A View from Within: Timbre as an Analytical Tool in Contemporary Viola Music

Ash Mach
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Abstract

Timbre is an elusive musical parameter that musicians, physicists, and cognitive scientists have been grappling with for centuries. While timbre can roughly be defined as an auditory attribute that distinguishes one tone color from another, this definition does not capture the complexities of sound and our perceptions thereof. Research on timbre has flourished since the 20th century, however, timbre studies has largely gone unnoticed within the viola community. This study, “A View from Within,” helps close the gap between timbre studies and viola repertoire scholarship by presenting analyses of three pieces from the 20th and 21st centuries through a timbre and orchestration lens. Utilizing my own knowledge of viola technique and performance practice as well as sinusoidal analyses, historical orchestration treatises, and music perception methodologies, I offer an original and interdisciplinary approach to music analysis while advocating for future studies of contemporary viola music.
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# Table of Contents

Abstract ................................................................................................................................. ii

Acknowledgements ............................................................................................................... iii

Table of Contents ................................................................................................................ iv

List of Figures ......................................................................................................................... vi

Introduction: What is Timbre and Why Does it Matter? ....................................................... 1

Chapter 1: Intentional Instrumentation in Claude Debussy’s Trio Sonata for Flute, Viola, and Harp .......................................................... 11

  Introduction ......................................................................................................................... 11
  Literature Review ............................................................................................................... 13
  Methodology ....................................................................................................................... 14
  Timbral Fusion ................................................................................................................... 15
    Measures 3-4 .................................................................................................................... 16
    Measures 36-42 .............................................................................................................. 19
    Measures 72-80 .............................................................................................................. 24
  Segmental Grouping and Degrees of Segregation ............................................................ 27
    Measures 9-11 ................................................................................................................ 27
    Measures 14-17 .............................................................................................................. 30
    Measures 63-70 .............................................................................................................. 31
  Form .................................................................................................................................. 37
  Conclusion .......................................................................................................................... 40

Chapter 2: Microformal Transformations to Create Macroform in Tristan Murail’s C’est Un Jardin Secret ........................................... 41

  Introduction ......................................................................................................................... 41
  Global Overview ................................................................................................................. 43
  Transition 1: Inharmonicity to Harmonicity ................................................................... 48
  Transition 2: Agitation to Resolution .............................................................................. 54
  How Transitions Create Macroform ............................................................................... 57
  Summary and Conclusion ................................................................................................. 61
Chapter 3: A Critical Analysis and Alternate Arrangement of Rebecca Clarke/Ruth Lomon’s Viola Sonata

Introduction .............................................................................................................. 63
Rebecca Clarke, the Viola, and the Orchestration’s Commission ...................... 65
Methodology ............................................................................................................. 67
Attack and Decay ..................................................................................................... 69
Instrumental Doubling and Changes in Volume .................................................. 80

Conclusion ................................................................................................................. 93

Bibliography ............................................................................................................... 96

Appendix A ............................................................................................................... 102
as if you were reading it naturally.

List of Figures

Figure 1: the flute and harp set up the viola entrance, and the viola enters m. 3 ........... 17
Figure 2: sinusoidal analysis of the viola entrance in m.3. The vertical scale represents frequency, measured in hertz (hz.), whereas the horizontal scale represents seconds in time. The red lines indicate the E4 in the harp (bottom) and E5 in the flute and viola .... 18
Figure 3: mm. 36-42, bracketed in blue ................................................................. 20
Figure 4: clustered flute and viola pitches from mm. 36-42 boxed in red; flute overtone circled in green ................................................................. 21
Figure 5: unison pitches in green, octave equivalencies in orange .................................. 23
Figure 6: mm. 72-77, bracketed in blue .................................................................. 25
Figure 7: mm. 78-80, bracketed in blue .................................................................. 26
Figure 8: mm. 78-80, performed by Kim, Neubauer, and Kibbey. The harp part is bracketed in blue, demonstrating the higher amplitude and thus perceptual prominence 26
Figure 9: mm. 9-11, bracketed in red .................................................................. 28
Figure 10: spectrogram of m. 9-11, performed by Pahud, Deyneka, and Khouri .......... 29
Figure 11: spectrogram of m. 9-11, performed by Kim, Neubauer, and Kibbey ........... 30
Figure 12: mm. 14-17, bass line bracketed in green, and flourishes bracketed in orange 31
Figure 13: mm. 62-65, bracketed in blue .................................................................. 32
Figure 14: flute’s entrance above the viola’s foundation, m. 62, performed by Pahud, Deyneka, and Khouri ................................................................. 33
Figure 15: flute’s entrance at m. 64 .................................................................. 34
Figure 16: mm. 69-70; thinned-out texture within the viola and harp to support the flute’s lower register .................................................................. 36
Figure 17: flute C4, recorded by the Music Technology Group, Universitat Pompeu Fabra, Barcelona ................................................................. 36
Figure 18: flute C6, recorded by the Music Technology Group, Universitat Pompeu Fabra, Barcelona .................................................................. 37
Figure 19: form graph ......................................................................................... 39

Figure 20: Color-mapping annotations for page 1 ...................................................... 45
Figure 21: Color-mapping annotations for pages 2 and 3 ........................................ 46
Figure 22: Smalley diagram, purple annotations my own ........................................ 50
Figure 23: Harmonic B5 bow changes in Transition 1, circled in blue .................... 51
Figure 24: one bow change, zoomed in. The frequency inside the circle shows a fade from light to dark grey, with one slight “bump” in the frequency between 8.6 and 8.7 seconds. That “bump” indicates the bow change ........................................ 52
Figure 25: Disintegration to A4 (~440 hz) ................................................................. 54
Figure 26: Transition 2 from noise to sound, starting from the fourth system of the second page to the fermata in the seventh system. The pitch density in the fourth system creates a jumble of partials and extraneous noise. As the density decreases, identifying the overtones of individual pitches becomes easier. This is most apparent from 126-128 seconds, or the singular D4. However, one can start to see the appearance of identifiable overtones starting at around 123 seconds, or the start of the ricochet at the end of the sixth system ......................................................................................... 57
Figure 27: In Saariaho’s words: “first sketches of the global form of Verblendugen for orchestra and tape.” Image from her article “Timbre and Harmony: Interpolations of Timbral Structures.” .......................................................... 59

Figure 28: formal outline of Périodes. Image from the article “The Emergence of Spectra in Gérard Grisey’s Compositional Process: From Dérives (1973-74) to Les Espaces Acoustiques (1974-85).” .......................................................... 59

Figure 29: Macroform of C’est Un Jardin Secret .......................................................... 60

Figure 30: Piano C4 through SPEAR, fundamental boxed in blue .................. 71
Figure 31: Viola C4 through SPEAR, fundamental bracketed in blue .................. 71
Figure 32: start of rehearsal 14, mm. 159-162 .......................................................... 73
Figure 33: Piano C7 through SPEAR .......................................................... 74

Figure 34: rehearsal 14 in the piano accompaniment: Paul Gardner, piano, purchased from piano-accompaniments.com .......................................................... 75

Figure 35: rehearsal 14 in orchestra accompaniment: Deanna Badizadegan with the Eureka Ensemble .......................................................... 75

Figure 36: sustained C# 5 viola, non-vibrato. The viola strings take a moment to respond to the bow, as seen from the gradient from light gray to black at the onset of the sound (circled in red) Downloaded from freesound.org .......................................................... 76

Figure 37: A4 strike on a xylophone. The attack is strong and provides enough resonance for ~2.5 seconds. Downloaded from freesound.org .......................................................... 77

Figure 38: combination of marimba strike and viola sustained note. The attack is reinforced through the marimba, but the viola sustains its sound. Marimba and viola sound mixed through Audacity .......................................................... 77

Figure 39: mm. 106-109 in Clarke’s score, bracketed in blue ........................................ 79
Figure 40: mm. 106-109 in Lomon’s score, bracketed in blue. The harp and woodwind parts are highlighted in yellow .......................................................... 79

Figure 41: rehearsal 3-4 ...................................................................................... 81
Figure 42: rehearsal 3, orchestra ........................................................................ 83

Figure 43: opening of rehearsal 4, mm. 39-46 .......................................................... 84

Figure 44: clarinet solo, mm. 39-44. The boxed section shows longer, sustained tones with only some activity in the bottom .......................................................... 85

Figure 45: increased activity within the orchestra, mm. 45-46. In the boxed section, the orchestra fills out the range and increases in amplitude within a short amount of time. .. 85

Figure 46: rehearsal 4, orchestra ................................................................ 87
Introduction: What is Timbre and Why Does it Matter?

“Timbre” is an elusive musical parameter that music researchers, cognitive scientists, audiologists, and physicists have been grappling with for at least the past two centuries. The *Oxford Dictionary of Physics* presents timbre from the perspective of “quality of sound,” stating that “the quality of a musical note has as a result of the presence of harmonics,” whereas the *Oxford Dictionary of Music* describes timbre as “tone color; that which distinguishes the quality of tone of one instrument or singer from another.”¹ The Acoustical Society of America defines timbre as the “multidimensional attribute of auditory sensation which enables a listener to judge that two non-identical sounds, similarly presented and having the same loudness, pitch, spatial location, and duration, are dissimilar.”² These definitions, while not incorrect, do not capture the complexity of sound and our perceptions thereof. For example, a violin and a snare drum are both musical instruments, yet only the violin produces harmonics above the instrument’s pitches. And whereas a violin will resonate for several seconds after the bow leaves the string, the snare drum will decay almost immediately after a single hit. Moreover, our perception of these two instruments can change depending on the infinite

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ways composers orchestrate them. Perhaps sound source identification is simple when
violinist sustains one long note at a loud dynamic and a percussionist plays a brief drum
roll alongside the sustain. But what if the violinist plays an accented chop exactly in sync
with a snare drum hit? Then, perhaps, sound source identification becomes more
complicated.

These questions are among the many that composers and timbre scholars have
been researching since the 19th century. In 1844, composer Hector Berlioz wrote the first
known orchestration treatise, Traité d’instrumentation et d’orchestration modernes. This
book served not only as a practical guide to instruments’ capabilities but also as a source
to understand their expressive potential. His suggestions were based on his firsthand
experiences with composing for orchestra rather than an objective study of instrumental
timbre. However, this book proved to be an invaluable resource to composers for the
remainder of the 19th and into the 20th century, inspiring similar treatises by Nikolai
Rimsky-Korsakov, Charles-Marie Widor, and others. In 1877, Hermann L.F. Helmholtz
was one of the first to propose that the “quality of sound,” or timbre, of a note, is
comprised of a fundamental frequency and its constituent upper partials, and that quality
of sound is dependent on the build of the acoustic resonator and the force that causes it to

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3 Chop: a percussive bow stroke performed at the frog, creating a non-resonant “crunch sound.” Laurel
Thomsen, Strings Magazine Online, March 1, 2016, https://stringsmagazine.com/6-ways-to-master-the-
chop/.

4 Hugh Macdonald, “Preface,” in Berlioz’s Orchestration Treatise: A Translation and Commentary,

vibrate. Later orchestration treatises, such as *Principles of Orchestration* by Rimsky-Korsakov (1913), attempted to apply these concepts to their own writings, although in Rimsky-Korsakov's case, the countless variations in wind and brass instrument construction proved to be too many to address in a single book.

In the 20th century, composers began bringing timbre into the forefront of their music, starting with Arnold Schoenberg’s conception of *Klangfarbenmelodie* in 1911, a term that describes the timbral varieties of a succession of pitches and how that is brought to the foreground. Edgar Varèse’s *Ionisation* (1929-31) was the first well-known piece for percussion ensemble, which brought the timbres of unpitched percussion instruments to the foreground as opposed to pitched melody. Following that composition was the emergence of electroacoustic and sound mass music in the 1950s and spectral music in the 1970s.

The 1970s and 80s witnessed a flourish in empirical timbre studies. Robert Erickson’s *Sound Structure in Music* (1975) and Robert Cogan and Pozzi Escot’s *Sonic Design: The Nature of Sound and Music* (1976) set the groundwork for understanding timbre in music by providing language and visuals for instrumental spectra as well as

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presenting musical analyses with timbre as the primary means of analysis.\textsuperscript{9} Robert Cogan takes timbral analysis a step further in \textit{New Images of Musical Sound} (1984) by providing spectral analyses of music to explore the relationships between sonic resemblance and contrast. To describe timbre through the means of sound visualization was at the time a novel concept; although timbre studies have shifted away from acoustical phenomena and is moving towards perception and music analysis, these initial writings on timbre provided the foundation of objective data for an otherwise subjective experience.\textsuperscript{10} Since the 1980s, musicians and scientists have explored timbre through various lenses, contributing to the fields of acoustics, cognitive psychology, and more.\textsuperscript{11} Recent publications on timbre include \textit{Timbre: Acoustics, Perception, and Cognition} (2019) and \textit{The Oxford Handbook of Timbre} (2021, online edition 2018).\textsuperscript{12} \textit{Timbre: Acoustics, Perception, and Cognition} provides a comprehensive guide to timbre through acoustical modeling and perceptual processes, synthesizing methodologies from cognitive neuroscience, audiology, and acoustic signal processing.\textsuperscript{13} \textit{The Oxford Handbook on


\textsuperscript{13} Siedenburg et al., \textit{Timbre: Acoustics, Perception, and Cognition}.
Timbre presents an array of perspectives on timbre, from understanding “timbre as harmony,” theories on instrumentation, and historiographical approaches to timbre.¹⁴

Related to the study of timbre and perceptual processes is the study of timbre through a socio-cultural lens. Composer and musicologist Olly Wilson (1937-2018) conceived of the “heterogeneous sound ideal” in relation to African American music, arguing that timbral contrast and a “combination of diverse timbres,” sometimes within a single line, is reflective of the ideal of respect for integrity within a group, a cultural tradition within African and African American communities.¹⁵ Two decades later, Nina Eidsheim, professor of musicology at the University of California Los Angeles, argues in her book The Race of Sound (2019) that vocal timbre is not an innate human quality but rather a socially constructed phenomenon that is learned through “formal and informal lessons.”¹⁶ Instead of taking a purely “scientific” approach to studying timbre, Eidsheim approaches timbre through a critical performance practice methodology, applying narrative analysis to several recorded performances by Black American musicians based on her listening observations¹⁷ Thus, rather than researching timbre in the hopes of advancing compositional practices, Eidsheim aims to reveal the connections between

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¹⁷ Eidsheim, The Race of Sound, 29.
vocal timbre and race/gender as well as discuss the political implications of perceiving identities through the voice.

Timbre as a music research area flourished in the 21st century, drawing international attention across several disciplines. At the forefront of timbre studies is the ACTOR Project, which stands for Analysis, Creation, and Teaching of Orchestration. Founded in 2018, this international coalition of music theorists, music perception researchers, music technology specialists, composers, and performers aims “to bring timbre and orchestration to the forefront of scholarship, practice, and public awareness” through the development of timbre and orchestration tools such as OrchView and OrchIdea, as well as educational resources for both young children and early-career scholars.18 Research conferences on timbre have only emerged within the past five years; the first International Conference on Timbre was held in 2018 in Montreal, Quebec, with the 3rd iteration held in 2023 in Thessaloniki, Greece.19 The Timbre and Orchestration Interest Group is also one of the newest interest groups affiliated with the Society for Music Theory, founded in 2022.

Even amidst the invaluable work of these research organizations, there still exists a lack of scholarship pertaining to timbre and viola. In its 38-year history, American Viola Society Journal has not published any articles about timbre of the viola or timbre in viola repertoire. In fact, throughout the musicological and theoretic literature, analyses


19 Technically, there were small workshops in 2014 (Paris, FR), 2015 (Cambridge, MA), and 2017 (Berlin, DE), however, the first “official” international conference was not until 2018. “The International Conference on Timbre,” Timbre, accessed October 10, 2023, https://timbreconference.org/.
that study timbre in viola music remain few and far between; to my knowledge, the only published timbre (or timbre-adjacent) analyses of viola pieces are “The Marvelous Illusion: Morton Feldman’s The Viola in My Life” by Thomas DeLio, an examination of Feldman’s compositional process through the perspective of pitch, interval, tone color, register, duration, and articulation; and “Radulescu: The Other Spectralist” by Martin Suckling, a comparative analysis of two spectral works for solo viola, Radulescu’s Das Andere and Grisey’s Prologue. This is a shame, because much of our repertoire lies in the 20th and 21st centuries when timbre was promoted from a secondary to primary musical parameter. To not study timbre within the context of contemporary viola repertoire is to miss out on significant aspects of the music that make viola literature, and the sound of the viola, so unique.

This study, “A View from Within,” helps close the gap between timbre studies and viola repertoire scholarship by providing analyses of three pieces from the 20th and 21st centuries through a timbre and orchestration lens. As a professional violist and music theorist who specializes in 20th- and 21st-century music, I offer an original and interdisciplinary approach to music analysis by drawing upon my knowledge of viola technique and sound production to understand sound while also offering empirical evidence of timbral observations using existing methodologies. Chapter 1, “Intentional Instrumentation in Debussy’s Trio for Flute, Viola, and Harp,” offers insight into how this orchestration, the first of its kind, creates varying degrees of fusion and segregation.

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through the individual and composite timbres of the flute, viola, and harp. With this knowledge, we can then construct a formal outline of this piece, using Kaija Saariaho’s sound/noise axis as a framework. Chapter 2, “Microformal Transformations to Create Macroform in Tristan Murail’s C’est Un Jardin Secret,” uses an original color-mapping analysis system to explore how spectral composer Tristan Murail developed global form through the interpolation of small musical units. The color-mapping system assigned contrasting colors to musical parameters such as “stopped pitches with soft attack” and “density in attack points,” allowing both the listener and performer to track the manipulation of timbre throughout the piece. Chapter 3, “A Critical Analysis and Alternate Arrangement of Rebecca Clarke/Ruth Lomon’s Viola Sonata,” highlights Ruth Lomon’s orchestration of Rebecca Clarke’s Viola Sonata, a seldom-played yet valuable addition to the viola repertoire. This analysis explores how expanding a piece from viola/piano to viola/orchestra creates significant changes in attack and decay and amplitude, which can lead to both the enhancement and stifling of the viola part.

While these chapters stand on their own, a few analysis techniques remain consistent throughout the thesis. The first is the use of sinusoidal editing software for spectral analysis. The software I used was Sinusoidal Partial Editing Analysis and Resynthesis (SPEAR). Developed by Michael Klingbeil as a Doctor of Musical Arts (DMA) dissertation in 2006, this software works to “represent a sound with many individual sinusoidal tracks (partials),” with each sinusoidal wave containing its own
frequency and amplitude over time. This is accomplished through the use of the McAulay-Quatieri technique of peak interpolation and partial tracking. The user must specify minimum frequency spacing in hertz to determine a window length and main lobe width. SPEAR also allows the user to easily manipulate frequencies as well as the ability to cut and paste or highlight aspects of the sound. This software was chosen because of its user-friendly interface and free download. In the context of this thesis, SPEAR was not used for compositional purposes but rather to observe attack/decay, the presence or lack of overtones, unpitched noise, and specific partial identification.

Whenever possible, I supported my analyses with writings by the composer or musicological experts researching these composers. For example, I used Murail’s own writings about his music and spectralism in Chapter 2, which informed my color-mapping system and approaches to analyzing transitions between microforms. Chapter 3 was enhanced by my conversations with Dr. Liane Curtis, founder of the Rebecca Clarke Society, and leading Rebecca Clarke scholar, and Christopher Johnson, great grandnephew of Rebecca Clarke and current manager of the Clarke estate. Both scholars offered me the necessary context behind Ruth Lomon’s orchestration and the reasons behind Rebecca Clarke’s lack of orchestral works, which then better informed the presentation of the analysis. Additionally, when my knowledge of other instruments proved to be insufficient, I relied on orchestration treatises by Samuel Adler, Hector


Berlioz, and Nikolay Rimsky-Korsakov, all of whom provided valuable information on playing technique and instrumental timbre within various registers.

Finally, this thesis would not have been possible without the writings of composers Kaija Saariaho, Gérard Grisey, and Joshua Fineberg, all of whom were deeply involved in the spectral movement and thus sound studies, as well as the secondary sources *The Oxford Handbook of Timbre* and *Timbre: Acoustics, Perception and Cognition.* The authors who contributed to these resources helped shape my conception of timbre and orchestration and gave me the necessary tools for pursuing these analyses.

This thesis aims to explore the connections between timbral analysis and performance and thus provide violists with additional tools for understanding timbre and orchestration within 20th- and 21st-century viola repertoire. It is my hope that future violists reading this thesis will gain an additional lens of understanding and thus develop a further appreciation for contemporary viola music. For music theorists, my goal is to demonstrate not just the possibility, but the necessity, of exploring timbre from a multidisciplinary lens. Perhaps timbre will always remain elusive to, but with cross-discipline collaborations and multimodal methodologies, we can further understand the role of timbre as an analytical tool.

Chapter 1: Intentional Instrumentation in Claude Debussy’s Trio Sonata for Flute, Viola, and Harp

Introduction

When Claude Debussy conceived of his Trio Sonata in 1915, he intended the instrumentation to be for flute, oboe, and harp to mimic a Baroque trio sonata. However, he swapped the oboe for the viola to “better blend with the pure flute timbre,” making this one of the first known compositions for this instrumentation. Theorists have described this combination of instruments as “melancholy,” “transparent,” or “antiquarian.” Despite these descriptors for this unique ensemble, however, there has been a very limited amount of analytical attention given to the instrumentation choice or timbral effects of the piece.

To investigate how this instrumentation impacts timbre, this paper will analyze the first movement of Debussy’s Trio Sonata from a timbre and orchestration lens, arguing that the combination of flute, viola, and harp has the capability to ebb and flow between fusion and segregation due to Debussy’s manipulation of their individual and composite timbres. In this paper, “orchestration” is defined as “the skillful selection,

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combination, and juxtaposition of instruments to achieve a common goal.”26 “Fusion” is defined as the merging of distinct entities, in this case instrumental timbres, into a whole, whereas “segregation” describes separation from other entities, thus allowing a single timbre to emerge in the foreground. The degree of fusion and segregation varies throughout the movement and manifest themselves through Debussy’s choices in pitch and harmony, range and register, attack transients, and instrument-specific techniques. To understand these varying levels of fusion and segregation, I adapt parts of orchestral grouping framework outlined in the article “A Taxonomy of Orchestral Grouping Effects Derived from Principles of Auditory Perception” by McAdams, Goodchild, and Soden (2022).27 The framework in this article uses auditory grouping principles to create three categories of orchestral grouping: concurrent, sequential, and segmental.28

This paper will have three major sections: “Timbral Fusion,” demonstrating the creation of various degrees of perceptual blend, and “Segmental Grouping and Degrees of Segregation,” demonstrating how Debussy was able to bring one instrument to the foreground based on his orchestration. I will then conceptualize global form for this movement through the lens of fusion and segregation, utilizing Kaija Saariaho’s “sound/noise axis” as a framework. By bringing timbre into the foreground of this analysis, this paper makes the case that Debussy’s choice in instrumentation was an intentional decision, setting the precedent for similar trio sonatas in years to come.


27 McAdams, “Taxonomy.”

28 Ibid.
Literature Review

The published analyses of this work are usually part of larger studies on the last of Debussy’s sonatas, focusing on form and harmonic structure, especially the contrast between his inventive harmonic language and his adherence to traditional forms. Marianne Wheeldon, Professor of Music Theory at University of Texas at Austin, explores the commonalities between Debussy’s early and late works, stating that both periods utilized cyclic forms. In his later years, cyclic forms were part of Debussy’s effort to return to “pure” music during the difficulties of World War I and his struggle with cancer.29 Hungarian music historian István Kecskeméti expands upon Debussy’s use of traditional forms, stating that the citing the past, especially composers like Rameau and Couperin, evokes a sense of nationalism, which was important to Debussy during the war. Debussy’s use of “neo-modal” harmonies still fit within these forms and were never used for the sake of breaking from the past.30 American music scholar Avo Somer focused on the form of smaller phrases in Debussy’s sonatas, but still demonstrates how Debussy was still indebted to traditional phrase structures, such as periods and sentences, while still exploring innovate harmony, tone color, and melodic segmentation.31 The late Richard S. Parks, former professor at Western University, differs the most from the

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30 Kecskeméti, “Claude Debussy.”

former analyses, focusing instead on the “impulsiveness” in Debussy’s music and how relations in meter and phrasing create an improvisatory character.\textsuperscript{32}

\textbf{Methodology}

The criteria for fusion and segregation are determined through close listening as well through sinusoidal analyses, using the software Sinusoidal Partial Editing Analysis and Resynthesis (SPEAR). The recordings I chose to analyze are performed by Emmanuel Pahud, Yulia Deyneka, and Aline Khouri, as well as Sooyun Kim, Paul Neubauer, and Bridget Kibbey.\textsuperscript{33} Because YouTube has hundreds of recordings of this piece, I narrowed down my recordings decision based on these criteria: a.) the performers are professionals, as opposed to university students; and b.) the recording is of a live performance, rather than a studio recording, since the audio is less likely to have been mixed. After narrowing down my choices, I randomly picked these two recordings. It is important to remember that this paper is an analysis of the piece, not necessarily of a particular recording. Hypothetically, this timbral analysis could apply to any recording of this piece.

Formal analyses based on timbral approaches emphasize “organic” processes from “self-generation of sounds,” rather than the superimposition of traditional formal

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{33} Emmanuel Pahud, Yulia Deyneka, and Aline Khouri, “DEBUSSY Sonata for flute, viola and harp | Pahud-Deyneka-Khouri,” December 13, 2018, video, \url{https://www.youtube.com/watch?v=rLvShcrp1c4}, Sooyun Kim, Paul Neubauer, and Bridget Kibbey, “Debussy: Sonata for Flute, Viola, and Harp, I. Pastorale,” Chamber Music Society of Lincoln Center, May 14, 2019, video, \url{https://www.youtube.com/watch?v=XKU4aMHJ9yl}.
\end{itemize}
\end{footnotesize}
structures.\textsuperscript{34} Spectral composers from the 1970s and 80s, such as Gérard Grisey, Tristan Murail, and Kaija Saariaho developed novel approaches to musical form that correspond to the physical structure of sound and/or trace a continuum of sounds over time.\textsuperscript{35} Kaija Saariaho conceived of the sound/noise axis, which allowed her track multiple musical parameters over time and thus develop small- and large-scale formal structures in her compositions.\textsuperscript{36} I use this framework to analyze the form of the first movement of Debussy’s Trio Sonata by mapping the transformations between fusion and segregation over time. A more detailed description of this process can be found in Section V.

\textbf{Timbral Fusion}

Throughout the first movement of the Trio Sonata, Debussy seamlessly blended the instrumental timbres into unified composite timbres, creating a “chimeric” effect. In Greek mythology, the chimera was a fire-breathing monster with a lion’s body, goat’s head, and serpent’s tail.\textsuperscript{37} Analogous to this is the auditory chimera, in which different sonic sources combine into a single, unified sound.\textsuperscript{38} This is the result of failed auditory perception, for one of the auditory cortex’s jobs is to parcel out individual timbres


\textsuperscript{35} See Grisey’s “Did You Say Spectral?” and Tristan Murail’s “The Revolution of Complex Sounds.”


through vibrations. As previously discussed, Debussy capitalized on each instrument’s individual timbre to show the sonic capabilities of each instrument. However, combinations of two or all these instruments can create various degrees of fusion. This is achieved through parallel changes in pitch and volume as well as common attacks. The effect is a lack of salient and supporting lines, which creates a sense of new emerging timbres. In this section, I will be focusing on mm. 3-4, mm. 36-42 and mm. 72-end.

**Measures 3-4**

In the opening of the piece, the flute and harp play in the middle of their registers. The flute dips down to one of its lowest notes, C4, in measure 2. The flute alludes to the opening note of the viola solo, E5, but quickly dips back down to the low register. Meanwhile, the harp takes on a more background role with the pedal G-flat in m. 2. The flute and harp then set up the viola’s entrance in beat 6 of m. 3.

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39 Ibid.
Figure 1: the flute and harp set up the viola entrance, and the viola enters m. 3

This is the first solo of the piece, leaving the viola alone with a “soft and penetrating” melody.\textsuperscript{40} E5, the opening note of the viola solo, is the highest note in the piece thus far. The climax of the solo is on beat 2 of m. 5, A-flat5. This is considered a more “brilliant” range for the viola; as the highest string on the viola, the A string possesses a bright timbre, but the pitches are still low enough to be supported by the instrument. Despite the brilliance of this range, Debussy still hides the initial attack of the viola’s entrance, allowing the viola to dovetail in with the flute and harp. This is an example of “onset synchrony,” in which “acoustic components begin synchronously.”\textsuperscript{41}

The viola is muted for the entire sonata, blocking out some of its upper partials. This takes away some of the instrument’s ring, allowing the viola to sneak into the flute and

\begin{itemize}
  \item \textsuperscript{40} Original French descriptor: \textit{doux et pénétrant}
  \item \textsuperscript{41} McAdams, “Taxonomy.”
\end{itemize}
harp sound. The flute and harp also set up the viola entrance through the E5 in the flute and E4 in the harp. This occurs on beat 6, yet the sound still rings into beat 7 when the viola enters. The following diagram is a spectrogram analysis of this entrance analyzed through SPEAR. E5 and its overtones are already present before the viola entrance. The first overtone of the harp’s note is E5, which is then reinforced by the E5 fundamental in the flute. The period between the harp and flute’s attack and the viola’s overlap lasts for only a short duration (~100 milliseconds), marking this as a “transforming” concurrent grouping. However, as is shown through the darker red line in the viola part, the viola evolves into the prominent voice, creating a transformation from completely blended into timbral salience.

![Figure 2: Sinusoidal analysis of the viola entrance in m.3. The vertical scale represents frequency, measured in hertz (hz.), whereas the horizontal scale represents seconds in time. The red lines indicate the E4 in the harp (bottom) and E5 in the flute and viola](image)

42 Concurrent grouping determines what components of sound are grouped together. Through this auditory fusion, the prominent timbre transforms from flute/harp to viola. McAdams, “Taxonomy.”
Measures 36-42

Starting at measure 36, the harp is labeled *en dehors*, meaning “outside of,” implying that the harp is the main melody. However, in the recording with Pahud, Deyneka, and Khouri, the harp hardly comes through as a solo and instead almost completely blends with the flute and viola texture. To set up this “solo,” the viola plays a murmuring triplet passage which is taken from the previous viola and flute solos from m. 26-35. This triplet passage is in the lowest register of the viola and is likely played on the C string. While the A-naturals would normally make the A string ring (assuming the performer plays them in tune), the fact that they happen so rapidly and are interchanged by the E-flat makes any ring unnoticeable. Furthermore, the viola is still muted, dampening any chance of added resonance. The flute hardly lies on top of the viola, playing only a minor 10th or minor 7th above the viola’s pitches while still sitting in its lowest register. As a result, the flute is producing a warm, yet airy and weaker timbre. With the articulations and rhythms between the two gestures, both gestures have a light, lilting feel.

Through the combination of muted registers and gestural similarity, neither instrument is distinct from one another. The following SPEAR example shows the flute and viola fundamentals clustered together and boxed in red. From this recording, SPEAR picked up on a limited number of overtones being produced in this passage. The most obvious one is the flute’s first overtone in m. 36, a G-flat 5. Otherwise, the flute and viola have rather limited resonance and blend into each other’s sounds. This creates a sense of “timbral emergence,” in which a new timbre emerges because the sound source is less
easily recognized as the two constituent sound sources. This is aided by the fact that the flute is playing in an unusual register. Samuel Adler, author of *The Study of Orchestration*, describes the flute’s lowest range (B3-G4) as “weak, but luscious,” and cautions orchestrators to use a “sparse texture” when composing in this range. Debussy did not follow such rule, and instead composed a busier viola texture alongside the flute.

*Figure 3: m. 36-42, bracketed in blue*

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43 McAdams, “Taxonomy.”

Figure 4: clustered flute and viola pitches from mm. 36-42 boxed in red; flute overtone circled in green

The harp solo, beginning at m. 39, is in a key area (A-flat major) where only the C, F, and G pedals need to be adjusted to the “natural” position. Because of this, over half of the harp’s string lengths are at their longest, producing the greatest sound potential. However, in this solo, Debussy did not maximize the harp’s full range, which thus caused the instrument to become swallowed by the flute and viola. The harp, with over a six-octave range, has the potential to play dense arpeggiated and blocked chords, as well as glissandi across the full range of the harp. In this solo, the left hand plays a simple bass line on the offbeats, and the right hand plays a simple monophonic melody in the same range as the harp and viola. Oftentimes, the viola and harp or flute and harp land on unison pitches or octave pitches, shown below. Even if the instruments do not line up on the same pitches, the harp solo outlines the A-flat major triad and A-flat mixolydian

Although, a professional harpist could compensate for the sound of the shorter string length through their playing technique.

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scale, neatly corresponding to the flute and viola accompaniments. The harp and viola unisons are another example of “onset synchrony”, occurring in short durations (punctuations). However, because the unisons are coupled with instances of consonant harmonies, I would categorize this passage as “transforming,” in which the perceived timbre changes over time.\textsuperscript{46}

Because of the rhythmic differences between the viola and harp, as well as the pitch differences between the flute and harp, one could argue that this passage is an example of “integration of surface textures,” in which two or more instruments with different material are integrated into one texture.\textsuperscript{47} Each of the instruments have somewhat independent lines; however, the similarities in volume, register, and pitch make it difficult to distinguish any sort of foreground or background layer. As a result, the instruments in this passage blend into a somewhat looser version of fusion.

\textsuperscript{46} McAdams, “Taxonomy.”

\textsuperscript{47} Ibid.
Perhaps Debussy did not intend for this solo to come to the foreground. According to Robert Orledge, professor emeritus at the University of Liverpool, Debussy told composer Manuel de Falla that “the harp cannot serve… to increase sonority” and its only purpose is for “adding color, but nothing else.” The overall understated timbre and lack of projection is demonstrated through the faint attacks and lower amplitude in the SPEAR diagrams. Debussy was likely influenced by Hector Berlioz’s 1884 *Grand traité d’instrumentation et d’orchestration modernes*, in which he stated, “unless [the harps] are to be heard in close intimacy in a salon, harps are more effective the greater the number you have.” Of course, this is true for nearly any instrument, however, Berlioz further emphasizes that the harp is not a solo instrument. A more flattering comment from

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Berlioz is “the strings of the top octave have a delicate, crystalline sound and a delicious freshness which makes them suitable for graceful, fairy effects.” The right hand of this harp solo sits in the highest practical octave, and because of the instrument’s lack of projection, truly adds a “delicate” color to the ensemble.

**Measures 72-80**

Continuing with the unison idea, Debussy concludes the movement with octave-equivalent or unison doublings between the flute, viola, and harp, allowing the music to settle into a placid state. Doublings are a very common orchestration practice and can create the impression of a lower fundamental and the upper second and fourth overtones on top. Starting at measure 74, the flute, viola, and harp come together in the melody, with the viola and alto voice of the harp providing the foundation and the flute and soprano voice of the harp sitting up top. However, in this passage, the upper octave from the flute and harp, as opposed to the fundamental, take prominence. This is well-founded because the flute’s ideal range for projection is in the fifth and sixth octave, and the fourth and fifth octaves from the viola and harp have a prominent second harmonic that blends into the upper octave. After m. 74, the harp drops out of the melody; at this point, there is no reinforcement of the lower octave by the harp, further amplifying the flute’s upper octave. This continues until m. 77, when the viola echoes the melody in the lower octave.

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50 Ibid.
Figure 6: mm. 72-77, bracketed in blue

From m. 78-80, the flute and viola continue the same melody through parallel changes in pitch and loudness. Rather than the viola rising to fit the flute’s brightest range, the flute drops down to its lowest octave to match the viola’s pitches, ranging from C4-A4. Because this is the flute’s lowest octave, the fundamental is less prominent, and the overall sound is breathy. Debussy marked this passage as piano in the score, creating a weaker amplitude as shown in SPEAR. Because of the parallel pitches and loudness, this creates a “sustained and stable timbral emergence.”

Neither the flute nor viola emerge as prominent, and this complete fusion of sounds remains consistent throughout.

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51 McAdams, “Taxonomy.”
this entire passage. This perceptual fusion sets up the harp to take a more salient role, as outlined by the dark blue lines circled below. Unlike the previous harp passage, in which the harp struggled to project over the flute and viola, due to the sparse writing, Debussy composed blocked chords in the right hand, providing more amplitude. The left hand also plays a contrasting rhythm to the flute and viola, allowing this voice to diverge from the rest of the parts.

Figure 7: mm. 78-80, bracketed in blue

Figure 8: mm. 78-80, performed by Kim, Neubauer, and Kibbey. The harp part is bracketed in blue, demonstrating the higher amplitude and thus perceptual prominence.
Segmental Grouping and Degrees of Segregation

Just as “fusion” is fluid and can transform over time, “segregation” can vary in terms of degree. Oftentimes, segregation creates “stratification,” in which two or more layers of musical material are separated in terms of textural hierarchy. Segregation also creates “segmentation,” where “discrete changes are involved in one or more musical parameters.”

To contrast the previous sections characterized by auditory fusion, Debussy orchestrated the following sections to highlight a particular voice and bring them to the foreground. This happens at least once per instrument, demonstrating how Debussy was conscientious of his instrument choice. This section will focus on mm. 9-11, mm. 14-17, and mm. 63-70.

Measures 9-11

Measures 9-11 are an example of an idiomatic harp solo and a signature of Debussy’s compositional aesthetic. This solo is characterized by a succession of rolled fifths with very few common tones. To add more dissonance to the stack of fifths, this solo is supported by a sustained blocked fifth, F4 and C5, which is in the middle of the viola register. Between the harp and viola, the only common tone is C. Otherwise, the notes clash with one another. While dissonance does not necessarily make an instrument stand out, it does inhibit blending because there are fewer common overtones. What does make an instrument project, however, are register and textural differences. The harp is significantly higher than the viola; whereas the viola sits on an F4 and C5 in the middle of its register, the highest note in the harp, A6, lies 1.5 octaves higher. The lowest note of

52 McAdams, “Taxonomy.”
the harp solo, A4, dips below the viola by a minor 3rd, but only on beat 3 of m. 10 and beat 2 of m. 11, which are both weaker beats. Most of the time, the lowest voice in the harp solo lies above the viola, albeit only by a minor 2nd. While the vertical range of this harp solo is rather wide, almost 2.5 octaves, the melodic line stays in a soprano range.

![Harp solo and viola notation]

*Figure 9: mm. 9-11, bracketed in red*

Samuel Adler describes the upper range of the harp as not having “a great dynamic range, sustaining power, or carrying potential; the *fortissimo* at the top of the range is like a *mezzo forte* in the middle.”\(^{53}\) The pedals for this section shorten the string length even more, inhibiting the sound even further. For this passage, all the pedals, except for B, would be placed in the second degree to account for no accidentals. The only pedal change would be in m. 11, where the E pedal is shifted back to the first degree. However, the listener is only drawn to the viola double stop on its entrance; because the double stop is a sustained tone that does not vary in pitch or rhythm, the

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listener loses attention to this part against the harp. The harp part, on the other hand, has much more pitch and rhythmic variety, bringing this instrument to the foreground.

Depending on the performance, the double-stops in the viola can overpower the harp, which can make some chords in the harp barely audible. This was the case in a performance by Emmanuel Pahud, Yulia Deyneka, and Aline Khouri. In the spectrogram below, the viola’s F4 sounds the most prominent, as seen through the darkened line at 349.23 hz. The vertical column-like structures represent the harp chords. For each chord, the attack and decay are almost immediate, causing the sound to die away quickly. With the exception of some of the bass notes, shown by the short, darker lines, the amplitude of the harp solo is less than the viola.

![Spectrogram](image)

*Figure 10: spectrogram of m. 9-11, performed by Pahud, Deyneka, and Khouri*

The viola overpowering is less apparent in a performance by Sooyun Kim, Paul Neubauer, and Bridget Kibbey. In this recording, the F4 and C5 are at a relatively similar amplitude to the harp, which can be seen by the homogenous coloring.
Measures 14-17

While the viola is not the primary line from measures 14-17 (the flute is the main melody), the listener is drawn to the viola part due to its unique timbre. In this section, Debussy instructs the violist to play *sul ponticello*, meaning “on the bridge.” This creates the presence of other overtones, resulting in a “scratchy” or distorted tone. This type of timbre is specific to bowed string instruments, and thus the viola is the only instrument in this trio that can create this sound. This line is divided into two voices between the bass and 64\textsuperscript{th}-note “flourishes,” shown below. Because the bass notes are similar register, the listener groups these notes together as one line, despite not being successive. Since this bass line is a descending tetrachord, the listener can easily follow its movement, thus drawing the listener in. The flourishes also stand out above the main melody; 64\textsuperscript{th}-notes are the fastest note values in this passage and the embellishment spans the range of an octave from A3-A4. Combined with the bass line, the viola line stretches up to 1.5 octaves. This rapid change in registers, combined with the rhythmic differentiations
between the bass line and flourishes, create a more complex line compared to the flute, which seems counterintuitive for a middle-ground figure, although my impression is that Debussy intended for the viola to have a “veiled” quality, so that the singing flute melody could soar on top.

![Figure 12: mm. 14-17, bass line bracketed in green, and flourishes bracketed in orange](image)

**Measures 63-70**

Up until measure 63, the flute has generally been in the lower-to-middle range of its register. While this register creates a luscious tone, it is also the hardest to project due to the length of the air vessel. Debussy, however, placed the flute in its “clear and brilliant range” in this passage, allowing the flute to stand at the foreground. The

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55 Adler, “Individual Woodwinds.”
measure leading up to measure 63 lead to the highest range for the flute thus far, in which
the flute performs a large leap from E4 to B-flat6, followed by an ascending scalar
passage up to E6. ⁵⁶ Debussy then transitions to a denser texture in the harp and viola
parts, characterized by blocked chords in the harp and a busier melodic passage taken
from the beginning of the piece at m. 63. The expectation is that the viola will serve as
the principal line, however, this expectation is quickly thwarted by the return of the
flute’s E6 in m. 64, this time sustaining for 3.5 beats at a mezzo-forte dynamic. The
flute’s assertive presence allows the listener to shift their attention to the flute’s agility,
which is showcased by the rapid descending scale down to F4 at m. 65.

![Figure 13: mm. 62-65, bracketed in blue](image)

⁵⁶ There is one instance of the flute rising above E6 (m. 31, rising to F6), however, in that passage, the flute
quickly descends to its lower tessitura with the next three bars. M. 63-70, on the other hand, sustain the
flute in this higher register.
The flute’s soloistic presence from mm. 62-65 is demonstrated in the following SPEAR diagrams. The viola’s C4, represented by the solid black line at 260.00 hz, sits as the foundation for the flute, in m. 62, which is then disrupted by the viola’s rapid scales. The flute’s B-flat5 is represented by the other solid black line, sitting at 936.00 hz. On the fourth beat of m. 62, the viola’s C4 and the flute’s B-flat5 sit at about the same amplitude, although the flute’s upper register juxtaposed by the viola’s lowest note allows the flute line to sit at the top of the ensemble.\(^57\)

![SPEAR diagram showing flute and viola interactions.](image)

**Figure 14: flute’s entrance above the viola’s foundation, m. 62, performed by Pahud, Deyneka, and Khouri**

Leading up to m. 64, Debussy wrote the viola and the harp parts in relatively low registers, with the viola playing between F3 to B4 and the harp sitting below middle C. Neither instrument projects effectively at this register and, given that the harp’s right hand is in the same octave as the viola, the effect is a rather muffled timbre. At m. 64, the

\(^{57}\) One challenge with SPEAR is the inability to parcel out specific amplitude measurements; thus, I am unable to compare the amplitude of the viola’s C4 with the flute’s B-flat5. An area of further research could be to reanalyze this piece with a more advanced software to obtain individual amplitudes. However, SPEAR is still an invaluable tool for the timbre community, given that it’s free and easy to use.
flute’s E6 entrance sustains above the rest of the ensemble at 1,344.00 hz, sitting an octave-and-a-half higher than the viola and two octaves higher than the harp. This entrance provides a sharp contrast to the viola and harp’s muffled timbre, drawing the listener’s attention to this “brilliant” sound. The flute’s descending run-in m. 65 is then complimented by the viola’s run in a similar register, creating a “chimera” effect which will be discussed in the next section.

![Figure 15: flute’s entrance at m. 64](image)

The harp and viola then set up the flute’s next agile run starting at the end of m. 66. Like m. 9-11, the viola sits on a muted blocked perfect fifth (F4 and C5) in the middle of its register, which as mentioned earlier, blocks out upper partials. The harp then reinstates its solo from 9-11. However, unlike the opening, where the harp sustains and reattacks the two blocked fifths in m. 12, the harp dies away by beat 7 of m. 68. The harp then transitions to a D-flat7 arpeggio within the 5th and 6th octaves, as opposed to playing mid-range triads in m. 13. This thinned-out texture allows for the flute to sit above the rest of the ensemble. From mm. 69-70, the flute plays several ascending and descending
runs that range from G4-G5 in m. 69 and then E4-E-flat5 in m. 70. These runs are on the lower end of the flute’s register, which was classified as “weak” by Adler. In some ways, this is true. Below is a spectrogram comparison of a C4 and a C6 played by a modern Western flute. In the C4 example, the fundamental sits at 261.63 hz. The 2nd-7th harmonics are very present, which leads to a weaker fundamental but a fuller, more complex sound with the other sonorities. On the other hand, the flute C6 has a present fundamental at 1046.5 hz, but with no presence of supporting harmonics. The effect is a sharp, piercing sound but with little complexity. Berlioz was fond of this lower register in his Treatise on Instrumentation and Orchestration, describing this sound as “individual” and lending itself to “sad and desolate melodies.” Although m. 69-70 would not be described as “desolate,” the flute runs do set up the somber coda. Furthermore, even if this lower register is considered “weak,” the harp and viola set up such a thin background that the flute could play in any register and still project over the other instruments.

58 Adler, “Individual Woodwinds.”


60 Berlioz, Orchestration Treatise.
Figure 16: mm. 69-70; thinned-out texture within the viola and harp to support the flute’s lower register

Figure 17: flute C4, recorded by the Music Technology Group, Universitat Pompeu Fabra, Barcelona.
Form

As mentioned in the introduction, previous scholarship on the Trio Sonata focuses on the relationship between form and harmony, particularly how Debussy utilized traditional sonata form while expanding the tonal language. One article of importance, however, is Richard Park’s “Structure and Performance: Metric and Phrase Ambiguities in the Three Chamber Sonatas” from the book *Debussy in Performance* (1999). Parks argues that in the second movement of the Trio Sonata, the “impulsiveness” and “improvisatory character” comes from Debussy’s manipulation of meter and phrase structure, particularly through the ambiguity between duple and triple meter or overlapping subphrases. While this paper does not discuss either of these parameters, Park’s descriptors of “impulsiveness” and “dramatic changes” informs my conception of form in the first movement of the Trio Sonata.

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61 Parks, “Structure and Performance.”
To visualize my perception of large-scale form in this movement, I graphed the relationship between fusion (F) and segregation (S) over time. This approach to form is directly influenced by Kaija Saariaho’s sound/noise axis, in which she explored the continuum of “pure sound” and “noise” and their interactions with time. I then borrowed the concept of “continuum” for my own graph, recognizing that transitions between fusion and segregation are never binary. In this graph, time is on the x-axis whereas F and S are on the y-axis. Similar to her idea of noise to tension and sound to release, I constructed the y-axis so that S is on the top as the “most tense” and F on the bottom as “the most release.” However, “tension and release” in this context is not to be seen as parallel to “dissonant and consonant” in the tonal sense. Rather, tension and release in this paper refers to the divergence and convergence of timbres. As we have seen throughout this paper, Debussy transitioned through the prevalence of blended and disparate timbres through manipulations in register, combination of instruments, and density in sound. Therefore, rather than constructing the graph like a typical point-to-point line graph, this graph uses a continuous, wavy line to show the ever-evolving nature of this piece.

One caveat to this approach is the two-dimensional aspect of the graph; this graph only focuses on one parameter (timbre) over time. Of course, there are numerous parameters that drive musical form. Previous scholarship on this Sonata focused on the relationship to melody and harmony over time, whereas this paper focuses on

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62 Saariaho, “Timbre and Harmony.”
instrumental timbre. I would also like to emphasize that this form graph is based on my listening experience; graphs can vary between listener according to attention to details and shifting focuses.

Figure 19: form graph

This graph was formulated in real-time while listening to Neubauer’s recording. The piece oscillates between blend and non-blend every 1-1.5 minutes, with three non-blend sections and two blend sections. The opening of the piece and the recapitulation at m. 50 (~3.6 min.) serve as the main segregated points. In these sections, Debussy used each instrument’s individual timbre to introduce the main themes for the movement. This presentation is generally straightforward to the listener; each theme is presented on a recognizable sound source that could stand out against the other instruments. In the middle section from mm. 26-48, which on the graph is between 2.5-3.5 min., Debussy created one long descent towards timbral fusion, which culminated between mm. 40-44 (~3.2 min.). This creates another element of contrast between the two outer sections. Instead of the audience panning their listening across three instruments, the orchestration invites the listener to focus their attention to the center of the ensemble by blurring the
distinctions between the three instruments and thus having the ensemble act as one unit. A similar phenomenon occurs during the coda, mm. 72-end or ~5.5-6.0 seconds. By blending multiple timbres into one unit, Debussy subtracted sound from the ensemble, which supports the movement’s eventual fade into silence.

**Conclusion**

Debussy’s 1915 Sonata for Flute, Viola, and Harp was composed during the final years of his life. During this time, Debussy explored traditional compositional aesthetics, such as composing with classical forms and Baroque-like instrumentations. Debussy’s initial goal was to mimic the baroque trio sonata, using flute, oboe, and harp. However, the result was a piece with a novel orchestration which then set the precedent for numerous pieces with this same instrumentation.⁶³ As Debussy anticipated, the flute, viola, and harp have the capability to blend with one another, creating perceptual fusion. On the other hand, each instrument has unique timbral qualities that allow them to stand out above the rest ensemble, creating a sense of segregation and textural hierarchy. It is unlikely that Debussy had these timbral choices at the forefront of his mind when writing this piece; from his extensive experience in orchestration, senses of blend and non-blend were probably intuitive. This paper provides an explanation as to how this particular instrumentation creates various degrees of timbral blending, which impacts the perception of form. However, questions still remain regarding “why these instruments?” How would this analysis have changed if the viola was swapped for a violin, or clarinet instead of flute?

⁶³ See trios by Arnold Bax, Maurice Ravel, Darius Milhaud, and Tōru Takemitsu.
As mentioned in the Methodology section, this paper uses two existing recordings to analyze timbre and orchestration in this trio. While I still believe that the observations throughout this paper would apply to any recording, it is also important to consider the variables in a recording, such as room resonance, instrument maker, and microphone setup, not to mention performance interpretation. Different recordings do not create identical sonic analyses, and therefore timbral observations from one recording should not be considered definitive. However, I am unsure if there is a way to judge timbre from a purely “objective” standpoint by removing these variables. Perhaps one would need to study several recordings and analyze trends across all of them or eliminate at least some variables such as recording a performance in an anechoic chamber. This could also lead to a larger music perception project, in which participants are asked to listen to a recording of the Trio Sonata and map its form according to the guidelines outlined in the previous section. While there are so many questions left unanswered, this analysis proves that Debussy’s Trio Sonata was a monumental feat from an instrumentation perspective and deserves to be celebrated through analysis and performance.
Chapter 2: Microformal Transformations to Create Macroform in Tristan Murail’s C’est Un Jardin Secret

Introduction

As the co-founder of *L’Itinéraire*, a Paris-based contemporary music ensemble that played “everything that [was] not considered establishment,” French composer Tristan Murail (1947-) became one of the most prominent figures of the spectral movement, a musical aesthetic that fundamentally changed the way composers and listeners conceive of sound. Spectralism, a term derived from “harmonic spectra,” is difficult to define, as composers since the 1970s have adapted this label to their own artistic practice or even rejected the label altogether. Spectralism is not a mathematical formula, nor is it a scientific experiment. Spectralism is also not the sum of a set of techniques. What spectralism is, however, is an “attitude towards music,” one that embraces the enmeshment of pitch and noise, harmony and timbre, and time and form. Spectral composers, including Murail, generally view this music as the evolution of sound through time, allowing the listener to experience a dilated sense of time.

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64 Murail did not necessarily embrace this term, for he found it too limiting. Ronald Bruce Smith and Tristan Murail, “An Interview with Tristan Murail,” *Computer Music Journal* 24, no. 1 (2000): 11-12.


Through his deep understanding of acoustics and with the help of computer-assisted technology at the *Institut de recherche et coordination acoustique/musique* (IRCAM), Tristan Murail developed a compositional aesthetic that explored the inner mechanisms of sound.67 As is reflected in his music, Murail appreciated not just the pitch of a sound, but also its noise, micro-fluctuations, and overall spectral envelope. Thus, swapping chromatic pitches for hertz (hz.) and rhythmic subdivisions for seconds (sec.), his music demonstrates how the structure of sound corresponds to musical form; he suggests that music should be conceived of as a global approach with continuous, rather than discrete categories.68

These compositional aesthetics are captured in his short solo viola work, *C’est un jardin secret*. Written as a wedding present for his two composer friends, this work features brief sonic gestures that are manipulated through the violist’s technique.69 Each sonic gesture transforms into the next through minute changes in left-hand and bow technique, creating a continuous evolvement of sound. The question I pose is: how do these sonic gestures, called microforms, or the superimposition of musical elements, transition from one idea to the next to create macroform, or global structure, in *C’est un jardin secret*? To answer this question, I develop a color-mapping system that outlines the microforms based on various sonic gestures in this piece. This system shows the

67 Smith and Murail, “An Interview with Tristan Murail.”


distinctions between sections as well as the transitions between one section and the next. I then use a recording of the piece by Paul Beckett and an audio analysis software called SPEAR to analyze partials, noise, and attack transients of two significant microformal transitions, which I label as “Transition 1: Transition from Inharmonicity to Harmonicity” and “Transition 2: Transition from Agitation to Resolution.” Inharmonicity is defined as a spectrum without specific intervallic organization, whereas “harmonicity” is defined as a note with overtones arranged in whole-number ratios. Finally, I created a roadmap based on these microformal transitions to show the macroform of this piece. Through this analysis, I argue that while form cannot be constructed in a predefined way, global structure can be conceived through latching onto the stark similarities between each microform and understanding the manipulation of timbre and density of sound to transition from one microform to the next. This analysis serves as a guide not just for music theorists but for other performers, demonstrating which musical parameters to bring to the foreground and how this knowledge can create the perception of a continuous evolution of spectra.

Global Overview

In his 2005 article “Spectra and Sprites,” Tristan Murail discusses the conceptions and compositional process of his masterpiece for ensemble and tape, Désintégrations. In it, he explains the “transition-transformation” of the 11 sections of the piece, expressing how each section evolves from “harmonic to inharmonic, or vice versa,” thus creating changes in order and disorder. My color mapping system takes inspiration from his article

70 See section “Transition 1: Inharmony to Harmonicity” for more information.
by displaying both the delineations and interpolations of each microform. Across his published articles, Murail never explicitly defines “microforms,” despite discussing it in length in “Spectra and Sprites.” He does define “spectra,” however, which are musical material composed of several elements, including frequency, amplitude, and function, or the relationship between musical events and time.71 Borrowing Murail’s terminology, in this paper, microforms, literally meaning “small forms,” are defined as the superimposition of elements and functions to create material for the piece. Therefore, each microform does not represent one singular musical parameter, but rather a combination of elements to create a sonic gesture.72 Moreover, while Murail’s analysis of the 11 sections of Désintégrations focuses on aggregates of partials, this analysis of C’est un jardin secret highlights the microformal relationships through a timbral lens.73

71 It should be noted, however, that Murail uses the term “spectra” quite loosely throughout this article and his other writings. The Acoustical Society of America defines “spectrum” (singular of spectra) as a “Fourier analysis of a signal or noise of a waveform.” Throughout this paper, I adopted Murail’s loose definition of spectra to refer to sound and its constituent parts. Murail, “Spectra and Sprites”; “Spectrum,” Acoustical Society of America, accessed October 28, 2023, https://asastandards.org/terms/spectrum/.

72 “Microform” and “macroform” are commonly used terms across music theory, with each author defining them in slightly different ways. Christian Utz and Thomas Glaser, in the context of Schoenberg’s Sechs Kleine Klavierstücke, describe microform as individual phrases within a given movement and macroform as the shaping of the entire cycle. In an analysis of Gottschalk’s “Concerto for Wind and Percussion Orchestra,” Keith DeFoor describes microform in “Scherzo” movement as themes, transitions, or opening/closing material, and macroform as the “A section,” “B section,” and so on. The essence of the two terms, however, describes the small “building blocks” of the music (motif, measure, phrase, etc.) and the larger scale makeup of the piece or cycle. In this analysis of C’est un jardin secret, microform describes smaller sections defined by sonic attributes (see Table 1) whereas macroform describes the overall structure of the piece. Christian Utz and Thomas Glasser, “Shaping Form: Performances as Analyses of Cyclic Macroform in Arnold Schoenberg’s Sechs Kleine Klavierstücke, op. 19 (1911), in the recordings of Eduard Steuermann and Other Pianists,” Music Theory Online 26, no. 4 (2020): 3-11; Keith DeFoor, “Analysis: Arthur Gottschalk’s ‘Concerto for Wind and Percussion Orchestra,’” Journal of Band Research 22, no. 1 (1986): 2.

73 Murail, ”Spectra and Sprites.”
Figures 1-3 show the annotated score with the microformal delineations. Each microform was determined by a section’s overall sonic profile. Sonic characteristics that I analyzed include natural vs. adulterated sound, density of sound, attack transients, and length of sound. The breakdown of each color can be found in the table following table:

**Table 1: Color and sonic descriptors for each microform**

<table>
<thead>
<tr>
<th>Color</th>
<th>Sonic Descriptor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>Harmonic sound</td>
</tr>
<tr>
<td>Pink</td>
<td>Density in stopped pitches</td>
</tr>
<tr>
<td>Purple</td>
<td>Stopped pitch with soft attack</td>
</tr>
<tr>
<td>Orange</td>
<td>Density in attack points</td>
</tr>
<tr>
<td>Blue</td>
<td>Stopped pitch with hard attack</td>
</tr>
</tbody>
</table>

*Figure 20: Color-mapping annotations for page 1*
Figure 21: Color-mapping annotations for pages 2 and 3
In this paper, a **harmonic** is a pitch represented with diamond noteheads for which the viola player lightly touches the string with their left hand. With this technique, only the pitches that belong to the string’s harmonic spectra will sound. Because the placement of the left hand is vital to producing the harmonic, performers will use hardly any vibrato, if at all. The effect is a crystalline sound. A **stopped pitch**, on the other hand, is a pitch played with normal left-hand pressure and can produce any chromatic or microtonal pitch. Stopped pitches are easier to produce, and thus players can vary vibrato and bow technique for different sound colors. **Density** refers to the relationship between space and pitches or attack points, as well as the number of pitches or attacks occurring simultaneously; less space between pitches or attack points means denser sound, and vice versa. Similarly, two or more simultaneous pitches means denser sound. **Attack** refers to a “momentary energetic impulse,” or the noise at the beginning of a sound and is a result of A “hard attack” produces a consonant “k” sound, caused by added bow pressure from the performer, whereas a “soft attack” blends with the core of the sound before its decay.

While timbre is the primary deciding factor for the microform delineations, the frequencies of the pitches are not a consideration. Unlike much of the music by his contemporary Gérard Grisey, *C’est un jardin secret* does not make use of microtonality, nor is it based on a singular harmonic series. This is because Murail’s music often uses

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traditional compositional techniques in addition to the spectral idiom. In *C’est un jardin secret*, this takes the form of traditional tuning, idiomatic double stops, and clear and approachable notation. Evident in this piece, composer Julian Anderson states that Murail’s first mature works are “composed around recurring harmonic spectra whose simple consonances provide easily recognizable beacons for the listener in the constant flux of music.”

Therefore, the form of this piece is determined by timbre and sonic manipulation, with pitch serving as a secondary parameter. In this case, a sound analysis software, such as SPEAR (Sinusoidal Partial Editing Analysis and Resynthesis), is useful for analyzing the timbral changes in each microform and can also be used to identify noise as a filter or consequence of bow technique, shape of attacks, and amplitude.

**Transition 1: Inharmonicity to Harmonicity**

The first microformal transformation on page 1 of the score represents a long transition from inharmonicity to harmonicity. This is depicted with yellow and pink colors, indicating “harmonic sounds” to “dense stopped pitches.” Composer Denis Smalley defines harmonicity as a spectrum of notes with specific intervallic organization, such as in the overtone series. While most traditional instruments make use of the harmonic spectra, inharmonicity is a spectrum of notes without that same acoustic

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organization, such as the spectra of an unpitched percussion instrument. Smalley also states that the addition of inharmonicity to a sound is a way to move towards noise.

This first transition is based on an F harmonic series, as determined by SPEAR and Michael Norris Harmonic Calculator. The pitch content stays consistent throughout the entire transition amidst its sonic manipulation. One way in which the sound is modified during this transition is through the increase in spectral density, which is a “fog, curtain, or wall… that allows sound to penetrate or not.” In other words, as the music transitions towards harmonicity, the sound becomes more concentrated. Smalley’s density diagram is shown below, with arrows pointing towards the result of the music by the end of page 1.

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76 When referring to “harmonic” vs. “inharmonic” spectra, Murail is referring to spectra that follow the harmonic series or spectra that have been distorted by either adding or subtracting frequencies or applying a new frequency curve, respectively. According to Grove Music Online, “harmonic” is defined as musical notes with frequencies related by “simple whole number ratios.” “Inharmonicity” (and by extension “inharmonic”) is defined as “the deviation of a set of frequencies from an exact harmonic series.” Murail’s descriptions match these two definitions well, and thus the reader can assume that Murail is referring to the acoustical definitions when discussing “harmonic” and “inharmonic.” Murail, “Spectra and Sprites”; Guy Oldham, Murray Campbell, and Clive Greated, “harmonics,” Grove Music Online, 2001, accessed October 28, 2023, https://doi-org.du.idm.oclc.org/10.1093/gmo/9781561592630.article.50023; Murray Campbell, “inharmonicity,” Grove Music Online, 2001, accessed October 28, 2023, https://doi-org.du.idm.oclc.org/10.1093/gmo/9781561592630.article.13801.

77 Smalley, “Spectromorphology.”


79 Smalley, “Spectromorphology.”

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Figure 22: Smalley diagram, purple annotations my own

To achieve the increase in spectral density, the music decreases its noise, increases amplitude (loudness), and gradually introduces stopped pitches. While harmonics are “natural pitches,” meaning they are unaffected by vibrato and are whole-number ratios to the viola strings (5:1 for B vs. G; 3:1 for A vs D, 3:1 for C vs C), the harmonics in the opening of C’est un jardin secret are inextricably linked to noise. As Figure 1 shows, the first few harmonics are not colored yellow. This is because the sound is so soft that audible pitch does not even come through until at least seven iterations of the opening harmonic. In the score, Murail indicated “sp,” meaning sul ponticello, as well as a pppp dynamic marking. These performance directions instruct the violist to play close to bridge with very little bow hair or bow speed. Since there is almost no friction between the bow and the string and the bow is placed in a sub-optimal position for resonance, the violist will end up creating more noise than definitive pitch. The noise then evolves into a normal pitch harmonic (B5, ∼981.15 hz.) through a crescendo and an

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80 Sul ponticello: when a string player places their bow very close to the bridge, emitting more harmonics and creating a “foggy” sound.
arrow towards “ord” (*ordinario*), directing the violist to play with more bow speed and bow hair as well as move the bow towards a contact point that yields to more resonance.

The rhythmic changes throughout the first transition are also linked to the increase in density. The violist’s bow changes and bow placement inevitably affect the sound; even with the most fluid and well-timed bow technique, there is always a slight disruption in the sound as the bow pulls the string in the opposite direction. Often this results in a slight “attack” at the beginning of the bow change. These bow changes are evident in the harmonic B5’s slight amplitude changes, which quickly fade back to noise. However, as the rhythmic divisions get smaller, more bow changes occur and thus the more “bursts” of the harmonic B5 occur. Eventually, as the B5 emerges with considerable amplitude, the sound of the harmonic overshadows the disruption from the bow change. This technique is called filtering, in which certain partials are exaggerated or enhanced.\(^8\) As more harmonic pitches appear in the first transition, the amplitude also increases, which is shown by the frequencies gradually darkening. As the harmonics turn into harmonic double-stops and then into stopped chords, the noise becomes overshadowed by stopped pitches.

![Figure 23: Harmonic B5 bow changes in Transition 1, circled in blue.](image)

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\(^8\) Murail, “Spectra and Sprites.”
Figure 24: one bow change, zoomed in. The frequency inside the circle shows a fade from light to dark grey, with one slight “bump” in the frequency between 8.6 and 8.7 seconds. That “bump” indicates the bow change.
This first transition is considered seamless because one new parameter is introduced to the music at a time:

1. Rhythmic accelerando
2. New harmonics added one-by-one
3. Tempo accelerando to double stop harmonics
4. Double stop harmonics to stopped pitches

These parameters are not introduced in isolation, but instead are superimposed onto each other, creating a sense of gradual build. As the rhythm accelerates throughout the first three systems, new harmonics are added. Then, as the tempo accelerates in the fourth system, the harmonics turn into stopped pitches due to the increase in left-hand finger pressure. Constant throughout the introduction of each parameter is one long crescendo from pppp to ff. The superimposition of musical parameters amidst a constant crescendo exhibit how Murail conceives of links between musical elements over time, expressed by the quote below:

In the domain of durations, it is easy to organize the appearance of elements in terms of functions (number of functions on the axis... time on the axis)... with simple functions, it is possible to generate many types of rallentandi or accelerandi by making them more complex, superimposing and adding functions, one can discover many sorts of fluctuation which can be used to introduce surprise or “humanize” the process.\(^82\)

On the “axis” between the first and fourth lines of the piece, the five elements listed above serve as “functions” to create the transition from inharmonicity to harmonicity, in which the addition of each parameter builds more and more drive towards a “climax.”\(^83\)

\(^{82}\) Ibid.

\(^{83}\) Saariaho, “Timbre and Harmony.”
There is a metaphorical release from the buildup with the lone A4 (440 hz) that gets left behind from the stopped chords and is used to pivot into the next microform.

Figure 25: Disintegration to A4 (~440 hz)

Transition 2: Agitation to Resolution

Transition 2 takes place on page 2 from the third system to the fermata at the end of the page. Colored in pink, orange, and blue, this transition is characterized by a rhythmic acceleration, reaching a climax at the start of the fifth system, immediately followed by a deceleration, as if the music were falling apart. This is achieved through manipulating pitch durations as well as the amount of space between notes. At the beginning of the transition, starting at the *forte* tremolo double stops in the third system, the lengths of the pitches last about 1 second, as determined by SPEAR. This 1 second duration includes pitches affected by a tremolo bow stroke, in which the bow moves back and forth at a rapid speed on one note. Because the bow changes in a tremolo stroke are concentrated together, SPEAR analyzes each of the tremolo double stops as one

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84 Pink denotes density in stopped pitches, orange density in attack points, blue stopped pitches with hard attack; refer to Section II for full color breakdown.
continuous pitch, rather than several separate bow changes. This changes by the 32\textsuperscript{nd}-note triplet, a written-out “slow” version of the tremolo, in which SPEAR parcels out each bow change. From there until the start of the feather beam in the fifth system, the length of the notes decreases from 1 second to 0.3-0.5 seconds, with some variability. The ricochet at the apex of the feather beam serves as the climax of this transition, with the pitch lengths lasting approximately 0.01 seconds. From there until the fifth system, the pitch lengths increase incrementally, and by the start of the fifth system, each pitch lasts for at least 1 second.

The durations of pitches do vary across recordings, for performance directions such as \textit{accelerando}, \textit{très vite} (very quickly), and \textit{rallentando} are mere guidelines for the performer, who determines the actual speed of each instruction. Furthermore, Murail utilizes musical notation in this transition that leads to great variability, such as feather beaming to indicate a decrease in speed, horizontal lines of varying lengths that represent an approximate pitch length, and ricochet notation with increasing attack points to indicate longer pitch durations. But because of the flexibility in tempo markings and musical notation, analyzing this transition through rhythmic subdivisions against the original tempo marking (eighth note=92) would be difficult, if not impossible. Therefore, temporal divisions are necessary to capture the acceleration and deceleration.

Opposite of Transition 1, the descent from a \textit{ff} to \textit{pp} dynamic in Transition 2 implies a shift from noise to sound, further supported through the different attacks. From a string player’s perspective, a \textit{forte} tremolo will produce extraneous noise due to the increase in bow pressure which yields hard attacks, several changes in string direction, and bow placement closer to the bridge. As the tremolo transitions to straight double
stops, the noise increases due to the *molto accelerando*. This is because the double stops require rapid string crossings across all four strings; as the speed increases, the friction between the bow and the strings decreases, which inhibits the performer from managing the tone quality in real-time. The increase in noise through the rhythmic acceleration is likely intentional and serves to enhance the chaotic energy of the acceleration. As the music decelerates into a ricochet stroke, as required in the fifth system, the amount of noise decreases, although some uncontrolled noise results as well, especially at the *forte* dynamic. Some factors that impact noise of the ricochet include height of bow bounce and speed of the fall and release, whether the ricochet hits other strings, amount of bow hair as more hair likely means more pitched sound and bow placement since placing the bow too close to either the bridge or the fingerboard results in more unpitched noise.

After all the disturbances to pitches throughout the transition, the agitation finally resolves to a resolution with a long fermata D4. This pitch could be played on an open D string, exhibiting the one of the most fundamental sounds on the viola.
Figure 26: Transition 2 from noise to sound, starting from the fourth system of the second page to the fermata in the seventh system. The pitch density in the fourth system creates a jumble of partials and extraneous noise. As the density decreases, identifying the overtones of individual pitches becomes easier. This is most apparent from 126-128 seconds, or the singular D4. However, one can start to see the appearance of identifiable overtones starting at around 123 seconds, or the start of the ricochet at the end of the sixth system.

How Transitions Create Macroform

Figure 11 is an idea for a “roadmap” of the piece. This roadmap serves as a “zoomed-out” visual, which can be challenging to observe on a sound analysis software. The roadmap and color-mapping system were conceived through several close-listening sessions with the score only acting as a supplement. This roadmap was inspired by the form diagrams in Kaija Saariaho’s article “Timbre and Harmony: Interpolations of Timbral Structures” (1987) as well as the formal outline of Gérard Grisey’s Périodes in the article “The Emergence of Spectra in Gérard Grisey’s Compositional Process: From Dérives (1973-74) to Les Espaces Acoustiques (1974-85)” by François-Xavier Féron.
Both Saariaho and Grisey’s diagram represent a rough outline of their compositions, depicted in color and/or abstract shapes. Saariaho’s diagrams use wedge shapes to represent large-scale shaping and opaque vs. translucent shading to represent inharmonicity to harmonicity. Grisey’s diagram, on the other hand, represents the piece’s general shape, tension and release, and hypothetical durations. Saariaho, Grisey, and Murail emphasize the importance of musical form in their compositions and its connection to sound throughout time. Therefore, while this paper has focused on transitions across microforms, the minutia must be viewed from the perspective of the entire piece.


86 Saariaho, “Timbre and Harmony.”

87 Féron, “The Emergence of Spectra.”

Figure 27: In Saariaho’s words: “first sketches of the global form of Verblendugen for orchestra and tape.” Image from her article “Timbre and Harmony: Interpolations of Timbral Structures.”

Figure 28: formal outline of Périodes. Image from the article “The Emergence of Spectra in Gérard Grisey’s Compositional Process: From Dérives (1973-74) to Les Espaces Acoustiques (1974-85).”

Like the sketches by Grisey and Saariaho, this roadmap serves as a starting point for understanding form and is based on personal listening and observations of each microform. The colors are uniform to microform diagram earlier, and the opaquer the color, the greater the harmonicity. Texture choices in the roadmap represent broad visual approximations of spectral envelopes within a given microform. For example, one microform in Transition 2 (sixth system of the second page in the score), characterized by ricochet on single notes, is depicted with a stipple texture in the right half of the roadmap.
Immediately following the ricochet depiction is a solid blue line depicting the long D3 at the bottom of the second page; however, the line is layered on top of the orange stipples to indicate that the D4 emerges from the preceding ricochet stroke. In this roadmap, the horizontal x-axis represents time, whereas the vertical y-axis represents changes in amplitude through an increase or decrease in density. The higher a microform is on the roadmap, the greater the density.

Figure 29: Macroform of C’est Un Jardin Secret

_C’est Un Jardin Secret_ forms somewhat of an arch since the beginning and end of the piece come from/taper to nothing. There are multiple smaller climaxes as well, designated in pink. This was an observation that only arose after creating the roadmap; a majority of the denser sections are characterized by density in stopped pitches, with or without hard attacks, but that are close to bridge and at least a _forte_ dynamic. Murail describes the form of his orchestral work _Désintégrations_ as “11 connected sections…"
progress[ing] from one section to the next by transition-transformation.”89 A similar concept could be applied to C’est Un Jardin Secret. There are about nine sections, with some repetitions. The microforms are transformed by adding or subtracting one parameter at a time while keeping another parameter, often pitch, stable for continuity. The point is to connect each idea to another to create a whole; when listening to the piece, one can latch onto how ideas blend into one another and use pitch content as an anchor point.

**Summary and Conclusion**

This paper explores the multidimensional view of microformal transformations and their conglomeration into macroform in Tristan Murail’s C’est un jardin secret. After providing the microformal breakdown of the piece through the color-mapping system, the paper then covered two major transitions from inharmonicity to harmonicity and agitation to resolution, analyzing spectral density, superimposition of musical parameters, space, and attack variations. Finally, the paper presented an idea of the macroform, emphasizing the overall shape of the piece as well as the overlap of each microform. In addition to the global form and details of two major transitions, this analysis provided a string player’s perspective to the sound world Murail created, the technical implications behind his writing, and how this information could enhance a future performance. Understanding the varied compositional techniques that Murail used to manipulate sound and rhythm in each microform informs performance choices of various parameters of the music, such as

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89 Murail, “Spectra and Sprites.”
when it is necessary to embrace the noise that emerges as a consequent of Murail’s
gestures, or the importance of differentiating between hard and soft attacks.

It should be noted that despite the explanations of sonic manipulations and form,
the methodology of this analysis may produce different results for each scholar. Perhaps
one may hear a microform begin slightly earlier, or perhaps the parameters for
microforms may be different entirely. The macroform roadmap is also somewhat
subjective, for the visuals are based on approximations of personal aural perception. The
x-axis of time would likely stay consistent throughout other roadmaps, but the y-axis is
variable. The y-axis could represent inharmonicity to harmonicity or degrees of density.

However, the methodologies presented in this paper are not intended to lead to a
definitive construction of form. Rather, the guidelines for the understanding of microform
and macroform serve as a guide for both the performer and listener, in order to better
understand the complexities yet fascinating sound world of *C’est un jardin secret*. If the
performer or listener can grasp the landscape of this piece through these methodologies,
then the goal of this paper has been met.

For further research, I would like to see how same concepts of microformal
transformations to create macroform would apply to other spectral solo viola works, such
as Grisey’s “Prologue” or Giacinto Scelsi’s *Manti I, II, & III*. I would also like to see an
analysis from a performance perspective, such as the temporal perspective of seconds;
how long does each microform last, what are the significance of any gaps, and how does
time shift throughout the piece?
Chapter 3: A Critical Analysis and Alternate Arrangement of Rebecca Clarke/Ruth Lomon’s Viola Sonata

Introduction

Violist, composer, and scholar Rebecca Clarke (1886-1979) described the viola’s character as “personal—somber yet glowing, reserved yet eloquent, with its ‘chief scope’ shining in chamber music.”90 As the violist in the English Ensemble, a touring all-female piano quartet, and as a published scholar in chamber music writing, Clarke understood the intricacies of viola writing—what is and is not idiomatic, how the viola’s sound fits into the other instruments, and what it takes for the instrument to shine as a soloist.91 Her most well-known work is her Sonata for Viola and Piano (1919), which received runner-up in the 1919 Berkshire Chamber Music Competition. Inspired by the Impressionist aesthetics of early-20th-century France, this sonata launched her international career as a composer and performer. Some sources state that the sonata got lost in obscurity until 1976, although others say this piece became the cornerstone of the viola repertoire almost overnight, making it difficult to know the impact of this sonata during Clarke’s lifetime.92


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In another effort to bring this piece to life, Canadian composer Ruth Lomon (1930-2017) orchestrated the Sonata in 2007, renaming the piece as “Sonata for Viola and Orchestra.” This orchestration has received critical acclaim from international soloist Patricia McCarthy and has been performed across the U.S. by notable violists such as Anne Leilehua Lanzilotti and Diane Pheonix-Neal. Despite the orchestration’s success, there exists no critical analysis of Lomon’s orchestration compared to Clarke’s composition. Drawing upon orchestration principles set by Hector Berlioz, Nikolay Rimsky-Korsakov, and Samuel Adler, as well as timbre analysis methodologies from scholars Stephen McAdams, Charalampos Saitis, and various spectral composers, this paper fills that gap, examining the ways in which Lomon’s scoring enhances the character of Clarke’s Sonata yet at other times stifles the timbre of the viola. After providing contextual background on Rebecca Clarke’s viola writing and the origin of Ruth Lomon’s orchestration, I analyze sections of the orchestration through the lenses of “Attack and Decay,” “Doubling,” and “Inherent Changes in Amplitude.” For every criticism, I present suggestions on alternative instrumentations for future orchestrations of Clarke or other composers’ sonatas. Finally, I present a portion of my orchestration for chamber ensemble, synthesizing Lomon’s timbre choices with my own critiques. This paper aims to shed light on this seldom-played orchestration of Rebecca Clarke’s

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93 “Concerto,” Rebecca Clarke Society. From 1998 until her death, Ruth Lomon was a composer/resident scholar at Brandeis University’s Women Studies Research Center. Aside from the Concerto, other notable pieces include her oratorio, “Testimony of Witnesses,” and “Songs of Remembrance,” both of which set poetry from the Holocaust to music.

94 Lanzilotti’s recording: [https://vimeo.com/293174883](https://vimeo.com/293174883)
masterwork while highlighting the precarities of orchestrating a piece from viola and piano to viola and orchestra.

Rebecca Clarke, the Viola, and the Orchestration’s Commission

Clarke started her musical journey as a violinist and enrolled in the Royal Academy of Music in 1903. After an incident with her harmony teacher in which he tried to propose marriage, Clarke’s father immediately pulled her out of the school. She later enrolled as a composition student at the Royal College of Music in 1907, studying with the renowned Sir Charles Stanford.\(^9^5\) Stanford encouraged Clarke to switch from violin to viola so that she could be “right in the middle of the sound and [could] tell how it’s all done.”\(^9^6\) After earning runner-up in the Berkshire Chamber Music Competition in 1919 and 1921 for her Viola Sonata and Piano Trio, respectively, she went on to perform as a soloist and chamber musician across the globe, collaborating with world-famous musicians such as Arthur Rubinstein, Pablo Casals, George Szell, and Percy Grainger.\(^9^7\) Thus, with the viola at the center of her musical career, Clarke intimately understood the role of the instrument in the chamber music setting.

Her two published essays, “The History of the Viola in Quartet Writing” (1923) and “The Beethoven Quartets as a Player See Them” (1927), describe the viola as “personal,” with an ability to “color a quartet.”\(^9^8\) She expands upon these concepts in her


\(^9^6\) Christopher Johnson, Preface to *Morpheus* by Rebecca Clarke (Oxford: Oxford University Press, 2010).

\(^9^7\) Ibid.

“Viola” entry for *Cobbett’s Cyclopedic Survey of Chamber Music* (1929), providing an historiographical survey of the viola in chamber music. She describes that in the latter half of the 19th and into the 20th century, composers were starting to discover the “peculiar and often most effective possibilities of the viola,” providing the viola with more soloistic and technically challenging parts and thus expanding the color palette of the string quartet in general.99 These are not her only chamber music essays; according to the Rebecca Clarke Society, there are three other unpublished essays in her estate titled “Haydn String Quartet in D minor, Op. 76, No. 2”, “Schubert and His Quartets,” and “Mozart and His Quartets.”100 While Clarke’s scholarship has largely gone unnoticed, these little-known essays provide insight into her perception and interpretation of major chamber music repertoire, almost certainly informing her viola writing. While there are not any known writings by Clarke about viola and piano duos, the Viola Sonata is a piece that upholds the idea of discovering “the most effective possibilities of the viola,” for it provides the violist an abundance of technical challenges such as glissandi to natural harmonics, rapid scales and arpeggios, and sudden dynamic changes. Dr. Liane Curtis, the founder of the Rebecca Clarke Society, remembers pianists describing the grandiose piano part as “orchestraly conceived,” and violists holding the Clarke Sonata as a “beloved part of the repertoire” and wishing that there were more viola concerti.101


100 “Writings,” Rebecca Clarke Society, accessed November 20, 2022, [https://www.rebeccaclarke.org/writings/](https://www.rebeccaclarke.org/writings/)

101 Dr. Liane Curtis, in discussion with the author, August 24, 2023.
The Rebecca Clarke Society thus commissioned Ruth Lomon, then resident composer and scholar at the Women’s Studies Research Center at Brandeis University, to orchestrate the Sonata.\textsuperscript{102} The premiere took place on June 8\textsuperscript{th}, 2007, and was performed by violist Peter Sulski and the Worcester Collegium in Worcester, Massachusetts.\textsuperscript{103} At the time of the orchestration’s conception, there was some debate over whether to call the orchestration a “concerto” or “sonata.” While Lomon’s orchestration is “functionally a concerto,” in which the viola acts as soloist with orchestral accompaniment, the piece does not utilize “concerto form in the classical sense.”\textsuperscript{104} On the other hand, the spontaneous, in-the-moment, exchanges between colleagues in chamber music do not exist in the viola and orchestra format, further creating the feeling of a concerto. While there was never a full settlement on the debate, the piece is currently titled “Sonata for Viola and Orchestra” by Rebecca Clarke, orch. by Ruth Lomon. Since the premiere in 2007, Dr. Curtis and Lomon continued to revise the orchestration, partially under a few conductors’ guidance to address balance issues and offer more practical instrumentation (a celeste, for example, may not be accessible to a community or youth orchestra).\textsuperscript{105}

Methodology

Re-orchestrating a piece from viola and piano to viola and orchestra affects the overall sonic experience because of variations in timbral properties like attack and decay,

\textsuperscript{102}“Concerto,” Rebecca Clarke Society.

\textsuperscript{103}Ibid.

\textsuperscript{104}Correspondence with Dr. Curtis

\textsuperscript{105}Ibid.
harmonic structure, and amplitude. Timbre is inherently perceptual because it relies not only on the acoustic properties of sound but how these sounds are represented in the auditory system. Because of this, orchestration analyses rely heavily on close listening rather than score analysis alone. Stephen McAdams, one of the founding scholars in timbral research and director of the Music Perception and Cognition Lab (MPCL) at McGill University, emphasizes that “[the lab] explore(s) how listeners perceive musical sound, how they comprehend a complex musical scene composed of sources, events, sequences, and musical structures and how they react emotionally to that scene” (emphases my own).

Therefore, I compared two recordings of Rebecca Clarke’s Sonata: Deanna Badizadegan with the Eureka Ensemble (orchestra) and Antoine Tamestit with Ying-Chien Lin (piano), listening for how the changes in instrumentation affect attack and decay, blend versus non-blend, amplitude, and effects of pitch displacement. After five close-listening sessions, these categories were determined through what I perceived to be the starkest differences between the viola/piano and viola/orchestra versions. While emotional affect was not the focus, I did take note of any personal reactions and its influence from instrumentation. When describing emotional affect, I depended on sensory

106 Ibid.


attributes from different modalities such as “sparkle” and “pedantic” or metaphorical associations such as “droplets.” According to Saitis and Weinzierl in the chapter “The Semantics of Timbre” from *Timbre: Acoustics, Perception, and Cognition*, timbre as a concept lacks sensory-specific vocabulary, leaving humans to communicate timbral perception through sensory attributes (bright, warm), onomatopoeic descriptions, or non-sensory/abstract depictions (harsh, deep). The chapter demonstrates the connections between acoustical properties and metaphoric attributions and outlines how common descriptors can be mapped on a three-dimensional space with axes for luminance, texture, and mass. Based on my timbral comparisons between the sonata with orchestra and sonata with piano versions, I constructed a sample “alternate arrangement” of the Sonata for violin, clarinet, and piano that considers both Clarke and Lomon’s compositional goals.

**Attack and Decay**

**Measures 159-171**

As with any orchestration, our previous timbral associations for that piece become elaborated and perhaps misconstrued. This is because timbre and pitch are inextricably linked, and many studies point to timbre as a principal feature in memorizing melodies. The human brain recognizes well-known sounds from musical instruments (such as the

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110 Ibid. One important note is that as a violist, I was already very familiar with the sonata version, which likely influenced my perception of the orchestration.

111 This sample score is to be used for study purposes only and is not intended for performance.
piano), activating auditory sensory representations.\textsuperscript{112} Thus, those who are familiar with Clarke’s Sonata may find recordings of Lomon’s orchestration surprising, even jarring. Familiar timbres created by the piano are replaced with new timbres from the orchestral instruments, which affects pre-existing extramusical associations with the piece. I found the most striking timbral difference to be the swap between piano and strings, for I lost the “sparkle” of the piano, which comes from the strong attack and rapid decay of the keyboard instrument.

One major difference between the piano and strings are their spectral envelopes, which American composer Joshua Fineberg defined as “the appearance, disappearance, and changing relative amplitudes of various partials.”\textsuperscript{113} This can be thought of as the overall shape of a sound spectra, considering the length and amplitude of the initial attack, sustain, and eventual decay. To demonstrate the differences in spectral envelopes between the piano and strings, I recorded two short clips of a C4 on a piano and viola and then analyzed them through the sinusoidal analysis software Sinusoidal Partial Editing Analysis and Resynthesis (SPEAR). Screenshots of the analysis are shown below.

\begin{flushright}
\begin{minipage}{0.9\textwidth}

\end{minipage}
\end{flushright}
For reference, the vertical scale represents frequency (hz.), whereas the horizontal scale represents temporal seconds. The darker the line, the greater the amplitude. The faint, grey jagged lines in both figures represent white noise from the room, which for the purposes of this study can be disregarded. The C4 fundamental, at 261.63 hz, is bracketed in the diagrams. One major difference between the piano and viola is the decay, or lack
thereof. The moment a key is struck on the piano, the sound decays almost immediately. In Figure 1, the C4 begins to decay after 0.6 seconds, which is shown by amplitude decreasing before 1.5 seconds. The first overtone, C5, remains present for 1.13 seconds, slightly longer than the fundamental. The rest of the overtones decay within a range of 0.075 to 0.247 seconds. These numbers were taken directly from SPEAR by holding the cursor over different points in the sound analysis.

The viola, on the other hand, can theoretically sustain a tone without decay almost indefinitely. Figure 2 demonstrates this by showing how the amplitude of the fundamental remains consistent throughout the recording. With the exception of the fourth overtone, C6, the overtones remain nearly consistent throughout as well. Reasons for the rapid C6 decay are unknown at the moment but could have to do with microphone placement or changes in bow pressure or contact point. The small “glitches” in Figure 2, where the amplitude lessens slightly, could also be a consequence of bow technique.

Because of the differences in their respective spectral envelopes, swapping a piano line with strings will create a very different timbre. Whereas a slurred piano line will still have a slight articulation and release at the beginning of each note, a slurred string line will sound sustained. This is evident in mm.159-171 in the first movement. In this passage, the viola takes the background role by playing a series of sul tasto arpeggios at a ppp dynamic. In the piano part, the left hand takes the main role with a melody that reminisces the second theme in rehearsal no. 4. The right hand soars three octaves higher with a triplet accompaniment passage. This passage in the piano part sweeps across the soprano and alto range but has peaks ranging from B-flat6 to E7. As mentioned earlier, the piano will always have a decay almost immediately after its attack; this remains even
more true the higher the register. Figure 33 shows a sinusoidal analysis of a C7 (2131.350 hz) played on the piano. The fundamental, which is the dark line towards the top of the diagram, lasts for 0.305 seconds. The initial attack, the short dark lines underneath the fundamental, decays after about 0.117 seconds. As is evident in this example, this note produces almost no overtones. This is because the piano strings' lengths are shorter in the higher registers, which leaves less room for the string to vibrate. Because of the even more rapid decay and the lack of ring from overtones, the piano creates an ethereal, “sparkly” effect, which I will describe as “droplets.”

![Figure 32: start of rehearsal 14, mm. 159-162](image)
Lomon gave the right-hand triplets to the flute and two solo violins, which produces a dissimilar timbre. The violins and flutes cannot achieve the same “droplet” effect through the slurred passages in Lomon’s score due to the instruments’ sustained sounds. Rather than providing a delicate backdrop to the viola, the nature of the sustain results in this line coming to the foreground. This is evident in the sinusoidal analyses below, where the amplitude in the triplets stays more consistent than in the piano part. While the lower notes in the piano part (around F#4 to D5) do sustain more, the piano part continually returns to the upper register and thus to the “sparkly” timbre.
If the strings are unable to achieve a similar timbre to the piano, then what could be an alternative? One solution could be to fuse a hard attack from another instrument at the onset of the strings’ sounds through onset synchrony, in which “acoustic components
begin synchronously.”\textsuperscript{114} A mallet percussion instrument, such as a xylophone or marimba, could cover the range of the piano/strings line, providing an attack similar to the piano if using hard mallets. The xylophone in particular also has enough resonance to blend into the strings’ sustained sound. Another option could be to change the articulation of the strings; instead of playing slurred lines, perhaps instruct the musicians to use a detached bow stroke with slightly more weight and vibrato at the beginning of each bow change. The flute could then reinforce this new articulation by using a consonant attack (such as a “t” sound) at the beginning of each note. The point is not to identify the sound source from the additional instrument, but rather to create a new timbre that combines the resonance of the strings with the attack reinforcement from the additional instrument.

Sinusoidal analysis examples are shown below.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{sine_wave.png}
\caption{sustained C\# 5 viola, non-vibrato. The viola strings take a moment to respond to the bow, as seen from the gradient from light gray to black at the onset of the sound (circled in red) Downloaded from freesound.org}
\end{figure}

\textsuperscript{114} McAdams, “Taxonomy of Orchestral Grouping.”
Figure 37: A4 strike on a xylophone. The attack is strong and provides enough resonance for ~2.5 seconds. Downloaded from freesound.org

Figure 38: Combination of marimba strike and viola sustained note. The attack is reinforced through the marimba, but the viola sustains its sound. Marimba and viola sound mixed through Audacity.
Lomon utilized onset synchrony from mm. 106-109 between the harp and the woodwinds, providing a sense of added articulation to the woodwind melody. The effect is the "sparkly" timbre like the upper register of the piano due to the higher range of the woodwinds (A5-G6 in the flute) as well as the hard attack from the harp. The harp is another example of an instrument with both a hard and immediate attack yet decays fast enough to allow the woodwind sound to carry through. Given this section is marked ppp to mp in Lomon’s score, the harp would be an appropriate choice to reinforce the woodwind attacks, as opposed to a piano, for example. This is because the harp has less carrying power overall and can thus blend into a softer dynamic. A piano, even at a softer dynamic, would add too much volume to the winds’ attack points, creating a sense of heterogeneity for the listener.

The flute is one octave lower than the piano part (see Figures 10 and 11), however this range is the upper range of the flute before sounding too shrill.

The piano versus the harp may seem to be a peculiar comparison given that Clarke’s score was originally written for piano. Most instruments with a hard attack and rapid decay could work for onset synchrony and produce similar results. The harp happens to be effective because the instrument can subtly blend into the woodwind’s attack points without increasing the overall volume. As shown in Figure 4, the piano in the upper register also has a rapid decay. However, the piano combined with the woodwinds will likely produce a dynamic above ppp-mp.
Figure 39: mm. 106-109 in Clarke’s score, bracketed in blue

Figure 40: mm. 106-109 in Lomon’s score, bracketed in blue. The harp and woodwind parts are highlighted in yellow
Instrumental Doubling and Changes in Volume

Strengths and Potential Pitfalls in Doubling

Doubling, defined as the “duplication of a melody by several performers” is a common orchestration practice used to create strength and definition in sound.\(^{117}\) Sometimes a melody is doubled in unison, but more often a melody is doubled in octaves, giving the impression of a lower-octave fundamental and the upper-octave second or fourth overtone. An example of an effective doubling in Lomon’s score is from rehearsal 3 to 4 (mm. 31-38). This passage, with the expressive marking *risoluto e allargando*, calls for a pronounced, determined countermelody to complement the accented solo viola line. Clarke’s piano score consists of a blocked-chord texture that remains relatively homogenous. Compared to Clarke’s more contrapuntal piano writing, there are relatively fewer notes in this section; the left and the right hand are in different octaves but otherwise nearly identical, and the harmonies themselves are triadic or quintal.

Lomon spread these chords throughout the whole orchestra by doubling certain voices in unisons or octaves, providing a wide spectrum of timbres to an otherwise similar texture. For example, the pitch G, the +4 in the quintal chord on the first beat of rehearsal 3, appears twice, once in the left hand and once in the right hand. In Lomon’s score, this note appears four times in Flute 2, B-flat Clarinet 1, Bassoon 1, and Cello. Doubling this chord tone emphasizes the dissonance between both the D and the A and reinforces the non-triadic harmony. The voices containing the pitch G remain doubled throughout the entire section. The ratio between orchestral instruments to piano score notes is about 2:1; the root of the first chord, D, occurs four times in the piano score and nine times in the orchestral score, whereas the note A appears two times in the piano score occurs four times in the orchestral score. Again, the doublings in these voices remain the same throughout the whole passage.
What is curious about these doublings are the octaves Lomon chose to put certain voices in. From mm. 31-38, Flute 1 sits in the middle of its register, with the outer divisi of Violin 1 doubling one octave higher and Flute 2 and Oboe 1 sitting a perfect fourth and a perfect fifth above Flute 1, respectively. This is unusual because traditional Western orchestration techniques call for Flute 1 to sit above the other woodwinds, unless there is piccolo. This could be seen as voice-crossing, though Lomon’s woodwind scoring was likely intentional. The viola, which is an acoustically imperfect instrument, has difficulty projecting over multiple instruments.\(^{118}\) If Flute 1 played the countermelody in the same octave as Violin 1, the sound would likely cover the viola, for that range (G5-G6) is considered the flute’s most “clear and brilliant” range.\(^{119}\) This is further supported by the dynamic markings in the woodwinds. Whereas the 1 1/2 beats are marked as \textit{mezzo forte} for Flute 2 and the subsequent winds, Flute 1 is marked as \textit{piano}, a dynamic marking that is carried on from the previous section. This dynamic marking, in addition to the lower octave, supports the idea of Flute 1 remaining as a background instrument.

\(^{118}\) The viola size has never been standardized and the body would need to be about 53 cm long to achieve the same acoustical results as the violin. Most adult-sized violas are around 41-43 cm long. David D. Boyden, and Ann M. Woodward, “Viola,” Grove Music Online, 2001, accessed Nov. 3, 2023, https://www.oxfordmusiconline-com.du.idm.oclc.org/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000029438.

On the other hand, doubling has the danger of creating a pedantic feeling, prohibiting a musical line from flowing at a natural pace. Because the amplitude increases whenever a melody is doubled, that melodic line will likely come to the foreground, depending on the rest of the orchestration. This is necessary in some passages of music, but too much concentration in the sound can negatively impact the character of the music, especially when aiming for a “tranquil” or “meandering” quality. This is the case during the orchestral interlude and opening of the viola solo from rehearsal 4-5. Clarke gave the expressive indication *langoroso*, which means “drooping
or flagging from or as if from exhaustion.” After the climax of rehearsal 3, the texture thins out considerably, leaving only an eighth-note ostinato in the right hand and a chromatic melody in the left hand. The range is very narrow in this passage, spanning no more than a major tenth.

Figure 43: opening of rehearsal 4, mm. 39-46

In Lomon’s orchestration, Clarinet 1 takes on this melody with the ostinato motion in Violin 2. Aside from sustained chords in the flutes, bassoons, harp, and strings, the clarinet and violin are the only two instruments carrying this passage. In mm. 45-46, Clarke turns the ostinato into a short countermelody in the alto voice, supporting the octave doubling of the melody in the soprano and bass. Given the added voices and the dynamic hairpins within these two measures, this cadential point is supposed to be played with more expression and thus slightly more volume. I emphasize “slightly” because

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Clarke does not give dynamic markings within these hairpins, and therefore these two measures should stay within *piano*. While Lomon does mark *pianissimo* to *piano* in mm. 45-46, the increased instrumentation and doubling are so sudden that the dynamic also suddenly increases. Here, both Clarinets 1 and 2 take on play the left-hand melody whereas Flute 1 and Violin 1 play the right-hand doubling. The contrast between the tranquil clarinet melody and concentrated activity in the orchestra is shown in the following SPEAR diagrams.

![Figure 44: clarinet solo, mm. 39-44. The boxed section shows longer, sustained tones with only some activity in the bottom.](image1)

![Figure 45: increased activity within the orchestra, mm. 45-46. In the boxed section, the orchestra fills out the range and increases in amplitude within a short amount of time.](image2)

Not only does the increase in amplitude make these two measures stand out from the rest of the phrase, but the sudden addition of timbres could also be perceived as jarring and takes away from the tranquil, “languid” quality of the music. If the flute alone were to play the right-hand doubling, then the timbre of the flute could blend into the
clarinet solo without issue since they belong to the same instrument family. The flute is accompanied by several violins in the same octave, though, which in the Eureka Ensemble’s recording cover the flute completely. Given the sheer number of violins compared to woodwinds, the violins cannot blend into the clarinet melody, and the result is a piecemeal-sounding phrase. Aside from flute playing this doubling alone, another option could be for the flute to be accompanied by the oboe, who is otherwise tacet for this section. If Lomon wanted the strings timbre for these two measures, then the flute could be accompanied by the viola or cello at least one octave lower, allowing the flute to soar above the other instruments.
Changes in Volume

Of course, instruments have varying projection abilities based on their acoustics. The viola, with its acoustically imperfect construction, struggles to project compared to a violin or cello, for example. Likewise, factors that contribute to an instrument’s projection within an ensemble include the acoustics of the room, distance between the performer and the audience, number of people in the room, and general balance of the ensemble. Balance, referring to the comparative loudness between instruments in an ensemble, is a unique challenge for every group that changes between every performance. Composers, however, will orchestrate pieces to support the ensemble’s balance, especially when an instrument is the primary voice. Samuel Adler, when writing for low flute, for example, advises orchestrators to thin out the texture of the rest of the ensemble,
so that the low flute can carry in this precarious register. This works well in pieces such as Dvořák’s Symphony no. 9 or Debussy’s “Prelude to the Afternoon of a Faun,” in which the strings provide a sheer blanket of sound to support the low flute \(^{121,122}\)

When a section of a piece is not orchestrated to support the primary voice, the loudness of the middle ground or background voices can confuse the listener as to where to focus their attention. Starting in m. 163, the upper range of the violins (B5-B6) yields to a higher amplitude due to the E-string’s brightness. In Lomon’s score, the viola is marked as **ppp** whereas the orchestra is marked *pp*. These dynamic markings stay true to Clarke’s score yet try to compensate for the sheer volume of an orchestra.\(^{123}\) Even with quieter dynamic in Lomon’s score, the two solo violins in particular cover the rest of the ensemble, creating confusion for the listener about the prominent voice. Lomon gave the left-hand melody to the horns and then the bassoons starting in m. 163 yet is almost entirely overpowered by the solo violins. This could be caused by a number of factors including distance between the violins and winds sections to the audience or recording microphone placement. However, I referenced the one other YouTube recording by Diane Pheonix-Neal and the James Madison University Symphony Orchestra in regard to


\(^{123}\) The piano part in Clarke’s score is marked *p*, so Lomon dropped the dynamic level down to *pp*.
balance, and the same issue of the violins overpowering the melody occurred with this ensemble as well.124

The horn parts are not written in a way that can project through the violins. While the horn melody is written in its “deep and solid range” (E4-G3), Lomon wrote for the horns to play with “stopped” technique, which entails “closing the bell with [their] right hands and getting a buzzy sound.”125 While this works in softer dynamics, “it’s best done in louder dynamics to pierce through the texture of the ensemble.”126 Lomon likely chose the stopped horn timbre to achieve a softer dynamic, but then wrote the two horns in unison to compensate for lost volume. Perhaps this passage is most effective for one solo horn with “open” technique. The horn could also replace the bassoon in m. 163 to maintain a consistent timbre and register, closer to what Clarke wrote in her score.

An Alternate Arrangement

In Appendix A of this document is an excerpt from my own orchestration of Rebecca Clarke’s Viola Sonata. I would like to emphasize that this is just one way to orchestrate this piece, and that other arrangements are valid. Because of Clarke’s chamber music scholarship, I chose to keep this in a chamber music format. The instrumentation is a trio for violin, clarinet, and piano—also instruments that Clarke herself has


126 Tarantelli, “Stopped Horn and Mute Change.”
written for.\textsuperscript{127} This instrumentation honors the piano timbre of the original score while still capturing the added wind and strings timbre from Lomon’s orchestration. An obvious difference is that there is no viola. This was certainly a factor to consider, and there is a case for still having the viola as the solo instrument with the three other instruments serving as accompaniment. The violin and clarinet were chosen because of the registral differences; while the violin can soar in the upper tessitura, the clarinet can take advantage of its deep, lower register. The piano can then provide bass support and cover a full range of pitches. Much of Clarke’s piano part was kept the same, but some parts were thinned out in order maintain a balance between three instruments. An example of this is at rehearsal 1 (m. 13). Rather than having the violin doubling the top line of the piano part, the piano is playing thinner chords. This allows for violin line to maintain enough independence from the piano as well as give enough room for the clarinet melody to come through. I also gave some piano melodies to other instruments, such as in rehearsal 4 (m. 39). This melody was given to the clarinet due to its alto register. While the violin technically could have played it, this melody sits right in the clarinet’s chalumeau register, offering an intense, deep sound.

\textbf{Conclusion}

Comparing a piano score to its orchestration poses challenges regarding the viability of this type of analysis, largely because the two scores are fundamentally dissimilar. Musicologist Michael Saffle, when reviewing a DMA dissertation on various orchestrations of Mussorgsky’s “Pictures at an Exhibition,” describes the process of

\textsuperscript{127} Examples include the Piano Trio (1921) and Prelude, Allegro, and Pastorale (1941).
comparing a piano score to an orchestral score like “comparing apples to oranges—an illogical procedure.” I do not agree that this process is entirely illogical, especially when the composer orchestrated the piece themselves. These types of analyses can provide insight into future orchestrations through observing instrumental combinations to highlight the composer’s original material. Furthermore, using sound analysis software like SPEAR, as was demonstrated in this paper, allows the composer or orchestrator to visualize aspects of sound, such as attack/decay, changes in amplitude, and overall spectral envelope. Sound analyses can then guide the composer in finding the most effective instrument choices for their artistic vision by providing insight into the perception of different instrument combinations. But because Clarke’s sonata was orchestrated nearly 30 years after her death, and because Clarke did not write any known orchestral pieces, it would be impossible to know how she would have orchestrated the piece if she had done it herself. Therefore, the best that Ruth Lomon or anyone could have done was use the clues that Clarke left behind alongside her compositional expertise to produce an orchestration that represents Clarke’s sonata favorably.

The purpose of this analysis was not to criticize Lomon, for her orchestration of Rebecca Clarke’s Viola Sonata has been a very valuable addition to the viola repertoire. World-renowned viola soloist Patricia McCarty enthusiastically described this orchestration as:


[129] An example of this is “Suite 1919” by Ernest Bloch.
Complementing but not overwhelming the viola line, the impressionistic colors and textures of Ruth Lomon’s orchestration of the Rebecca Clarke Sonata offer listeners an opportunity to hear this work on a grand scale, making new friends for this work long beloved by viola players.130

The “Concerto” page on the website of The Rebecca Clarke Society also exudes nothing but enthusiasm, filled with plentiful exclamation marks and descriptors such as “masterful orchestration” and “brilliant performance.”131 Rather, this analysis aims to reveal the major timbral differences of translating a piece from piano to orchestra and demonstrate how a literal, line-by-line orchestration effects the overall perceptual experience. To my knowledge, there is no previous scholarship on Ruth Lomon’s orchestration. Therefore, I hope that this study will provide a starting point for discussion on this arrangement and inspire further scholarship on both Rebecca Clarke and Ruth Lomon’s music.

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130 “Concerto,” Rebecca Clarke Society.

131 Ibid.
Conclusion

This thesis analyzes three pieces from the contemporary viola repertoire through a timbre and orchestration lens, a rare occurrence in viola scholarship. The three main body chapters rely on multiple close listening sessions, sinusoidal analyses, and orchestration treatises to understand instrumental timbres and orchestration intentions. The scores to each of the three pieces serve as supplementary material to the analyses; personal perception and listening experience are at the center of my process.

Chapter 1, “Intentional Instrumentation in Debussy’s Trio for Flute, Viola, and Harp,” explores how Debussy flowed between blend and non-blend through the individual and composite timbres of the flute, viola, and harp. At the time of composition, this instrumentation was considered novel, leading to creations of new timbres. The flute, viola, and harp timbres create various degrees of fusion and segregation, which describe the perceptual blend of sounds. Fusion and segregation have a range of salience, will change throughout the piece, and may vary based on the listener’s perception. Based on this analysis, I construct a form diagram that demonstrates my perception of fusion and segregation throughout the piece based on Kaija Saariaho’s sound/noise axis framework.
Chapter 2, “Microformal Transformations to Create Macroform in Tristan Murail’s *C’est Un Jardin Secret*” uses an original color-mapping system to show how the superimposition of musical parameters create a global form. The chapter also closely examines the interior of two major transitions, using sinusoidal analyses of a recording by Paul Beckett. To offer practical guidance to future performers as to which parameters to bring to the foreground, as well as how to create the illusion of a continuous spectra, this chapter also draws upon my own knowledge of the instrument.

Chapter 3, “A Critical Analysis of Rebecca Clarke/Ruth Lomon’s Viola Sonata” studies how Lomon’s orchestration of the Sonata for Viola and Piano by Rebecca Clarke enhances or stifles the timbre of the viola. To exemplify this argument, this orchestration study analyzes the differences in spectral envelopes between the orchestral instruments and piano, as well as how certain orchestration combinations lead to changes in amplitude, which negatively affect the solo viola’s projection. Located in Appendix A of this thesis is an “alternate arrangement” of Clarke’s Sonata for violin, clarinet, and piano that considers both Clarke and Lomon’s compositional goals.

Of course, this thesis does not capture the entire gamut of the contemporary viola repertoire, nor does it exemplify every aspect of timbre and orchestration analysis. Some instrumental combinations not covered in this thesis that are worth exploring include viola and electronics, viola and voice, and viola and wind ensemble. And while this thesis explores timbre using common orchestration and spectral analysis techniques, it does not cover areas of timbre research such as timbre semantics (aside from my own descriptors) or utilize methodologies such as multidimensional scaling or sound source identification experiments. However, to cover every major piece in the contemporary viola repertoire or
every methodology in timbre research would result in a much larger work, likely needing several authors. Further research on timbre and viola music, could include experiments studying perceptual trends across multiple groups of people including professional and amateur musicians as well as non-musicians. Examples of such perceptual trends include analysis of timbre descriptors during and after listening, or commonalities in form diagrams. As a violist, I was already familiar with the repertoire in the thesis and therefore could not analyze timbre and orchestration from a completely “unbiased” viewpoint. Anyone entering a listening session, however, carries their own thoughts and viewpoints that influence the overall listening experience. Perhaps these same pieces are presented to another professional violist who is unfamiliar with the repertoire and dislikes contemporary music. Their perception of timbre and orchestration will likely be different from myself or an amateur pianist who loves spectral music. Therefore, gaining the perspective of multiple groups of people is essential to understanding timbre; our perceptions are inherently personal, and our analyses are therefore a reflection of our own experiences. While there are still several avenues for further research, this just means that understanding timbre in contemporary viola music presents a range of possibilities. “A View from Within” sets in stone the significance of the viola repertoire in contemporary music research and the immense value it adds to the field of timbre studies.
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https://www.youtube.com/watch?v=g9LiD9JFBvU.


https://www.rebeccclarke.org/writings/

Appendix A

Alternate Arrangement to Rebecca Clarke/Ruth Lomon’s Viola Sonata