of music leads to subjective judgments and interpretations and to emotional responses (in simplistic terms, our 'liking' or 'not liking' a particular piece of music). In our analyses, on the other hand, we attempt to create objective conditions for our understanding of that music. In other words, we attempt to experience music at a level of consciousness that transcends our subjective perception of that music. In the absence of a historical and social context, however, this experience would seem to be devoid of the ground on which to rest. And the historical context by itself, without a consciousness of the structures underlying the music, would seem to lack the possible conceptual depth provided by objective understanding. Or, using Lourenço's succinct formulation again, 'history without phenomenology is blind, and phenomenology without history is empty'. In this article I have attempted to provide a pedagogical framework for the organization and presentation of a course in post-1945 analysis, in a way that brings together the phenomenological understanding of music as an objective entity on the one hand, and the historical and social contexts needed to provide the necessary perspective to our conceptual understanding of a musical work on the other.

References

ADLINGTON, Robert, *Louis Andriessen: De Staat* (Burlington - VT, Ashgate, 2004)

BABBITT, Milton, 'Who Cares if You Listen?', *High Fidelity,* 8/2 (1958), pp. 38-40, 126-7

BASS, Richard, 'Sets, Scales, and Symmetries: The Pitch-Structural Basis of George Crumb's *Makrokosmos* I and II', *Music Theory Spectrum,* 13/1 (1991), pp. 1-20

BERNARD, Jonathan, 'Pitch/Register in the Music of Edgard Varèse', *Music Theory Spectrum,* 3 (1981), pp. 1-25

BERNARD, Jonathan, 'Inaudible Structures, Audible Music: Ligeti's Problem, and His Solution', *Music Analysis,* 6 (1987), pp. 207-36

BERNARD, Jonathan, *The Music of Edgard Varèse* (New Haven, Yale University Press, 1987)

BERNARD, Jonathan, 'The Evolution of Elliott Carter's Rhythmic Practice', *Perspectives of New Music,* 26/2 (1988), pp. 164-203

BERNARD, Jonathan, 'The Minimalist Aesthetic in the Plastic Arts and in Music', *Perspectives of New Music,* 31 (1993), pp. 86-132

BERNARD, Jonathan, 'Problems of Pitch Structure in Elliott Carter's First and Second String Quartets', *Journal of Music Theory,* 37 (1993), pp. 231-66

BERNARD, Jonathan, 'Voice Leading as a Spatial Function in the Music of Ligeti', *Music Analysis,* 13 (1994), pp. 227-53

BERNARD, Jonathan, 'Theory, Analysis, and the "Problem" of Minimal Music', *Concert Music, Rock, and Jazz since 1945: Essays and Analytical Studies*, edited by Elizabeth West Marvin and Richard Hermann (Rochester, Rochester University Press, 1995), pp. 259-84

BERNARD, Jonathan, 'Ligeti's Restoration of Interval and Its Significance for His Later Works', *Music Theory Spectrum,* 21/1 (1999), pp. 1-31

BRODY, Martin, "'Music for the Masses": Milton Babbitt's Cold War Music Theory', *Musical Quarterly,* 77/2 (1993), pp. 161-92

CAGE, John, *Silence* (Middletown - CT, Wesleyan University Press, 1961)

CAGE, John, *A Year from Monday* (Middletown - CT, Wesleyan University Press, 1967)

CLENDINNING, Jane, 'The Pattern-Meccanico Compositions of György Ligeti', *Perspectives of New Music,* 31 (1993), pp. 192-234

CLENDINNING, Jane, 'Structural Factors in the Microcanonic Compositions of György Ligeti', *Concert Music, Rock, and Jazz since 1945: Essays and Analytical Studies*, edited by Elizabeth West Marvin and Richard Hermann (Rochester, Rochester University Press, 1995), pp. 229-56

COGAN, Robert, *New Images of Musical Sound* (Cambridge - MA, Harvard University Press, 1984)

COGAN, Robert, and Pozzi ESCOT, *Sonic Design: The Nature of Sound and Music* (Englewood Cliffs - NJ, Prentice-Hall, 1976)

COHN, Richard, 'Transpositional Combination of Beat-Class Sets in Steve Reich's Phase-Shifting Music', *Perspectives of New Music,* 30/2 (1992), pp. 146-77

COPE, David, *New Directions in Music* (Prospect Heights - IL, Waveland Press, 2001[7])

DEMBSKI, Stephen and Josep STRAUS (eds.), *Milton Babbitt: Words about Music* (Madison, University of Wisconsin Press, 1987)

DODGE, Charles, and Thomas A. JERSE, *Computer Music: Synthesis, Composition, and Performance* (New York, Schirmer, 1997[2])

EPSTEIN, Paul, 'Pattern Structure and Process in Steve Reich's *Piano Phase*', *The Musical Quarterly,* 72/4 (1986), pp. 494-502

EVERETT, Yayoi Uno, *The Music of Louis Andriessen* (Cambridge: Cambridge University Press, 2006)

FINEBERG, Joshua, 'Sculpting Sound: An Introduction to the Spectral Movement - Its Ideas, Techniques and Music' (DMA dissertation, Columbia University, 1999), published as 'Guide to the Basic Concepts and Techniques of Spectral Music', *Contemporary Music Review,* 19/2 (2000), pp. 81-114

FINEBERG, Joshua (ed.), *Spectral Music*. *Contemporary Music Review,* 19/2-3 (2000)

HALBREICH, Harry, *Olivier Messiaen* (Paris, Fayard - SACEM, 1980)

HARVEY, Jonathan, *The Music of Stockhausen* (Berkeley, University of California Press, 1975)

HASKINS, Rob, *John Cage* (London, Reaktion Books, 2012)

HELMUTH, Mara, 'Multidimensional Representation of Electroacoustic Music', *Journal of New Music Research,* 25 (1996), pp. 77-103

HELMUTH, Mara, 'Barry Truax's *Riverrun* for 8-Channel Tape', *Analytical Methods of Electroacoustic Music*, edited by Mary Simoni (Oxford, Routledge, an Imprint of Taylor & Francis, Inc.), forthcoming

HEINEMANN, Stephen, 'Pitch-Class Set Multiplication in Boulez's *Le Marteau sans maître*' (DMA dissertation, University of Washington, 1993)

HEINEMANN, Stephen, 'Pitch-Class Set Multiplication in Theory and Practice', *Music Theory Spectrum,* 20/1 (1998), pp. 72-96

HICKS, Michael, 'Text, Music, and Meaning in the Third Movement of Luciano Berio's *Sinfonia*', *Perspectives of New Music,* 20 (1981-2), pp. 199-224

HICKS, Michael, 'The New Quotation: Its Origins and Functions' (DMA dissertation, University of Illinois, 1984)

HICKS, Michael, 'Interval and Form in Ligeti's *Continuum* and *Coulée*', *Perspectives of New Music,* 31 (1993), pp. 172-90

HILLIER, Paul, *Arvo Pärt* (Oxford, Oxford University Press, 1997)

HOOK, Julian L., 'Rhythm in the Music of Messiaen: An Algebraic Study and an Application in the *Turangalîla Symphony*', *Music Theory Spectrum,* 20/1 (1998), pp. 97-120

HUSH, David, 'Asynordinate Twelve-Tone Structures: Milton Babbitt's Composition for Twelve Instruments', *Perspectives of New Music,* 21 (1982-3), pp. 152-205

JANIK, Allan, and Stephen TOULMIN, *Wittgenstein's Vienna* (New York, Simon and Schuster, 1973)

JOHNSON, Robert Sherlaw, *Messiaen* (London, Dent, 1989)

JOHNSON, Timothy, 'Harmonic Vocabulary in the Music of John Adams: A Hierarchical Approach', *Journal of Music Theory,* 37/1 (1993), pp. 117-56

KOHL, Jerome, 'Serial Composition, Serial Form, and Process in Karlheinz Stockhausen's *Telemusik*', edited by Thomas Licata, *Electroacoustic Music: Analytical Perspectives* (Westport - CT, Greenwood Press, 2002, pp. 91-118)

KOBLYAKOV, Lev, *Pierre Boulez: A World of Harmony* (New York, Harwood Academic Publishers, 1990)

KRAMER, Jonathan, *The Time of Music* (New York, Schirmer, 1988)

KRAMER, Jonathan, 'Beyond Unity: Toward an Understanding of Musical Postmodernism', *Concert Music, Rock, and Jazz since 1945: Essays and Analytical Studies*, edited by Elizabeth West Marvin and Richard Hermann (Rochester, University of Rochester Press, 1995), pp. 11-33

LAUGESEN, Emily Snyder, 'Construing Text as Music in Berio's *Thema (Omaggio a Joyce)* and Stockhausen's *Stimmung'* (Ph.D. dissertation, Columbia University, 2003)

LEWIN, David, 'A Way into Schoenberg's Opus 15, Number 7', *In Theory Only,* 6/1 (1981), pp. 3-24

LIGETI, György, 'Pierre Boulez: Decision and Automatism in *Structure Ia*', *Die Reihe,* 4 (1960), pp. 36-62

LOSADA, Catherine, 'A Theoretical Model for the Analysis of *Collage* in Music Derived from Selected Works by Berio, Zimmermann and Rochberg' (Ph.D. dissertation, City University of New York, 2004)

LOSADA, Catherine, 'Between Modernism and Postmodernism: Strands of Continuity in Collage Compositions by Rochberg, Berio, and Zimmerman', *Music Theory Spectrum,* 31/1 (2009), pp. 57-100

LOSADA, Catherine, 'Complex Multiplication, Structure, and Process: Harmony and Form in Boulez's Structures II', *Music Theory Spectrum,* 36/1 (2014), pp. 86-120

LOURENÇO, Eduardo, *Tempo da música, música do tempo* (Lisboa, Gradiva, 2012)

LUKOMSKY, Vera, 'Sofia Gubaidulina: "My Desire is Always to Rebel, to Swim against the Stream"', *Perspectives of New Music,* 36 (1998), pp. 5-35

MACONIE, Robin, *The Works of Karlheinz Stockhausen* (Oxford, Clarendon Press, 1990)

MARTINO, Donald, 'The Source Set and Its Aggregate Formations', *Journal of Music Theory,* 5/2 (1961), pp. 224-73.

MEAD, Andrew, 'Pitch Structure in Elliott Carter's *String Quarter No. 3*', *Perspectives of New Music,* 22/1 (1983), pp. 31-60

MEAD, Andrew, *An Introduction to the Music of Milton Babbitt* (Princeton, Princeton University Press, 1994)

MEAD, Andrew, 'Twelve-Tone Composition and the Music of Elliott Carter', *Concert Music, Rock, and Jazz since 1945: Essays and Analytical Studies*, edited by Elizabeth West Marvin and Richard Hermann (Rochester - NY, University of Rochester Press, 1995), pp. 67-102

MESSIAEN, Olivier, *The Technique of My Musical Language,* translated by John Satterfield (Paris, Alphonse Leduc, 1956)

MORGAN, Robert, *Anthology of Twentieth-Century Music* (New York, Norton, 1992)

MORGAN, Robert, 'The Modern Age', *Modern Times: From World War I to the Present*, edited by Robert Morgan (Englewood Cliffs, Prentice Hall, 1993, pp. 1-32)

MORRIS, Robert, and Brian ALEGANT, 'The Even Partitions in Twelve-Tone Music', *Music Theory Spectrum,* 10 (1988), pp. 74-101

MORRIS, Robert, *Composition with Pitch-Classes: A Theory of Compositional Design* (New Haven, Yale University Press, 1987)

MORRIS, Robert, *Class Notes For Atonal Music Theory* (Hanover - NH, Frog Peak Music, 1991)

NYMAN, Michael, *Experimental Music: Cage and Beyond* (New York, Schirmer, 1974)

OSMOND-SMITH, David, *Playing on Words: A Guide to Luciano Berio's Sinfonia* (London, Royal Musical Association, 1985)

PELES, Stephen etc. (eds.), *The Collected Essays of Milton Babbitt* (Princeton, Princeton University Press, 2003)

POTTER, Keith, *Four Musical Minimalists* (Cambridge, Cambridge University Press, 2000)

PRITCHETT, James, *The Music of John Cage* (Cambridge, Cambridge University Press, 1993)

RAE, Charles Bodman, *The Music of Lutosławski* (London, Faber and Fager, 1994)

RAHN, John, *Basic Atonal Theory* (New York, Schirmer, 1980)

REICH, Steve, *Writings about Music* (Halifax, The Press of the Nova Scotia College of Art and Design, 1974)

ROCHBERG, George, Liner notes to LP 'String Quartet no. 3' by the Concord String Quartet (Nonesuch Records, H71283, 1973)

ROEDER, John, 'Beat-Class Modulation in Steve Reich's Music', *Music Theory Spectrum,* 25/2 (2003), pp. 275-304

ROEDER, John, 'Toward the Analysis of Postmodern Music: Cooperating Continuities in Compositions of Thomas Adès', *Music Analysis*, forthcoming.

ROIG-FRANCOLÍ, Miguel, 'Harmonic and Formal Processes in Ligeti's Net-Structure Compositions', *Music Theory Spectrum,* 17/2 (1995), pp. 242-67

ROIG-FRANCOLÍ, Miguel, *Understanding Post-Tonal Music* (New York, McGraw-Hill, 2008)

ROIG-FRANCOLÍ, Miguel, *Anthology of Post-Tonal Music* (New York, McGraw-Hill, 2008)

ROSE, François, 'Introduction to the Pitch Organization of French Spectral Music', *Perspectives of New Music,* 34/2 (1996), pp. 6-39

SCHIFF, David, *The Music of Elliott Carter* (Ithaca - NY, Cornell University Press, 1998)

SCHWARTZ, Elliott, and Daniel GODFREY, *Music since 1945: Issues, Materials, and Literature* (New York, Schirmer, 1993)

SCHWARZ, K. Robert, *Minimalism* (London, Phaidon Press, 1996)

SPIES, Claudio, 'Some Notes on Stravinsky's Requiem Settings', *Perspectives of New Music,* 5/2 (1967), pp. 98-123, reprinted in *Perspectives on Schoenberg and Stravinsky,* edited by Benjamin Boretz and Edward Cone (Princeton, Princeton University Press, 1968), pp. 223-50

STARR, Daniel, and Robert Morris, 'A General Theory of Combinatoriality and the Aggregate', *Perspectives of New Music,* 16/1 (1977-8), pp. 364-89, and 16/2, pp. 50-84

STOCKHAUSEN, Karlheinz, 'Momentform', *Texte zur elektronischen un instrumentales Musik*, vol. 1 (Cologne, DuMont, 1963), pp. 189-210

STONE, Else, and Kurt STONE (eds.), *The Writings of Elliott Carter* (Bloomington, Indiana University Press, 1977)

STRAUS, Joseph, *Introduction to Post-Tonal Theory* (Upper Saddle River - NJ, Pearson - Prentice Hall, 2005[3])

STRAUS, Joseph, *Stravinsky's Late Music* (Cambridge, Cambridge University Press, 2001)

STUCKY, Steven, *Lutosławski and Tis Music* (Cambridge, Cambridge University Press, 1981)

TRAVERS, Aaron, 'Interval Cycles, Their Permutations and Generative Properties in Thomas Adès's *Asyla*' (Ph.D. diss., University of Rochester, 2005)

TROCHIMCZYK, Maja (ed.), *The Music of Louis Andriessen* (New York, Routledge, 2002)

WENNERSTROM, Mary, *Anthology of Twentieth-Century Music* (Englewood Cliffs - NJ, Prentice Hall, 1988)

WESTERGAARD, Peter, 'Some Problems Raised by the Rhythmic Procedures in Milton Babbitt's Composition for Twelve Instruments', *Perspectives of New Music,* 4 (1965), pp. 109-18

WUORINEN, Charles, *Simple Composition* (New York, Longman, 1979)

Miguel A. Roig-Francolí, Distinguished Teaching Professor of Music Theory and Composition at the University of Cincinnati, has been recognized internationally for his work as a music theorist, composer, musicologist, and pedagogue. He is the author of *Harmony in Context* and *Understanding Post-Tonal Music*, as well as over twenty articles published in leading scholarly journals in the USA and Europe. His compositions have been widely performed in Spain, England, Germany, Mexico, Italy, Switzerland, Colombia, France, and the U.S.

Recebido em | *Received* 27/01/2016
Aceite em | *Accepted* 01/03/2016