

A THEORETICAL AND PERFORMANCE ANALYSIS OF TWO  
WORKS FOR SAXOPHONE QUARTET: *XA2* BY IANNIS  
XENAKIS AND *RASCH* BY FRANCO DONATONI

By

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A LECTURE-DOCUMENT

Presented to the School of Music and Dance of the University of Oregon  
in partial fulfillment of the requirements for the degree of  
Doctor of Musical Arts in Music Performance

August 2013

## ACKNOWLEDGEMENTS

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I would like to thank my advisor, Dr. Idit Shner, for her unending support and guidance through the process of completing this document and during my time at the University of Oregon. I wish to thank my committee members, Dr. Steve Vacchi and Dr. Jack Boss for their invaluable insight and suggestions throughout the writing and editing processes.

I would like to thank my parents for their selflessness and words of encouragement throughout my entire music career. Finally I must thank my close friends Dr. Javier Rodriguez, Mr. Mark Rockwood, and Ms. Rianna Cohen for their collaboration and support throughout the last four years.

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# CHAPTER ONE

## INTRODUCTION

This project sought to gain a greater understanding of *XAZ* by Iannis Xenakis (1987) and *Rasch* by Franco Donatoni (1990) through a combination of performance-based and theoretical perspectives. In studying the techniques used by the composer, I searched for a unifying logic that gives greater insight into the work as a whole. It is my hope that my research will continue to foster an appreciation for the saxophone quartet as a performance medium. The dedication of academia to the performance of chamber music is commendable, but academic discussion of chamber music is less prevalent. The scholarly community could enhance the viability and popularity of this music, its creators, and its proponents through study and publication. To that end, fusing the two disciplines of theory and performance within one project will encourage scholars to combine their research in a collaborative effort.

### Selection of Repertoire

These two pieces for saxophone quartet were written within three years of one another and stand as examples of late 20<sup>th</sup> century chamber music written for the saxophone. Each of these works, *Rasch* and *XAZ*, were written for the Raschèr Saxophone Quartet and thus carry titles that relate to the name of the instrument and quartet. While *XAZ* is a clear mirror image of the last name of the instrument's inventor, Adolphe Sax, it is also an anagram of the composer's last name, **XanAkiS**. Similarly

while the word *rasch* means quick or quickly in German, the Italian composer clearly titled his work as homage to the ensemble's founder, Sigurd Raschér. In addition, both Xenakis and Donatoni utilize a post-tonal compositional language. The composers also share similarities in pre-compositional process: each makes certain decisions prior to writing the piece, and follow this framework which informs the choices available to him when composing.

The modern performer's selection of repertoire from the late 20<sup>th</sup> century stretches across the borders of narrow compositional niches; as do the analytical techniques used to describe this music. The variety of contemporary repertoire available for saxophone quartet is similarly diverse. Two saxophone quartets from the last 25 years, *XA2* by Iannis Xenakis and *Rasch* by Franco Donatoni, add to the richness of musical material available for the medium of saxophone quartet through use of timbre, rhythmic intricacy, and melodic and harmonic fragmentation.

### **Biographical Sketches of the Composers**

Franco Donatoni (1927-2000) was an Italian composer of exceptional chamber music, both in aesthetic quality and the process behind his method of composition. In *Rasch*, a saxophone quartet written in 1990, Donatoni utilizes compositional processes in a new way while challenging the players with his individual brand of rhythm and composite structure. *Rasch* explores post-tonal technique composition by combining two schools of 20<sup>th</sup> century analytical thought: 12-tone technique and Allen Forte's set theory.

Donatoni's search for his compositional voice led him to experiment with several styles.<sup>1</sup> In the early 1950s Donatoni met Bruno Maderna, who suggested he study the works of Mahler, Schoenberg and Webern. Shortly after, Donatoni attended the 1954 summer course for composition in Darmstadt and was exposed to the music of Stockhausen, Boulez, and Cage. Through the late 1950s and 1960s, Donatoni continued this process by transforming fragments of previously composed material in order to create a compositional logic. In the middle of the 1970's Donatoni battled depression<sup>2</sup>; believing he could no longer continue in composition, he decided to become a copyist instead. Despite this, in 1977 he began to take on a few composition students. A compositional focus on chamber music freed Donatoni from the massive orchestral works he had written previously. The period from 1977 until his death, his most prolific, is known as his *joyous* period.<sup>3</sup> Franco Donatoni's *Rasch* for saxophone quartet exemplifies the stylistic change evident in the composer's output from the last twenty years of his life.

Iannis Xenakis (1922-2001) championed a new wave of concepts in music, largely influenced by his studies in architecture, mathematics, and physics.<sup>4</sup> Less confined by the strictures of traditional pitch and harmonic relationships, rhythmic patterns, and conventional instrumental sound models, Xenakis focused on the articulation of form "based on the juxtaposition or superimposition of predefined

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<sup>1</sup> David Osmond-Smith. "Donatoni, Franco." *The New Grove Dictionary of Music and Musicians*. Edited by Stanley Sadie and J. Tyrrell. London: McMillan, 2001. vii: 460-464.

<sup>2</sup> Bradley David Decker. *Preserving the fragment: techniques and traits of Franco Donatoni's joyous period (1977 to 2000)*. Thesis (D.M.A.)--University of Illinois at Urbana-Champaign, 2006.

<sup>3</sup> "Who's Pulling the Strings? Michael Gorodecki Introduces the Music of Franco Donatoni". *The Musical Times*. 134/1803 (1993): 246-251.

<sup>4</sup> Gibson, Benoît. 2011. *The instrumental music of Iannis Xenakis: theory, practice, self-borrowing*. Hillsdale, NY: Pendragon Press. xvii.

textures.”<sup>5</sup> Xenakis’s musical output began with a series of Bartókian folk-inspired solo piano pieces, most of which were unpublished during the composer’s lifetime.<sup>6</sup> Shortly after, he began to experiment with other sonic possibilities including voice, strings, and orchestra in *Metastaseis* from 1953. Inspired by the array of sounds available from the entire orchestra, Xenakis began to explore the concept of *sound composition*. Through his study of the acoustics of sound, Xenakis created a concept of musical events as dictated by controlling independent parameters such as pitch, rhythm, and timbre. This approach rejected traditional polyphonic part writing in favor of large-scale features as a function of compositional process.

Iannis Xenakis’s 1987 work *XAZ* for saxophone quartet features sonorities taken from the tonal traditions, as well as from a more contemporary sound world. There are moments of complete rhythmic chaos: four independent voices, each in its own sound world completely detached from the rest of the ensemble. Other moments stun the listener when all voices play in absolute unison, creating the sensation of temporarily freezing the motion of time and space. This intense focus on the properties of sound within established musical contexts was a continuous theme throughout Xenakis's entire compositional career.

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<sup>5</sup> Ibid, 3.

<sup>6</sup> Hoffmann, Peter. “Xenakis, Iannis.” *The New Grove Dictionary of Music and Musicians*. Ed. Sadie, Stanley. New York: Grove’s Dictionaries, 2001.

## Available Literature

The available scholarly literature on the subject of *Rasch* and *XAZ* is significantly lacking. Brief program information is available through liner notes found in the recordings of the Raschèr Quartet, Habañera Quartet, and XASAX.<sup>7</sup> There is little information about the pieces relating to performance or theoretical research. With respect to *Rasch*, Susan Fancher authored an article in the *Saxophone Journal* in 2002 that detailed the general formal sections of the piece and labeled these sections by description of their sonic events.<sup>8</sup> In the article there was little discussion with respect to the compositional process and only limited information about required skill level and performance-related considerations.

Similarly, aside from general biographical knowledge of Xenakis himself, there is not much scholarly output related to *XAZ*. One theoretical analysis of this piece from Athanasios Zervas comes from a paper given at the 2005 International Symposium devoted to the performance and analysis of the work of Iannis Xenakis.<sup>9</sup> This particular analysis focuses on the topic of sieves, which Xenakis described as an unequal division of pitch material by which he could conceive of a compositional framework. This research is closely related to Forte's concept of pitch-class set analysis. Zervas includes a small passage about Xenakis's use of range and timbre as it relates to the extreme

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<sup>7</sup> See bibliography for a detailed listing of all recordings and musical scores.

<sup>8</sup> Susan Laverne Fancher. 2002. "Franco Donatoni's *Rasch* for saxophone quartet". *Saxophone Journal*. 26 (5): 17-18.

<sup>9</sup> Athanasios Zervas: "An analysis of *XAZ* (1987) for saxophone quartet by Xenakis: Searching for the design and content through a representative theory of all music." Athens, Greece: International Symposium Iannis Xenakis, 2005.

altissimo and the use of multiphonics. Following him, I have chosen to investigate the property of range as structurally significant material for *XA2*.

There are published papers and articles that detail the compositional practice and include analysis of selected works of both Donatoni and Xenakis. In 1993, Michael Gorodecki authored a short article in *The Musical Times* introducing the music of Franco Donatoni.<sup>10</sup> This article discusses several of the composer's works and says a bit about his style, but mentions nothing of the saxophone quartet written three years earlier. Recently, Bradley Decker completed a dissertation in 2006 devoted to Donatoni's chamber work *Refrain for eight instruments* (1986) and details the composer's compositional style and the emergence of his chamber music in the latter part of his life.<sup>11</sup> Although the existing material available for the composer is limited, it is my hope to add to the scholarly research devoted to this composer and his work. There is literature addressing the compositional style and techniques of Iannis Xenakis. In addition to the *XA2* paper given by Mr. Zervas, there are a few sources that relate specifically to Xenakis's instrumental music. *The instrumental music of Iannis Xenakis: theory, practice, self-borrowing* by Benoît Gibson,<sup>12</sup> published in 2011, is a new resource that offers an approach that relates theory to practice in the composer's work. There is also extant research discussing Xenakis's theories of acoustics. Some of the current work of Florida State University professor Evan Jones investigates the specific acoustic properties

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<sup>10</sup> Michael Gorodecki. "Who's Pulling the Strings?" *The Musical Times* 134 (May 1993): 246-251.

<sup>11</sup> Bradley David Decker. 2006. *Preserving the fragment: techniques and traits of Franco Donatoni's joyous period (1977 to 2000)*. Dissertation Abstracts International. 67-07. Thesis (D.M.A.)--University of Illinois at Urbana-Champaign, 2006.

<sup>12</sup> Benoît Gibson. 2011. *The instrumental music of Iannis Xenakis: theory, practice, self-borrowing*. Hillsdale, NY: Pendragon Press.

used by the composer. A 2002 article highlights Xenakis's use of *col legno* in his piece *Nomos Alpha* for solo cello.<sup>13</sup> Jones is hinting at a timbral analysis similar to the study of the effect of range as compositional determinant as found in *XA2*.

After Iannis Xenakis's death in 2001, there were many pieces of new scholarship devoted to his work. In May 2005 the 2<sup>nd</sup> International Symposium dedicated to the music of Iannis Xenakis was held in Athens. Conversely, there has not been a similar increase in scholarship of Donatoni's music. With a compositional output widely varied in style, Franco Donatoni persevered through tremendous difficulty to arrive at his *joyous* period, in which he wrote several works for chamber ensemble that deserve more performances and analysis.

### **Contribution of the Raschèr Saxophone Quartet**

The Raschèr Saxophone Quartet, which commissioned both *Rasch* and *XA2*, paved the way for the success of many contemporary chamber ensembles. Originally confined to performing arrangements of other music, the group has now commissioned and premiered more than 250 new works written specifically for their ensemble.<sup>14</sup> Some of the substantial and most frequently performed pieces of music in the saxophone quartet repertoire today were created through the group's pioneering efforts. Thanks to the archival efforts of Ms. Carina Raschèr and The Raschèr Quartet, programs from the premieres of both pieces are reproduced below:

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<sup>13</sup> Evan Jones. 2002. "An Acoustic Analysis of Col Legno Articulation in Iannis Xenakis's "Nomos Alpha". *Computer Music Journal*. 26 (1): 73-86.

<sup>14</sup> James Noyes. "Raschèr Saxophone Quartet." *Saxophone Journal*. 23/6 (1999): 32-41.



JOHANN SEBASTIAN BACH ( 1685-1750)  
*Contrapuncti I, VIII et IX, extraits de l'Art de la Fugue*

NICOLA LE FANU (née en 1947)  
*Moon over the Western Ridge, Mootwinge (création française)*

GERARD MASSON (né en 1936)  
*Saxophones Fourcade (création française)  
à quatre parties sans titre*

IANNIS XENAKIS (né en 1922)  
*Xas (création mondiale)*

TRISTAN KEURIS (né en 1947)  
*Music for Saxophones (création française)*

Figure 1.1 Premiere Program for XA2

Duo Due: Christian Muthspiel – Posaune, Klavier;  
Wolfgang Muthspiel – Gitarren  
Camerata Transsylvania  
Dirigent: Wim van Zutphen  
Lichtgestaltung: Alfons Schilling

Wiedergabe in Ö1: 13. November, 23.05 Uhr

**Freitag, 5. Oktober, 18 Uhr**  
**Alte Remise, Steyrergasse**  
**IN ZUSAMMENARBEIT MIT DER AKADEMIE GRAZ**

Richard DÜNSER:  
PERSONAE  
Fünf Stücke für Saxophonquartett (1990) (U) 10 Minuten  
*Kommissionsauftrag des steirischen Herbstes*

Franco DONATONI:  
RASCH  
für Saxophonquartett (1990) (U) ca. 15 Minuten  
*Kommissionsauftrag des steirischen Herbstes*

PAUSE

Mit Unterstützung der  
Schweizerischen Kulturstiftung  
PRO HELVETIA

Michael JARRELL:  
... CHAQUE JOUR N'EST QU'UNE TRÈVE ENTRE DEUX  
NUITS ...; ... CHAQUE NUIT N'EST QU'UNE TRÈVE ENTRE  
DEUX JOURS ...“ (ASSONANCE V)  
für Violoncello und 4 Instrumentalgruppen (1990) (U) 15 Minuten  
*Kommissionsauftrag des steirischen Herbstes*

York HÖLLER:  
RESONANCE  
für Orchester und Tonband (1981) 15 Minuten

The Raschèr Saxophone Quartet  
Michael Stirling – Violoncello  
Ensemble Modern  
Dirigent: Peter Eötvös  
Lichtgestaltung: Alfons Schilling



Wiedergabe in Ö1: Donatoni, Jarrell: 24. Oktober, 23.05 Uhr  
Dünser: 29. Oktober, 23.05 Uhr  
Höller: 14. November, 23.05 Uhr

**Freitag, 5. Oktober, 20.30 Uhr**  
**Grazer Congress, Stefaniensaal**

Beat FURRER:  
STUDIE – ÜBERMALUNG  
für Orchester (1989/90) (U) 13 Minuten  
*Kommissionsauftrag des ORF*

Luigi NONO:  
NO HAY CAMINOS. HAY QUE CAMINAR ...  
ANDREJ TARKOVSKIJ  
für 7 Instrumentalgruppen (1987) (ÖE) 25 Minuten

PAUSE

4

5

Figure 1.2 Premiere Program for Rasch

## CHAPTER TWO

### A THEORETICAL ANALYSIS OF *XA2*

Iannis Xenakis developed a system of composition that dealt not in typical scales such as major, minor, pentatonic, octatonic etc., but rather in an organization of pitches that he called “sieves.” In this method of categorizing pitches, mathematical concepts structure a sequence of pitches without a linear pattern of whole and half steps. The French word for this is *crible*; an approximate English translation is sieve. Below are the sieves for *XA2* as expressed in musical notation, note names, and integers, highlighting both the musical and mathematical basis for its creation.<sup>15</sup> My goal is to demonstrate how Xenakis manipulates the sieve throughout the piece as both melodic and harmonic material.

#### **XAS : Cribles hors-temps**

The image displays two musical staves, Crible A and Crible B, each with a sequence of notes and integers above them. Crible A consists of 28 notes, and Crible B consists of 31 notes. The notes are written in a non-linear fashion, reflecting the 'sieve' concept. The integers 1 through 28 are placed above the notes in Crible A, and 1 through 31 are placed above the notes in Crible B. The notes are written in a non-linear fashion, reflecting the 'sieve' concept.

Table 2.1 Table of Sieves

<sup>15</sup> Serge Bertocchi. *Présences de Iannis Xenakis*. Edited by Makis Solomos. Paris: Centre de documentation de la musique contemporaine, 2001.

**The pitches used to form Sieve A are:**

D, E, F#, A#, B, D#, E, G, Ab, C, Db, E, F, A, Bb, D, D#, E, G, G#, B, C, D, F, F#, A#, B, C

**The same sieve expressed in integers:**

-22, -20, -18, -14, -13, -9, -8, -5, -4, 0, 4, 5, 9, 10, 14, 15, 16, 19, 20, 23, 24, 26, 29, 30, 34, 35, 36.

**The pitches of Sieve B are:**

C#, D#, F, G, Ab, A, C, C#, D, F, A, A#, B, D, Eb, F#, G, G#, B, C, C#, F, F#, A, Bb, C#, D#, E, G, G#, A.

**The same sieve expressed in integers:**

-23, -21, -19, -17, -16, -15, -12, -11, -10, -7, -3, -2, -1, 2, 3, 6, 7, 8, 11, 12, 13, 17, 18, 21, 22, 25, 27, 28, 31, 32, 33.

The divisions of  $X\mathcal{A}\mathcal{Z}$  that I selected are based on the compositional use of the sieve theory in combination with that of the textural shifts Xenakis employs. The sections are as follows:

**Section I. Measures 1-9**

**Section II. Measures 10-21**

**Section III. Measures 22-30**

**Section IV. Measures 31-40**

**Section V. Measures 40-73**

**Section VI. Measures 73-81**

**Section VII. Measures 82-87**

**Section VIII. Measures 88-100**

## Section I (Measures 1-9)

*Les valeurs métronomiques sont approximatives: fonctions de l'acoustique.  
The metronomic values are approximate depending on the Hall acoustics.*

$\text{♩} \approx 76$

Example 2.1 Xenakis, *XA2*, score, meas. 1-3

The powerfully dissonant opening of *XA2* is marked at eighth note = 76 *fff*, and features both equal tempered and microtonal sonorities.<sup>16</sup> In this section I will explain the usage of the equal tempered sonorities only. The initial chord of C# E F A, voiced in root position, occurs six times in the opening three measures of the piece. In addition to the theory of sieves explained previously, analysis by Zervas shows the many recurring set classes of the opening section.<sup>17</sup> From the information in this table an apparent intervallic and harmonic progression is formed throughout the work's first few measures.

m. 1	[0, 3, 4, 8]	<1 0 1 3 1 0>
	[0, 1, 5, 6]	<2 0 0 1 2 1>
m. 2	[0, 1, 4, 8]	<1 0 1 3 1 0>
m. 3	multiphonics – unis. [0]	
m. 4	[0, 1, 4, 5]	<2 0 1 2 1 0>
m. 5	[0, 1, 3, 5]	<1 2 1 1 1 0>
m. 6	[0, 1, 5, 8]	<1 0 1 2 2 0>
	[0, 2, 3, 7]	<1 1 1 1 2 0>
m. 7	(repetition of m.4, [0, 1, 4, 5])	<2 0 1 2 1 0>
m. 8	[0, 1, 4, 6]	<1 1 1 1 1 1>
m. 9	[0, 1, 2, 6] <sup>8</sup>	<2 1 0 1 1 1>

Table 2.2 Post-Tonal Progression by Zervas

<sup>16</sup> At the top of the score, the composer writes: “The metronome values are approximate depending on the hall acoustics.”

<sup>17</sup> Athanasios Zervas: “An analysis of *XA2* (1987) for saxophone quartet by Xenakis: Searching for the design and content through a representative theory of all music.” Athens, Greece: International Symposium Iannis Xenakis, 2005.

There are only three separate equal tempered sonorities that occur in this opening. In addition to the opening simultaneity, there are also the sonorities of E, F, A, B-flat and G#, C, C#, E.<sup>18</sup> Within these three measures the composer's interjection of microtonal pitches, indication of very wide vibrato, and employment of multiphonics color the repeated establishment of this sonority. The constantly shifting dissonant harmony of the first three measures reaches a climax on the second half of beat two in measure 3 when all four voices hold separate multiphonics for two beats. The cluster of four discrete multiphonics sounding at the same time creates the maximum amount of harmonic complexity present in the piece. As indicated by the fingerings provided by the Raschèr Saxophone Quartet,<sup>19</sup> the soprano multiphonic contains four notes, the alto three notes, the tenor two, and the baritone three. While the dissonant simultaneities featured in the first three measures of the piece might be considered shocking, those sonorities contained at maximum only four sounding pitches. At the end of measure 3, the simultaneous multiphonics create a cluster of 12 pitches.<sup>20</sup> If the piece is analyzed as a spectrum with poles between order and disorder, this moment presents the most harmonic disorder written for the quartet in this piece.

At the height of dissonance in measure 3, all tension created thus far is released with a single sustained unison pitch in all four voices. The juxtaposition of extreme dissonance with the most perfect consonance is a jarring shift in harmony. Moreover, this unison note is held for three beats, to this point the longest duration of the piece.

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<sup>18</sup> While there are three separate sonorities, these represent only two different set classes: 4-19 (0148) and 4-8 (0156).

<sup>19</sup> Taken from a note in the individual parts, "multiphonics by Rascher Saxophone Quartet"

<sup>20</sup> Multiphonics are notated with a specific number of pitches available beginning with two, but the harmonic spectrum allows for many of these sonorities to sound a great number of pitches, extending to the highest tessitura of the instrument.

Following the unison, the simultaneities from the first two measures return, this time in a new order. Measure 4 features four consecutive chords from Sieve A that appear in descending order [see diagram]. Here, the composer uses strictly adjacent pitches from the sieve, in the same “inversion,” in order to create smooth voice leading. Examining the individual melodic lines, the soprano plays B-flat, A, F, E, while the alto plays A, F, E, D-flat, the tenor F, E, D-flat, C, and the baritone E, D-flat, C, A-flat. Continuing in measure 5, the baritone begins a melodic line on G (the 8<sup>th</sup> position in Sieve A) and creates another melodic passage of adjacent pitches with the tenor. It should be noted here that the baritone part has an incorrect pitch written in the score: the last note of measure 5 should be an A, not a C, in order to create the same E, F, A, B-flat sonority found in the previous measure. Similarly, the argument for A rather than C is strengthened if the melodic pattern is followed as a continuation of the baritone line omits alternate pitches once it reaches its highest note of C on the second half of beat 2 (C, E, A are positions 10, 12, and 14 in Sieve A). Notable here is that the held chord found at the end of measure 5, for the first time, does not feature the soprano voice with the highest pitch. The composer stretches the tenor line above the alto and soprano in favor of the melodic importance of reaching the B-flat.



Example 2.2 Xenakis, *XA2*, score, meas. 4-6

Continuing in measure 6, the technique of consecutive descending chords used in measure 4 returns. Here, Xenakis does not utilize strictly contiguous pitches to create the melodic and harmonic content; instead, he omits one pitch from the sieve. All melodic lines are created through selection of adjacent pitches in the sieve, however the baritone line begins on a C instead of the expected D-flat. In this passage the exact melodic pitches from measure 4 are shifted up one instrument in score order. Therefore, the previous line of A, F, E, D-flat found in the alto part is now found in the soprano, the previous tenor line is now the alto and the former baritone is now found in the tenor part (see example above). After sustaining the chord of E-flat, A-flat, C, D-flat, the highest and lowest voices repeat their pitches throughout the rest of the measure while the inner voices move by step (whole in tenor, half in the alto) in alternate directions. This passage represents an aesthetic choice made by the composer, as the individual alternated pitches are not found adjacent in the sieve.<sup>21</sup> Similarly, the sonority created in the second half of beat 2 in measure 6 (E-flat, B-flat, B, D-flat) follows suit. There are also no adjacent pitches are found in the downbeat of measure 7. Each note lasts three beats and trills the interval of a descending half step. If the two note pairings are considered, one can find a pattern of adjacent pitches (positions 4 and 5, 6 and 7, 10 and 11, and 15 and 16), although this may be interpreted as merely a product of the intervals created in this segment of the sieve.<sup>22</sup> After a crescendo to *ff* the ensemble arrives on a sonority in beat 4 almost exclusively created from the trilled semitones. The soprano voice is the only deviation from this pattern: it retains the D-flat from the previous note, creating a simultaneity not formed using adjacent pitches directly from the sieve; however, it could

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<sup>21</sup> Sieve A, after initial whole steps, alternates between intervals of half steps and 3rds.

be constructed using non-adjacent pitches (positions 11, 14, 15, and 17). Also, if one examines the 14<sup>th</sup>-17<sup>th</sup> positions in Sieve A the succession of A, B-flat, D, D# is revealed. Returning to an idea discussed above, Xenakis manipulates this four-note collection and inserts D-flat instead of D natural. Without finding direct proof from the composer's sketches it is difficult to say why this decision was made, though one might guess that Xenakis chose this sonority for purely acoustic and aesthetic reasons. Another possibility is that C#/D-flat is only found once in Sieve A, in the 11<sup>th</sup> position. Due to the prevalence of this pitch in the majority of the simultaneities formed in this opening section, perhaps the composer is utilizing D-flat as a connective thread thus far in the piece.



Example 2.3 Xenakis, *XA2*, score, meas. 7-9

This same sonority is reiterated on the downbeat of measure 8 with a *subito p* marking beginning a string of sixteenth notes lasting throughout the entire measure. The harmonic content produced from this string of sixteenth notes introduces another sieve, previously unused in the composition. Beginning on the second sixteenth note of the measure, the sonority created is D, E-flat, F#, G (positions 14-17 in Sieve B). Each voice then oscillates an ascending half step back to a pitch collection from Sieve A: E-flat, E, G, A-flat (positions 17-20 in Sieve A). This moment illustrates the first instance of the

compositional technique of pairing two contrasting harmonic spectra together in the same temporal space. Similarly, measure 9 interrupts the soft parallel semitones with a *fff* chord of A, B-flat, D, E-flat which are found in positions 14-17 of Sieve A. There is an exact parallel between position numbers using both sieves immediately following one another in measures 8-9. Continuing that pattern, beat 3 of measure 9 features the simultaneity of B, C, D-flat, F (positions 19-22 in Sieve B). As before, Xenakis is using smooth voice leading in order to transition between these sonorities. No voice moves larger than the interval of a whole step; the soprano, tenor, and baritone voices move in the same direction while the alto descends by half step.

### Section II (Measures 10-21)

The image shows a handwritten musical score for Section II (Measures 10-21) of Xenakis' XA2. It consists of two systems of four staves each. The first system begins with a tempo marking '♩ = 96' and a dynamic marking 'p'. The music features complex rhythmic patterns and chromatic movement. The second system ends with a dynamic marking 'ff'.

Example 2.4 Xenakis, *XA2*, score, meas. 10-15

At measure 10 there is a noticeable change in texture and tempo. All four voices immediately accelerate to 8<sup>th</sup> note = 96 and begin a strict fugue at the sixteenth note, contrasting the isorhythmic patterns heard in the opening of the piece. Also of note at the

beginning of measure 10 is that the ensemble returns to a soft dynamic, previously only heard twice in the first nine measures. The imitative texture begins here with the soprano voice, followed by the alto, tenor, and baritone in score order. In measure 10 Xenakis creates melodic material from positions 10-16 of Sieve A: C C# E F A A# D, all in ascending order. In the following measure the composer again chooses to use Sieve A (and will continue to do so through m.16), this time utilizing a jagged contour to the line: Bb A D Bb F E A F D E, positions 12-18. In measure 11 it is important to note that in the alto part there is an incorrect pitch: the third sixteenth note of the measure should be an A in the score, rather than the printed F. Below is a chart of the pitches used from measures 10-15. The numbers to the right of the pitches are the number of pitches used in the phrase, here bracketed, followed by the number of non-repeated pitches in parentheses.

10: C C# E F A A# D [7] (7)
11: Bb A D Bb F E A F D E [10] (5)
12: Db C F A E A Db E [8] (5)
13: C E F A Bb D D# E D# [9] (8)
13/14: E D# E G G# B C E [8] (6)
14/15: C B G# D C B D Eb [8] (6)

Table 2.3 Pitches Used in *XA2*, Measures 10-15

From measures 10 through 14 the soprano voice begins the fugue, stating the imitated melodic fragment on the downbeat of each measure. These four measures are clearly separated by use of pitch content as well as rhythmic placement. The rhythmic properties of these measures are such that each iteration of the fugal fragment ends on a

different sixteenth note subdivision of the beat.<sup>23</sup> While the beginning of each measure occurs on the downbeat, the duration of the held note following the fugal subject changes with each statement. This compositional technique simultaneously features both regularity and irregularity of rhythmic placement. The last voice of the fugal statement, the baritone, reaches its final note on the 2<sup>nd</sup>, 1<sup>st</sup>, 3<sup>rd</sup>, and 4<sup>th</sup> sixteenth note in measures 10-14. The strict writing of the fugue lasts until measure 16 when the pattern is broken slightly. The imitated melodic fragment in the soprano part ends with Ab, however the lower three voices continue the descending line, adding two more pitches: G and E. This is not a compositional mistake, rather a choice that leads the soprano to rest on its lowest note available on the instrument.



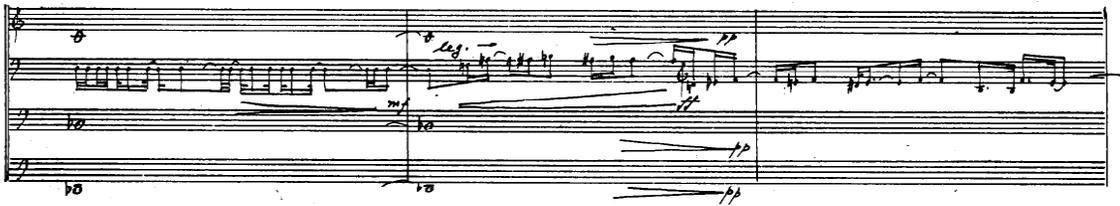
Example 2.5 Xenakis, *XA2*, score, meas. 16-21

Measure 17 begins with a short ascending baritone solo lasting only two beats. The pitch collection used for this interjection is mainly from Sieve B, but the end of the melodic line employs a half-step (F E F) not found in that set. On beat 3 of the same

<sup>23</sup> Also found in measures 15-16.

measure another ascending melodic pattern begins, now in the tenor part, and imitated by the alto, soprano, and then the baritone. This melodic line is taken directly from Sieve B: positions 11-29, in succession. Only the alto voice reaches the highest note of this pattern, while the other three voices arrive on E in the tenor, D# in the soprano, and Bb in the baritone. Again, the composer is utilizing both sieves in the same phrase: the imitated melodic line in measure 17 taken strictly from Sieve B and the simultaneity achieved in measure 18 [Bb E G D#] from positions 15, 17, 18, and 19 of Sieve A. The sonority is held for almost two beats and then is articulated in a rhythm recalling measure 9. This repetition launches the quartet into a texture of controlled disorder: three measures of constant 32<sup>nd</sup> notes. While the group is rhythmically unified, each individual part has its own melodic contour and collection of pitches.

### Section III (Measures 22-30)



Example 2.6 Xenakis, *XA2*, score, meas. 22-24

At measure 22 the soprano, tenor, and baritone sustain a chord for the entire measure while the alto begins its solo for the next three measures. The sonority created on the downbeat is [Db Bb D C]. Unlike the close voicing of the first measures of the piece, here the smallest interval separating the individual parts is the major third between

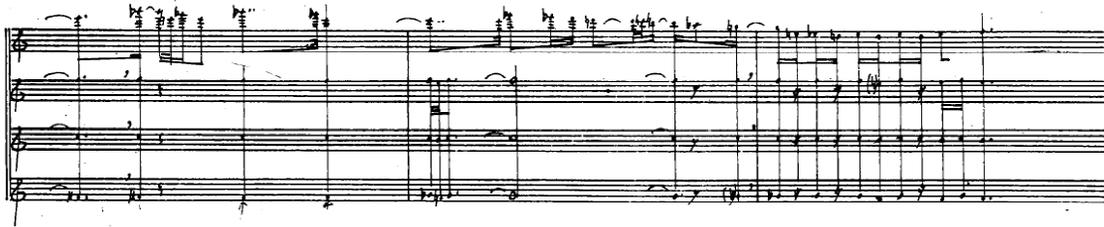
the tenor and alto voices. The outer voices create a minor sixth interval between baritone and tenor and a minor seventh between alto and soprano. The alto solo emerges out of the sustained chord with an ascending melodic line that follows positions 9-15 of Sieve B strictly until measure 24. Beginning with the F tied over from the previous bar, the composer has “modulated” back to Sieve A, but now he has added another half-step (D#) below the E-F pattern and also a B; neither are found consecutively within the collections of Sieves A or B.



Example 2.7 Xenakis, *XA2*, score, meas. 25-27

Beginning in measure 25 the fugal writing returns. The opening statement is composed entirely of Sieve A: E F A A# D Eb (positions 12-17). Once again notes are added from outside the sieves as the melodic pattern progresses. The soprano part in measure 26 consists of Eb D Bb G Ab Bb D Gb F, of which only Bb, Db, and Eb are found in one of the preconceived sieves. The two half-step pairings [G-Ab and Gb-F] create a chromatic set displaced by an octave. Immediately following the fugue, the rhythmic “call” motive of two short articulations followed by a long note returns in all four voices and continues into measure 28. This sonority, F# C F E, is repeated three more times in the same measure with the soprano alternating between the E on the downbeat and a Bb a diminished fifth above it. Following the iterations of the E-Bb pair,

the soprano continues a descending melodic line directly extracted from Sieve A starting with the Bb on the second beat of measure 29 (positions 26-16) and extending to the third beat of measure 30.



Example 2.8 Xenakis, *XA2*, score, meas. 28-30

Conversely, the other three voices of the ensemble reemphasize the sonority from measure 28 in the subsequent two measures. The half-step melodic alternating pattern in measure 30 among the lower three voices recalls the motives found in measures 6 and 8 mentioned previously. The compositional difference of this statement of the motive is the addition of rests in the alto, tenor, and baritone parts. These occur on the second and fourth 16<sup>th</sup> note of beat 1 and the fourth 16<sup>th</sup> note of beat 2, serving to thin the texture before the sonority on the third 16<sup>th</sup> note of beat 3. The simultaneity created here is F B E F, featuring the rare interval of an octave between the outer voices.

#### Section IV (Measures 31-40)



Example 2.9 Xenakis, *XA2*, score, meas. 31-33

Measure 31 recalls the organ-like opening of the piece – four equal voices moving in unison rhythm, creating blocks of sound. The dynamic markings alternate from *mf* to *fff* in eighth notes and oscillate between sonorities in the lower tessitura with that of the upper range of each instrument. Here, the alto, tenor, and occasionally baritone parts reach above the soprano voice on the second half of each beat. Compositionally, these blocks of sound are created using very close voicing that features the interval of a 7<sup>th</sup> or 9<sup>th</sup> between the outermost voices.<sup>24</sup>

Xenakis manipulates the sieves as melodic material in order to generate the vertical sonorities. While the chords formed express stacked intervals, each individual part is constructed based on the rhythmic structure of downbeats and upbeats. The table below indicates the pitches of each voice in measures 31 and 32 separated by their placement on the beat, downbeats (D) and upbeats (U) and sieve identity.

Soprano:	D- Db Ab C	<b>A (9-11)</b>
	U- F# F C# C B	<b>B (19-23)</b>
Alto:	D- A D F	<b>A (13, 14, 16)</b>
	U- D# A Bb C#	<b>B (24-27)</b>
Tenor:	D- Ab Eb B (Db)	<b>A (5, 6, 9)</b>
	U- Bb C# F# G#	<b>B (18, 23, 25, 26)</b>
Baritone:	D- C A Eb G Db	<b>B (1, 2, 4, 6, 7)</b>
	U- C# C B F F#	<b>B (19-23)</b>

Table 2.4 Pitches on Downbeats and Upbeats, *XA2*, Measures 31-32

The sonority of the downbeat of measure 33 is A Eb D Ab, a return of the exact voicing from beat two of measure 31. The first three pitches A Eb D are found in Sieve A in positions 14, 17, and 16, respectively. The inclusion of the soprano Ab both

<sup>24</sup> This does not always occur as only soprano and baritone voice pairing.

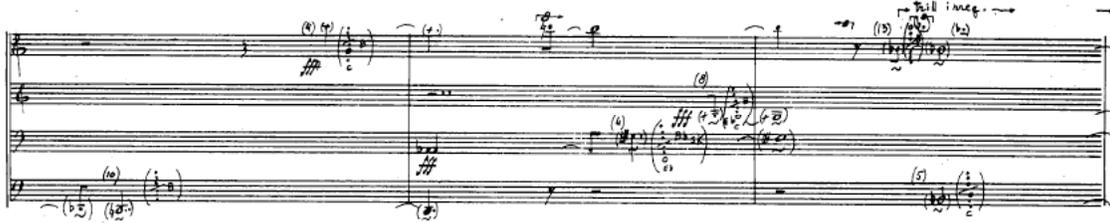
supports the outer voice interval pattern and repositions the same pitch found in the sieve in surrounding octaves (positions 9 and 21). Following the chord, there is an imitative motive recalling the earlier fugal sections. Instead of continuing the intricate counterpoint of the fugue, this rendering of the motive culminates in unison rhythmic figures. This one measure, solely comprised of melodic patterns from Sieve A, combines the two textural motives found in the piece thus far: imitative and isorhythmic compositional writing.



Example 2.10 Xenakis, *XA2*, score, meas. 34-36

Measure 34 begins with a sonority constructed from Sieve A: Eb, C#, Bb, E (positions 6, 11, 15, 18). Here, Xenakis is not using consecutive pitches from the sieve, but rather a concentric pattern of skipping pitches: first 4, then 3, then 2 positions between the selected notes. The texture thins as the upper three voices fade out and a baritone solo emerges, beginning on Eb as part of the chord and continuing with an E and F. Once again, the intervals of major 7<sup>th</sup>s and half steps are featured. The Eb to E connection follows Sieve A by skipping three pitches (positions 6 and 2), but then deviates from the scale by adding the half-step F to the collection. Growing from the F is a multiphonic on the second half of beat 3 that sustains into measure 36. The baritone solo pushes into measure 37, changing multiphonics at a regular rate of once every three

beats. This consistency of rhythm creates a new agogic accent; to the listener each note of the baritone solo feels like a strong beat.



Example 2.11 Xenakis, *XA2*, score, meas. 37-39

The baritone is then joined by a soprano multiphonic that strongly enters on beat 4 of measure 37. This is answered by a *fff* Ab in the tenor voice on the downbeat of the following bar. The contrast between the sustained multiphonics that carry into the first two beats of measure 38 and the Ab in the tenor part (the lowest note available on the instrument) establishes a strong presence in the low tessitura. The next entrance of the soprano, on the second half of beat 2, contrasts the forceful low note with an altissimo B, also marked *fff*.

In measures 38 and 39 Xenakis continues to add voices one at a time, beginning with the tenor part on the second half of beat 3 of m. 38. The multiphonics then stack on top of one another until cacophony is reached on the downbeat of measure 40 with all four voices executing loud multiphonics. The composer further complicated this texture with the addition of a trill in the soprano part, raising both the volume and complexity of pitch material to an extreme point.

## Section V (Measures 40-73)

Emerging from this cacophony is a segment of 33 measures that features stochastic writing,<sup>25</sup> polyphony, and complex rhythmic relations. Recalling the composer's affinity for mathematical processes, the middle section is almost exactly 1/3 of the entire piece. Beginning in measure 40, this section is the largest of the work and can be divided into five subsections of varying length. In subsection A, comprising measures 40-49, Xenakis indicates a general steady sixteenth note rhythm and suggested goal pitches are loosely specified in each individual part.

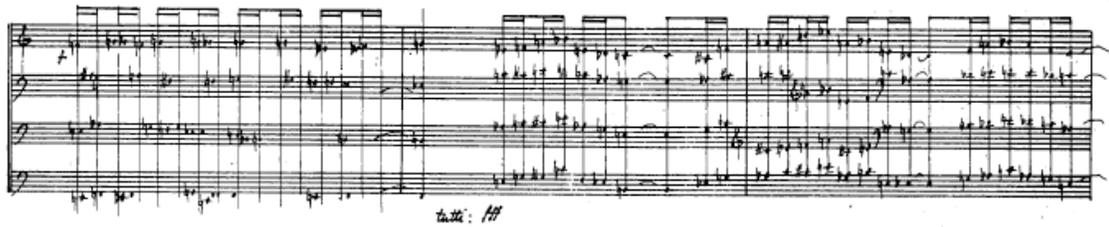
Example 2.12 Xenakis, *XA2*, soprano part, meas. 40-34

This quasi-improvisational character is generated from the chaos established by the sonic textures that concluded Section IV. Adding to the complicated rhythmic structure is an alternation of terraced dynamics between *mf* and *f*, with the louder of the two dynamics featured predominately.

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<sup>25</sup> Stochastic music is a genre that employs advanced mathematical formulas such as game theory, Markovian chains, and group theory as compositional determinants. For more information on stochastic music, see *Formalized Music* by Iannis Xenakis

The demarcation between subsections A and B is drastic. While subsection A is rhythmically indeterminate and hectic, subsection B (measures 50-53) is strictly isorhythmic and unifies the ensemble on a downbeat quarter note.



Example 2.13 Xenakis, *XA2*, score, meas. 49-51

Following the disorder of the previous subsection, the extended length of the agogically-placed quarter note in measure 50 has the effect of temporarily suspending time.

Continuing in measure 50, all voices of the quartet move in rhythmic unison, only pausing to land on an extended simultaneity five times in the span of four measures.

Here the ensemble is at full force with all instruments at a *fff* dynamic as all voices move in approximate parallel motion throughout the entire subsection.

Subsection C begins in measure 54, all voices are marked at a subito *p* dynamic and the quartet's rhythm is unison 32<sup>nd</sup> notes. In the following measure the ensemble crescendos to a full *ff* as multiple complex rhythmic relationships are created.



Example 2.14 Xenakis, *XA2*, soprano part, meas. 55

The soprano and baritone parts have rhythmic indications of 7:5 and 4:3, respectively, while the tenor part plays constant sextuplets, and the alto plays a metronomic string of 32<sup>nd</sup> notes. In measure 56 all voices return to the unison 32<sup>nd</sup> note rhythmic pattern for a full measure beginning in the middle of the measure and continuing into measure 57. As the group crescendos once again, this time to *fff*, each voice repeats a single pitch nine times. This is one of the only instances in Section V that a harmonic simultaneity is perceived: the sonority of G B C F from Sieve A. Similar divergent rhythmic patterning appears in measures 57-58 with the alto voice producing steady 32<sup>nd</sup> notes, the tenor sextuplets, the baritone 7:5 and 4:3 and the soprano 5:3 and 6:4. At the end of measure 58 and continuing to 60, the ensemble is in rhythmic unison at the 16<sup>th</sup> note at a subito *fff* dynamic. The rhythmic unison doubles as the intensity and tessitura rises into measure 61.



Example 2.15 Xenakis, *XA2*, score, meas. 63-69

Subsection D indicates to the performers loose rhythms and isolated pitches on a sixteenth note grid at a soft dynamic. This improvisatory feel ends after only a measure

giving way to the strict rhythmic unison of 32<sup>nd</sup> notes. The group swells to *ff* and back down to *p* over the course of two and a half measures before a *subito fff* ushers in a dotted eighth-sixteenth figure that is repeated three times in unison throughout the quartet. The next subsection resumes the rhythmic complexity at measure 66, where the alto and tenor execute displaced identical 7:5 rhythms while the soprano and baritone hocket back and forth based on an underlying triplet pulse. Like the previous instance of this rhythmic intricacy, the disorganization of the ensemble is felt through the level of specificity indicated on the page.

### Section VI (Measures 73-81)

The next section of music from the middle of measure 73 to the downbeat of measure 81 is characterized by a succession of organ-like chords.<sup>26</sup>



Example 2.16 Xenakis, *XA2*, score, meas. 73-75

The harmonic content of this passage follows a pattern of strict adherence to a given sieve structure immediately followed by a sonority that is not defined by either of the sieves independently. The chords that feature non-discrete harmonic content from the sieves either loosely relate to multiple pitches from a sieve or derive material from

<sup>26</sup> As seen previously in measure 31

wholly outside of the given structures. The “progression” alternates from Sieve A to an unidentified collection to Sieve B to unidentified and so on until measure 80, at which point material from Sieve A and Sieve B are clearly stated, concluding the section.

<b>73</b>	G B C F   C D G# F
<b>74</b>	F# G B G   A B C F   Bb D# E G#
<b>75</b>	E A A# D#   F D C# A   F# E G D#
<b>76</b>	D# C# D C   G# A G# D   A F# G F#
<b>77</b>	B C F# E   G B C F   G F D# E D# C# D C   D A B C
<b>78</b>	D# C# B G#   E A Bb D#
<b>79</b>	F# G B G   E A A# D#
<b>80</b>	G B C F   B C F# E

Table 2.5 Pitches Used in *XA2*, Measures 73-80

With respect to rhythmic patterning, this section utilizes multiple note values to obscure the meter and sense of pulse. The durations are constantly changing and unpredictable. Below is a chart of each chord’s duration in eighth notes:

<b>2</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>4</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>4</b>	<b>2</b>	<b>8</b>
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Table 2.6 Rhythmic Patterning in *XA2*, Measures 73-80

Taken all at once there are no obvious patterns immediately visible, either independently or in conjunction with the score. If previous compositional techniques are taken into consideration, rhythmic vales might be divided into several repeating figures.

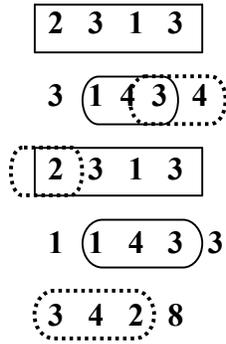


Table 2.7 Breakdown of Rhythmic Patterning in *XA2*, Measures 73-80

If the section of 2 3 1 3 is assumed as the basis of the rhythmic material, the four-note pattern repeats twice. In between iterations of 2 3 1 3 is 3 1 4 3 4, a five-note pattern that does not fit the previously established model. Instead, Xenakis derives new combinations from extant material.<sup>27</sup>

The two 3-note combinations found due to this process are 1 4 3 and 3 4 2. Once isolated, there is one number unaccounted for per rhythmic pattern, creating a “buffer” between them. This theory serves to explain the segments of numbers not included in the initial pattern as well as to justify the final 8 in the sequence. As noted previously, Xenakis often makes aesthetic choices that do not always align with the specific system he establishes. After instances of 2, 3, and 4 eighth-note durations, the composer’s conclusion of a displaced whole note (8 eighth note beats) functions as the longest note in

<sup>27</sup> It is probable that the composer used a mathematical formula to calculate these relationships, similar to the creation of the sieves.

the 8-measure phrase while transitioning to the next section which features several independent pitches of measure-long duration or more.

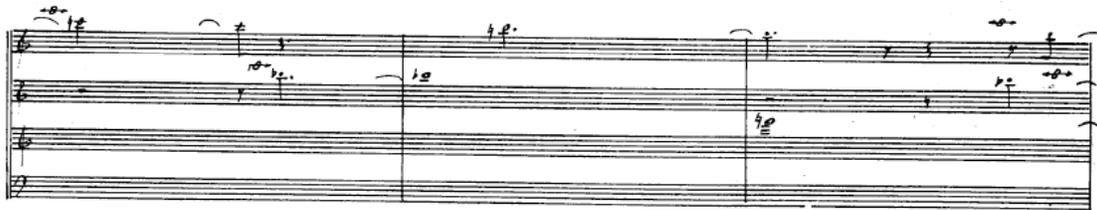
It should be noted that these two systems, both harmonic and rhythmic, seem to function independently. I found no correlation between any of the repeating sonorities in concurrence with given rhythmic values. Below is a table of repeated sonorities and the measures in which they occur. The repetition is not limited to the chords extracted from Sieve A or B, nor does there appear to be a pattern as to which sonorities are repeated, nor how many occurrences of each.

1. G B C F	<b>73, 77, 80</b>
2. B C F# E	<b>77, 80</b>
3. F# G B G	<b>74, 79</b>
4. D# C# D C	<b>76, 77</b>
5. E A Bb D#	<b>75, 78, 79</b>

Table 2.8 Chords Expressed in *XA2*, Measures 73-80

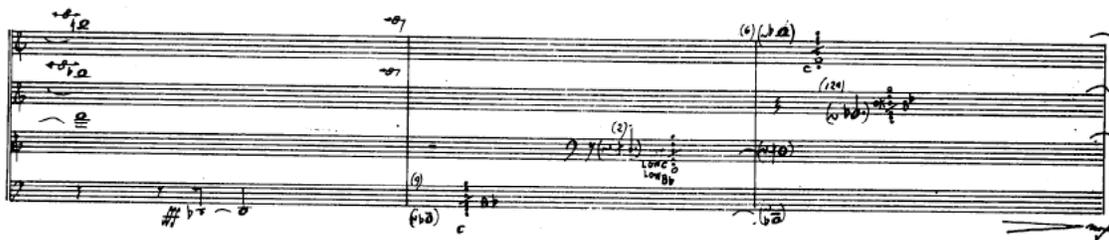
### Section VII (Measures 82-87)

Following thick block chords, the soprano line leaps into the altissimo with a single held C. Xenakis again creates a drastic change in texture here, with the highest voice alone in its most extreme register. After six beats of solo soprano, the alto line enters a major second lower just as the soprano releases its note. The soprano re-enters with a B-natural creating a composite melodic chain of three half-steps: Bb-B-C, all chosen from the last positions of Sieve A (26-28).



Example 2.17 Xenakis, *XA2*, score, meas. 82-84

In measure 84, the tenor enters with an F-natural (position 24) and sustains this pitch for two full measures. On beat 4 the alto joins with the previous Bb, quickly answered by the B-natural in the soprano. This sustained sonority extends through measure 85. On the second half of beat 2 in m. 85 the baritone enters with a low Db. This entrance both contrasts the register of the altissimo pitches in the other three voices and can be seen as completing the half-step pattern established previously by the soprano and alto voices (adding Db to Bb-B-C). Growing from that texture in m. 85 is a series of multiphonics, beginning with the baritone voice. Two and a half beats later the tenor adds its own multiphonic, followed by the soprano on the downbeats of measures 87 and finally the alto on beat 2.



Example 2.18 Xenakis, *XA2*, score, meas. 85-87

### Section VIII (Measures 88-100)

The top three voices sustain the sonority into measure 88, while the baritone initiates a fugue-like rhythmic motive beginning with constant 32<sup>nd</sup> notes. The tenor, alto, and soprano voices enter on subsequent beats, continuing the steady rhythmic pulse established by the baritone. Each iteration of this motive has a varied duration of approximately two and a half beats. Following the statement of steady 32<sup>nd</sup> notes, the composer reintroduces complex rhythmic groupings including 5:3, 7:5, 5:4, and 8:7. While these individual rhythmic figures are then placed in proximity to one another, all four voices create simultaneous polyrhythmic structures.

The image displays a handwritten musical score for measures 88-93 of Xenakis's *XA2*. It consists of two systems of four staves each. The notation is highly complex, featuring dense rhythmic patterns, including many 32nd notes and various polyrhythmic groupings. The score is written in black ink on white paper, with some annotations and markings throughout.

Example 2.19 Xenakis, *XA2*, score, meas. 88-93

Three measures of continuous rhythmic interplay throughout the ensemble concludes when the alto voice lands on a sustained B $\flat$ , quickly answered by the tenor on F, soprano on A, and finally the baritone on G. The sonority F, G, A, B $\flat$  features 2 whole step intervals and one half-step between the soprano and alto voices.

A familiar rhythmic motive returns after the fermata, built from constant oscillations of half-step relationships in all four voices. The alternation between G Eb Ab D and F# D G C# not only expresses a descending half step pattern, but also an alternation of Sieves A and B.<sup>28</sup>



Example 2.20 Xenakis, *XA2*, score, meas. 94-96

The sequence begins as eighth notes for one measure, then doubles its speed to sixteenth notes before achieving the accelerated frantic pace of a four-voice trill. The trill lasts more than six beats, yet incorporates a quick 2-beat diminuendo from *fff* to *p* and then an entire measure to return to the extreme *fff* dynamic. There is an indicated pause at the end of measure 96 before all voices re-enter at *p*. In addition to the written soft dynamic, the performers are instructed to create these pitches by producing overtones.<sup>29</sup> This effect creates a sense of instability in the ensemble at a soft dynamic.

The 3-chord sequence that concludes the piece decreases in instrumentation with each iteration. Excluding the low baritone pitches in measures 98 and 99, the gradual progression from four voices to three to the final two creates an interesting intervallic pattern.

<sup>28</sup> Here again the composer uses pitches found in non-adjacent octaves to fit with his aesthetic design.

<sup>29</sup> Overtones will be discussed further in the following section of this document.



Example 2.21 Xenakis, *XA2*, score, meas. 97-100

The sonority of Ab Bb C Db on the downbeat of measure 97 contains ordered intervals of whole, whole, and a half step. The chord on beat four of the same measure contains a whole and a half step. The soprano, alto, and tenor voices have been transposed a perfect fourth above the previous chord, excluding the baritone part in the second chord. The downbeat of measure 99 features the same Eb F whole step pairing from the previous measure, with the soprano voice omitted this time.<sup>30</sup> This final four-measure chorale concludes the piece by distilling the initial sonority from a mixture of whole and half steps down to a single sounding whole step between the alto and tenor saxophones.

<sup>30</sup> The addition of the baritone part to the intervallic patterns discussed above always creates the interval of a half step between the baritone and tenor lines.

## CHAPTER THREE

### A PERFORMANCE ANALYSIS OF *XA2*

“Many saxophonists first approach *XA2* in college, and often the challenges of the piece, at first glance, appear to lie in the angular altissimo writing, the realization of complex layered rhythms, and the reliability of response and intonation at extreme dynamic ranges. These are certainly lifelong aspects for us to refine in our playing. My impression is that these are preliminary demands to the aesthetic core of the work: texture, density, timbre, and dynamic, which serve as the main elements of musical construction. I believe this stylistic aspect of the work to be one of the greatest challenges in effectively presenting the work. Xenakis' writing suggests a sound that is suspended and static while fueled by an intense underlying energy.” --Michael Ibrahim<sup>31</sup>

Performers of *XA2* must devote time and attention to both the execution of technical and aesthetic concerns when preparing this piece. The ability to produce overtones and altissimo is essential to any successful performance of the work, while the ensemble should be equally aware of the textural and density choices of the composer. Though a difficult work for any quartet, concentration and preparation of these aspects will lead to a greater understanding, and therefore a better interpretation, of the piece.

#### Compositional Use of Overtones

The ability to produce notes in the upper register of the saxophone requires special attention and development of a technique called overtones. The saxophone is a tube that resonates at a given frequency when all of the keys are closed. This complete closing of the tube sounds an Ab in concert pitch on soprano and tenor, a Db in concert pitch on alto, and a C on most modern baritones. From this fundamental pitch, the

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<sup>31</sup> This quotation is excerpted from a conversation with Dr. Michael Ibrahim, Assistant Professor of Saxophone at West Virginia University. It is duplicated here with consent from the author.

saxophonist is challenged with producing multiple pitches while fingering the same note. These pitches, above their respective fundamentals, are achieved through careful manipulation of the oral cavity and tongue. The pitch sequence available on the saxophone follows the harmonic series: the first interval is an octave higher than the fundamental, then a fifth, and then a fourth. These first three overtones span the interval of two octaves and are the basis of early instruction in overtone production. From the second octave above the fundamental, the sequence continues up a major third, then a minor third, another minor third, and finally a major second to once again reach the same pitch as the fundamental of the instrument.

In Sigurd Raschèr's study of overtones, *Top Tones for the Saxophone*<sup>32</sup>, the saxophonist is challenged with "arpeggiating" the series ascending as well as descending. Once the saxophonist is able to achieve this based on five fundamental fingerings, the exercises begin to skip around the overtone series. Intervals of octaves, 10ths and 12ths are regularly required in these subsequent exercises.<sup>33</sup> In this text Raschèr emphasizes that the saxophonist should develop the ability to feel and hear these intervals before executing them, he labeled this: "pre-hearing." This ability is cultivated through diligent practice, isolating and frequently repeating the minute adjustments inside the mouth, as confirmed by the pitch of the resulting sound. The mastery of this skill is achieved once the saxophonist is comfortable with the shape of the oral cavity required to produce specific pitches in the overtone series.

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<sup>32</sup> Sigurd Raschèr, *Top-tones for the saxophone: four-octave range* (New York: C. Fischer, 1977).

<sup>33</sup> *Ibid*, 12.



\*The horizontal line indicates unchanged finger position.

\*\*Any flat, sharp or natural sign is valid for the tone to which it is given for the remainder of the exercise, unless changed;  
 ◡ indicates end of exercise.

Figure 3.1 *Top Tones for the Saxophone, Overtone Exercises*

*XAZ* requires an extreme control over this particular aspect of sound production on the instrument. The composition even requires all members of the ensemble to produce overtones as an effect. In the closing bars of the piece, each voice has an altissimo note that is written with a ° marking above the pitch with instructions for the player to finger a low Bb and produce the given pitch. In order to accurately produce this exact pitch the performer must be able to hear and feel the specific overtone before it sounds.

## Compositional Use of Altissimo

Xenakis utilizes the unique abilities of the Raschèr Saxophone Quartet and stretches the boundaries of saxophone composition in the process. In addition to producing overtones in the piece, the composer requires each saxophonist to test the limits of his or her range. The soprano saxophonist is required to play an altissimo D, and the alto, tenor, and baritone all have a written super G.<sup>34</sup> These pitches are precarious on their respective instruments and require a great amount of control to produce. The composer chooses to use the extreme upper tessitura of the saxophone to express a given texture. In addition to these uppermost pitches, Xenakis also prominently features the altissimo register with varying pitch and scale combinations. Built from the foundations of overtone production, altissimo fingerings are created by using an irregular finger combination and altering the oral cavity to produce the upper tessitura of the instrument.

Xenakis requires each member of the quartet to execute the altissimo writing in the piece to the highest degree. Certain moments of *XA2* present the instruments in close proximity in the altissimo register. While a great intonation challenge, these moments produce resultant tones that guide the performer's ear. These pitch relationships resonate at a lower frequency similar to a perfect fifth or a major triad. The ensemble can use these aural cues to adjust very closely placed intervals.

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<sup>34</sup> An octave above the beginning of the altissimo range

## Compositional Use of Texture

The expression of texture throughout *XAZ* focuses largely on density, instrumentation, and tessitura of the quartet. As discussed above, the four members of the ensemble are expected to control the very highest register of their instruments at an extremely advanced level. The result of this is a loud and perhaps abrasive experience for the audience. Therefore, the quartet should strive to highlight moments when the density of sound is much thinner, such as the moments at softer dynamics and in a less extreme range. The theoretical analysis mentioned the use of complex rhythmic structures and stochastic writing to display density of the group with an extremely thick texture. The end of the work features soft overtones in the altissimo range that, when played beautifully, have the opposite effect on the listener.

When dividing the piece into its eight sections for the theoretical analysis portion of this project, I was largely influenced by the use of instrumentation and density as determining factors. While *XAZ* begins with an isorhythmic pattern, this texture is modified slightly with the cascading fugal motive which is begun by the baritone. It is from this compositional choice of imitation that the use of instrumentation and texture indicate the sectional transitions throughout the rest of the piece.

## CHAPTER FOUR

### A THEORETICAL ANALYSIS OF *RASCH*

Of the few composers that Donatoni favored, a special reverence was held for Béla Bartók. In a 1981 article titled “Presenza di Bartók” in *Il sigaro di Armando*, Donatoni detailed four essential aspects of Bartók’s music. These characteristics are “(1) cellular exposition and organism growth; (2) growth without development, conservation of the fragment; (3) juxtaposition of organisms; mutation, not evolution; and (4) stasis of pulsations, continuity of tone.” Donatoni’s chamber music is no doubt reflective of these compositional aspects. In his dissertation, *Preserving the Fragment: Techniques and Traits of Franco Donatoni’s Late Chamber Music*, Bradley Decker comments on Donatoni’s compositional process from his ‘joyous’ period:

After a period of self-doubt and artistic transfiguration in the mid-1970s, Donatoni regained confidence by concentrating on the horizontal line, discovering a Bach-like “game-playing exercise in invention” through the more effective use of “automatic procedures,” which he called “codes.” In a 1990 pamphlet he summarized his compositional goals: “Complexity of code, simplicity of result... [and] difficulty [for others] to know the nature of the code.”<sup>35</sup>

This compositional procedure was to take a fragment from a work of his own and, with no pre-determined plan, spontaneously create a set of rules from which new material would be derived. Donatoni’s code for this piece begins with an aesthetic choice. In an effort to avoid the sound of several blocks of chords in a row he uses rhythmic manipulation to disguise the harmonic patterns used in the piece. Usually the four voices are written contrapuntally, however Donatoni employs grace notes to break up any

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<sup>35</sup> Bradley David Decker. *Preserving the fragment: techniques and traits of Franco Donatoni's joyous period (1977 to 2000)*. Thesis (D.M.A.)--University of Illinois at Urbana-Champaign, 2006.

imitative connection the listener might possibly infer. The composer also fills the ends of his measure-long phrases with silence.

The image shows a handwritten musical score for four voices: soprano (sopr.), alto, tenor (ten.), and baritone (bar.). The time signature is 9/8. The first measure contains a triplet of eighth notes (111) in the soprano part. The second measure contains a triplet of eighth notes (777) in the soprano part. The third measure contains a triplet of eighth notes (777) in the soprano part. The fourth measure contains a triplet of eighth notes (777) in the soprano part. The fifth measure contains a triplet of eighth notes (777) in the soprano part. The sixth measure contains a triplet of eighth notes (777) in the soprano part. The seventh measure contains a triplet of eighth notes (777) in the soprano part. The eighth measure contains a triplet of eighth notes (777) in the soprano part. The ninth measure contains a triplet of eighth notes (777) in the soprano part. The tenth measure contains a triplet of eighth notes (777) in the soprano part. The eleventh measure contains a triplet of eighth notes (777) in the soprano part. The twelfth measure contains a triplet of eighth notes (777) in the soprano part. The thirteenth measure contains a triplet of eighth notes (777) in the soprano part. The fourteenth measure contains a triplet of eighth notes (777) in the soprano part. The fifteenth measure contains a triplet of eighth notes (777) in the soprano part. The sixteenth measure contains a triplet of eighth notes (777) in the soprano part. The seventeenth measure contains a triplet of eighth notes (777) in the soprano part. The eighteenth measure contains a triplet of eighth notes (777) in the soprano part. The nineteenth measure contains a triplet of eighth notes (777) in the soprano part. The twentieth measure contains a triplet of eighth notes (777) in the soprano part. The twenty-first measure contains a triplet of eighth notes (777) in the soprano part. The twenty-second measure contains a triplet of eighth notes (777) in the soprano part. The twenty-third measure contains a triplet of eighth notes (777) in the soprano part. The twenty-fourth measure contains a triplet of eighth notes (777) in the soprano part. The twenty-fifth measure contains a triplet of eighth notes (777) in the soprano part. The twenty-sixth measure contains a triplet of eighth notes (777) in the soprano part. The twenty-seventh measure contains a triplet of eighth notes (777) in the soprano part. The twenty-eighth measure contains a triplet of eighth notes (777) in the soprano part. The twenty-ninth measure contains a triplet of eighth notes (777) in the soprano part. The thirtieth measure contains a triplet of eighth notes (777) in the soprano part. The thirty-first measure contains a triplet of eighth notes (777) in the soprano part. The thirty-second measure contains a triplet of eighth notes (777) in the soprano part. The thirty-third measure contains a triplet of eighth notes (777) in the soprano part. The thirty-fourth measure contains a triplet of eighth notes (777) in the soprano part. The thirty-fifth measure contains a triplet of eighth notes (777) in the soprano part. The thirty-sixth measure contains a triplet of eighth notes (777) in the soprano part. The thirty-seventh measure contains a triplet of eighth notes (777) in the soprano part. The thirty-eighth measure contains a triplet of eighth notes (777) in the soprano part. The thirty-ninth measure contains a triplet of eighth notes (777) in the soprano part. The fortieth measure contains a triplet of eighth notes (777) in the soprano part. The forty-first measure contains a triplet of eighth notes (777) in the soprano part. The forty-second measure contains a triplet of eighth notes (777) in the soprano part. The forty-third measure contains a triplet of eighth notes (777) in the soprano part. The forty-fourth measure contains a triplet of eighth notes (777) in the soprano part. The forty-fifth measure contains a triplet of eighth notes (777) in the soprano part. The forty-sixth measure contains a triplet of eighth notes (777) in the soprano part. The forty-seventh measure contains a triplet of eighth notes (777) in the soprano part. The forty-eighth measure contains a triplet of eighth notes (777) in the soprano part. The forty-ninth measure contains a triplet of eighth notes (777) in the soprano part. The fiftieth measure contains a triplet of eighth notes (777) in the soprano part. The fifty-first measure contains a triplet of eighth notes (777) in the soprano part. The fifty-second measure contains a triplet of eighth notes (777) in the soprano part. The fifty-third measure contains a triplet of eighth notes (777) in the soprano part. The fifty-fourth measure contains a triplet of eighth notes (777) in the soprano part. The fifty-fifth measure contains a triplet of eighth notes (777) in the soprano part. The fifty-sixth measure contains a triplet of eighth notes (777) in the soprano part. The fifty-seventh measure contains a triplet of eighth notes (777) in the soprano part. The fifty-eighth measure contains a triplet of eighth notes (777) in the soprano part. The fifty-ninth measure contains a triplet of eighth notes (777) in the soprano part. The sixtieth measure contains a triplet of eighth notes (777) in the soprano part. The sixty-first measure contains a triplet of eighth notes (777) in the soprano part. The sixty-second measure contains a triplet of eighth notes (777) in the soprano part. The sixty-third measure contains a triplet of eighth notes (777) in the soprano part. The sixty-fourth measure contains a triplet of eighth notes (777) in the soprano part. The sixty-fifth measure contains a triplet of eighth notes (777) in the soprano part. The sixty-sixth measure contains a triplet of eighth notes (777) in the soprano part. The sixty-seventh measure contains a triplet of eighth notes (777) in the soprano part. The sixty-eighth measure contains a triplet of eighth notes (777) in the soprano part. The sixty-ninth measure contains a triplet of eighth notes (777) in the soprano part. The seventieth measure contains a triplet of eighth notes (777) in the soprano part. The seventy-first measure contains a triplet of eighth notes (777) in the soprano part. The seventy-second measure contains a triplet of eighth notes (777) in the soprano part. The seventy-third measure contains a triplet of eighth notes (777) in the soprano part. The seventy-fourth measure contains a triplet of eighth notes (777) in the soprano part. The seventy-fifth measure contains a triplet of eighth notes (777) in the soprano part. The seventy-sixth measure contains a triplet of eighth notes (777) in the soprano part. The seventy-seventh measure contains a triplet of eighth notes (777) in the soprano part. The seventy-eighth measure contains a triplet of eighth notes (777) in the soprano part. The seventy-ninth measure contains a triplet of eighth notes (777) in the soprano part. The eightieth measure contains a triplet of eighth notes (777) in the soprano part. The eighty-first measure contains a triplet of eighth notes (777) in the soprano part. The eighty-second measure contains a triplet of eighth notes (777) in the soprano part. The eighty-third measure contains a triplet of eighth notes (777) in the soprano part. The eighty-fourth measure contains a triplet of eighth notes (777) in the soprano part. The eighty-fifth measure contains a triplet of eighth notes (777) in the soprano part. The eighty-sixth measure contains a triplet of eighth notes (777) in the soprano part. The eighty-seventh measure contains a triplet of eighth notes (777) in the soprano part. The eighty-eighth measure contains a triplet of eighth notes (777) in the soprano part. The eighty-ninth measure contains a triplet of eighth notes (777) in the soprano part. The ninetieth measure contains a triplet of eighth notes (777) in the soprano part. The ninety-first measure contains a triplet of eighth notes (777) in the soprano part. The ninety-second measure contains a triplet of eighth notes (777) in the soprano part. The ninety-third measure contains a triplet of eighth notes (777) in the soprano part. The ninety-fourth measure contains a triplet of eighth notes (777) in the soprano part. The ninety-fifth measure contains a triplet of eighth notes (777) in the soprano part. The ninety-sixth measure contains a triplet of eighth notes (777) in the soprano part. The ninety-seventh measure contains a triplet of eighth notes (777) in the soprano part. The ninety-eighth measure contains a triplet of eighth notes (777) in the soprano part. The ninety-ninth measure contains a triplet of eighth notes (777) in the soprano part. The hundredth measure contains a triplet of eighth notes (777) in the soprano part.

Example 4.1 Donatoni, *Rasch*, score, meas. 1

This serves two purposes: first, the musical phrase has an embedded breath and second, the silence creates a partition for the melodic material and hints at the construction of the piece. In the middle section of the piece, the composer creates an increased sense of melodic interplay by featuring notes grouped in short rhythmic fragments rather than the continuous lines heard at the beginning. This difference from continuous sound between the four voices to a sound that is separated using space creates a noticeable change in the listener's ear. Nearing the end of the piece Donatoni combines these two ideas, creating a cascading effect of a sustained chordal base under the small rhythmic fragments of the soprano line.

In *Rasch*, the four voices of the saxophone quartet work independently as melodic lines and through these melodic fragments a harmonic pattern emerges. Since this piece was written in 1990, well after the popularity of the Second Viennese School and Milton

Babbitt and his disciples, the composer modified the atonal compositional language used before him. If one analyzes the individual lines of the first measure of the work, there isn't a dodecaphonic row that's common throughout the voices. But, there is a connective tissue of which specific pitches are omitted. As an example, the soprano part has these pitches in order {2, 4, 6, 10, 8, 2, 1, 11, 5, 1, 11, 9} and although the arrangement of {2, 4, 6, 8, 10} appears slightly out of order, that is not the end of the pattern. When the entire soprano line is treated as if it were an unordered 12-tone row there are four notes that do not appear {0, 3, 7, 8}. One would then expect that when analyzing the alto, tenor and baritone voices that the composer would omit the same pitches and create an 8-note row. However, Donatoni uses the system with a bit more sophistication: the omitted notes in the alto part are {1, 4, 8,9}, the tenor {3, 4, 8, 11} and the baritone {2, 5, 9, 10}. Among these four sets there is not one common tone – while the pitch of G# (numeral '8') is present in three of the four voices there doesn't seem to be a logical intersection between all of the voices. This is where another system of post-tonal writing is involved: pitch class sets. Each of the individual four-note omitted groupings {0, 3, 7, 8}, {1, 4, 8,9}, {3, 4, 8, 11} and {2, 5, 9, 10} when reduced to their prime form all express the set class [0158], or Allen Forte's set number 4-20.<sup>36</sup> If this same method of analysis is applied to measure 2, the resulting pitch class set is 3-1 [012]. Continuing in measure 3, the omitted set is [01], which Forte labels 2-1. Therefore, the omitted set of measure 3 is a subset of measure 2. In the following measure, Donatoni reverts back to the 4-note omitted set, this time in the form of 4-12 [0236].

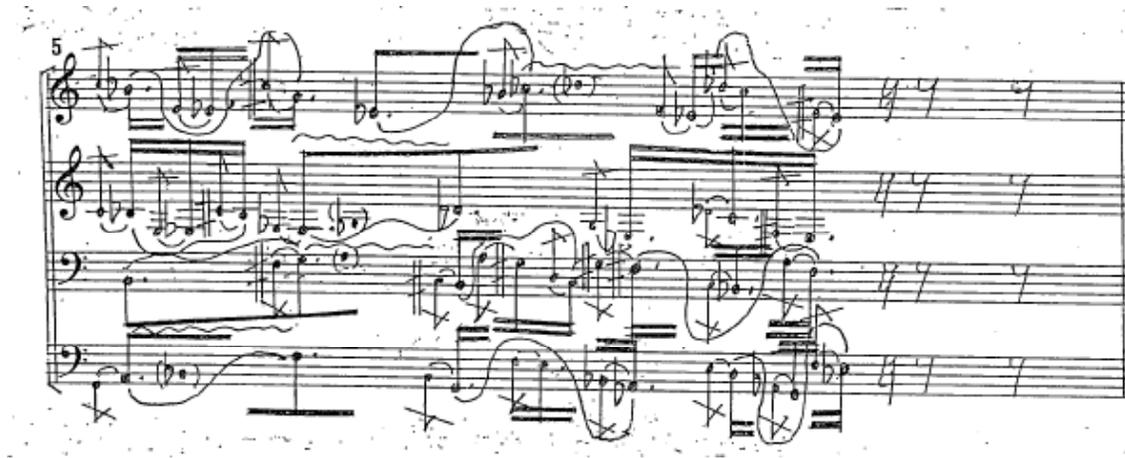
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<sup>36</sup> By extension, then, the notes that sound belong to set class 8-20.

Example 4.2 Donatoni, *Rasch*, score, meas. 2-4

Here the pattern is broken: in measure 5 the omitted set is either two or three notes depending on the individual part. In the soprano line the set is {2, 7, 8}, alto {2, 8, 9}, tenor {3, 4} and {0, 1, 6} in the baritone. This reintroduces the subset relationship

due to the soprano, alto and baritone voices representing set class 3-5 [016] and the tenor voice [01], which is only missing one member from that class. Similarly, in measure 6, the composer has one voice at odds with the other three. In this short measure, each voice only has four pitches: soprano {8, 9, 0, 1}, alto {9, 10, 1, 2}, tenor {5, 8, 9, 0} and baritone {1, 2, 5, 6}. The soprano, alto and baritone lines all represent set 4-7 [0145], though the tenor line expresses 4-17 [0347].



Example 4.3 Donatoni, *Rasch*, score, meas. 5

The first occurrence of an entire row of 12 pitches is in measure 7. Each individual part has all 12 individual pitches in four entirely different orders and with very little repetition of pitches. This exact process is used to craft measure 11, however there are no repeated notes present in any individual line. In the preceding measure (10), Donatoni uses four permutations of set class 6-Z6 to precede the measure of strictly dodecaphonic music. The most interesting property of 6-Z6 is that it is a palindrome, therefore a measure containing a six note set that can be divided into groups of three directly precedes a measure of the entire set of 12 available pitches.

Hidden inside this composition are numerous tiny imitations between voices. Isolating the first measure of this piece as an example, where the opening two notes of the tenor line {6, 0} are repeated in retrograde {0, 6} by the baritone immediately after. The next entrance of the tenor is a {10, 9} grouping, which begins a series of half steps that continue until the middle part of the measure.

Example 4.4 Donatoni, *Rasch*, score, meas. 1

The baritone responds similarly with {4, 3} only to be answered by the soprano {2,1} and the alto with {3, 2}. Immediately following this cycle, the tenor creates another pattern to follow that begins with a similar interval {7, 1} which recalls the opening {6, 0} in the same voice, now up a half step. In response to this the baritone once again plays a retrograde {1, 7} of the tenor line. Continuing on, the soprano plays the same interval sequence {11, 5} and the alto brings the motive back to the original {0, 6}. The interplay of these figures is not only limited to two-note pairings; the end of measure 1 utilizes three-note sets. The last four notes of the baritone line are {3, 1, 11, 8} however when paired with the last three notes of the soprano {1, 11, 9} there is a clear pattern of set

class 3-6 [024] in both when omitting the final pitch of the baritone line {8}. Similarly, the very last three notes of the alto {2, 0, 10} and tenor line {10, 0, 2} express this same set and are also palindromes, or voice crossings, of one another.

*Rasch* begins with these melodic patterns and continues until the peak of these interrelationships in measure 12. In a global sense, this is a large-scale transition from half and whole step groupings stacked on top of one another to the impression of purely horizontal whole steps. Just as in the beginning one voice echoes the other in retrograde, though this time there are two sets of these relationships happening simultaneously. The opening {4, 2} in the soprano is answered by the baritone immediately after {2, 4}; and the first alto pitches of {10, 0} result in a tenor reply of {0, 10}. In the middle of the measure there are plenty of half-step pairings in all of the voices: the soprano with {8, 7} {2, 3} {10, 11} {6,5}, the alto with {6, 7} {0, 11} {4,3} {8, 9}, tenor {4, 3} {10, 11} {6, 7} and baritone {10, 11} {4,3} {8,7} {0, 1}. However, all of these half-step pairings are then stated as whole step pairings at the end of the measure: soprano {11, 9}, alto {3, 5}, baritone {7, 9} and tenor {7, 5}.

In addition to melodic lines containing a progression of pitch class sets, Donatoni also outlines a harmonic pattern in the opening 12 measures of the piece. The succession of the melodic notes in the opening bars, while not conforming to a matrix or other serial process, is an important vertical (rather than horizontal) aspect of the piece. The opening simultaneity of the piece is a fragment of set class 3-11 [037]. The actual pitches are {2, 6} and create the pattern of [-37] which is answered in m. 2 with {4, 7, 11} or 3-11 [037]. Similarly the beginning of each subsequent measure until measure 8 includes a statement or omission based around set class 3-11. If Donatoni is striving to set up a question or

problem that must be answered by the end of the piece, he might be juxtaposing a melodically dodecaphonic composition that is based harmonically on the trichord that represents both the major and the minor chord.

The importance of vertical sonorities continues in measures 16-37, where after continuous melodic material the composer adds rests in the middle of the measure, thus creating further rhythmic complexity. In order to offset the rhythmic figures, Donatoni occasionally chooses to bring sustained chords out of the texture momentarily before returning to the subterranean stream of activity.

The image shows a musical score for measures 16-37 of Donatoni's *Rasch*. The score is written on four staves: two treble clefs (top two) and two bass clefs (bottom two). The music is highly complex, featuring dense rhythmic patterns, including many sixteenth and thirty-second notes, and frequent rests. Vertical sonorities are prominent, with chords often spanning across the staves. The notation includes various accidentals, such as sharps and flats, and dynamic markings like *mp* and *p*. The overall texture is dense and intricate, reflecting the composer's focus on vertical sonorities and rhythmic complexity.

Example 4.5 Donatoni, *Rasch*, score, meas. 16

In the beginning of measure 16 the composer sets up a cascading effect beginning with the bottom voice: the baritone's C on the downbeat gives way to a C on the second 16th note in the tenor voice. This same process happens between the subsequent note in the baritone, a B, which is then echoed in the tenor on the following sixteenth note. This canon-like structure is not only limited to the baritone and the tenor; the first E in the tenor line is repeated in the alto line on the very next note. The same interplay between

the voices is used in measure 17 as well, here involving the lower three voices. When the imitative figures can go on no longer there are sustained chords at the end of the measure. One such chord at the end of measure 16 is {1, 3, 6} or 3-7 [025]. The ends of several measures have this same structure and their harmonic identities are listed below. The intriguing property among all of the set classes listed is that only one is repeated, 4-16 [0157], which shows a true intention on the composer's part to express a distinct progression of sonorities.

Measure	Pitches		Prime	Forte
16	{3, 6, 10}	→	[025]	<b>3-7</b>
18	{0, 1, 6, 9}	→	[0147]	<b>4-18</b>
20	{1, 4, 6, 9}	→	[0358]	<b>4-26</b>
24	{0, 4, 6, 11}	→	[0157]	<b>4-16</b>
25	{1, 8, 9, 10}	→	[0125]	<b>4-4</b>
26	{1, 2, 7, 9}	→	[0157]	<b>4-16</b>
37	{2, 7, 8}	→	[016]	<b>3-5</b>
	{3, 5, 6, 9}	→	[0236]	<b>4-12</b>

Table 3.1 Pitches Used in *Rasch*, Measures 16-37

Similarly the harmonic pattern from measures 40-45 creates non-repeating set classes:

Measure	Pitches		Prime	Forte
40	{0, 2, 4}	→	[024]	<b>3-6</b>
	{2, 4, 7, 9}	→	[0257]	<b>4-23</b>
40/41	{0, 1, 8, 11}	→	[125]	<b>4-4</b>
42/43	{1, 3}	→	[02]	<b>2-2</b>
43	{4, 6, 8, 9}	→	[0135]	<b>4-11</b>
43/44	{0, 2, 3, 5}	→	[0235]	<b>4-10</b>
44	{1, 6, 10}	→	[037]	<b>3-1</b>
44/45	{0, 5, 7, 9}	→	[0247]	<b>4-22</b>

Table 3.2 Pitches Used in *Rasch*, Measures 40-45



Example 4.6 Donatoni, *Rasch*, score, meas. 49

A particularly intriguing moment occurs in measure 49. There are large spaces surrounding 4-note groupings, which serve as a slight reprieve before entering back into the mass of sound and rhythm. The pitches in these two sequences belong to an 8-note set, 8-22 [0124579E], which means that the omitted set is once again 4-22 [0247]. Please refer to the table below:

<b>S:</b>	7	1	4	5	E	7	5	1
<b>A:</b>	5	E	2	7	7	5	1	2
<b>T:</b>	E	0	7	9	9	9	E	0
<b>B:</b>	9	2	E	0	2	7	9	E

Table 3.3 Twelve-tone Expression of Pitches Used in *Rasch*, Measure 49

None of the 4-note sets are repeated in this passage and a pitch is only repeated consecutively once. The composer was careful to ensure that the pitch groupings were not directly related to one another. This break from the relentless output of sound in the

piece, albeit mostly at a soft dynamic, resets the listener's palate as these are not repeated melodic patterns that occur frequently in the piece.

At the conclusion of the piece, Donatoni returns to the importance of verticality with sustained chords in the lower three voices while the soprano continues the pattern of seemingly sporadic 32<sup>nd</sup> notes broken by occasional brief rests. The chords expressed here provide a progression to the end of the piece through subtle intervallic changes. Once again this succession of harmony avoids repeating any sonority and comes to rest just as the piece began.

Measure	Pitches		Prime	Forte
66	{2, 5, 6}	→	[014]	<b>3-3</b>
	{0, 8, 11}	→	[013]	<b>3-2</b>
67	{0, 7, 10}	→	[025]	<b>3-7</b>
	{3, 4, 10}	→	[016]	<b>3-5</b>
	{0, 2, 8}	→	[026]	<b>3-8</b>
	{6, 7, 11}	→	[015]	<b>3-4</b>
	{1, 4, 10}	→	[036]	<b>3-10</b>
68	{5, 7, 11}	→	[026]	<b>3-8</b>
	{4, 8, 11}	→	[037]	<b>3-11</b>
69	{4, 8, 11}	→	[037]	<b>3-11</b>

Table 3.4 Set Classes Used in *Rasch*, Measures 66-69

The penultimate sonority in measure 68 {5, 7, 11} moves smoothly by common tone from 3-8 to 3-11 by shifting only two voices each a half step to {4, 8, 11}. This conservation of motion recalls some of the tenets that Bartók set forth and that Donatoni rigorously followed.

Handwritten musical score for measures 68-69, system 1. The system consists of four staves. The top staff is in treble clef with a key signature of one flat (B-flat). It contains a melodic line with eighth and sixteenth notes, some beamed together, and slurs. The second staff is in treble clef and contains rhythmic notation, including rests and eighth notes. The third and fourth staves are in bass clef and contain a bass line with eighth and sixteenth notes, some beamed together, and slurs.

Handwritten musical score for measures 68-69, system 2. The system consists of four staves. The top staff is in treble clef with a key signature of one flat (B-flat). It contains a melodic line with eighth and sixteenth notes, some beamed together, and slurs. The second staff is in treble clef and contains rhythmic notation, including rests and eighth notes. The third and fourth staves are in bass clef and contain a bass line with eighth and sixteenth notes, some beamed together, and slurs.

Example 4.7 Donatoni, *Rasch*, score, meas. 68-69

## CHAPTER FIVE

### A PERFORMANCE ANALYSIS OF *RASCH*

The duty of the diligent performer is to analyze aspects of a given piece carefully as they relate to the execution of its performance. “Unlocking the code”, from the performer’s perspective, is deciphering the intentions of the composer and mindfully considering how to project those choices to an audience. The saxophone quartet that chooses to undertake this piece must focus on aspects of texture expressed through individual and group rhythmic structures, articulation, and dynamics.

#### Compositional Use of Dynamics

For the performer, awareness of how certain musical parameters change throughout the piece is essential. Subsequent demonstration of these large-scale transformations leads to producing a thoughtful and convincing interpretation of the work. *Rasch* challenges performers to express a wide range of dynamics, from *ppp* to *ff* (with added sforzando accents). Unlike Xenakis, Donatoni explores the softer end of the dynamic spectrum extensively. The piece utilizes the subtlety of *ppp* and *pp* in 34 measures of the 69-measure work. Below is a graph that shows the dynamic markings of given sections. Multiple colors or shades suggest that there is more than one dynamic present in the measure, causing the graph to spike or dip in certain places, highlighting the subtle dynamic contour utilized by the composer. The table indicates the measures at

the far left followed by their length in parentheses and a short description of the dynamic shapes in the column furthest to the right:

- 1-14 (14) *ppp sempre*
- 15-28 (14) *pp cresc. to p at the end of measure*
- 29-37 (9) *pp sempre*
- 38-49 (12) terraced dynamics (*p, mp*, etc. then crescendo to *fff*)
- 50-59 (10) *ff* (also *sf* added)
- 59-62 (4) gradual diminuendo (through subtraction of instruments)
- 63-65 (3) *ppp* (juxtaposed with *f* slap tongue indication)
- 66-69 (4) *ppp* (coda)

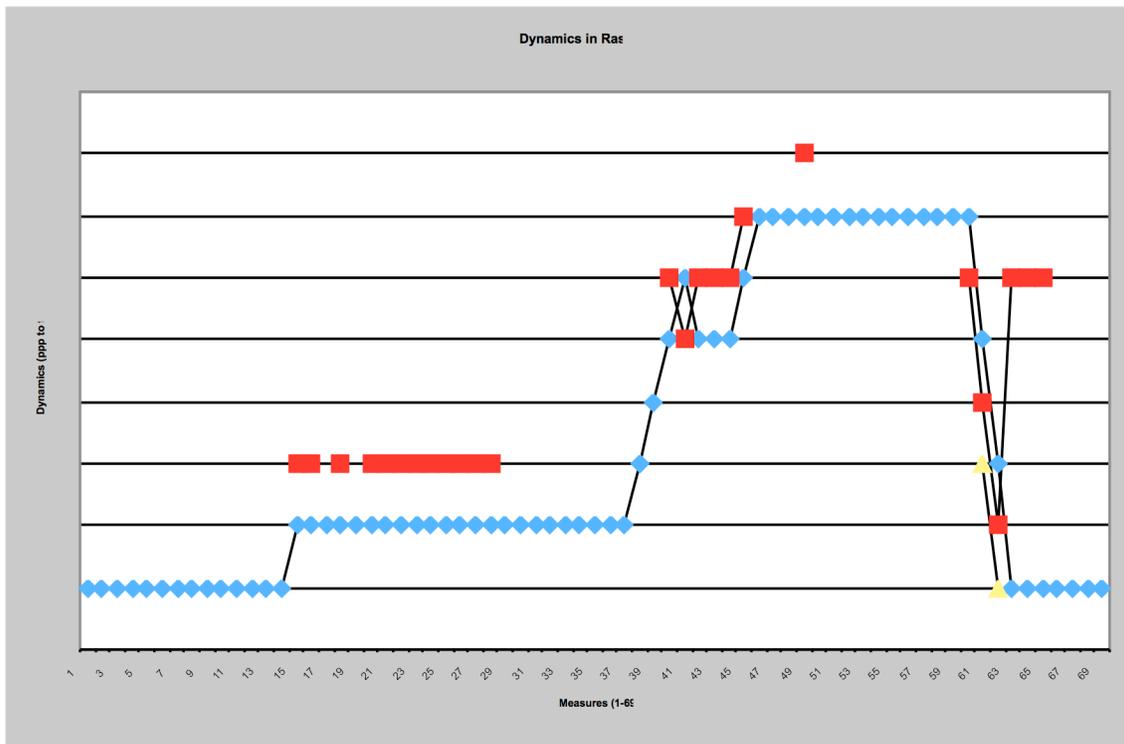


Figure 5.1 Dynamic Contour for *Rasch*

Donatoni's compositional choices include featuring both terraced and gradual dynamic changes. The first fourteen measures of the piece are marked *ppp sempre* and evoke a murmuring quality.<sup>37</sup> The delicacy of this dynamic is achieved through careful regulation of the air stream just enough to produce an audible sound. At measure 15 the dynamic raises to *pp* indicated by a slight crescendo in the solo baritone line. Here, the ensemble must produce a different tone color than that of the opening measures. A more present sound and precise articulation will help to indicate a clearly defined section change. Executing this crucial distinction in the opening of *Rasch* will establish the level of subtlety needed to project the subsequent terraced and gradual dynamic shifts of the piece. While the character of measures 15-37 is certainly energized, the group must be careful not to let it sound agitated. Therefore, a great deal of restraint is needed for the longer notes at the ends of phrases. These notes indicate a slight crescendo from *pp* to *p*, but this change in dynamic should be conceptualized as a change in intensity to preserve the character established at the beginning of the piece.

Similar to measure 15, a tone color change is necessary at measure 40 where the ensemble dynamic is suddenly *mf*, with sustained note values that intensify the dynamic change. All voices grow through the long notes to *f*, and undulate back and forth from *mf* to *f* until measure 45. This new dynamic range feels oddly powerful compared to the soft opening, and the quartet should express this with a big sound while still allowing the *ff*, *ff* + *sforzando*, and *fff* markings to be stronger. The intensity continues to rise in measure 45 when all voices are marked *ff* and have staccato accents indicated above all pitches. The sonic effect of this is a very punchy character that communicates a forceful aggression to the audience. From this loud dynamic, the four saxophones can only

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<sup>37</sup> In measure 66 this is indicated by a marking of "mormorando"

increase their volume by sustaining notes through slurs. In addition to increasing the power of the group through usage of the slur, Donatoni also includes trills in all voices. These trills will sustain the intensity established if the ensemble makes a concerted effort not to relax during them, keeping the same character as well as the previously-established dynamic.<sup>38</sup>

Beginning at measure 59 the intensity begins to fade through choice of instrumentation as well as dynamic. The baritone solo is marked *ff* and begins an upward melodic line that passes from one voice to another. The density of the thick four-voice texture from before is drastically thinned. In measures 60-62, a terraced diminuendo is indicated in the ensemble, while the overlap between the voices is increased from just one note in measure 60 to four and five notes in measure 62. This compositional technique is employed to legislate the pace of the diminuendo, and to obscure the terraced markings in the score. As the ensemble returns to the opening *ppp* dynamic, the lower two voices interrupt the murmuring character with violent slap tongues marked *f*. Following this section is a coda that returns to familiar material from the beginning, this time in the soprano voice alone while the other three voices hold a soft chord at the barely audible *ppp* dynamic. The final measures of the piece conclude as it began, highlighting an unmistakable arch-like dynamic structure.

### **Compositional Use of Rhythm**

Texture is prominently expressed in *Rasch* through the use of rhythmic interplay. The beginning of the piece features largely homophonic rhythms between all four voices,

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<sup>38</sup> See measure 59 where composer indicates “non dim.”

yet Donatoni complicates this texture with the addition of grace notes, undermining the presence of a clear pulse. The listener is first presented with the sound of four softly murmuring voices, lacking a clear sense of harmony or rhythm. This ambiguous effect is stabilized by the palate-cleansing moments of silence at the end of each of the first 14 measures of the piece. These clear separations serve the compositional purpose of providing a partition for the measure-long micro phrases. Here, the soft dynamic of the opening creates an interesting phenomenon. The pitches are barely audible, but the sounds of the keys opening and closing are very clear. The rhythmic mechanics of the instrument, therefore, become an integral part of the performance of the work. The rapidly occurring rhythmic unisons created between the four voices are now a function of the keywork of the saxophone in addition to the written pitches.

The idea of rhythmic unison returns many times in the piece. In opposition to the opening motive, many sections feature exact synchronicity or overlap between the parts. Unlike *XA2*, the four voices are in rhythmic accord rather than in opposition. *Rasch* utilizes cascading texture often when one voice begins a pattern and is imitated by the following voices. Measures 26, 50 and 60 are clear examples that show how overlapping has an obviously different rhythmic and textural effect as compared to the unstable rhythmic identity of the opening.

Beginning in measure 55, all four voices are in rhythmic unison while executing trills at regular intervals. This combination creates a chaotic rhythmic structure inside a static texture. The speed with which each player executes the trill varies, and irreconcilably clashes with the sense of unity created by the composer's isorhythmic

writing. The rhythmic structures of this piece require the four members of the quartet to communicate and execute each phrase as if they were one saxophone.

### **Compositional Use of Articulation**

Donatoni creates texture changes through shifts in articulation. From extended slurs to punchy accents, the composer utilizes the entire spectrum in *Rasch*. The specific articulation types used in *Rasch* include: staccato, tenuto, accented staccato, sforzando, and slap. These diverse attack envelopes create multiple textures available to the composer. The group of performers must approach these varied articulations with the goal of establishing a separate character for each. The table below is a representation of the articulation markings by section found in the piece with corresponding measures to the far left.

1-14	slurred measure-long phrases with grace notes
15-28	short slurred groupings, with isolated staccato and tenuto notes
29-37	slurred groupings with isolated accented staccato notes
38-39	staccato <i>sempre</i>
41-45	continuous slurred groupings
45-49	accented staccato groupings
50-59	slurred with <i>sf</i> at the beginning of each grouping
59-62	continuous slurred groupings
63-65	slurred groupings juxtaposed with slap tongue in the lower two voices
66-69	slurred in soprano with tenuto in the lower three voices

The opening measures of the piece begin with small slurred groupings of 2, 3, and 4 notes including the grace notes in each voice. The number of notes beneath the slur continues to grow with each subsequent statement. By measure 14, 8-note slur groupings occur in all four voices at some point within the bar. The following phrase contrasts the

opening motive with 2- and 3-note slur groupings with intermittent rests, creating space between each statement. The notes marked tenuto at the end of each measure serve to add a restrained intensity before each new presentation of the established gestural motive. The new articulation pattern added to the texture in measure 32 is the single, isolated accented staccato note. This idea is in stark contrast to both the long lines of the first section and the shorter slurs of measures 15-28. A brief two-measure interjection follows, featuring running staccato 32<sup>nd</sup> notes that are parsed throughout the ensemble, yielding a pointillistic effect.

After a section of long slurred passages, measure 45 returns to the isolated accented staccato note. Here, the composer has extracted the isolated staccato note and uses that motive as the basis for as many as five articulations in a row. The accented staccato articulation has a very aggressive character, much like the *sf* marking. In measures 50 and 51, Donatoni returns to his long slurred passages, adding constant trills, and opts for a more defined beginning to each voice's entrance. As the piece closes and the dynamic returns to its hushed volume, the composer elects to contrast the articulation patterns within the ensemble. The use of slap tongue in this piece is reserved for measures 64-65 in only the tenor and baritone parts. These isolated notes serve as punctuation that fills in the gaps of continuous slurred melodic lines in the soprano, alto, and sometimes tenor voices. From measure 66 to the end, the coda presents near-constant slurred 32<sup>nd</sup> notes in the soprano part while the lower three voices oppose that with long tenuto notes occasionally spaced by silence.

## CHAPTER SIX

### CONCLUSION

Through the completion of this project I gained a greater understanding of the theoretical and performance value of these two works for saxophone quartet. In the process I discovered multiple continuous compositional logics for both *Rasch* and *XA2* that are clearly demonstrated through the use of several analytical techniques. By building upon existing research of these composers and their music, the richness of academic material available will enhance the fields of performance and music theory. The combination of these two disciplines merits serious consideration for any musician exploring the works of the late 20<sup>th</sup> century. *XA2* and *Rasch* for saxophone quartet are deserving of research and analysis through the lens of the performer, the composer, and the theorist. Written more than 20 years ago, these pieces by Donatoni and Xenakis warrant programming as paragons of the literature. Critical thinking about and analysis of these works is also justified. An inspection of the inner workings of each of these pieces will reveal larger concepts applicable to 20<sup>th</sup> century music composition as well as theoretical constructs.

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