UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

DISORDER AND UNITY IN BRUNO MANTOVANI'S *BUG* FOR SOLO CLARINET

A THESIS

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

Degree of

MASTER OF MUSIC

By

RACHEL WOLZ
Norman, Oklahoma
2021

Downloaded from SHAREOK. Persistent Handle URL: https://hdl.handle.net/11244/329646

DISORDER AND UNITY IN BRUNO MANTOVANI'S *BUG* FOR SOLO CLARINET

A THESIS APPROVED FOR THE
SCHOOL OF MUSIC

BY THE COMMITTEE CONSISTING OF

Dr. Sarah Ellis, chair

Dr. Jonathan Nichol

Dr. Frank Riddick

© Copyright by RACHEL WOLZ 2021
All Rights Reserved.

Table of Contents

List of Figures.....v

Abstract.....viii

Publisher Copyright Release.....x

Introduction.....1

General Layout.....4

Form.....5

Primary Motives.....7

Manipulation of Time.....9

Section A: Line 1-24.....11

Rhythmic Permutations: Regularity vs Irregularity.....11

Prefixes and Suffixes on Motives X and Y.....15

Rhythmic Interruptions.....18

Extensions of Sounds.....20

Diminution and Augmentation.....25

Section B: Line 24-29.....27

Three Episodes of Time.....27

Creating Cohesion.....35

Unity Through (026), Major Third, Tritone.....34

Motivic Development: Augmentation, Diminution, Inversion.....41

Conclusion.....46

Bibliography.....48

List of Figures

1. A form table of *Bug*.....6
2. Motive X and Y as they appear in line 1 at the opening of the work.....7
3. A chain of dotted eighth notes in line 3.....12
4. Chains of rhythmic permutations on Motive X in line 5 interrupted by two and four pulses, shown in red boxes.....13
5. Chain of rhythmic permutations shown in red boxes surrounded by conflicting pulses in lines 13 and 14.....14
6. The final use of the rhythmic permutations in line 21 shown in red boxes. The surrounding groupings of notes create conflicting two and four pulses shown in blue boxes.....15
7. A prefix attached to a variation of motive X in line 1.....16
8. A suffix added to the end of motive Y in line 2.....17
9. A suffix attached to motive Y in lines 2 and 3 shown in the red boxes.....17
10. A rhythmic interruption of motive Y in line 5 seen in the G#5.....18
11. A longer interruption of motive Y shown in the blue box in line 5.....19
12. Motive Y interrupted by a two-octave leap down to G#3 in line 7.....19
13. A long phrase starting in line 9 interrupted by a group of thirty-second notes.....20
14. Extension of sound created through the repetition of A#3 in line 1.....21
15. Compound extensions of sound created through sustained and articulated pitches in lines 4 and 5.....22
16. Extension of sound created through the repetition of G#5 in line 2.....23
17. Extension of sound created through repetition of G#5 at varying lengths in line 14.....24

18. Oscillation around A5 which creates an extension of sound in line 18.....24
19. Rhythmic diminution and augmentation creating an irregular sense of time moving faster and slower in line 2.....26
20. Rhythmic diminution and augmentation created through the interplay of pulses in line 3.....27
21. A table outlining the three episodes of time in the B section starting at the end of line 24 through the end of the piece.....29
22. Episode one outlining pitches from (026) in red boxes in lines 24 through 25.....30
23. Episode two, shown in the blue boxes, overlapping episode one, shown in the red boxes, in lines 25 and 26.....31
24. The beginning of episode three starting in line 27.....32
25. A significant dynamic shift in episode three in line 28.....33
26. The end of episode three, shown by the repeated A4 at the end of line 29.....33
27. (026) returning twice in line 1, shown in red boxes.....36
28. A transposition of (026) seen in line 3.....37
29. Two overlapping transpositions of (026) in line 3.....38
30. Two gestural moments clarified by the outlining of a major third between F4 and A5, shown in red boxes, in line 15.....38
31. A phrase in line 18 unified through persistent use of augmented fourth.....39
32. A phrase made cohesive in line 17 through all three pitch collections; the augmented fourth in the red box, the major third in the blue box, and (026) in the black box.....40
33. Variation of motive X that grows through expansion in line 4.....42
34. Motive X varied by diminution in line 17.....42

35. A phrase in line 5 clarified through variations on motive Y.....43

36. Phrase unity shown through variations of motive X and Y in line 6 and 7.....45

Abstract

Bruno Mantovani's *Bug* (1999) for solo clarinet is a musical metaphor that depicts the disarray and disorientation caused by an imaginary computer malfunction. Historically, this piece parallels the anxiety surrounding the uncertainty of Y2K. The density of the musical material often makes this piece difficult to categorize and conceptualize. He divides the piece into a clear bipartite design, utilizes different durational patterns, juxtaposes regular and irregular rhythms, develops motives throughout all sections, and transforms pitch-class sets to ultimately give both the listener and the performer on a sense inconsistent time. While the material creates disorder, Mantovani also highlights cohesion through his pitch-class set and motivic unity. *Bug* is a rich and dynamic piece of contemporary music that can be conceptualized through an analysis of pulse, rhythm, pitch, and motive, to ultimately reveal how Mantovani alters our perception of time and creates overall coherence.

Mantovani sets the rhythmic framework of the piece through two primary motives; motive X and motive Y. Motive X is defined through its three sixteenth-note grouping. Motive Y is defined through its dotted eighth note with a trill and quarter note with a bisbigliando. Each motive is varied to different degrees throughout the work.

One of the biggest ways Mantovani plays upon our conception of time is through rhythm and pulse. *Bug* is written with an absence of time signature and bar lines, making pulse and meter difficult to understand. There are two major aspects I consider about rhythm: how Mantovani creates different pulses and how the interaction of multiple pulses cause conflict in our perception of time. Mantovani sets up most of the rhythmic activity of the piece through the grouping of a rhythmic duration—three sixteenth notes. This is established from the start as three separate, articulated entities, which further develops into a series of different rhythmic

permutations. Mantovani then sets up the rest of the piece through relationships between these rhythmic durations, varying ideas through augmentation, and diminution, and ultimately creating conflict through juxtapositions of different pulses.

Bug also gains coherence by the repetition and variation of pitch collections and motives. There are three important pitch collections that are central to the work; (026), the major third, and the tritone. Each collection is used throughout sections to create a sense of unity. He also develops primary motives to create cohesion throughout phrases and across large sections.

As the thesis reveals, *Bug* is a vigorous and virtuosic contemporary work that can be understood through the analysis of form, understanding of relationships between rhythmic durations, and motivic development. Through his use of rhythm and harmonic language, Mantovani reflects on the societal preoccupation with time at the during the end of the 20th century, resulting in a piece centered around controlling our sense of time.

Publisher Copyright Release

Bug by Bruno Mantovani
© 1999 Copyright Editions Henry Lemoine, Paris.
Reprinted by Permission.

Introduction

Bruno Mantovani's *Bug* (1999) for solo clarinet is a musical metaphor that depicts the disarray and disorientation caused by an imaginary computer malfunction. Historically, this piece parallels the anxiety surrounding the uncertainty of Y2K. The density of the musical material often makes this piece difficult to conceptualize and categorize. Throughout the piece, Mantovani manipulates our sense of time through pulse, and lack thereof, and rhythmic alterations to motives. Through this, he underscores a deeper metaphorical level—our "bug" of human time-keeping. Despite the disordered sense of time, Mantovani brings cohesion to the work through his persistent use of three important pitch collections and large-scale motivic unity across sections. In an analysis of rhythm and pulse, motive, and pitch-class sets, I analyze how Mantovani morphs our conception of time but also creates large-scale unity across the piece.

Premiered in 1999, this work paralleled the panic that society felt regarding the change to the new millennium— there was uncertainty about what would happen with computers and technology at the turn of the millennium. The Y2K problem refers to the events related to the formatting and storage of calendar data beginning in the year 2000. Society anticipated issues with computer programming because many programs represented years with the final two-digits, marking no differentiation between 1900 and 2000, causing errors such as incorrect display of dates in ordering of records or events. This issue provided society with a chance to understand the technological vulnerabilities that can arise from human shortsightedness.[1] This work, in combination intense rhythms, extreme juxtapositions in range, tessitura, articulation, and dynamics, takes the listener on a journey through these vulnerabilities.

[1] Robert F. Bennet, "The Y2K Problem," *Science* 284, no. 5413 (April 1999): 438, https://www.jstor.org/stable/2898353.

There is limited analytical scholarship on this work. There are two articles that I have been able to come in contact with; Nicki Roman's lecture recital notes for her dissertation (her dissertation is not available to the public yet) and Eric Schultz's article on *Bug*. Roman, a saxophonist, in her work "A Performer's Guide and Approach to Bruno Mantovani's *Bug,*" takes the saxophone transcription of *Bug* and creates a performance guide. In her dissertation, she asks two questions; "As a performer, how does the use of timbre, articulation, and rhythm help affect the interpretation and approach of the piece? Why does this piece work well for the saxophone and where did the popularity of its adaptation stem from?"[2] The goal of her dissertation is to present an in-depth view of *Bug* for saxophone and influence more saxophonists to take on the adaptation. Schultz is a clarinetist, and his work **"**Dissecting Bug, Bruno Mantovani's Virtuosic Work for Solo Clarinet" as a part of the National Association of College Wind and Percussion Instructors journal (NACWPI), discusses how Mantovani parallels the conflict in his compositional style with the Y2K problem in the year 2000. Through an analysis of form, thematic material development, and pitch-class sets, Schultz describes how Mantovani effectively imitates the Y2K bug itself and also relates to larger societal problems.

Born in 1974, Bruno Mantovani is a young French composer who has integrated many types of influences into his own writing. His music is a fusion of styles like jazz, current trends, electroacoustic techniques and the latest research into spectral harmony.[3] Mantovani studied at the Paris Conservatory, attended the computer music program Cursus at IRCAM, and then embarked on an international career. Through his inspiration of linking music with other forms of artistic expression, Mantovani has begun several extended collaborations with the Paris Opera,

[2] Nicki Roman, "A Performer's Guide and Approach to Bruno Mantovani's *Bug*," (Lecture Recital Notes, University of Rochester, 2018), 2.
[3] "Discography," Bruno Mantovani, accessed September 23, 2020, https://www.brunomantovani.com/en/discographie.html.

and novelists, librettists, chefs, choreographers, and film makers. His music often reflects popular forms and history of Western music. Mantovani has served as the headmaster to the Paris Conservatory since 2010.[4]

Bug was dedicated to Philippe Berrod, who gave the premiere performance in Mériel, France on June 2nd, 1999. Berrod is a French clarinetist and Principal of the Orchestre de Paris. He studied at Conservatoire National Supérieur de Musique de Paris. He is the Principal Professor of Clarinet at Conservatoire National Supérieur de Musique de Paris and is artistic advisor for Henri Selmer Paris.[5]

There are limited commercial recordings of *Bug.* There are two clarinet recordings by Nicolas Baldeyrou and Ensemble Alternance. There is a transcription for alto saxophone played by Vincent David. Each recording has a unique interpretation, as well as differences in tempi, articulation, and range.

The purpose of this thesis is to provide a formal, motivic, and pitch-class set analysis in order to provide tools for the listener and performer to categorize and conceptualize the music. This thesis gives coherence and overall understanding to the piece in order to further performer and listener contextualization.

[4] "Biography," Bruno Mantovani, accessed September 23, 2020, https://www.brunomantovani.com/fr/biographie.html.
[5] "Philippe Berrod," Henri Selmer Paris, accessed December 8, 2020, https://www.selmer.fr/en/artist/philippe-berrod.

General Layout

Bug is written with an absence of bar lines, time signature, and key signature. It is written in treble clef. I have labeled each line in number order, and my examples are listed with the respective line number. The music is scored for B-flat clarinet.

Mantovani lists a few temporal markings. The beginning up until the start of line 14 is listed as quarter note=144 for groups of sixteenth notes and quarter note=132 for groups of longer notes. In line 14, the quarter note changes to 100. It increases to 132 in line 15 and 144 in line 17. In line 22, the quarter note value is 132. From the end of line 24 to the end of the piece, pitches are notated with time stamps in seconds. In line 26, the quarter note=84, in 27 it equals 92 and then changes to 60 for the remainder of the piece.

Form

Bug follows a binary model with the A and B sections temporally dividing the piece in half.[6] The A sections starts at the beginning of the piece and goes until line 24. The B section starts at line 24 and goes until the end. In total, each section runs for roughly 3 minutes. The A and B sections are starkly contrasting.

The A section contains three smaller subsections, denoted by lowercase a, b, and c. Subsection a occurs from the beginning through the end of line 5. This section is characterized by long phrases and rhythmic augmentations. Phrasing is dominated by rhythmically intense technique, and there are few lyrical moments. Subsection b occurs from line 6 through line 16. This section is characterized through repeated articulation with constant fluctuations between technical and lyrical melodies. Unlike subsection a, phrases in this section are short and choppy. Subsection c starts at line 17 and goes halfway through 24, ending on the G6. This subsection opens with an asymmetrical feel, defined through syncopation, long phrases, and many disjunct, large interval leaps. Section A culminates in line 24 with a series of gestural sweeps concluding with the highest and loudest note in the piece, a screeching G6 at ***ffff***.

Section B counters and responds to the musical climax that closes A. As noted, the A section concludes with an explosive gesture at ***ffff***, on highest note in the piece. After this outburst, time seemingly changes; through time stamps, long, sustained notes, and slow, syncopated rhythms, Mantovani removes any sense of pulse that was created in section A. This ending is somewhat contradictory; the sustained pitches serve as a calming resolution to the aforementioned tension while simultaneously not giving any rest to the performer who has endured all of the previous activity. Through his increased use of microtones, Mantovani creates

[6] Eric Schultz argues that *Bug* is written in sonata form, using emphasis on contrast and conflict in the thematic content as his main support. I argue for binary form.

a sense of pitches melding together. The pitches blend together, and the juxtaposition with the A section creates an ethereal atmosphere.

This form graph outlines each section and subsection with their respective line number and also lists notable tempi throughout each section.

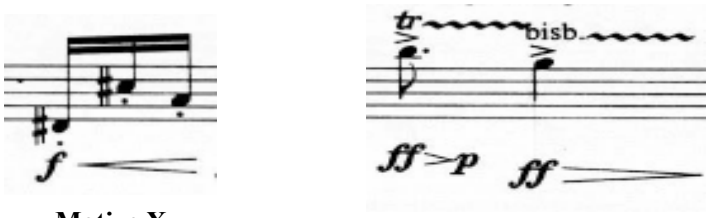
Section	Line	Tempo
Section A	1-24	♩=144 for groups of ♪ ♩= 132 for groups longer ♩=100 ♩=132 ♩=144 ♩=132
Subsection a	1-5	♩=144 for groups of ♪ ♩= 132 for groups longer
Subsection b	6-16	♩=100 ♩=132
Subsection c	17-24	♩=144 ♩=132
Section B	24-29	Time stamps in seconds ♩=84 ♩=92 ♩=60

Figure 1: A form table of *Bug*

Primary Motives

There are two primary motives in *Bug* that set the foundation for the piece. Both of these motives are constantly being developed throughout. Each motive is manipulated to different degrees to change how the listener perceives time and pulse but are also circulated through each section to bring cohesion.

Two motives, which I label motive X and motive Y, are shown in Figure 2 as they appear at the beginning in line 1.[7]



Motive X **Motive Y**

Figure 2: Motive X and Motive Y as they appear in line 1 at the opening of the work

Motive X is characterized by the group of three sixteenth notes, staccato articulation, ***forte*** dynamic, (026) set class, and the minor seventh, diminished fifth, and major third intervals within the three pitches. The grouping of three sixteenth notes from this motive sets the main, important rhythmic basis for *Bug;* the three sixteenth-note grouping is continuously altered over time, sometimes seen as a string of straight sixteenth notes or hidden in other note values, most often the dotted eighth note. Usually, this motive takes the form of a group of staccato sixteenth notes, but may be slurred. The ***forte*** dynamic gives the motive the abrasive quality. The D#, C#, and A pitches form the set class (026). The pitches also generate intervals that are significant

[7] All examples come from screenshots from the Bb clarinet score. All examples are written in treble clef. *Bug* is written without key signature and time signature.

throughout the piece. The outermost interval forms a diminished fifth and the inner intervals form a minor seventh and major third. The diminished fifth and major third reoccur frequently throughout *Bug*.

Motive Y is defined through its trill and bisbigliando, the dotted eighth-note and quarter-note pair, the ***fortissimo*** dynamics with decrescendos, the accents, and the major third interval. In the motive, the trill is attached to the dotted eighth note and the bisbigliando is attached to the quarter note, which is an added effect to color sound in a unique way. In motive Y, each note is accented and starts ***fortissimo*** and decrescendos. The B5 and G5 form a major third interval, which also occurs in motive X, and is a central theme to the work.

The rhythmic structure of these motive and subsequent transformations, whether it be regular or irregular, help create the sensation of the manipulation of time. Variations of these motives at a local level within phrases, mainly through slight rhythmic adjustments, create disjunction and unsteadiness. However, at the large-scale, global level, frequent return of these motives and their variations create continuity and understanding to the piece.

Manipulation of Time

Throughout *Bug*, Mantovani shifts between a regular, consistent and an irregular, erratic passing of time. When perceiving musical time, the musical surface is important to defining time. Pulse is defined as a series of timepoints, and throughout *Bug,* there is never a clearly consistent or regular representation of pulse; Mantovani frequently switches between different groupings of time points. The three main types of pulse that Mantovani articulates are a two, three, and four pulse. In my analysis, I largely define pulse through how sixteenth notes are grouped. I separate these different pulses through the amount of sixteenth notes that each note or group of notes contain, derived from the group of three sixteenth notes set up by motive X. For example, a quarter note would articulate a four pulse since there are four sixteenth notes in a quarter note. An eighth note would articulate a two pulse for the same reason. There additionally are certain phenomenal or sonic accents that clarify whether or not something articulates a two, three, or four-pulse. Types of sonic emphases include literal accents, slurs, and contour and range changes. The juxtaposition of these even and odd pulses is what morphs our overall sense of time and how the listener perceives it. For the purpose of this thesis, I mainly look at how the perception of time shifts when Mantovani switches between grouping sixteenth notes in groups of two, three, and four.

Time is regular when Mantovani consistently strings any of the pulses together; the consistent chain creates a distinct pulse with a discernable beat, leading to easily tangible and perceptible points in time. Moments of regularity are brief, and the passing of time becomes irregular when the three different rhythmic pulses are juxtaposed, interrupted by other rhythmic values, or overtaken by conflicting pulses.

To understand this piece as a performer and listener, it is helpful to dissect how pulses are created and how through disruption and a lack of continuity, Mantovani manipulates how time is perceived. Mantovani frequently switches how time is heard in the work creating an overall trajectory of disjunction and unsettledness. Through rhythmic permutations on the three sixteenth notes from motive X, rhythmic prefixes and suffixes (which will be explained in a later section), interruptions with short note values, extensions of sounds, and rhythmic augmentations and diminutions, Mantovani consistently disrupts a sense of the passing of time in the A section. In the B section, he uses several compositional techniques to convey three different episodes of time, each with a unique aesthetic and distinct perception of time.

Through my analysis, I have found time manifesting itself differently and uniquely in both the A and B section. I break up my analysis of time manipulation in how Mantovani conveys time in the A section and the B section. Throughout the A section, Mantovani shifts our sensing of time specifically with rhythmic alterations to both primary motives and its resulting conflicting pulses. In the B section, Mantovani presents three distinct, overlapping episodes of time, each with a different aesthetic. I will first describe the way rhythmic permutations and motive manipulation define pulse in the A section. I will then look at how Mantovani creates three distinct episodes of time throughout the B section.

Section A: Line 1-24

Rhythmic Permutations; Regularity vs Irregularity

Using motive X as a starting point, Mantovani sets up different permutations of its rhythmic value of three sixteenth notes.[8] Mantovani uses three different rhythmic permutations of the three sixteenth-note grouping from motive X; the original rhythmic motive of three sixteenth notes in a row, a dotted eighth note, or a sixteenth note connected to an eighth note and vice versa. Throughout section A, the dotted eighth note permutation is the most prevalent of the permutations of the motive.

The first time that Mantovani groups the three sixteenth notes from motive X as a dotted eighth note happens in line 3, shown in Figure 3. The dotted eighth notes form a consistent string of three pulses, creating a sense of regularity, as the passing of time is delineated in an even, steady manner. The music in Figure 3 is immediately followed by a group of three sixteenth notes and another dotted eighth note, which continues the regularity. The note that follows is a quarter note, breaking up both the continuous chain of threes, and the sense of regularity. The quarter note, containing four sixteenth notes, thus emulating a four pulse, interrupt the regularity that was enforced through the chain of dotted eighth notes. The line closes with a quintuplet, which even further breaks down the consistency in pulse felt by the chain of dotted eighths.

The section of music shown in Figure 3 not only gains consistency in the chain of dotted eighths, but also in dynamics. Each dotted eighth is accented and begins ***forte*** followed by a diminuendo. The dotted eighths are also grouped by timbral effects. The first three dotted eighths in Figure 3 have a marked trill and the last has a bisbigliando.

[8] Nicki Roman also refers to these groupings of the three sixteenth notes as permutations in her lecture recital notes and dissertation.

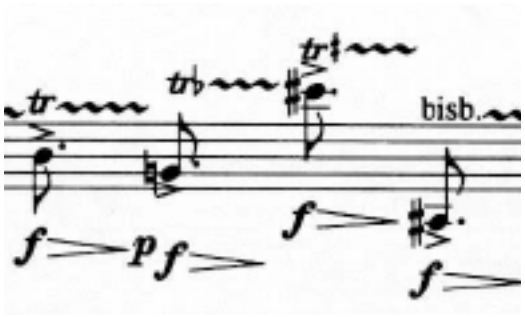


Figure 3: A chain of dotted eighth notes in line 3

An example of how Mantovani creates irregular time comes at the close of subsection a at the end of line 5. Shown in Figure 4, Mantovani emphasizes conflict in our sensing of time first by creating a sense of continuity with a string of rhythmic permutations with a three pulse and then immediately disrupting it with conflicting two and four pulses. As mentioned earlier, the three pulse is created by the rhythmic permutations on motive X. In this example, all three types of rhythmic permutations are seen. The two and four pulses are created when sixteenth notes into single eighth notes, quarter notes, or two or four sixteenth notes in a row.

Figure 4 highlights the moments of disrupting pulses throughout line 5 created by a group of two sixteenth notes, a quarter note, and an eighth note. The red boxes mark interruptions of the rhythmic permutations, and thus disruptions of consistent sense of pulse. As Figure 4 shows, line 5 starts with the sixteenth-note, eighth-note grouping, which leads to straight sixteenth-note grouping, and then leads to the dotted eighth note, cycling through all three rhythmic permutations of the motive. Consistency breaks down in the next grouping; the slurred A#3 and B4 emphasizes a group of two, noted by the slur and accented A#3. The pulse that was forming prior to this is now broken down. The pulse tries to restart but is dismissed through the F#4 quarter note and A4 eighth note. This fluctuation continues through the end of the line. Two

groupings of three sixteenth notes and the dotted eighth note F#4 attempt to reestablish the pulse, but again is interrupted by the grouping of two sixteenth notes on G#5 and F#4. The quarter note at the end of the figure also diminishes this pulse. Throughout this phrase, the time seems to be consistent at moments, but ultimately is overruled by irregularity. While a regular pulse is almost achieved, there is never a true continuity. Subsection a almost closes with some sense of a consistent marking of time, but with these interruptions, a bug in the consistent flow of time, begins to intrude.

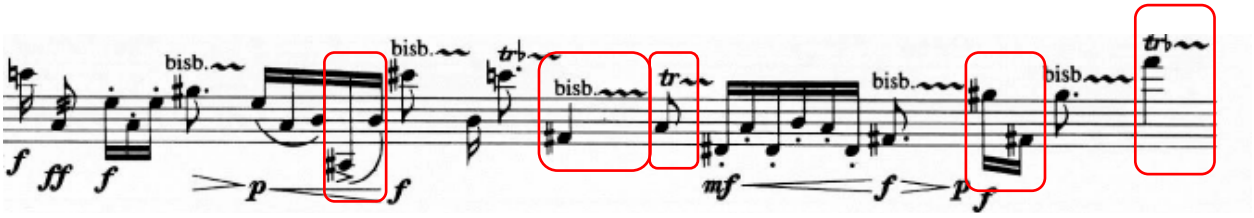


Figure 4: Chains of rhythmic permutations on Motive X in line 5 interrupted by two and four pulses, shown in red boxes

Another example of conflicting pulses happens at the end of line 13. Shown by the red boxes in Figure 5, three uses of the rhythmic permutations of the three sixteenth notes carry momentum forwards into the G#3. This consistent chain seems to propel rhythmic activity and stability forwards but is ultimately thwarted by the sustained G#3. Before the permutations in line 14 is a grouping of two sixteenth notes, A5 and G#5, creating a two pulse, marked by staccato articulation and proximity in range (the A5 and G#5 being separated in range from the B4). Afterwards, the pulse is carried through these rhythmic groupings and is lost in the G#3, which lasts for four seconds. There are not any more clear, consistent uses of these rhythmic permutations until line 21. From line 14 through 21, pulse is inconsistent, shifting between large, gestural runs and asymmetrical syncopated lines.

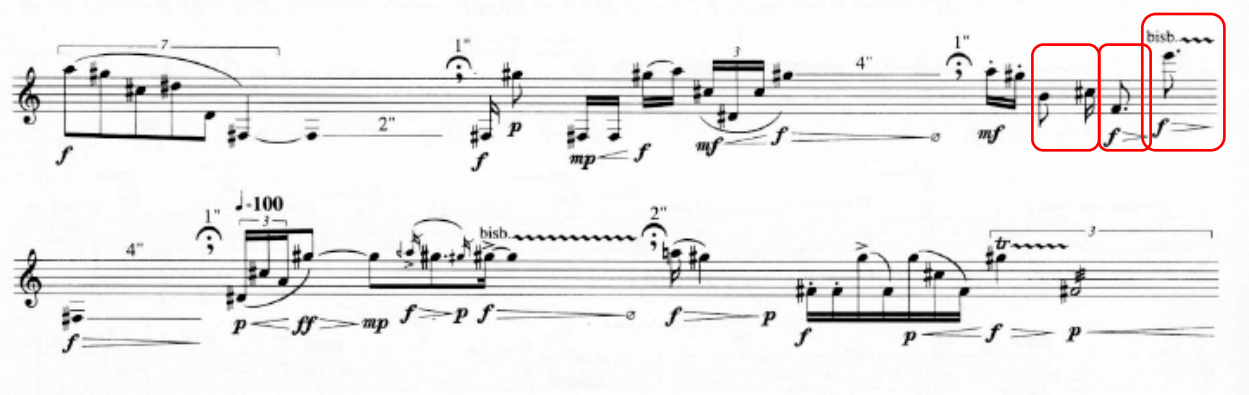


Figure 5: Chain of rhythmic permutations shown in red boxes surrounded by conflicting pulses in lines 13 and 14

The final clear use of the rhythmic permutations is at the end of line 21, shown in Figure 6. The rhythmic permutations are highlighted in red boxes. The other two and four pulses are shown in blue boxes. Like the example before, the first rhythmic permutation, the dotted eighth note, comes after a grouping of two sixteenth notes, which creates a conflict of pulses. The preceding two sixteenth notes create a two pulse, defined by proximity in range and staccato articulation. Two rhythmic permutations on the three sixteenth notes afterwards attempt to establish the regular three pulse but are overtaken by other pulses. The second red box, with the pitches C#5, F4, and C4, articulate a rhythmic permutation and a three pulse through its range and contour. The motion of the C#5 down to the C4 is descending; the fourth sixteenth note in that group, F#5, separates itself from the group by its leap up in the opposite direction. This F#5 acts as an anacrusis to the four pulse that follows in the A5 quarter note. The next group of sixteenth notes after the A5 quarter note articulates a four pulse because of range and contour. The overall contour of this grouping of notes descends downwards, and it is separated from the next rhythmic permutation by a leap up from B4 to G5. The last rhythmic permutation, the eighth note and sixteenth note, try to reestablish consistent pulse, but the four second held A5 takes over

and wins out. The juxtaposition of two, three, and four pulses create conflict in our sense of time and foster feelings of unevenness. After this moment, there are no more clear appearances of any of the rhythmic permutations.

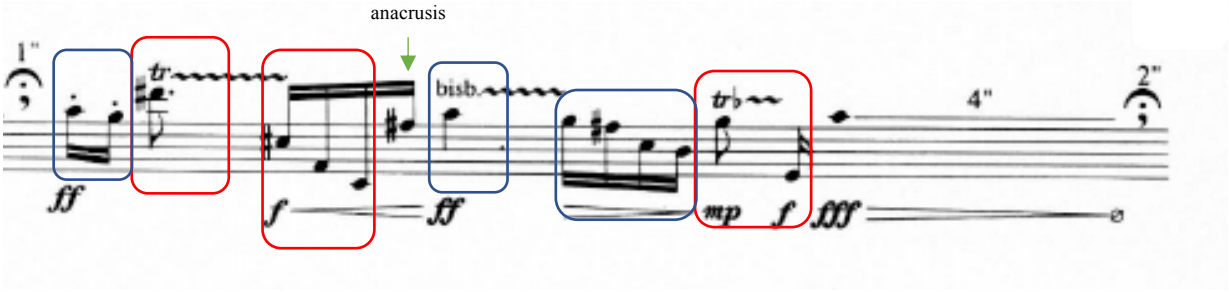


Figure 6: The final use of the rhythmic permutations in line 21 shown in red boxes. The surrounding groupings of notes create conflicting two and four pulses shown in blue boxes

Mantovani sets up different rhythmic permutations of the sixteenth notes from motive X to affect the consistency of time moving forwards. Oftentimes, these rhythmic permutations are in conflict with pulses created through groupings of sixteenth notes in groups of two and four instead of three. Time feels regular when there is a consistent chain of rhythmic permutations. The flow is time is erratic when he conflicts these rhythmic permutations with other groupings.

Prefixes and suffixes on motives X and Y

Another way Mantovani manipulates time is through rhythmic prefixes and suffixes attached to the two primary motives. The slight adjustments to the original motives work to undermine the stability created by the continued recurrence and work to break down the pulse is that is being carried and heard over time.

The first example of a rhythmic prefix comes at the end of line 1, shown in Figure 7. The slurred three-note grouping of A4, D#5, and E4 followed by the staccato grouping of G5, D#5,

and A4, both represent motive X through similarity in contour and pitch-class set to the primary motive. The first group, A4-D#5-E4, has the same contour and has a similar pitch-class set, (016), as the original motive. The second grouping is the same pitch set, (026), but varies in contour. The C#6 that comes before these two groups functions as a rhythmic prefix because of its range and dynamic. The pitch delays the arrival of the motive.[9] This prefix, the early arrival of C#6, generates volatility, especially when it shifts the perception of the main (026) pitch-class set. This prefix interrupts our sensing of time by articulating an odd pulse before the three pulse that is generated afterwards by the chain of rhythmic permutations.

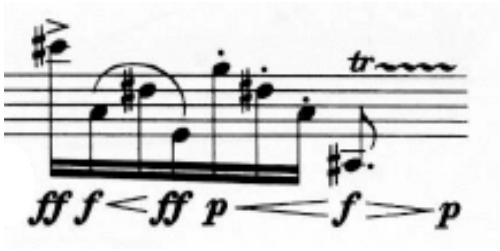


Figure 7: A prefix attached to a variation of motive X in line 1

In other places, Mantovani expands time by adding suffixes. An example of a suffix occurs in line 2, shown in the Figure 8. Here, motive Y is extended by a single sixteenth note tied to the end of the quarter note. By extending Motive Y by one sixteenth note, that moment of time is prolonged, making it difficult for the listener recognize the regular pulse and slightly prolongs the association to the primary motive.

[9] The C#6, when combined with A4 and D#5 form a (026) set and thus theoretically could be considered a variation of Motive X. But, I argue, the separation of the C# from what follows via register, articulation, and dynamics eliminate this grouping as a functional variation of Motive X.

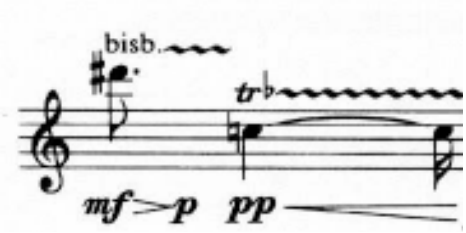


Figure 8: A suffix added to the end
of motive Y in line 2

At the end of line 2 into 3, this slight expansion by a singular value from the previous example continues to grow even more. As shown in Figure 9, Motive Y appears at the end of line 2, seen in the dotted eighth note followed by a quarter note. Here, Mantovani attaches another suffix to the end; this time, motive Y is expanded by an eighth note, making the moment even longer and further breaking down time the sense of pulse. By the end of line 3, there still has not been any consistency in pulse; Mantovani has taken motive Y and has gradually ended each appearance with one additional note value.

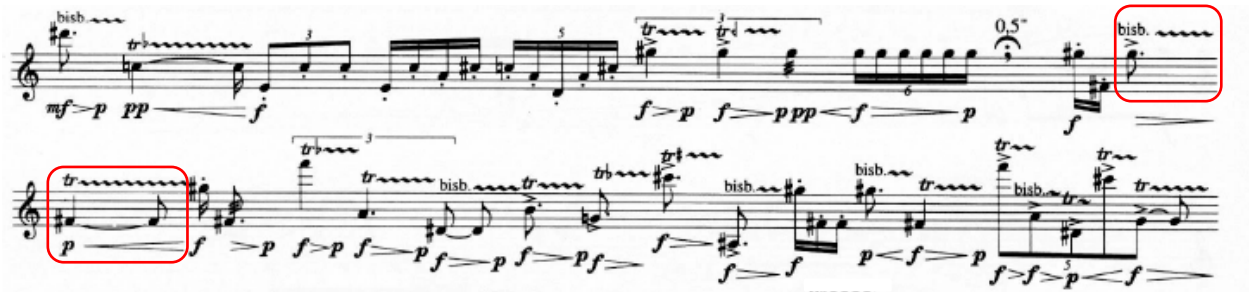


Figure 9: A suffix attached to motive Y in lines 2 and 3 shown in the red boxes

These prefixes and suffixes based on the central motives all affect the consistency of pulse throughout *Bug*. These additions to motives X and Y disfigure and replace the expectation of what the pulse is going to be, which was established by the opening statement of motives X and Y.

Rhythmic Interruptions

Another way Mantovani manipulates time is through rhythmic interruptions, when shorter note values, such as an eighth note or a sixteenth note, interrupt a longer line. These brief moments generate disjunction that interrupts how the music marks the passing of time. Oftentimes, these interruptions quickly break up the flow and pulse that is trying to be established by the music. In most cases, the interruption comes with an extreme range or dynamic and usually involves a large intervallic leap. Sometimes, these interruptions are inserted in the middle of variations on motive X and Y.

An example of a short note interrupting motive Y comes in line 5. Shown in Figure 10, a sixteenth note is inserted in the middle of motive Y. The consistent passing of time, which would have been heard in a clear repetition of motive Y, is broken down through this interrupting note. The idea starts with a quarter note tied to a sixteenth note, immediately followed with an accented interrupting note, leading to the dotted eighth note. The G#5 interruption is separated by articulation and contour, as it is both staccato and separated by a descending leap. This separation causes disjunction, creating a stutter in the passing of time.

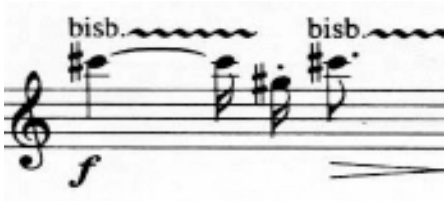


Figure 10: A rhythmic interruption of motive Y in line 5 seen in the G#5

Sometimes, Mantovani uses slightly longer interruptions to disrupt the passing of time. Figure 11 shows a sense of time slowing down, as more rhythmic values are inserted in between motive Y, which extends how long it takes for the listener to hear the motive. In line 5, motive Y

is heard between the C#7 and G#6, shown in the red boxes. The G#6 that leaps up to C#7, highlighted in the blue box, interrupts the motive.

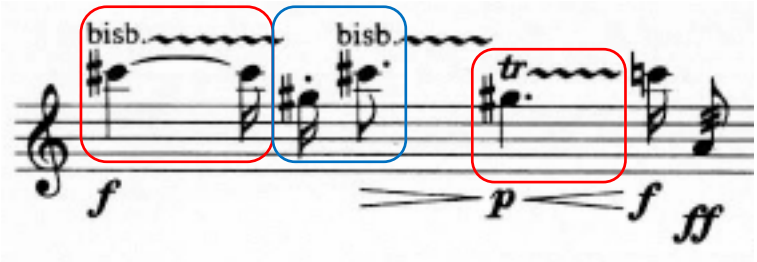


Figure 11: A longer interruption of motive Y shown in the blue box in line 5

The interruptions become more extreme in the following lines. In line 7, Motive Y is heard between the G#5 and the E6, which is interrupted with a large interval leap down to a G#3. Shown in Figure 12, this two-octave leap creates an even more dramatic time disruption. The G#5's long note value before creates anticipation for a normal resolution of motive Y, but time is sliced through the jarring G#3. Again, dynamic contrast contributes to this interruption of flow of time; the extreme change from ***forte*** to ***piano*** is startling.

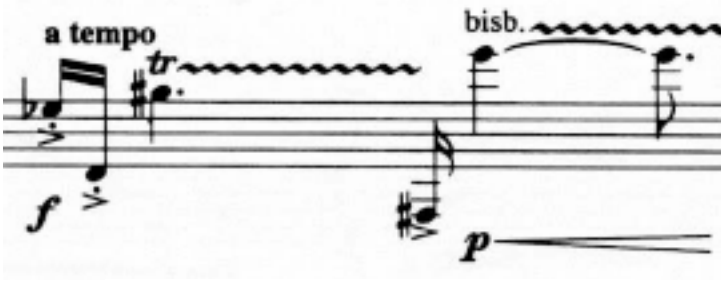


Figure 12: Motive Y interrupted by a two-octave leap down to G#3 in line 7

Mantovani sometimes uses rhythmic interruptions to disrupt long phrases. In line 9, the phrase extends from the E6 and flows all the way to the D#5, articulating a longer sense of time.

Shown in Figure 13, in the midst of this phrase, thirty-second notes act as an interruption to the flow of this line. This moment is a longer collection of shorter note values, and the interruption is forceful, articulated through the low, accented, and ***forte*** G#3. The pacing of this line begins slowly, and this moment attempts to speed up time. This change, however, is prevented by the long D#5 that follows, heightening the inconsistent pulse.

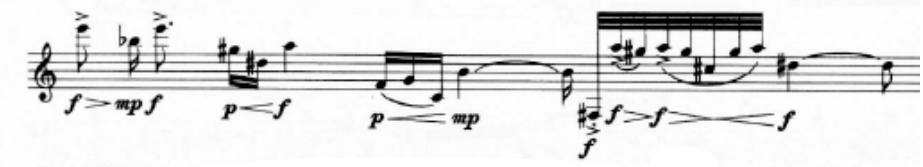


Figure 13: A long phrase starting in line 9 interrupted by a group of thirty-second notes

Mantovani uses short, rhythmic interjections, sometimes as short as a single sixteenth note, to interrupt the flow of the melodic line. Usually seen in the middle of motives X and Y, these interruptions take away from consistency.

Extensions of Sounds

Another instance of time distortion comes from the ways in which Mantovani extends sounds by the repetition of a singular pitch. Most often, pitches are repeated either through staccato articulation or they are sustained for unequal lengths of time. This results in the perception of time changing at an uneven rate.

In line 1, Mantovani creates inconsistency in the passing of time with the repetition of A#3 at different lengths. Shown in Figure 14, after the quintuplet, the A#3 is sustained three times in a row. Each repetition is paired with a different timbral effect and dynamic, producing

three distinct moments in time. These three repeated notes progressively get longer in length, but not by an even amount. The first A#3 lasts the length of a quarter note tied to a sixteenth note, which progresses into a dotted quarter note, increasing only by one sixteenth note. The third articulation of A#3 at ***ppp*** is held for three seconds, suddenly lasting a lot longer than the previous notes. This, paired with the extreme quiet dynamic, contributes to a sense of time slowing down at an uneven rate. The A#3 is articulated a fourth time at the end of the line after a series of sixteenth notes. Although separated by other faster moving notes, the sound of A#3 is carried from the initial onset to the end of the line. By writing this long, drawn-out emphasis of A#3, separated by a grouping of sixteenth notes, Mantovani suspends time.

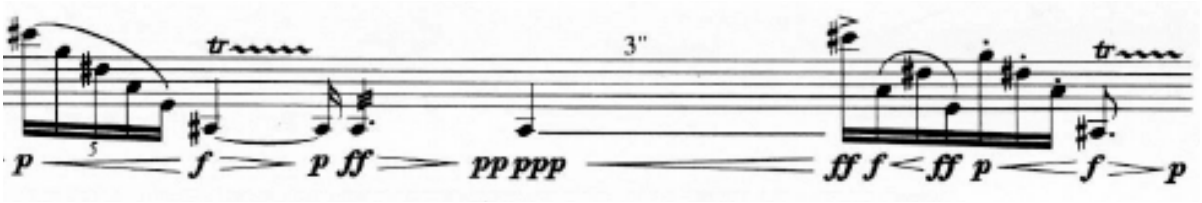


Figure 14: Extension of sound created through the repetition of A#3 in line 1

A unique way that Mantovani extends sounds is when he sustains multiple pitches and follows them with repeated articulation in lines 4 and 5, creating a compound melody. Mantovani prolongs G#5, C6, F6, and C#6 in these two lines. In Figure 15, the colored boxes highlight each different pitch that is being extended.

The first pitch that is prolonged is G#5. At the beginning of line 4, shown in the yellow box, Mantovani presents the G#5 as a dotted quarter note. Over the course of these two lines, this G#5 is extended with varying note values, being seen in single, staccato sixteenth notes, dotted quarter notes, and dotted eighth notes. The C6 is also extended in line 4 and is first seen as a

dotted quarter note shown in a green box. This eventually morphs into a dotted eighth note that is followed by a few repeated, articulated sixteenth notes. This moment then steps up a half step to C#6, shown in red boxes. At the end of line 4, the high C#6 is articulated four times before being sustained. This instance also comes at a phrase elision. The preceding phrase ends with four articulated C#6s. The new phrase starts at line 5. The sustained pitches paired with trills and timbre trills slows the pacing down. The G#5 in line 5 serves as a brief interruption before returning to another long note value. The last pitch that is prolonged is the F6, highlighted in the purple boxes. It comes at the highpoint of the phrase in line 4 and culminates the phrase at the end of line 5.

The extension of sounds on these different pitches that create a compound melody expands the sense of time by carrying the sound of each pitch through different lengths with varying note values and articulations. All of these pitches together represent perfect intervals, with perfect fourths between G#5 and C#6 and C6 and F6. Because of the juxtaposition of short, articulated notes and long values, the listener attaches different lengths of time to each pitch, creating a feeling of prominence over the rest of the notes throughout the entirety of the two phrases. Overall, with a prolongation of each of the pitches, time feels unsteady, drawn out, and extended even longer.

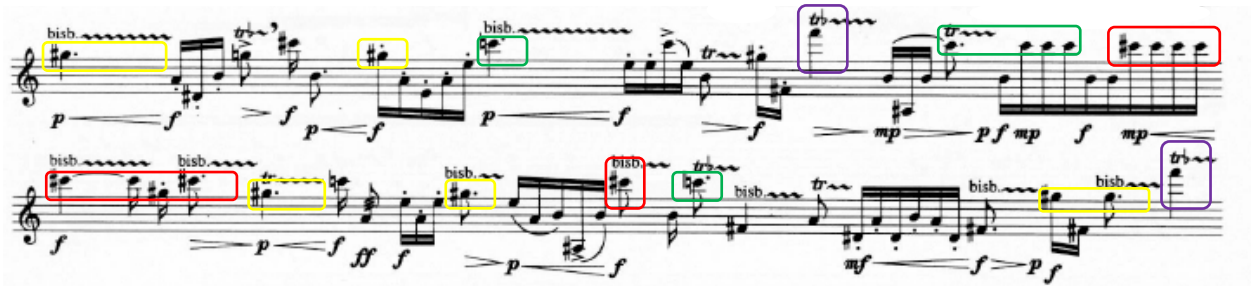


Figure 15: Compound extensions of sound created through sustained and articulated pitches in lines 4 and 5

Another way Mantovani achieves this drawn out time through repeated articulation is shown in line 2. In Figure 16, The same G#5 is heard several times in a row, each colored differently with timbral effects and dynamic change. Even with the brief 0.5 second pause and fermata, the repetition of G#5 expands our sense of time, making this moment feel longer. The prolongation of the G#5 creates a sense of stasis of time; with nothing else changing or moving around it, except for the brief F#4, the listener attaches moving time to the unchanging pitch.

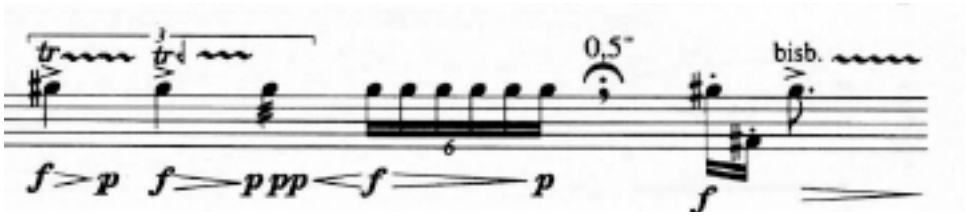


Figure 16: Extension of sound created through the repetition of G#5 in line 2

Another instance of extension of sound comes in line 14. A variation of motive X is seen in the first three notes in Figure 17. The motive is compressed into one single eighth note as a triplet instead of taking place over three sixteenth notes like the first appearance of motive X. After this motive, Mantovani adds on a G#5 suffix, which then morphs into an extension of tones. Each repeated G# is a different length, progressively getting longer. The duration of the first onset is two eighth notes tied together. This value then is extended by one eighth note, turning into a dotted eighth note. The last articulation of this note is the longest; the sixteenth note is tied to a long note, unspecified in length. This figure highlights a gradually drawing out of time, with each iteration of G#5 becoming longer, extending both the tone itself and the overall time. The quarter tones after the first G#5 also obscure length by delaying when the G#5 is heard.

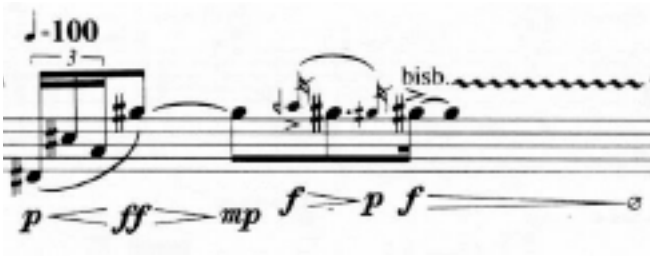


Figure 17: Extension of sound created through repetition of G#5 at varying lengths in line 14

Another moment of this happens in line 18. Shown in Figure 18, the repeated A5 becomes the focal point in the phrase, serving as an axis for other notes to oscillate. A5 is articulated, held as a long note, and articulated several times again, drawing out time. Because of the repetition of a single note that our ears focus on, time becomes static and seemingly unmoving for a brief moment.

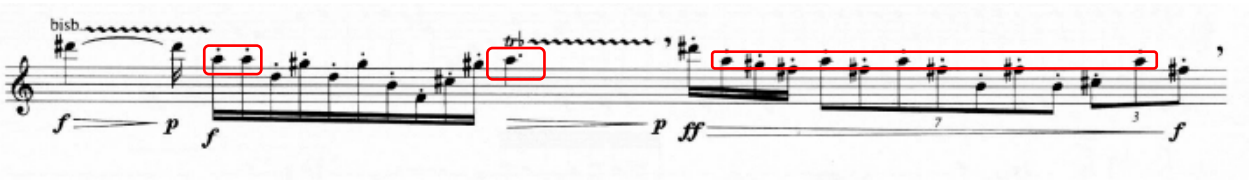


Figure 18: Oscillation around A5 which creates an extension of sound in line 18

Mantovani continues to represent a manipulation of time through the ways he extends tones. This extension comes from both repetitions of single, articulated pitches and repeated pitches followed by the same pitch at a long, sustained value. Most often, the repetition of notes is at unequal lengths, which causes time to feel unsteady. Other times, the long, sustained repetition of a singular pitch causes the perception of time to feel static and stand still.

Diminution and Augmentation

Another method that Mantovani employs to alter the listener's sense of time passing is the use of rhythmic diminution and augmentation. Diminutions occur when rhythmic values decrease and get shorter over time, creating a sense of accelerando. Augmentations are the opposite, occurring when rhythmic values are increased, drawing out the sense of time. In some cases, diminutions and augmentations occur over large phrases, gradually affecting how time is perceived from the start to the end of the line. Other instances occur sporadically, when he both augments and diminutes a rhythm over a short period of time. Mantovani utilizes this compositional device to create tension in our perception of how time is moving.

The first example of this occurs in line 2, shown in Figure 19. From beginning to end of this phrase, the rhythmic values are cut in half, seen in the eighth-note triplet beginning and the sextuplet ending. The sense of time morphs through an interplay of both diminution and augmentation. The augmentation begins as an eighth-note triplet expands to four sixteenth notes. Mantovani morphs the triplet then grows into quicker moving sixteenth notes. The passing of time now is starting to increase and feel faster, with only an addition of one pitch. By changing the rhythmic value from triplets to sixteenth notes, Mantovani achieves this time augmentation. The pitches E4 and C5 from the triplet are used again at the start of the group of sixteenth notes. This helps create a sense of anchorage; the reiteration of these two pitches connect the two groups together while also simulating an increase of time. Afterwards, time increases even faster with the change from sixteenth notes to quintuplets. Like the change from triplets to sixteenth notes, a few pitches help establish an anchor. This time, C5 and A4 create that anchorage. The increase of time created by this augmentation suddenly is shifted and stalled by the quarter-note triplet, however. For a brief moment, the passing of time slows down and stops the forwards

momentum that was happening because of the augmentation. This does not last for long, though, because once again, Mantovani disrupts flow of time and restarts the augmentation with the sextuplet. Throughout this example, the passing of time starts moving regularly forwards through the augmentation, is interrupted by the quarter-note triplet, and then starts moving forwards again through the sextuplet. This juxtaposition makes our perception of time irregular.

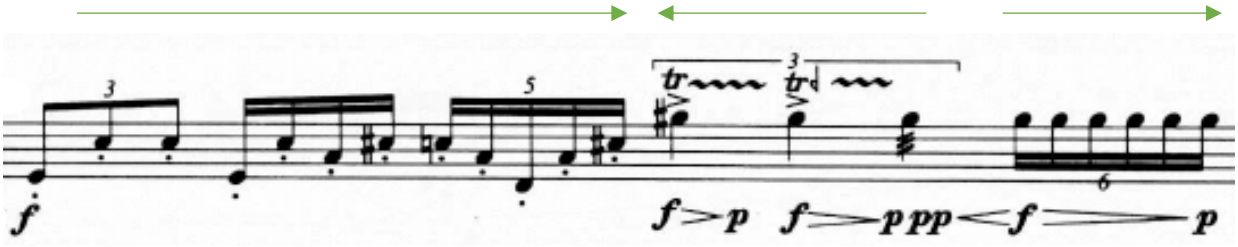


Figure 19: Rhythmic diminution and augmentation creating an irregular sense of time moving faster and slower in line 2

A similar event happens in the line 3, shown in Figure 20. A quarter-note triplet starts the phrase off slowly. Afterwards, the phrase is carried through by a three pulse created through the rhythmic permutations on motive X with chain of dotted eighth notes and one grouping of three sixteenth notes. Time moves forwards with a three pulse until suddenly being interrupted and slowed down for a brief moment by a conflicting four pulse articulated by the quarter note F#4. After this brief moment of slowing down time, Mantovani continues the rhythmic diminution through the quintuplet. Ultimately, time on the large scale increases faster with the change from quarter-note triplet to the chain of rhythmic permutations to the quintuplet, being interrupted by the four pulse.

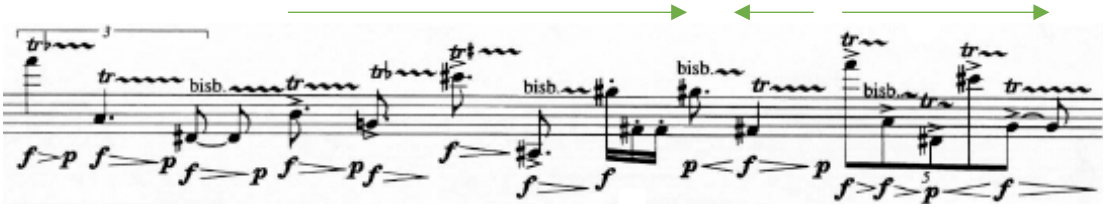


Figure 20: Rhythmic diminution and augmentation
created through the interplay of pulses in line 3

Mantovani uses rhythmic diminutions and augmentations to influence the perception of time. Through these, time and pulse are constantly speeding up and slowing down. These diminutions and augmentations occur both at gradual, regular rates and at irregular rates, influencing how we perceive time on the large scale.

Section B: Line 24-29

Three Episodes of Time

A unique way Mantovani shifts our perception of time in the B section is through creating three distinct episodes of time that each have a unique characteristic. Mantovani breaks down all aspects of pulse that were used in the A section; most of the intense rhythmic activity is lost, and the listener is pulled into a nebulous, open soundscape, shown through long, sustained note values and time stamps. Pitches seems to meld together through the use of quarter tones, extremes in range, and mostly extreme dynamics. Through the augmentation of set class (026), rhythmic growth using tritone and major third, and the use of syncopation and quarter tones, Mantovani creates three distinct pillars of time; each layer has unique characteristics that separate it from the rest and provides a different feeling of how time is moving.

The first episode, starting after the end of the A section at the end of line 24, is static; through the restatement of pitches from the (026) pitch-class, specifically D#, A#, and C#, set in

sustained notes with time stamps, time feels motionless. Each pitch has a different time stamp, and the time in between notes is never equal or consistent. Episode one concludes at the end of line 26. The second way Mantovani represents time is through his slightly rhythmic undulation between the major third and tritone. This episode overlaps with the first for a brief moment; it starts at the end of line 25 in between some of the sustained pitches from set class (026) and continues into line 27, stopping after the F#5-B4-F#5 triplet. This episode has an ethereal and floating quality defined through its constant oscillation between two pitches. The third episode starts in line 27 at the tempo change to quarter note=60 and finishes at the end of the piece. This episode is defined through its sublime, airy quality; through quarter tones and syncopation, this episode represents an unsteady, uneven sense of direction. These episodes are outlined in the table below in Figure 21.

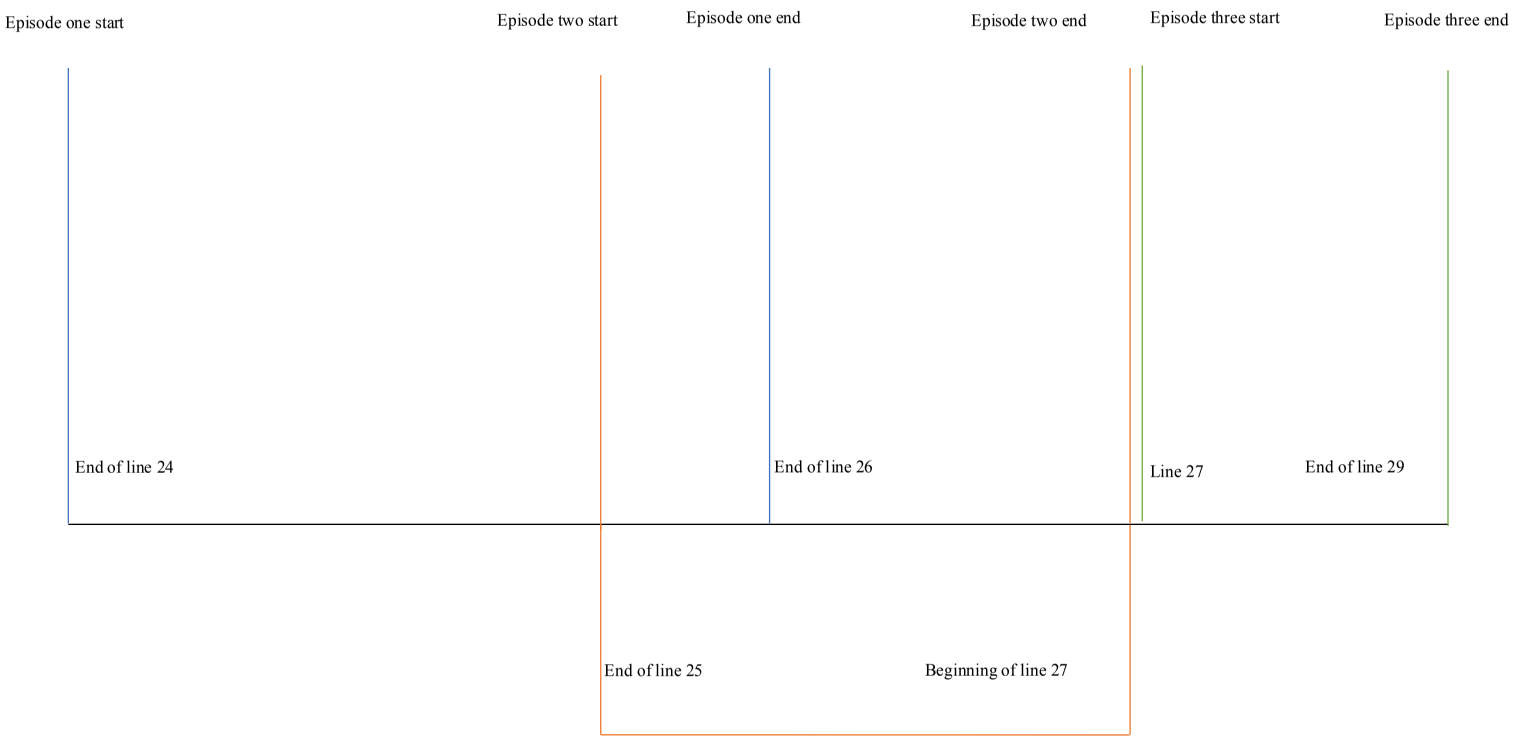


Figure 21: A table outlining the three episodes of time in the B section starting at the end of line 24 through the end of the piece

The first episode augments set class (026). Starting at the end of line 24, Mantovani connects us back to the opening of the piece through the reiteration of the set class that is central to the piece. Through long, sustained pitches with time stamps in seconds, Mantovani stretches out (026) using D#6, A5, and C#6. Each sustained pitch has a different time stamp, and the time in between each pitch is unequal. In line 25, the D#6 is repeated twice in a row, with a different timbral coloring each time. Compared to the opening, which covers (026) briefly within three sixteenth notes, this episode stretches out the set class, making the sense of time feel motionless. Figure 22 highlights the pitches from (026) in the red boxes.

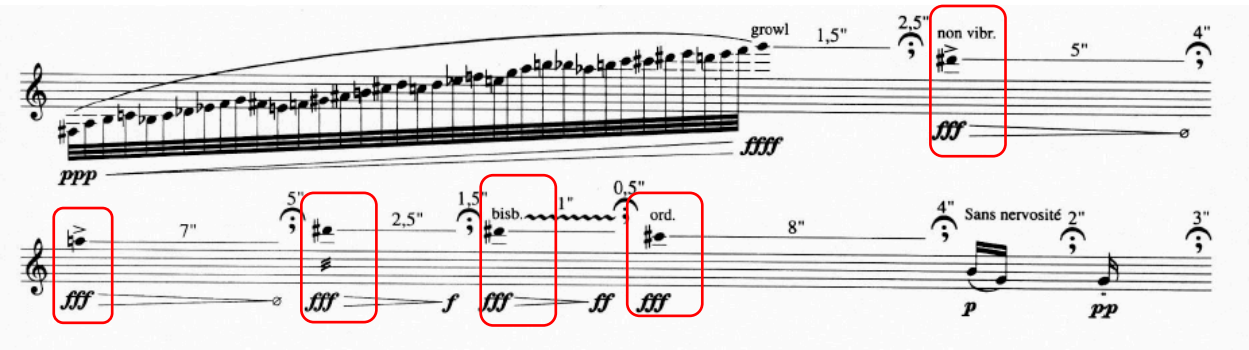


Figure 22: Episode one outlining pitches from (026) in red boxes in lines 24 through 25

The first episode does not go uninterrupted, however. From lines 24 to 25, there is a literal restatement of (026), but after the eight second sustained C#6, the second episode starts; however, that does not mark the end of episode one. The expanded, sustained (026) augmentation continues until the end of line 26. There are other moments that interrupt the expansion, too. There are two pitches that do not fit the (026) set class, but that still fit the episode one. In line 26, there is a A#5 and D6, that are only half steps away from the pitches that fit the set class (A and D#). These create bring brief moment of tension. The other interruption

begins when the second layer starts at the end of line 25 before the augmentation of (026) is completed. Layer two starts in line 25 with a major-third, sixteenth note triplet. This is a stark contrast of time compared to the long, sustained values of (026), and it interrupts before the end of the expansion of the set class. These three interrupting moments are shown in Figure 23. The moments where layer two intercede are shown in blue and the tension notes to (026) are shown in red.

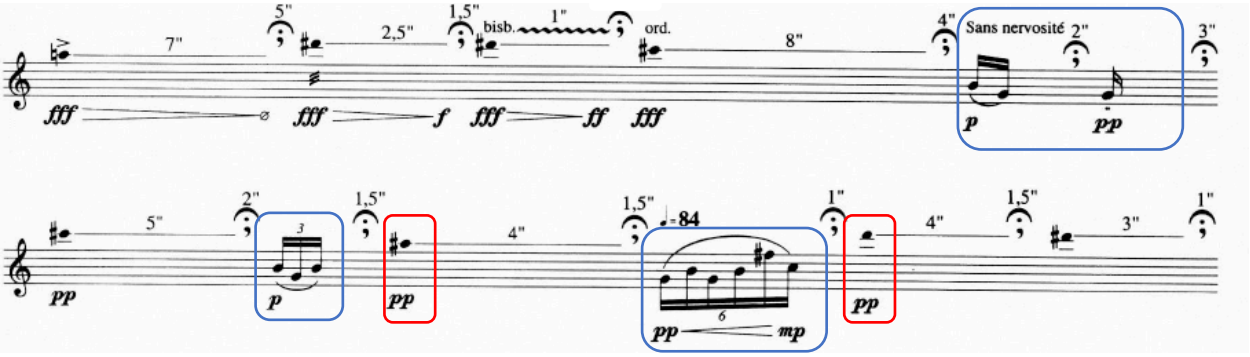


Figure 23: Episode two, shown in the blue boxes, overlapping episode one, shown in the red boxes, in lines 25 and 26

The second episode begins at line 25, marked by the *sans nervosite*, and expands both the tritone and major third through rhythmic growth. Starting as two sixteenth notes, this episode expands perception of time through the progression of rhythms, floating between sixteenth notes, triplets, and sextuplets. The beginning of the episode starts as sixteenth notes and grows into triplets and sextuplets. At the *sans nervosite,* the first rhythm outlines the major third interval in sixteenth notes, between B4 and G4. The G4 is rearticulated again after a moment of silence. In line 26, this same interval is heard again at a faster rate. The next rhythm again highlights the same major third interval, and then adds a perfect fifth and augmented fourth. The perfect fifth is

between B4 and F#5, and the augmented fourth is between C5 and F#5. This instance is even longer than the previous rhythm. The long expansion of these intervals creates a new layer of sound. These moments are shown in the previous Figure 23 in the blue boxes, which are seen in line 25 and line 26.

Episode three starts at line 27, shown in Figure 24. Microtonality blurs the line between pitches and conveys feelings of haziness and fuzziness. The quarter tones are first used in long note values, such as whole notes, and gradually compress into shorter note values, seen in dotted rhythms, triplets, and quintuplets. Time stamps are also used here to further obscure pulse and flow of line. The long note values at the ends of phrases obscures time, as time appears lost through this inconsistency. The frequent syncopation also adds to unsettled time. Downbeats are obscured through tied note values and syncopation. Phrases are united through consistent values such as the dotted eighth-sixteenth pair and the triplet.



Figure 24: The beginning of episode three starting in line 27

The phrase at the end of line 28 brings a dramatic ***forte*** dynamic, shown in Figure 25 on the G#3. This sudden change in the direction of volume breaks up the sense of time established at the beginning of episode three. Drastic change in volume and register add a heightened sense of instability by suddenly bring a burst of energy among the fuzzy and hazy section.

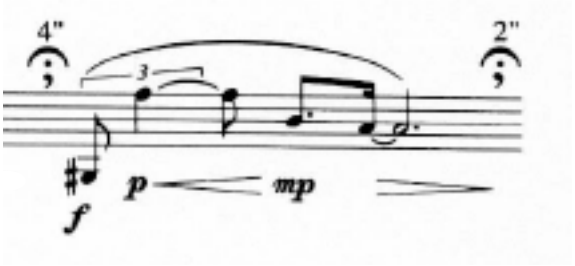


Figure 25: A significant dynamic shift in episode three in line 28

The end of this episode, and the end of the piece, is marked by the A4 repeated at different dynamic levels and durations. The same pitch is heard but the differing dynamics and length color the sound and control the feeling of time in a unique way. The timbral differences of the repetition of A4 further exploit a sense of diminishing steady time. The last A4 marked with *bruit de cle,* acts as a symbol of the typing of a keyboard, relating to the programmatic aspect of *Bug.* This is shown in Figure 26 at the end of line 29.

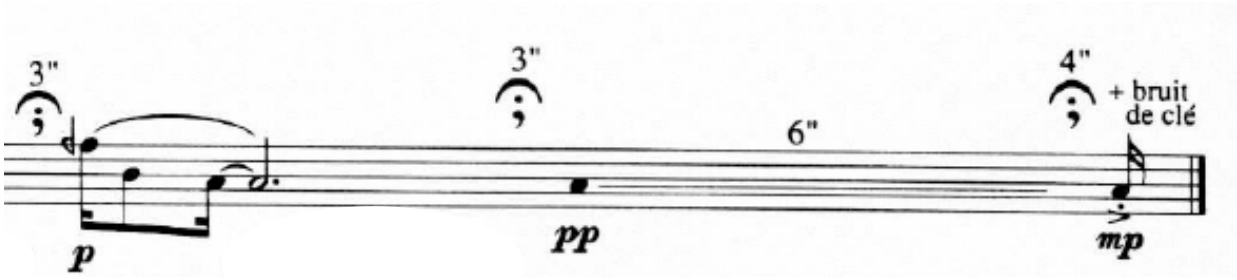


Figure 26: The end of episode three, shown by the repeated A4 at the end of line 29

Mantovani constructs three distinct perceptions of time throughout section B through different episodes that are characterized by a unique aesthetic. These episodes sometimes overlap. The first episode, defined through the augmentation of set class (026), feels stationary, with loud, sustained pitches of unequal duration. The second episode has a floating aesthetic,

defined through fluctuation between two pitches, mainly the major third and tritone. Microtonality and syncopation define the third episode, creating a sense of fuzziness.

Creating Cohesion

Although *Bug* is written in binary form with two contrasting sections, Mantovani achieves cohesion through pitch and motive. While the passing of time is most often unstable throughout the piece, overall pitch and motivic connection bring a sense of stability. Three distinct pitch collections are central to the piece; the (026) set class, the major third, and the tritone. These three collections are connected across both the A and B sections and each of section A's subsections. As noted in the previous sections, Mantovani uses a number of variations of motive X and motive Y, and these variations are developed through sections A and B, showing a deeper, more underlying connected structure. In my analysis of pitch and motive across sections A and B, I highlight and underscore Mantovani's overall cohesion, continuity, and connection, despite all of his manipulation on our sense of how time is moving.

Unity Through (026), major third, tritone

Mantovani develops three important pitch collections throughout *Bug*; (026), the major third, and the tritone. All three important pitch collections are seen within motives X and Y. Through repetition and variance, these pitch collections ultimately contribute to the large-scale formal structure. Pitch unity brings cohesion within phrases and across sections, bringing understanding to disjunct lines, melodies, and phrases, and also bringing reference back to the opening of the work. While rhythm and motive are continuously manipulated, morphed, and distorted, the connection of pitch-class sets over time brings overall unity. Pitch unity not only connects within sections, but also always brings the listener back to the opening of the piece.

One way the listener can hear connection in *Bug* is through the set class (026). (026) is seen at the beginning of the piece in motive X. Figure 2 shows the primary motive, and the pitches D#4, C#5, and A4 form the pitch-class set (026). The intervals formed from this motive

are the minor seventh, major third, and a diminished fifth. (026) appears several times across phrases, lines, melodies, and sections and is an important pitch-class set because it shows unity several times throughout the piece.

The pitch-class set (026) is used to connect the listener back to the opening of the piece at the end of line 1. The first time this set class comes back is after a moment of rhythmic and temporal disjunction with a sustained A#4. Mantovani connects the listener back to the opening with a restatement of (026). In this instance, pitches appear exactly how they are in the opening, but in a different order, starting with C#6, A4, and D#5. Although the rhythm here is off-set from the beginning, the repetition of the same notes that form (026) associates the melody with the opening. The last grouping of three sixteenth notes in this figure also represent (026), with the pitches G5, D#5, and A4 also forming (026). This moment creates cohesion over the entire first line of the piece. These are highlighted in Figure 27.

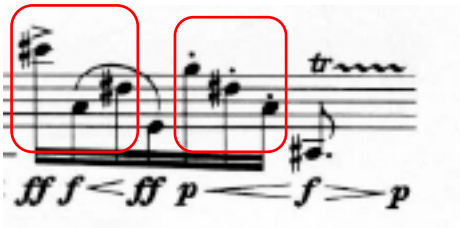


Figure 27: (026) returning twice in line 1, shown in red boxes

Another moment of cohesion created by repetition of (026) comes in line 3; shown in Figure 28, Mantovani expands the rhythm from motive X from sixteenth notes to a quarter-note triplet. The intervallic content here consists of a diminished third on the outside (major second enharmonic), a minor sixth, and a diminished fifth. The set class, like the beginning, is (026).

This triplet contains the pitches F6, A4, and D#4, which also form (026) through transposition. Instead of a C#, which is a major third above A, the F in this (026) collection is formed through the rotation of a major third around A. The F pitch is produced when a major third is rotated below A instead of above. The reiteration of (026) at the end of this line contextualizes the line and melody, bringing unity and cohesion.

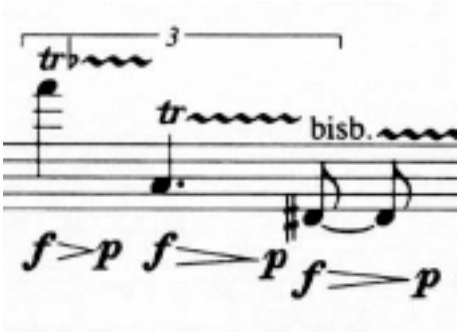


Figure 28: A transposition of (026) seen in line 3

(026) also ties the phrase together in line 3, coming back twice within the quintuplet. Shown in Figure 29, Mantovani takes the same transformation of the set class with the pitches F6, A4, and D4#, and compresses the rhythm into a quintuplet. The pitches are still in the same order, but at a faster rate. After the D#4, he adds a C#6, reverting back to the original group of pitches that formed (026). These two transpositions of (026) and the (026) from the beginning of this phrase in line 3 bring aural connection, bringing the close of the phrase to a stable close, similar to the way that the tonic harmony brings connection over a phrase.

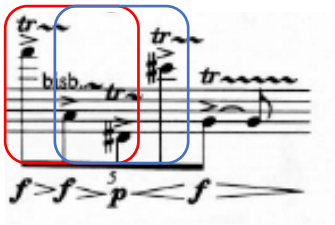


Figure 29: Two overlapping transpositions of (026)

Mantovani also makes use of (026) at the beginning of the B section. As shown in Figure 22 on page 29, Mantovani augments (026) in long, sustained pitches. The repetition of this set class over an extended period of time makes it the complete antithesis to section A; (026) starts the work abrasively with the forte, staccato sixteenth notes from (026), and the B section closes the work more melodically with the same set class.

Another pitch collection that draws parallels across the whole work is the major third, a dyad that is part of both motive X and Y. In line 15, Mantovani presents a series of large, gestural technical runs. From start to finish, both motions sweep upwards and outline a major third between the first and last pitch of each run, specifically between the F4 and A5. The major third is used in this context to bring clarity to the line**.** Figure 30 shows these consecutive moments. Both gestures ascend upwards and have the same goal note, A5. What happens in between the gestures feels erratic, with constant changes in contour, dynamic, and articulation, but eventually becomes codified at the end through this interval.

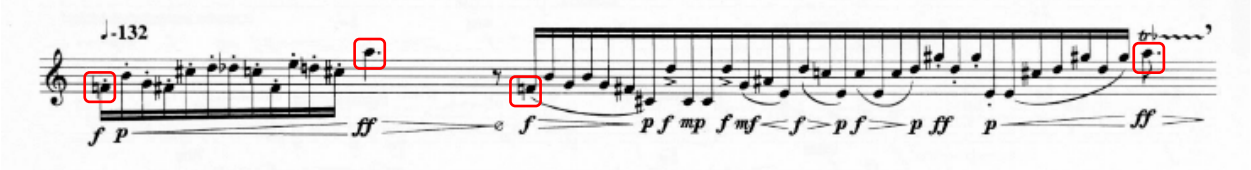


Figure 30: Two gestural moments clarified by the outlining of a major third between F4 and A5, shown in red boxes, in line 15

The B section also emphasizes the major third. As shown in Figure 23 on page 30 in the blue boxes, Mantovani floats between B4 and G4, emphasizing the major third often from lines 25 through 27, reinforcing a connection back to the opening of the A section.

The tritone is also important throughout the piece. The outer most interval from motive X, the tritone occurs in each section, clarifying lines and bringing references back to the beginning. Like both the (026) set class and major third, Mantovani uses the tritone as a rhetorical device to reference the opening of the piece. The tritone is an important pitch collection in the piece and returns often throughout sections and phrases. Further analysis of the piece shows the tritone as being an important pitch collection.

Subsection c emphasizes the tritone, specifically the augmented fourth. There are both leaps up and down augmented fourths. An example of a moment where the augmented fourth connects line is in line 18. Figure 34 shows when there is both a leap up and down an augmented fourth. The first idea articulates an augmented fourth between D#6 down to an A5. The A5, brought back again at the end of the phrase in a dotted quarter-note trill, fades to ***piano,*** but brings connection after the breath mark with the leap up an augmented fourth to D#6. This is a reversal to what happens in the beginning of the line, thus unifying the start and end to the phrase.

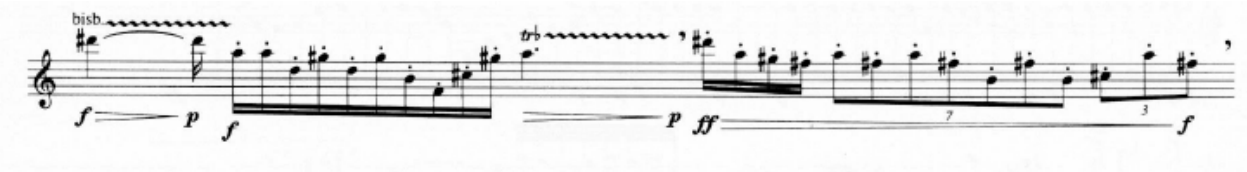


Figure 31: A phrase in line 18 unified through persistent use of augmented fourth

There are moments in Bug where Mantovani uses all three pitch collections within the same moment of time to make connection across the piece. An example of this happens in line 17. Shown in Figure 32, the phrase, although rhythmically detached by its asymmetry in rhythm, is cohesive through its use of (026), the major third, and the tritone. Mantovani first stresses the tritone here, emphasized by syncopation and accents. The first note, A5, leaps up to the long, accented D#6. This motion becomes a focal point in this phrase, mostly articulated through large, upward leaps to D#6 and its subsequent energy. The beginning and end of the phrase are connected by (026); shown in the annotations, both the beginning and end contain A5, D#6, and F4 which is (026). The second iteration flips the placement of A5 and D#6, which therefore makes the major third interval between A5 and F4 more apparent. The red boxes show the moments where the tritone is heard. The blue box shows the clear use of the major third. The black box highlights how the entire phrase utilizes pitches from the (026) set class.

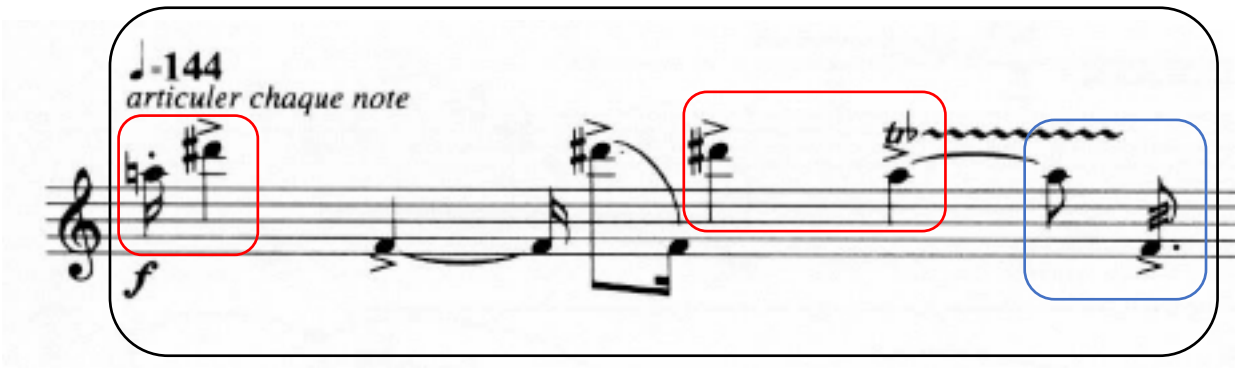


Figure 32: A phrase made cohesive in line 17 through all three pitch collections; the augmented fourth in the red box, the major third in the blue box, and (026) in the black box

These three important pitch collections bring consistency to the entire work. All three pitch collections are heard within the two primary motives that open the piece. Each

aforementioned moment in this section emphasizes either (026), the major third, the tritone, or sometimes all three pitch collections simultaneously. The continuous emphasizes on these three collections brings unity to the piece because it allows the listener to make references back to the pitches from beginning of the work. Although the rhythm of *Bug* is most often sporadic, pitch collections bring continuity, clarity, and unity.

Motivic Development; Augmentation, Diminution, Inversion

While *Bug* looks and sounds disorderly, a closer look into how motives are developed makes the piece more organized and understandable. Both motives X and Y are varied in each section and subsection to large-scale continuity. Neither motive returns verbatim but rather are slowly varied and developed over time through inversion, retrograde, augmentation and diminution.

An example of an inversion and subsequent augmentation of motive X happens in line 4, shown in Figure 33. Motive X is created through the three sixteenth-note grouping after the dotted quarter note which includes A4, D#4, and B4. The interval direction in this variation is inverted compared to the first motive X; here, the first interval leaps down and then up. Like the beginning, this group of sixteenth notes have staccato markings and is marked ***forte***. This collection of pitches has the set class (026). Further, Mantovani develops this through augmentation, using the pitch-class set (015) variation on motive X. Following the B4 dotted eighth note, the pitches G#5, A4, and E4, which also form (015), are drawn out through the repetition of A4 and E5.

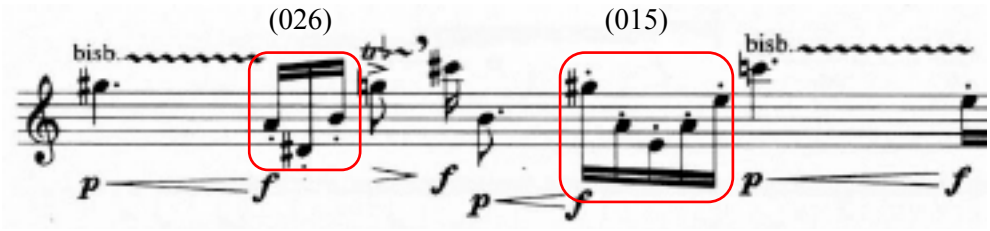


Figure 33: Variation of motive X that grows through expansion in line 4

Motive X is altered by diminution at the end of line 17. Shown in Figure 34, the rhythmic value from the original sixteenth notes is compressed into eighth-note triplets. Each triplet is a variation of motive X. The first group of three notes from the first triplet, with B4, F4, and C#5, share (026) with the first motive X. The next grouping, with G5, D5, and A5, slightly varies from the first motive X by having the set class (027). The last grouping, with G5, A5, and C#5 also shares (026). This moment bring connection and references the opening by using the same and similar pitch-class sets, (026) and (027), and stretching the rhythm of the opening from three sixteenth notes to triplets.

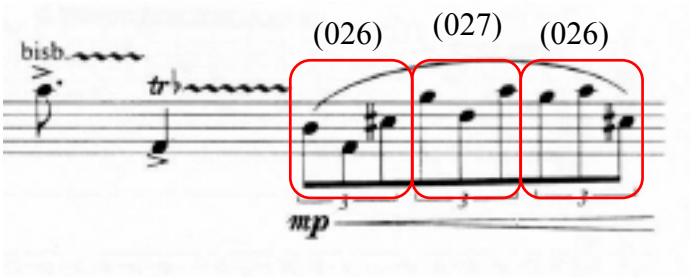


Figure 34: Motive X varied by diminution in line 17

Like motive X, the development of motive Y helps unify phrases and bring large-scale connections. This motive is often altered through inversion, retrograde, retrograde-inversion, augmentation, and diminution. Typically, the interval direction and note value are inverted, with the swapping of quarter note and dotted eighth note. In other instances, the motive is or

augmented by a singular value. In Figure 35, the variation of the motive Y is expanded, compressed, and inverted in three separate places. The phrase starts in line 5 through the close of subsection a. In this example, the main motive is heard between the C#6 and G#5. Its length is expanded and is interrupted by another G#5 and C#6. The timbral effects are inverted and reversed; the bisbigliando occurs on the first note of the variation and the trill comes on the second note. Originally, the motive spans from short to long value; here, this variation inverts it. The first note of the motive is long and the second is short. However, like the original motive, the difference between the first and second note of the motive is a singular eighth note. This variation spans an interval of a P4, compared to the major third from the original motive. The next variation occurs in the middle of the phrase. This variation is condensed, taking place between the C#6 eighth note and the C6 dotted eighth note. Like before, this variation is also interrupted, this time by a singular B4. The last variation at the end of the phrase is similar to the original motive but varies in contour. At the end of the phrase, the G5 leaps up a minor seventh to an F6. These three moments of variation bring clarity over a seemingly disjunct line, bringing connection through the continuation and development of motive Y.

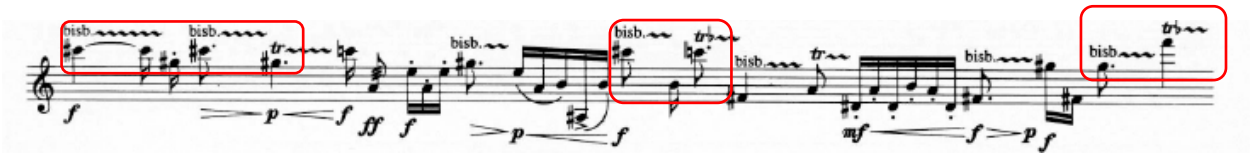


Figure 35: A phrase in line 5 clarified through variations on motive Y

Motive Y is extended twice from lines 6 to 7. It is preceded and followed by similar material, shown in Figure 36. In line 6, motive Y appears on the A5, D#5 and E6. It follows the

opposite contour from the first motive Y; the overall contour leaps up instead of down a major third. The timbral effects are the same as the original motive; the trill happens first and the bisbigliando occurs on the last note. This variation of the motive is obscured by a sixteenth note, but it happens so quickly that the overall contour of the motive is heard as rising.

Here, the varied motive Y is approached first by a variation on motive X. The three sixteenth notes prior, G#5, F#4, B4, is an inversion of motive X. The contour is the opposite from the first motive. This variation leaps down and then leaps up. It leaps down a major seventh (the original motive leaps up a minor seventh) and then leaps up a perfect fourth (the original motive leaps down a major third). These pitches form the set class (025), which compresses the largest interval down by one half step; (026) goes down to (025).

In the next line, motive Y is further extended. This variation, shown after the *a tempo* with the G#5, G#3, and E6, is another inverse of the original motive. Between the G#5 and E6 is a minor sixth interval, which is the complete inverse of the major third from the first motive Y. Like the variation in the line before, the contour of this variation is obscured by a single sixteenth note. In this variation, the sixteenth note interruption is at an extreme range, spanning two octaves from the note preceding. As before, this note is so brief that the contour of the line is still perceived as rising, another inversion to the original motive that leaps down.

This variation is followed by more running sixteenth notes, as the variation that happens in the line before. The phrase starting at section B in line 6 thus becomes more interconnected in itself and references the beginning several times.

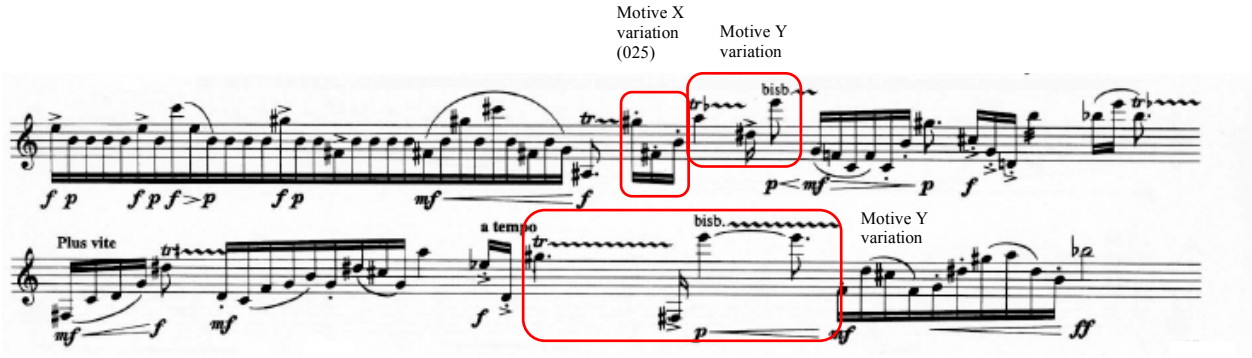


Figure 36: Phrase unity shown through variations of motive X and Y in line 6 and 7

Despite the all of the rhythmic disorder created throughout *Bug,* Mantovani achieves unity by his primary motive development. Both motive X and Y bring large-scale cohesion and interconnect each section and subsection.

Conclusion

Primary motives X and Y set both the rhythmic and pitch collection foundation for which the entirety of *Bug* is built. Using the transformation and development of both of the motive's rhythm and pitch, Mantovani creates a piece that disrupts and removes the expectation of regular, consistent pulse while simultaneously creating cohesion on the large scale.

Mantovani challenges the expectation of pulse through the different ways in which he groups and presents sixteenth notes. Through this, he creates multiple pulses that often erratically switch back and forth, causing conflict in how the listener hears regularity. Additionally, he changes motives X and Y through compositional techniques such as rhythmic prefixes and suffixes, rhythmic diminutions and augmentations, and rhythmic interruptions to disrupt the flow of time. He also morphs the sense of time through the ways in which he extends tones and sounds by repeated articulation. In the B section, he creates three drastically different episodes of time. While the rhythmic and motivic change highlights chaos and disorder, Mantovani also creates large-scale unity. By emphasizing three important pitch-class sets and through augmentations, diminutions, and inversions on motives X and Y, Mantovani shows connection amongst the disarray.

Thus, *Bug* is a work that simultaneously highlights themes of confusion and unity, while also reflecting on the theme of human timekeeping that was so prevalent at the start of the new millennium in 2000. Over the course of the piece, Mantovani constantly switches how the listener feels and perceives the flow of time, but ultimately brings back order at the end with the tempo change back to quarter note= 60, which is representative of typical clock seconds. Through my analysis of this piece, I have discovered how *Bug* is a vibrant, energetic

contemporary work for solo clarinet that underscores themes of disorder, disruption, and disjunction while also creating unity.

Bibliography

Bennet, Robert F. "The Y2K Problem." *Science* 284, no. 5413 (1999): 438-439. https://www.jstor.org/stable/2898353.

Bruno Mantovani. "Biography." Accessed September 23, 2020. https://www.brunomantovani.com/fr/biographie.html.

Bruno Mantovani. "Discography." Accessed September 23, 2020. https://www.brunomantovani.com/en/discographie.html.

Henri Selmer Paris. "Philippe Berrod." Accessed December 8, 2020. https://www.selmer.fr/en/artist/philippe-berrod.

Roman, Nicki. "A Performer's Guide and Approach to Bruno Manotvani's *Bug.*" Lecture Recital Notes, University of Rochester, 2018.

Schultz, Eric. "Dissecting Bug, Bruno Mantovani's Virtuosic Work for Solo Clarinet." *NACWPI Journal* 66 (2018): 19–23. http://search.ebscohost.com.ezproxy.lib.ou.edu/login.aspx?direct=true&db=mah&AN=132838053&site=ehost-live.