

Analysis of *Duo for Flute and Piano* by Aaron Copland
Exploring Copland's last major composition in the context of performance

by
M Sage Gustafson

A THESIS

submitted to
Oregon State University
Honors College

in partial fulfillment of
the requirements for the
degree of

Honors Baccalaureate of Science in Music
(Honors Scholar)

Presented July 11, 2017
Commencement June 2018

AN ABSTRACT OF THE THESIS OF

M Sage Gustafson for the degree of Honors Baccalaureate of Science in Music presented on July 11, 2017. Title: Analysis of *Duo for Flute and Piano* by Aaron Copland.

Abstract approved: _____

Christopher Chapman

Aaron Copland is known by many as the founder of American Music and is still considered one of the pre-eminent composers to come from the Americas, particularly North America. He composed from 1917-1973, with many of his most recognizable works composed in the early 1940s. *Duo for Flute and Piano* was composed from 1969-1971 as his last substantial composition. Much attention has been given to his earlier compositions, but *Duo* is underrepresented in scholarly literature.

Through the use of timelines, an analytical methodology developed by professor Jan LaRue at New York University, phrase structure and compositional patterns are readily identifiable for all three movements, which can inform performance technique. Additionally, since the first movement of *Duo* is motivically dense, a motivic map is used to visually trace the motives as they transform over the course of this movement. Emphasis is placed on aural identification of motives and phrases, with the intent to inform performance interpretations.

Key Words: Music analysis, Aaron Copland, Duo, Duo for Flute and Piano, music, analysis, music theory, aural analysis, timelines, motivic map, motives, flute, performance

Corresponding e-mail address: m.sage.gustafson@gmail.com

©Copyright by M Sage Gustafson
July 11, 2017
All Rights Reserved

Analysis of *Duo for Flute and Piano* by Aaron Copland
Exploring Copland's last major composition in the context of performance

by
M Sage Gustafson

A THESIS

submitted to
Oregon State University
Honors College

in partial fulfillment of
the requirements for the
degree of

Honors Baccalaureate of Science in Music
(Honors Scholar)

Presented July 11, 2017
Commencement June 2018

Honors Baccalaureate of Science in Music project of M Sage Gustafson presented on July 11, 2017.

APPROVED:

Christopher Chapman, Mentor, representing Music

Jill Pauls, Committee Member, representing Music

Olin Hannum, Committee Member, representing Music

Toni Doolen, Dean, Oregon State University Honors College

I understand that my project will become part of the permanent collection of Oregon State University, Honors College. My signature below authorizes release of my project to any reader upon request.

M Sage Gustafson, Author

ACKNOWLEDGEMENTS

Thank you to my committee for their hard work and willingness to always take the time to answer my endless questions. This project would never have gotten off the ground without your enthusiasm and knowledge.

I would like to extend an additional thank you to Dr. Jill Pauls, who did the work of a mentor while also being a phenomenal lessons teacher. It has been an inspiration and a joy to work with you these last 5 years and I look forward to what we will work on in the future.

Thank you to all the wonderful music teachers I have had, who encouraged me to look beyond the notes and fostered my love of music theory even if you may not have loved theory yourself. In particular, thank you to Stuart Welsh who introduced me to the study of music theory and Angela Carlson who always challenged me to go beyond acceptable and work with dedication and integrity.

Thank you to my dad, Scott, for his continuous support of my love for music even if you didn't always understand it and for constantly inspiring me to push myself and take on challenges.

Thank you to my mom, Pam. You taught me how to critically read my own writing, and critically listen to my own performances, while being the best collaborative pianist a music student could ever dream to have. Playing with you inspired a large portion of this study and the ensemble work that we do challenges me to think more deeply about the music we play. I am so excited to play with you in the future.

Thank you to my sister, Tarah. While mom taught me how to critically read my own writing, you taught me the ins and outs of proofreading. You have spent countless hours fixing my comma errors, and ensuring that I communicate my ideas to the fullest extent. This paper would not be what it is without your influence. I hope to someday make you proud with my comma usage and I am excited to see what great things are in your future.

TABLE OF CONTENTS

Abstract	9
Introduction	10
<i>Statement of the Problem</i>	10
<i>Need for the study</i>	11
<i>Limitations.</i>	12
Background	13
<i>Aaron Copland.</i>	13
<i>Duo for Flute and Piano.</i>	16
<i>Methods used</i>	18
Materials and Methods.	20
<i>Materials.</i>	20
<i>Methodology</i>	21
Timelines.	23
Motivic maps.	27
Results	30
<i>Movement 1</i>	31
<i>Movement 2</i>	38
<i>Movement 3</i>	43
Discussion	45
<i>Other analyses</i>	45
<i>Performance implications</i>	47
Bibliography	53
Appendix 1.	56
Appendix 2.	85
Appendix 3.	86

ABSTRACT

Aaron Copland is known by many as the founder of American Music and is still considered one of the pre-eminent composers to come from the Americas, particularly North America. He composed from 1917-1973, with many of his most recognizable works composed in the early 1940s. *Duo for Flute and Piano* was composed from 1969-1971 as his last substantial composition. Much attention has been given to his earlier compositions, but *Duo* is underrepresented in scholarly literature.

Through the use of timelines, an analytical methodology developed by professor Jan LaRue at New York University, phrase structure and compositional patterns are readily identifiable for all three movements, which can inform technique. Additionally, since the first movement of *Duo* is motivically dense, a motivic map is used to visually trace the motives as they transform over the course of this movement. Emphasis is placed on aural identification of motives and phrases, with the intent to inform performance interpretations.

INTRODUCTION

STATEMENT OF THE PROBLEM:

The goal of every artist is to effectively communicate with their audience. In a musical performance, the performer mediates the composer's message to the audience; thus, the process of interpretation by the performer is vitally important to achieving this artistic goal. Performance interpretation depends on the performers knowledge of the compositional intent, as well as their own knowledge of the structure of the piece. The goal of this research is to analyze *Duo for Flute and Piano* by Aaron Copland and use that analysis to aid in performance interpretations.

This analysis will expand a current analytical structure for 20th century compositions, and present motivic development over the course of this piece in an intuitive and highly adaptable structure. Throughout this study, the following questions will be addressed:

1. What methods of analysis are most effective in assisting performers and listeners in understanding *Duo for Flute and Piano*?
2. What is the motivic and theoretical analysis of *Duo for Flute and Piano*?
3. What implications does this analysis have on the performance or interpretation of *Duo for Flute and Piano*?

NEED FOR THE STUDY:

This study is the first in-depth analysis of *Duo* in the context of performance, and therefore fills an existing gap in musical analysis of chamber music from the 20th century. Aaron Copland is one of the foremost composers to come from North America. His canon has had a significant effect on 20th century music and American music in particular. While many of his works have been thoroughly analyzed, the academic literature has tended to highlight his symphonies, ballets, works for solo piano, and film scores, with emphasis placed on his compositions from the late 1930's through the early 1940's. His compositions from this period earned him the title "Dean of American Music" and their influence is studied frequently and is well-represented in scholarly literature. However, there is a dearth of analysis pertaining to Copland's chamber music, particularly of compositions written late in his career. This analysis is a step toward filling that gap in research literature.

Duo is a significant piece in the flute repertoire. It is performed frequently by both professionals and amateurs with a wide variance in performance interpretations. This analysis will help inform performers of the motivic development and structure of the piece, thus allowing them to perform more knowledgeable interpretations. Additionally, it will present a method of communicating analyses intuitively to listeners who wish to learn about *Duo* in a way that augments the aural experience.

LIMITATIONS:

Although there is an argument to be made that *Duo for Flute and Piano* is a sonata in all but name, the focus of this research is not on this category of form. Sonata-Allegro form is intentionally avoided to prevent the shift of focus away from motivic analysis. To this end, section labeling is intentionally non-conformational with traditional sonata form associations. Additionally, this is not intended to be a performance instruction manual, but rather a provision of insight for performers to make informed and intentional decisions and more effectively communicate with audiences through the medium of *Duo for Flute and Piano*.

BACKGROUND

AARON COPLAND:

Aaron Copland (1900-1990) stated late in his life that his goal was to convey the most complex message in the simplest of terms. He felt that this goal was misconstrued as writing simplistic music, an idea perpetuated by his title as “Dean of American Music”.¹ This sentiment, however, did nothing to diminish his profound impact on music throughout the Americas as a composer, lecturer, writer, and conductor. Born and raised in Brooklyn, Copland began composing at the early age of eight, sketching out a dramatic opera about the city by incorporating the Jewish folk tunes as the basis for many of the songs.² Though this composition never came to fruition, his desire and ability to use the ambient folk music in his compositions never changed.

In 1920, after three years of private study with a local New York composer, Copland traveled to Paris to study with Nadia Boulanger, a renowned pedagogue of piano and composition. Her eclectic influence encouraged an already curious Copland to explore the best of music, including medieval chants, popular folk melodies, and the most progressive and avant-garde compositions at the time. Copland left Paris in 1924, determined to create what he called “a naturally American strain of so-called serious

¹ Howard Pollack, *Aaron Copland: the life and work of an uncommon man* (Urbana: University of Illinois Press, 2000).

² Howard Pollack, *Aaron Copland: the life and work of an uncommon man* (Urbana: University of Illinois Press, 2000).

music.”³ He soon realized that his influence as a composer was limited by the lack of a cultural relationship between the people of the United States and the composers who were attempting to capture their essence in music. This realization inspired him to become an active ambassador of American music, not only as a composer but also as a prolific writer, a frequent guest lecturer, and an organizer of “serious music” events for young composers.⁴

During this time, many artists shared Copland’s goal of creating an American identity within their art forms. Copland worked with choreographers, dancers, librettists, and film score directors to expand the palate for American art. These collaborations produced works that gained both popular and critical acclaim, such as the ballet *Appalachian Spring*, completed with dancer and choreographer Martha Graham, as well as landmark film scores such as *Of Mice and Men*, *The Red Pony*, and *Something Wild*. These scores changed the way music was used in Hollywood and altered the way composers work with filmmakers. Copland insisted that he get paid adequately for his time, setting a precedent that soon became standard practice. He also insisted that he be provided with specific timestamps on scenes so that he could tailor his music to scene changes and climactic moments. Additionally, he insisted on personally approving any edits to his music, completely changing the dynamic between directors and composers.⁵ This use of music was so effective that nearly all scores followed suit, cementing Copland’s legacy in film scores for the next twenty years.

³ John Rockwell, "Copland, Dean of American Music, Dies at 90," New York Times, December 3, 1990, accessed May 20, 2017, <http://www.nytimes.com/books/99/03/14/specials/copland-obit.html>.

⁴ Howard Pollack, *Aaron Copland: the life and work of an uncommon man* (Urbana: University of Illinois Press, 2000).

⁵ Howard Pollack, *Aaron Copland: the life and work of an uncommon man* (Urbana: University of Illinois Press, 2000).

Copland influenced the direction of music in the Americas through his relationships with other composers. As he gained recognition and no longer struggled to survive on his income, he began teaching and sponsoring young composers such as Leonard Bernstein and Carlos Chavez. He also developed close personal relationships with these composers, writing hundreds of letters which provide detailed accounts, if not of his personal life (he was notoriously private), then of his ideas on music, composition, and the role of art in the world.⁶ He traveled extensively throughout Central and South America as a guest lecturer and ambassador of American music, and his travels expanded his palate of folk music from which to draw upon, inspiring works such as *El Salon Mexico* and *Danzon Cubano*.⁷

Compositionally, Copland believed the ultimate goal was to communicate with performers and audiences. He aspired to create art that would portray an incredibly complex message in the simplest terms possible. This goal drove him to employ a wide variety of techniques, from modern serialism to counterpoint; however, he was always cautious of writing music for the sake of a technique. Unlike many influential composers of that time such as Schoenberg or Cage, Copland utilized compositional styles as tools to expand his ability to create different sounds and reach different effects, so none of his works are strictly in one style or another.⁸ His desire to create a sound using the diverse set of tools he had learned led to a hugely varied canon of music unified by a distinct

⁶ Aaron Copland, "Aaron Copland Collection, Correspondence," The Copland Collection, accessed March 29, 2017, <https://www.loc.gov/collections/aaron-copland/?fa=subject%3Acorrespondence>.

⁷ Howard Pollack, *Aaron Copland: the life and work of an uncommon man* (Urbana: University of Illinois Press, 2000).

⁸ Howard Pollack, *Aaron Copland: the life and work of an uncommon man* (Urbana: University of Illinois Press, 2000).

Copland sound. Wide intervallic movement in melodic lines, missing tones in chords giving a hollow open sound, contrasting and complex rhythmic structure, and primarily tonal melodies define his sound.⁹

DUO FOR FLUTE AND PIANO:

Duo for Flute and Piano was commissioned in 1969 by a group of 70 students and friends of the late William Kincaid, one of the most influential flute performers and educators in the United States.¹⁰ In addition to being principal flautist in the Philadelphia orchestra from 1921 to 1960, Kincaid taught at the then-newly established Curtis Institute of Music in Philadelphia for nearly four decades, having a profound impact on flute education throughout the United States.¹¹ John Solum and Elaine Shaffer, two of his most successful students, organized the commission of *Duo*, working directly with Copland in the final steps of the composition. *Duo* was completed in 1971 and was premiered by Elaine Shaffer on flute and Hephzibah Menuhin on piano at the Settlement Music Festival in Philadelphia, Pennsylvania on October 3rd, 1971. Elaine Shaffer, along with Aaron Copland on piano, were the first to record *Duo* in December of 1973. However, this recording is somewhat insufficient as a guide to interpretation; Shaffer was battling advanced stage lung cancer and passed away less than two months after completing the recording.¹²

⁹ Quincy C. Hilliard, *A theoretical analysis of the symphonies of Aaron Copland*, PhD diss., University of Florida, 1984, accessed May 15, 2017, <http://ufdc.ufl.edu/AA00003825/00001>.

¹⁰ Copland, Aaron. *Duo for Flute and Piano*. (Milwaukee, WI: Boosey & Hawkes, Inc., 2014.)

¹¹ Dr. Jill Pauls (flute faculty at Oregon State University) in discussion with author, spring 2017.

¹² Aaron Copland, "Aaron Copland Collection, Correspondence," The Copland Collection, accessed March 29, 2017, <https://www.loc.gov/collections/aaron-copland/?fa=subject%3Acorrespondence>.

In a letter to Vivian Perlis, Copland describes his intent with *Duo* briefly as follows:

“Being aware that many of the flutists who were responsible for commissioning the piece would want to play it, I tried to make it grateful for the performer, but no amateur could handle the *Duo* - it requires a good player... the style was naturally influenced by the fact that I was composing for Kincaid’s students, not for future generations (although I hoped younger flutists would play *Duo* eventually).”¹³

Copland’s compositional intent is important in understanding the tonal, accessible nature of *Duo*. This makes *Duo* a particularly interesting subject of analysis because, while it draws on his earlier styles, Copland used his entire career’s worth of experience to rework ideas that originated early in his life, reflecting his more mature style.

In the same letter, Copland describes the three movements of *Duo* to Vivian Perlis as such:

“The first movement is altogether a rather easygoing pastoral sort of movement, while the second uses harmonic and melodic language more akin to my later works, with the principal idea in the flute projecting a whole-tone sound similar to the opening of *Piano Quartet*. The second movement has a sort of mood that I connect with myself - a rather sad and wistful one I suppose. The last movement is lively, with a triadic theme in free form.”¹⁴

In other mentions and brief analyses of *Duo*, this description of “whole-tone sound” is latched upon as a literal descriptor of the second movement.¹⁵ Through this analysis, it is clear that this is a description of the general aesthetic of the movement rather than a theoretical analysis of any depth.

¹³ Copland, Aaron. *Duo for Flute and Piano*. (Milwaukee, WI: Boosey & Hawkes, Inc., 2014.)

¹⁴ Copland, Aaron. *Duo for Flute and Piano*. (Milwaukee, WI: Boosey & Hawkes, Inc., 2014.)

¹⁵ Corrie Rebecca Pelsler, *Interpretation of Aaron Copland's Duo for Flute and Piano*, Master of Music diss., California State University, Long Beach, 2010, accessed April 30, 2017, <http://pqdtopen.proquest.com/doc/860134423.html?FMT=ABS>.

METHODS USED:

In this study, the overall structure of the analysis was utilized to fulfill two functions. Detailed analysis must be presented in a highly structured and condensed form which allows the reader to visually see an entire movement on a page. This condensation of information brings attention to the most salient information of a work, especially regarding form and harmonic patterns. Secondly, analytical structure must present a specific and referable framework on which to base discussion of analysis and overarching patterns.

Two general analytical structures are used in this analysis: timelines and motivic maps. Timelines were developed originally by Jan LaRue as a method for teaching theory and analysis to undergraduate music majors.¹⁶ Richard Trombley, a student both of LaRue and Kincaid, adapted timelines to expand LaRue's work to aural analysis with the intent to teach aural analysis to music students.¹⁷ Dr. Jill Pauls, while working with Trombley, furthered this methodology with the intent to aid in performance and memorization of music, specifically classical concerto form.¹⁸

Motivic development of through-composed music poses a significant challenge in current structures of music analysis. With existing methods being wordy and inaccessible, creating a format for intuitively presenting motivic analysis was a secondary goal of this research. As an analytical method to address these challenges, motivic maps were

¹⁶ Floyd Grave, Review of *Guidelines for Style Analysis*, by Jan LaRue, *Israel Studies in Musicology Online*, 2011.

¹⁷ Trombley, Richard. "An Approach to the Teaching of Aural Analysis for Music Majors." *Exploring Diverse Perspectives*. October 01, 1995. Accessed May 31, 2017.

¹⁸ Dr. Jill Pauls (flute faculty at Oregon State University) in discussion with author, spring 2017.

developed during the course of this analysis. Motivic maps are structured to display color-coded themes organized temporally, by instrument, and by timbre, so that the simultaneous presentation of multiple motives can be visually traced throughout the work.

MATERIALS AND METHODS

MATERIALS:

Primary materials for this analysis are the score for *Duo for Flute and Piano* by Aaron Copland and various recordings used for the purpose of aural analysis. *Duo* was originally published in 1971 by Boosey & Hawkes, Inc. The edited score used for this analysis was published by Boosey & Hawkes, Inc. in 2014, edited by Joel K. Boyd. During the creation of the later edition used in this research, careful comparison was done by the editor to identify any discrepancies between the original publication and the prepublication proofs found in the Aaron Copland Collection of the Library of Congress. This updated publication was therefore used in this analysis as a more complete engraving of *Duo*. All excerpts including reprinting of the score in appendix one, are used with permission from Boosey & Hawkes, Inc.

Initially, nearly all professional recordings found presently on Spotify, iTunes, and YouTube, were listened to. Special attention was given to the 1973 recording by Copland and Shaffer, but, due to Shaffer's advanced disease and its effect on her performance, this recording could only be used in a limited fashion. During the aural analyses, no single recording was used exclusively; instead, several different recordings were selected to represent a wide range of performances. The recordings used to analyze *Duo* are listed as follows:

Copland, Aaron. *Aaron Copland, Arthur Foote, Chamber Music with Flute*. Fenwick Smith, Flute; Jayne West, Piano. Koch Records, 2000. Spotify.

- Copland, Aaron. *Amazing Grace: An American Tapestry*. Donna Kissinger, Flute; Jon Klibonoff, Piano. Eroica Classical Recordings, 2000. Spotify.
- Copland, Aaron. *American Sonatas*. Goran Marcusson, Flute; Joakim Kallhed, Piano. Intime Musik, 2010. Spotify.
- Copland, Aaron. *Burton, Copland, & Prokofiev: Flute Works*. Anja Setzkorn-Krauss, Flute; Jens Hoffmann, Piano. Castigo Classic Recordings, 2015. Spotify.
- Copland, Aaron. *Carol Wincenc, Flute*. Carol Wincenc, Flute; Samuel Sanders, Piano. Nonesuch 79114, 1995. YouTube.
- Copland, Aaron. *A Copland Celebration, Vol. II*. Elaine Shaffer, Flute; Aaron Copland, Piano. Sony, 1974. YouTube.
- Copland, Aaron. *Copland: Works for Violin and Piano (Complete)*. Peter Zazofsky, Violin; Paul Posnak, Piano. Naxos, 2002. Spotify.

METHODOLOGY:

Analysis of music can take many different forms depending on the music being analyzed and the purpose of the analysis. With the intent to analyze *Duo for Flute and Piano* for performance interpretation, specific information needs to be conveyed through analysis. Aspects of music such as large-scale form, rhythm, and melody are defined by the composer and there is minimal ambiguity when interpreting these aspects as a performer. However, aspects such as phrase structure, tempo, balance, and tone color are all extremely dependent on interpretation by the performer and can significantly impact both the performance and the experience of the audience. This analysis will primarily focus on clarifying the structure of *Duo* for performers with the intent to inform performance and improve the experience of the listener.

For a listener, form is vitally important to promote understanding. Without hearing form, a listener loses the organization of sound and thus is unable to understand relationships in

the material. For this reason, large-scale form does need to be addressed and communicated effectively through the course of this analysis. Similarly, comprehension of thematic areas through mid-scale form is important for understanding the structure of the music and displaying hierarchical relationships within a movement. Small-scale form and phrase structure is as vitally important to performance interpretation as sentence structure is to a written story. In order to promote the listeners understanding, the performer must show phrase structure through dynamics, tone color, vibrato, tempo, and breathing.

As Copland states in the introduction of “What to listen for in Music”:

“...The thing that takes the place of a story in music is, as a rule, the melody. The melody is generally what a piece is about.”¹⁹

In *Duo*, the melody is a complex stream of constantly transforming material. This development both over time and between voices is how this piece tells its story and, therefore, is of utmost importance to the listener; tracing motivic development allows the performer to choose the story that the listener will hear. Continuing the literary analogy, the harmonic structure of the music is the context in which the story occurs: supporting or confounding the story, placing the story in a time or mood, or drawing attention to the story by the absence of harmony. This analysis, then, must effectively communicate motivic development, harmonic function, and form on many levels to be effective in assisting the performer in interpretation.

¹⁹ Aaron Copland, Alan Rich, and Leonard Slatkin, *What to listen for in music* (New York, N.Y: Signet Classics, 2011).

Large-scale form is defined by similar style and material throughout and can be seen in fig. 3.

Symbol	Meaning
A	First large aural area to occur within a movement
B	Second large aural area to occur within a movement
C	Third large aural area to occur within a movement
A'	Modification on A area

Figure 3: Large-scale form. Lettering begins new in each movement

Mid-scale form is divided into thematic groups. For the purposes of this study, primary themes are distinguished from secondary themes by the distance between recurring appearances of the thematic material. Primary themes appear dispersed throughout a movement, but secondary themes are more localized. Transition areas are defined by lack of melodic thematic material – material that appears nowhere else or music that is lacking in melodic material. Thematic areas are labeled within a section designation (either P, S, or T), with a number (iteration of the designated theme), and labeling restarts at the beginning of each movement. This is the mid-scale form that can be seen in figure 4.

Symbol	Meaning
P	primary thematic area
S	secondary thematic area
T	transition area
1, 2, 3, etc.	iteration of designated area eg. 1P/2P are separate primary areas

Figure 4: Mid-scale form- labeling restarts at the beginning of every movement

Themes are often based on motives or material that appears earlier in *Duo*. These themes are often transformed, and their nomenclature is indicative of the type of transformation that is undergone. Beneath the theme, the length of the phrase is shown in number of measures; a caret indicates an anacrusis to the phrase. The legend for small-scale form can be seen in figure 5. Motivic labeling is consistent through the analysis between movements, and so a motif in movement 1 labeled **X** will also be **X** in movements 2 and 3. However, themes and phrases begin relabeling at the start of each large-scale form section (as opposed to mid-scale form section), and are referred to in later appearances in conjunction with the capital letter associated with the large-scale section in which they originally appear. For an example of this, see line 7 of figure 5. When viewing the timelines, use of the same phrase designation does not indicate identical phrases, but rather phrases that are structurally similar enough to be functionally the same.

Symbol	Meaning
1	one measure phrase
^1	one measure phrase with anacrusis
(2 + 2)	four measure phrase divided into two, two measure phrases
a ^[P]	"a" phrase, based on "P" motive
a ^{[Y]s1}	"a" phrase, based on "Y" motive, the first in a series
s ³	the third in a series, phrase remains as first in the series
a ^{[Bc]-1}	"a" phrase, based on "c" phrase of section "B", inverted
d ^{[B]_r}	"d" phrase, based on "B" motive, rhythmically transformed
G.P.	structural silence
:^1:	exactly repeated one measure phrase with an anacrusis

Figure 5: Small-scale form legend. Motivic labels are consistent throughout the analysis. Phrase lettering restarts in each large section of each movement

Timelines also provide a format for briefly discussing harmonic structure, the legend for which can be seen in figure 6.

Symbol	Meaning
B ^b :	key of B ^b , defined by prolonged tonality, continues until section end or new harmonic designation
a ^b m	brief tonal centering around a ^b m (note the lack of colon)
V	chordal area in key
V -> iv	harmonic progression in key
C [^] ^C	contrapuntal harmony
/\/\	significant harmonic instability
Ped:	pedal point

Figure 6: legend for harmonic structure labeling in timelines

Timelines are incredibly useful to determine patterns of repetition and show form at all levels. Each timeline displays a concise overview of its respective movement and



Figure 8: Excerpt from key to motivic map. For complete motivic development chart, refer to results section or appendix 1

Each primary motif, labeled with a single letter, is associated with the color on the motivic map (i.e. **B** associated with blue). All motivic development is discussed as a variation on a primary motif; the specific transformation is described in the label. The labels for motives in this paper will be bolded for clarity. A lowercase letter following the primary motif indicates the presence of other motivic material in the transformation. For example, **Pb** is the **P** motif based on some aspect of motif **B**. Subscripts describe the type of transformation, such as **Y_{ex}** (expansion of **Y**), and superscripts describe the iteration and the direction of the transformation (see figure 5). For example, **Y_r⁻¹** is the **Y** motif inverted and with a rhythmic transformation.

Motivic maps provide some of the same information as timelines. They display large- and mid-scale form in the arrangement of the grids, and show some small-scale structure in the phrase lengths. In opposition to timelines, motivic maps are much better at showing simultaneously appearing and developing material, and presenting a visual representation of aural information. This can help inform performers of balance between voices, particularly in deciding what material to emphasize at a given time, and further clarify the small-scale phrase structure shown in the timelines. Additionally, the display of beats and

measures allows the listener to see how the melodic material is interacting with the meter, a nuance that Copland uses to great effect in *Duo*. The interaction of both the timelines and the motivic map provide the most comprehensive information about movement 1.

Because motivic maps are most effective in conveying simultaneously presented material, only the analysis of movement 1 is presented in the form of a motivic map. Movements 2 and 3 almost exclusively present motivic material in an independent fashion, and therefore can be adequately represented in timelines.

RESULTS

This analysis is presented in figures 9-13 and appendix 1. The timelines and motivic map present the information in the most compact form and are frequently referenced, along with the score. It is therefore recommended that the reader have all six of these documents (the timelines from all three movements, motivic map for movement 1, motivic development sheet, and score) readily available for reference while reading this analysis. For a reference to large- and mid- scale form by measure number in the score, refer to appendix 2, and for a compact guide to reading motivic maps and timelines, see appendix 3.

Duo for Flute and Piano is a piece in three movements, each with a distinct form. Movement 1 is a symmetrical form, ABCBA, with a short coda. Sections A and B are not motivically related to each other, but they share a simple, slow, and smooth style. The transitions between B and C are aurally smooth, without the abruptness that might be expected due to the change in styles. Movement 2 is a rondo in form, but maintains the slow middle movement style expected in a three-movement work. Within movement 2, there are hierarchical relationships on a large scale, where B is more closely related to the refrain (section A) than C, which acts as the climax of the movement and a middle point in *Duo*. Of all the sections in movement 2, section C of is also the most thematically related to both movements 1 and 3. Movement 3 is the simplest in form, with a clear rounded binary format and a short coda to bring the piece to a close.

Figure 11: Motivic development of movement 1. For enlarged version, see appendix 1

Movement 1 of *Duo for Flute and Piano* is aurally structured into a comfortable slow-fast-slow progression. These three parts are further divided into the five large sections shown in the timelines and motivic map, where A and B belong to the slow parts and C acts as the central, fast and jazzy transition section. Sections A and C are similarly broken into three parts. Section A mirrors the movement with a slow, melodic starting and ending in the 1P area and a more energetic and rhythmically compressed middle 2P area. The B section is essentially one single idea, the 1S thematic area, followed by a transition in its first presentation. Section B is differentiated from the A section because of its completely new tempo and harmonic material, but maintains the open, serene, and transparent ambiance of section A. Section C is three consecutive transition areas, with continuous adaptation of melodic, rhythmic, and harmonic language. The 2T area is

stacked full of fragmented and rhythmic ideas that bounce through the timbre of the music with abandon. None of these fragments are fully expanded, most remaining under a measure in length and are unidirectional in contour. The 3T area is the most melodic of the C section, developing and combining thematic ideas from earlier in the movement into the only expanded phrases within section C. Section C concludes with 4T, a brief, scalar section set over complex mixed meter and jazzy piano chords. This section is the culmination of the fast and jazzy middle section, and it fades from the bottom up, into a single flute scale to bring the transition to a close. Movement 1 ends with a simplified restatement of section B, and a nearly identical restatement of section A.

Duo begins with a solo flute line, which has a tonal area that suggests the dominant. This can be seen by the first notes of the piece, the first presentation of the P motif, immediately centering the tonality on the 5th scale degree in B^b. The E^b in mm. 4 acts as a lowered 7th, which would be found in the dominant tonal area.



Figure 12: P motif, first three notes of *Duo*

This E^b can also be seen acting as the subtonic in mm. 14 and 15, arresting any harmonic momentum, but also clearly centering the ear on the F dominant tonality. The lack of metric regularity obscures any agogic accent, a style that is accentuated by the performance directions “freely, recitative style”. The lack of metric pattern is reminiscent

of medieval chants; a source that Copland loved and used in much the same way he used folk melodies.²⁰ This melody is full of soaring 4ths and 5ths, sounding undeniably like *Fanfare for the Common Man* and *Third Symphony*.

Within movement 1, nearly all the motivic material for the entirety of *Duo* is presented. The A section of the first movement, as can be seen in figure 10, presents motivic material in a continuously developing but consistently related way. Phrases are extended toward the middle of each thematic area and are simpler at the beginning and end, mirroring the structure of the movement. The piano is also used very sparingly during the A section, only to highlight tonal chord progressions in the 2P area. 2P is distinguished from 1P by the change in character and instrumentation.

In section B, Copland uses first species counterpoint extensively. Copland's characteristic open sound is maintained by the wide separation between the two lines of the counterpoint. This section initially follows the rules of traditional counterpoint (although with a nonstandard rhythmic and melodic content) with primarily contrary motion and fairly straightforward voice leading within the phrases. However, there are several instances in which the rules of first species counterpoint are broken. In mm. 39 of 1S, there are parallel 6ths, obscured by the interjectional motivic material **Gy**. In mm. 51 and 53, the beginning of 1T, the counterpoint begins to disintegrate with parallel 5ths, preceded by similar motion in mm. 53. During this time, **Gy** is becoming increasingly more present, preparing the audience for the more angular and quick tempo of the following section C. While **Gy** could be interpreted as second species counterpoint, its

²⁰ Howard Pollack, *Aaron Copland: the life and work of an uncommon man* (Urbana: University of Illinois Press, 2000).

relationship to material in section C and its jagged voice leading prevents this aural association. Instead, **Gy** acts as the primary material for the transitional area 1T, connecting sections B and C of movement 1.

Gy transforms smoothly into **G** from 1T to 2T. However, the stylistic differences between **G** and **Gy** provide a completely different character to section C. **Gy** is smooth; it frequently starts on beat 2 of a measure and is aurally connected by slurs, supplementing the smooth counterpoint of the other two voices. Often descending, **Gy** brings rhythmic energy to a melody that is almost exclusively quarter notes with small intervals. **G** is similarly angular, but staccato, with a syncopated last note, matching with the syncopation of the last note of **Y_{ex}**.

Connecting 2T and 3T sections is the interplay of the developments of **Y** and **O**. **Y** and **O** develop toward each other, differing only in the rhythmic placement of the scale in the meter. **O** is consistently landing on the beat, but **Y** is defined by its emphasis on the weak beat, as can be seen in figure 13.

Figure 13: Development of Y and O motive in section C of Movement 1

Oy and **Yo** appear as the most similar developments of the **Y** and **O** motives and upon cursory inspection could appear to be the same figure. However, the accent in **Oy** is on the strongest beat, beat one, and the rest of the figure is slurred to strengthen the connection to the accented beat. In contrast, **Yo** has an anacrusis, and the accent (and the widest leap) is on the second half of beat one, displacing agogic accent and fulfilling a very different role than **Oy**. Similarly, **Oex²** heavily accents the beats at the end of the phrase by repeated two-note slurs, where **Yex** changes direction unexpectedly on the final sixteenth note of beat two. Movement 3 also contains traces of **O** and not a hint of the syncopation of **Y**, showing the motivic development of **Y** and **O** becoming more similar in movement 1 before growing apart in subsequent movements. Additionally, the interaction of **Y** and **G**, with their simultaneous syncopation reinforcing each other, emphasizes the importance of the interplay between rhythm and meter in the motivic development of this section. These motives are indeed similar, and their developments

and transformations mirror one another but their rhythmic differences merit a separate motivic root.

3T functions as the keystone of the this bridged form in this movement. As can be seen in the motivic map, this area is full of longer sounding phrases, introducing motif **B** as the basis for most of the thematic material. This syncopation of **B** was hinted in the 2P area, and is brought back as a primary idea in movements 2 and 3 as well. The expanded phrases of area 3T quickly devolve into fragmented rhythmic motives, a return of material from the 2T area (especially the upward scale idea in the left hand of the piano). Section C ends with one final transition section, breaking into a rollicking piano part that drives the syncopated melody of the flute forward. This fades away, each voice losing the syncopation as the time signature moves from the irregularity of 5/8 into a consistent 4/8, contracting from a wide spread to a single line in the flute. The movement ends the same way it began, completing the symmetric form.

MOVEMENT 2:

$$\begin{array}{l}
 \text{A} \left(\begin{array}{c}
 \text{1P} \left(\frac{a^{[X]} \quad a^{-1} \quad a^{[X]} \quad a^{-1} \quad a^{[V]} \quad b^{[X]} \quad a^{[X]} \quad [W]}{3 \quad + \quad (^2 \quad + \quad ^2) \quad + \quad (^2 \quad + \quad (^1 \quad + \quad ^1)) \quad + \quad ^4 \quad + \quad ^2 \quad + \quad ^1} \right) \\
 \text{Ped:} \quad \text{cm} \qquad \qquad \qquad \text{B} \qquad \qquad \qquad \text{cm} \\
 \text{CM} \qquad \qquad \qquad \qquad \qquad \qquad \text{CM} \qquad \qquad \qquad \text{CM}
 \end{array} \right) \\
 \\
 \text{B} \left(\begin{array}{c}
 \text{1T} \left(\frac{a^{[Aa]} \quad b^{[Z]} \quad b^{[Z]} \quad s2 \quad s3 \quad s4}{1^{\wedge} \quad + \quad 2 \quad + \quad (1 \quad + \quad 1 \quad + \quad 1 \quad + \quad 1)} \right) \\
 \text{Ped:} \quad C^7
 \end{array} \right) \\
 \\
 \text{A}' \left(\begin{array}{c}
 \text{1P} \left(\frac{c^{[Aa]} \quad a^{[X]} \quad a^{-1} \quad a^{[X]} \quad a^{-1} \quad a^{[V]} \quad b^{[X]} \quad a_{\text{ex}}}{1 \quad + \quad | : \wedge 1 : | \quad + \quad (^2 \quad + \quad ^2) \quad + \quad (^2 \quad + \quad (^1 \quad + \quad ^1)) \quad + \quad ^4 \quad + \quad ^2} \right) \\
 \text{D}^b\text{M} \qquad \qquad \text{Ped:} \quad \text{D}^b\text{m} \qquad \qquad \qquad \text{C} \\
 \qquad \qquad \qquad \qquad \qquad \text{D}^b\text{M} \qquad \qquad \qquad \text{D}^b\text{M}
 \end{array} \right) \\
 \\
 \text{C} \left(\begin{array}{c}
 \text{2T} \left(\frac{a \quad b^{[B]} \quad a^{-1} \quad b}{2 \quad + \quad ^2 \quad + \quad 2 \quad + \quad ^1} \right) \quad \text{2P} \left(\frac{a^{[P]} \quad a^{[B]s1} \quad s2 \quad s3 \quad s4 \quad s5 \quad s6 \quad [W]^{-1}}{2 \quad + \quad (^1 \quad + \quad ^1 \quad + \quad ^1 \quad + \quad ^1 \quad + \quad ^1 \quad + \quad ^1) \quad + \quad ^1} \right) \quad \text{3T} \left(\frac{c}{(^1 \quad + \quad 1) \quad + \quad 1} \right) \\
 \wedge \wedge \wedge \qquad \qquad \qquad \wedge \wedge \wedge \qquad \qquad \qquad \text{b}^b\text{m} \quad \text{E}^b\text{M}
 \end{array} \right) \\
 \\
 \text{A} \left(\begin{array}{c}
 \text{1P} \left(\frac{a^{[X]} \quad a^{-1} \quad a^{[X]} \quad a^{-1} \quad a^{[V]} \quad b^{[X]} \quad a^{[X]} \quad [W]}{2 \quad + \quad (^2 \quad + \quad ^2) \quad + \quad (^2 \quad + \quad (^1 \quad + \quad ^1)) \quad + \quad ^4 \quad + \quad ^2 \quad + \quad ^2} \right) \\
 \text{CM} \quad \text{Ped:} \quad \text{cm} \qquad \qquad \qquad \text{B} \qquad \qquad \qquad \text{CM} \\
 \qquad \qquad \qquad \text{CM} \qquad \qquad \qquad \qquad \qquad \qquad \text{CM}
 \end{array} \right)
 \end{array}$$

Figure 14: Timeline for movement 2

Movement 2 is a rondo in form, but the hierarchical relationships between the sections cloak this large-scale form. Sections A and B are harmonically and melodically related, but are aurally distinct enough to merit separate large-scale form distinctions. The melodic material in the 1P area, found in the A section, is characterized by mostly scalar fragments. These phrases appear again in the B section, this time disrupted by octave leaps and rhythmic expansion. Additionally, the A and B sections are harmonically related by the C major pedal point that continues through the B section. However, this harmonic relationship is aurally opaque due to the inversion of the C⁷ placing the B^b in the bass. The tempo and metric change at the beginning of section B contribute in distinguishing it from the A material and causes section B to function as an extended transition back to 1P material in section A'. Section C brings back melodic and rhythmic material from movement 1, tying movements 1 and 2 together. Within the movement,

section C has a loosely palindromic form due to stylistic similarities of the 2T and 3T sections of apparently tonal melodies and an emphasis on the piano. Section C mirrors the first movement in form as well as thematic material. This differentiates it from both sections A and B and their respective singular structures. The rondo form of movement 2 is emphasized by the presence of one particular motif. Motif **W** in the second movement fills a specific role as punctuation at the end of a section, especially the A sections. The melodic material in the 1P section of movement 2 is primarily scalar, so this wide leaping motif is particularly striking. Its presence at the end of the 2P thematic area is notable because of its placement in section C, rather than at the end of section A, as it appears elsewhere. This brings out the importance of the 2P area and contributes to the 2P area's function as a primary thematic area.

The distinct chromaticism found in the melodic material of movement 2 could be interpreted as a whole tone scale because of the apparent raised 4th scale degree. That is where the similarity ends; the melodic material in the 1P area is more accurately described as a non-diatonic scale fragment. The melodic phrases end on, or at least contain, the **X** or **V** motives shown in figure 18.

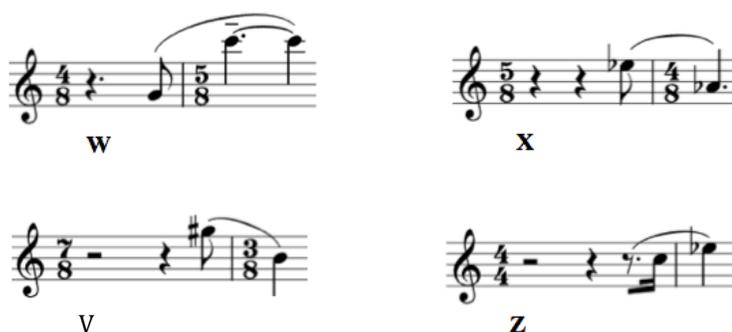


Figure 15: motivic material in movement 2

The bitonality of the harmonic material in the 1P areas emphasizes the chromaticism in the melody. The left hand of the piano features a C major pedal point with the constant C and E. This is countered with E^b and C as bell tones, high in the right hand of the piano, creating a cm over CM bitonal pedal point. Within these 1P areas, there is a rounded binary type form, where the first and last sections are based on **X** and the center is based on **V**. The **X** motif is explored at the end of unidirectional scalar phrases. As motif **V** is first presented, the right hand of the piano shifts the harmonic structure to B/CM pedal point, with an implied B major, but no third actually present. Along with the return to the cm/CM pedal, the **X** motif is again used, reestablishing the A^b as a place of stability. This A^b is unexpectedly pushed to the G, beginning the **W** motif and resolving to the tonic C that the piano harmonic structure has been repeating quietly and insistently throughout the entire movement.

The B section consists of the 1T thematic area. This area continues the C major pedal point but the melodic material becomes significantly more angular and has increasing rhythmic variation compared to the 1P thematic area. The scalar theme is still present, but is obscured by octave leaps and the addition of a few minor thirds. The piano also has the notable addition of B^b below the C and E, disrupting the clarity of the earlier C major pedal point with the dominant 7th and obscuring the scalar motive. The addition of the B^b creates enough harmonic tension to cement the area as functionally transitive. This section continues to add textures and harmonic complexity, building in energy and volume. Copland requires the listener to recognize the now regular 4/4 meter for the first time in the movement by emphasizing the first beats of several measures, leading into

beat 1 with a distinctive dotted 8th-16th figure. This rhythmic figure continues until a false arrival in mm. 26, emphasizing the metric regularity that defines section B.

The beginning of the next section, A', is marked by a D^b major chord on the downbeat, the first complete major chord of the movement and the first rhythmic arrival of the piece. This arrival at mm. 26 marks a return to 1Pa, but now in a more defined major tonality, this time including the 5th to complete the D^b major chord. As this chord dissipates, the repeated upward scale in the piano emphasizes the new pitch center and provides a quick transition into a nearly direct transposition of the melodic material from section A. The repeated upward scale is rhythmically placed to disrupt any sense of meter or agogic accent that was gained through the end of section B, ending on second sixteenth of beat 3. The flute plays a background role to the melody in the right hand of the piano, providing the minor third to the M/m clash that characterizes the harmonic nature of 1P. Halfway through this section, the flute again takes up the melody, leaving the piano to continue its rhythmically nebulous harmonic role.

Section C is marked by an abrupt change in tonality, leaving any semblance of major or minor tonality behind in favor of a very characteristic Copland chord of stacked 5ths and 6ths without a clear pitch center. The flute part here, in contrast, is significantly more tonal than it has been for the entire beginning of the movement.

The 2P thematic area recalls the beginning of the first movement, outlining a triad. This dissolves into a development of the **B** motif, marking this as the climax of the movement and perhaps *Duo*. 3T is strikingly different from the rest of the movement, providing a brief, nearly tonal interlude and traveling through 2 different chords before delicately

settling into the original C major of the beginning. This provides a perfect transition into one final setting of the original theme, nearly verbatim with only few octave transpositions, to bring the movement to a close.

MOVEMENT 3:

$$\begin{array}{l}
 \mathbf{A} \quad \begin{array}{c}
 \begin{array}{c}
 \text{1P} \left(\frac{[\text{O}] \quad a^{[\text{B}]} \quad a^{[\text{B}]} \quad a \quad a^{s1} \quad s2}{2 + 4 + 4 + (2 + 1 + 1)} \right) \\
 \text{DM}
 \end{array} \\
 \begin{array}{c}
 \text{1S} \left(\frac{b^{[L]} \quad b^{[L]}}{3 + 2} \right) \\
 \text{B}^{\text{bM}} \quad \text{EM}
 \end{array} \\
 \begin{array}{c}
 \text{1P} \left(\frac{a^{[\text{B}]-1} \quad a^{[\text{B}]} \quad a}{2 + 3 + 2} \right) \\
 \text{/\ \ /}
 \end{array} \\
 \begin{array}{c}
 \text{2P} \left(\frac{a \quad c^{s1} \quad s2 \quad s3 \quad c_{\text{ex}}^{-1}}{2 + 2 + 1 + 1 + 2} \right) \\
 \text{/\ \ /}
 \end{array}
 \end{array} \\
 \\
 \mathbf{B} \quad \begin{array}{c}
 \text{1T} \left(\frac{a \quad a \quad a \quad a \quad a \quad a^{s1} \quad s2 \quad s3 \quad a_{\text{ex}}}{\wedge 3 + 2 + \wedge 4 + \wedge 4 + \wedge 6 + (\wedge 1 + \wedge 1 + \wedge 2) + \wedge 10} \right) \\
 \text{/\ \ /}
 \end{array} \\
 \begin{array}{c}
 \text{2T} \left(\frac{b \quad b \quad b \quad a \quad b \quad b}{6 + 3 + 2 + 5 + (2 + 3)} \right) \\
 \text{/\ \ /}
 \end{array} \\
 \begin{array}{c}
 \text{3T} \left(\frac{b^2 \quad b^2 \quad b^2}{\wedge 1 + 3 + 3} \right) \\
 \text{/\ \ /}
 \end{array} \\
 \\
 \mathbf{A}' \quad \begin{array}{c}
 \text{1P} \left(\frac{a^{[\text{B}]} \quad a^{-1} \quad a^2}{5 + 2 + 4} \right) \\
 \text{DM} \quad \text{B}^{\text{bM}} \quad \text{/\ \ /}
 \end{array} \\
 \begin{array}{c}
 \text{1S} \left(\frac{b^{[L]} \quad b^{[L]}}{2 + 2} \right) \\
 \text{B}^{\text{bM}} \quad \text{EM}
 \end{array} \\
 \begin{array}{c}
 \text{1P} \left(\frac{a \quad c^{[a]}}{4 + (1 + 2 + 1)} \right) \\
 \text{/\ \ /}
 \end{array} \\
 \begin{array}{c}
 \text{2P} \left(\frac{a_{\text{ex}} \quad a_{\text{ex}}^2 \quad a_{\text{ex}}^3}{(2 + 2) + (2 + 2 + 2) + (2 + 2)} \right) \\
 \text{D}^{\text{bM}} \quad \text{AM}
 \end{array} \\
 \\
 \text{Coda} \quad \begin{array}{c}
 \text{1T} \left(\frac{[\text{Ac}] \quad b \quad c \quad d^{[P]} \quad [\text{Ac}]}{3 + 4 + 4 + (\wedge 1 + \wedge 1 + \wedge 1) + 4} \right) \\
 \text{am} \quad \text{E}^{\text{bM}}
 \end{array}
 \end{array}$$

Figure 16: Movement 3 timeline

Movement 3 is the simplest of the movements, with short thematic areas that are clearly aurally defined. The A sections in movement 3 are structured with alternating primary and secondary areas and with alternating styles and tempos. The 1P theme is related (although not identical) to the **B** motif from movements 1 and 2. Rhythmically, the **B** motif in movement 3 is abbreviated, so listeners expect the long-short short-long idea from earlier in *Duo*, but the last long note is cut off, driving the melody forward. As can be seen in figure 11, only one new motif is presented. The 1P sections of the movement are based loosely upon ideas that had been presented earlier in *Duo*. Figure 17 shows this new motivic material, motif **L**, which is present in thematic area 1S. Motif **L** contrasts motif **B** by its smooth and syncopated style and much more virtuosic flute part, melodically alternating with the piano.



Figure 17: L motif, only new motivic idea presented in movement 3

Section B plays on the rhythmic components found earlier in the movement, slowly building an angular, staccato phrase that brings out the percussive possibilities in both the flute and the piano. The melodic phrases become increasingly syncopated, building in intensity and complexity until bursting back into the A' section. 2P is functionally a development of the phrases found in 1P, with some phrase expansion that is similar in style to that in the 3T section of movement 2. Phrases are expanded in both range and length. The coda is a return to a mix of materials from throughout the movement as can be seen in the timeline. Additionally, the d phrase of the coda is based upon the **P** motif, returning the listeners attention back to the very first idea presented. Further analysis of chamber music by Aaron Copland will continue to inform performance, and result in a fuller understanding of performance of chamber music by Aaron Copland.

DISCUSSION

OTHER ANALYSES:

There is very limited literature published directly regarding theoretical analysis of *Duo for Flute and Piano* by Aaron Copland. Related to the focus of this research, there is only one published article – an analysis of *Duo* by Nina Perlove.²¹ Her hypothesis is that *Duo* is a work rife with Native American exoticism as a result of exposure and unintentional inclusion of Native American idiom found in the popular culture of the time. Perlove's argument begins with the erroneous claim that Copland assigned instruments to specific settings, and the flute was an inherently outdoor sound. The idea of flute being used to represent the outdoors is often used to explain orchestration by Copland, but the source of this comes from a single writing of his about the *Billy the Kid* ballet,²² during *Prairie Night*, when Billy leaves the card game inside, his change of scene outside is signaled by the sound of the flute. However, this one instance is not enough to make the overarching statement that Copland utilizes the flute sound to represent the outdoors and undermines a foundation of Perlove's argument.

Copland himself states that one cannot define the meaning of a specific musical idea for all listeners and, for that reason, avoided writing programmatic music. Despite this, Perlove suggests that the use of open intervals indicate the wide-open prairie, a suggestion supported by many critics. Even for Copland's film scores he utilized silence

²¹ Nina Perlove, "Inherited Sound Images: Native American Exoticism in Aaron Copland's *Duo for Flute and Piano*," *American Music* 18, no. 1 (2000): doi: 10.2307/3052390.

²² Howard Pollack, *Aaron Copland: the life and work of an uncommon man* (Urbana: University of Illinois Press, 2000).

as carefully as music and avoided idiomatic clichés.²³ Quite simply this excerpt from Copland's introduction of *What to Listen For in Music* can sum up his philosophy on the meaning of music:

“Is there a meaning to music? Yes. Can you state in so many words what that meaning is? No.”²⁴

While Copland did have a romanticized view of Native American life and their relationship with nature and poverty, especially in Mexico²⁵, the passages described as having Native American characteristics in the first movement are almost exclusively developments of motivic material, as was discussed in the analysis portion of this study. For example, the repeated two-note slur in motif **O_{ex}²** (figure 13) is described as representative of Native American war whoops, by its repeated nature. It is the conclusion of this study that this is an expansion of the **O** motif and a rhythmic device to strengthen the connection to the strong beat. In addition, the aspects described by Perlove are only loosely associated with the characteristics that she describes as having Native American character, and it is a stretch to be able to fit the examples into the described framework of Native American Exoticism. During her second movement analysis, Perlove describes the thematic material for the A section as primarily pentatonic. Through careful analysis, it becomes clear that the melodic material strays far beyond the bounds of pentatonic, adding so many passing tones that the sound loses the hollow, atonal quality of a pentatonic scale. While some of the passages addressed by Perlove are reminiscent of popular culture's view of Native American music, there is not enough

²³ Howard Pollack, *Aaron Copland: the life and work of an uncommon man* (Urbana: University of Illinois Press, 2000).

²⁴ Aaron Copland, Alan Rich, and Leonard Slatkin, *What to listen for in music* (New York, N.Y: Signet Classics, 2011).

²⁵ Howard Pollack, *Aaron Copland: the life and work of an uncommon man* (Urbana: University of Illinois Press, 2000).

evidence to conclusively state that Native American exoticism is a primary feature in *Duo*.

PERFORMANCE IMPLICATIONS:

An effective performance of *Duo* requires a wide range of techniques developed in the American school of flute playing by Kincaid. Kincaid was known for his use of various tone colors, from full and almost brassy to hollow and haunting. These tone colors should be fully explored throughout the *Duo*. Additionally, a full range of vibratos, from fast to slow and wide to narrow, should be considered, using this aspect of flute playing with intent to communicate more significantly with the audience. While ensemble balance is vital for any successful performance, a performer must be cognizant of the collaborative nature of *Duo*, where themes are passed between both instruments equally, creating a duet of equal partners rather than a flute solo with piano accompaniment.

As a performer, the goal is to effectively convince your audience of your interpretation of the music. This discussion will only address a few of the myriad ways that a performer could choose to interpret *Duo*, with the intent to equip performers with the tools they need to effectively create their own interpretation based on this analysis or any other analysis. Any examples given in this section are therefore not intended as the only correct interpretation.

The solo flute opening of *Duo* provides wide space for interpretation, where a performer could choose to emphasize any number of thematic presentations. In the context of this

analysis, it is important to consider the motivic material being presented, and perform that material so the listener can recognize returning ideas. For example, it can be tempting to play the first note as its own phrase, but doing so fragments the **P** motif and can keep the listener from hearing the return of that idea throughout *Duo*. The simplicity the opening of *Duo* disguises the presentation of a surprising amount of material, especially material that will return in the second and third movements. The first three notes in the flute, which form the **P** motif, are scattered throughout *Duo*. While this may not be the most important theme for the movement, it fills a structurally significant role in all three movements. Figure 18 shows the presentation of the **P** motif in all three movements.

The figure consists of three musical staves, each showing a different presentation of the P motif. The first staff is in 3/4 time and shows a half note followed by a quarter note. The second staff is in 4/4 time and shows a half note followed by two quarter notes. The third staff is in 5/8 time and shows a half note followed by a quarter note and an eighth note.

P motif:
mm. 1, movement 1

P motivic development:
mm. 51, movement 2

P motivic development:
mm. 144, movement 3

Figure 18: Development and presentation of P motif through Duo

In movement 1, the dominant tonal area defines this figure, but it also has a long-short-long rhythmic character. This rhythmic and harmonic character can be seen clearly in the first measure of the 2P area of movement 2 as the melody in the flute outlines the V chord (3-1-5), ending on a longer note. The harmonic structure of the **P** motif is not present in the third movement, but the rhythmic structure is clearly present and even emphasized by the 5/8 time and the performance instructions “don’t hurry”. There are other, weaker, associations with this motive as well, primarily in the second movement.

The **X** motif in the second movement is a descending 5th. While the descending 5th is contained within the **P** motif, it is the conclusion of this study that this functions as a weakly related inversion of the **P** motif, as the ascending and descending 5ths are both at the end of phrases.

The scalar theme filling section C of movement 1 and ornamenting the A 1S sections of the third movement is first hinted at in mm. 13 with the **Po** transformation.



Figure 19: **Po** motif- the first presentation of the scalar motivic material throughout Duo

In the 2P area of movement 1, the introduction of the chord progressions in the piano and the sudden shift in tessitura in the flute emphasizes the presentation of new material, but it is still functioning as the **P** motif. The rhythmic pattern here of long-short short-long, with the second half rhythmically augmented, is emphasized through sequential treatment in both the first and second movement directly following the climax, as well as being a basis for the first primary motivic area in the third movement. This initial presentation of the **Pb** transformation, and subsequent treatment in all three movements, can be seen in figure 20.

The figure displays four musical staves, each representing a different transformation of Motif B. The first staff (top left) is in B-flat major, 4/4 time, and features a triplet of eighth notes. The second staff (top right) is in B major, 3/4 time, and features a triplet of eighth notes. The third staff (bottom left) is in B major, 4/4 time, and features a triplet of eighth notes. The fourth staff (bottom right) is in B major, 4/4 time, and features a triplet of eighth notes.

Motif Pb, area 2P of mvmt. 1

Motif B, area 3T of mvmt. 1

Motif B, area 2T of mvmt. 2

Motif B, area 1P of mvmt. 3

Figure 20: Transformations of motif B

The chord progressions in the 2P material of movement 1 are notable because they are the only instance of traditional chord progressions that occur in *Duo*. Even so, Copland avoids the perfect authentic cadence and obscures the imperfect authentic cadence by the presentation of **Pb** in the left hand of the piano, emphasizing the plagal and deceptive cadences occurring in the first two measures of the section.

These three ideas, the **P** motif, the scalar **O** motif, and the rhythmic **B** motif, can be treated many different ways in performance. A performer could choose to emphasize one as the primary motivic material through the use of tone color or articulation to allow that idea to transport the listener through the piece. For example, if the **P** motif was to be played as the cohesive idea through *Duo*, a slight crescendo could be added to the middle note in the **P** motif wherever it appears to emphasize the upward motion to the last note. This would specifically emphasize the dominant tonal area as well as place the rhythmic emphasis on the last note of the three-note phrase. This stylistic interpretation would work particularly well in the first and third movement, but could also be adapted for the

second movement. In the first movement, the presentation of the **P** motif is always in the flute, which allows for crescendos through notes. The **P** motif is also presented at a slow enough tempo to leave room for noticeable growth to the last note. In the second movement, where the **P** motif appears in the flute part, the first note could be slightly elongated, to draw attention to its harmonic similarity with the rest of *Duo*. The **X** motif, too, could crescendo to the last note, informing the phrasing in the refrain as well as providing continuity through *Duo*. In the third movement, this performance idea is already inherent in the use of grace notes leading up to the final note. Those grace notes could be brought out with a bigger, richer sound and played as a melody rather than a flourish, which builds the intensity to the last note, emphasizing the rhythmic pattern of the **P** motif.

Depending on the interpretation of the performer, the balance in the transition sections of the first movement could be adjusted to bring out the ideas that are most important. For example, the **O** motif that fills the first and third movements could be emphasized in the left hand of the piano in the 2T section of movement 1 and again when the piano takes the melodic material in movement 3.

If a performer were to use the **B** motif as a cohesive force, the **Pb** motif could have the third note emphasized to draw attention to the syncopation that will occur as this rhythmic idea develops and becomes metrically displaced. Alternatively, the first note could be brought out using vibrato in every occurrence of this rhythmic idea, creating a bell-like effect and interrupting the meter rather than displacing the motif from the metric flow.

In contrast to the ideas presented above, one could choose to emphasize other material that is concurrent to these motives so that the listener hears the full complexity of *Duo*. The interpretations and performance possibilities discussed here are only a few suggestions and ideas, extrapolated from the observation of *Duo*'s form and motivic development. Through understanding of form, a performer has significant flexibility to choose the interpretation they present to the audience. It is worth noting that music is a performance art, and performers must trust their musical senses to avoid overly segmenting their performance. It is the goal of this research to assist performers in greater understanding of *Duo for Flute and Piano* so that they can inform their decisions and ultimately create more meaningful art.

BIBLIOGRAPHY

SCORE:

Copland, Aaron. *Duo for Flute and Piano*. Milwaukee, WI: Boosey & Hawkes, Inc., 2014.

All excerpts and inclusion of the score in the appendix are reprinted with permission from Boosey & Hawkes, Inc.

Duo for Flute and Piano by Aaron Copland
© 1971 by The Aaron Copland Fund for Music
Boosey & Hawkes, Inc., sole licensee.
Reprinted by Permission.

RECORDINGS FOR ANALYSIS:

- Copland, Aaron. *Aaron Copland, Arthur Foote, Chamber Music with Flute*. Fenwick Smith, Flute; Jayne West, Piano. Koch Records, 2000. Spotify.
- Copland, Aaron. *Amazing Grace: An American Tapestry*. Donna Kissinger, Flute; Jon Klibonoff, Piano. Eroica Classical Recordings, 2000. Spotify.
- Copland, Aaron. *American Sonatas*. Goran Marcusson, Flute; Joakim Kallhed, Piano. Intime Musik, 2010. Spotify.
- Copland, Aaron. *Burton, Copland, & Prokofiev: Flute Works*. Anja Setzkorn-Krauss, Flute; Jens Hoffmann, Piano. Castigo Classic Recordings, 2015. Spotify.
- Copland, Aaron. *Carol Wincenc, Flute*. Carol Wincenc, Flute; Samuel Sanders, Piano. Nonesuch 79114, 1995. YouTube.
- Copland, Aaron. *A Copland Celebration, Vol. II*. Elaine Shaffer, Flute; Aaron Copland, Piano. Sony, 1974. YouTube.
- Copland, Aaron. *Copland: Works for Violin and Piano (Complete)*. Peter Zazofsky, Violin; Paul Posnak, Piano. Naxos, 2002. Spotify.

OTHER SOURCES:

- Copland, Aaron, Alan Rich, and Leonard Slatkin. *What to listen for in music*. New York, N.Y.: Signet Classics, 2011.
- Copland, Aaron. "Aaron Copland Collection, Correspondence." The Copland Collection. Accessed March 29, 2017. <https://www.loc.gov/collections/aaron-copland/?fa=subject%3Acorrespondence>.
- Floyd Grave, review of *Guidelines for Style Analysis*, by Jan LaRue, Israel studies in Musicology Online, 2011, <http://www.biu.ac.il/hu/mu/min-ad/14/Grave-Guidelines.pdf>.

- Hilliard, Quincy C. *A theoretical analysis of the symphonies of Aaron Copland*. PhD diss., University of Florida, 1984. Accessed May 15, 2017.
<http://ufdc.ufl.edu/AA00003825/00001>.
- Pelser, Corrie Rebecca. *Interpretation of Aaron Copland's Duo for Flute and Piano*. PhD diss., California State University, Long Beach, 2010. Accessed April 30, 2017.
<http://pqdtopen.proquest.com/doc/860134423.html?FMT=ABS>.
- Perlove, Nina. "Inherited Sound Images: Native American Exoticism in Aaron Copland's Duo for Flute and Piano." *American Music* 18, no. 1 (2000): 50. doi:10.2307/3052390.
- Pollack, Howard. *Aaron Copland: the life and work of an uncommon man*. Urbana: University of Illinois Press, 2000.
- Rockwell, John. "Copland, Dean of American Music, Dies at 90." *New York Times*, December 3, 1990. Accessed May 20, 2017.
<http://www.nytimes.com/books/99/03/14/specials/copland-obit.html>.
- Trombley, Richard. "An Approach to the Teaching of Aural Analysis for Music Majors." Exploring Diverse Perspectives. October 01, 1995. Accessed May 31, 2017.
https://symposium.music.org/index.php?option=com_k2&view=item&id=2117%3Aan-approach-to-the-teaching-of-aural-analysis-for-music-majors&Itemid=146.

APPENDIX 1

Table of contents

Score	57
Movement 1 motivic development	78
Movement 1 motivic map	79
Movement 1 timeline	82
Movement 2 timeline	83
Movement 3 timeline	84

To the memory of William Kincaid

1

Duo for Flute and Piano

AARON COPLAND

I

Flowing ♩ (♩ = 84)

FLUTE

p freely, recitative style

PIANO

6

poco

11

mf *più p* *rit.*

2

Much slower ($\text{♩} = 56$)

16

resume

mf 3 (don't hurry)

mp

mf *p* *mf* *p*

Ped. *

Tempo I

20

Ped. *

2 Much faster (always flowing) with delicacy

 $\text{♩} = 60$

25

mp

31

mf

mp

Ped. * *Ped.* * *Ped.* * *Ped.* *

37 4

Ped. * Ped. * Ped. * Ped. * Ped. * Ped. *

42 5

Ped. * Ped. *

47 relax the tempo somewhat

* Ped. * Ped. *

53 6 (♩ = 96)

* Ped. * Ped. *

4

58

8-----1 8-----1 8-----1

Ped. * Ped. * Ped. *

62

p

66

7

f marc.

ff vigorous (non legato)

71

8

relax the tempo ($\text{♩} = 84$)

meno f

mf with charm

ff

76

f

81

mf *più marc.* *f*

9

mf *(mf)*

poco marc. (dryly)

85

mf soave *mp (soave)*

89

f (don't hurry) *f (don't hurry)*

10

6
94

gradually slowing to

97

(rit.)

As at first (but starting slowly)

100

11 (♩ = 112)

mp, espress.

mp

poco accel. a tempo (♩ = 60)

106

poco cresc. *mf* *f*

poco cresc. *f*

Ped.

113

12

* Ped. *

120

mf

13 (♩ = 84)

127

mp (freely - as at first) *poco*

mf Ped. *

133

mf *più p* rit. . . .

8

14

Much slower (♩ = 56)

resume

Musical score for measures 138-141. The score is in 3/4 time and features a melodic line with triplets and a piano accompaniment. Dynamics include *mf* (don't hurry), *mp*, *mf*, and *p*. There are markings for *Red.* and *** in the piano part.

Tempo I

Musical score for measures 142-146. The score is in 3/4 time and features a melodic line with slurs and a piano accompaniment. Dynamics include *p*. The piano part has a complex rhythmic pattern with slurs.

15

relax the tempo

Musical score for measures 147-151. The score is in 3/4 time and features a melodic line with slurs and a piano accompaniment. Dynamics include *p simply* and *p*.

152

Musical score for measures 152-155. The score is in 3/4 time and features a melodic line with slurs and a piano accompaniment. Dynamics include *f* (*poco sf*), *f* (*sf*), *mf* *poco sf*, and *f* (*sf*).

II

Poetic, somewhat mournful ($\text{♩} = \text{circa } 96$)

p freely expressive

p (r.h. to the fore, bell-like)

Ped. on each l.h. chord

mp

warmer tone

p

32 *mp (espress.)*

37 **4**

42 **5** moving to (♩ = 69)

(with emphasis) *f* *f (with emphasis)*

46 *mf* *mf* *f* *mf* *f* *ff*

12

50 [4] 6 simile

(ff) intensivo e marc.

ff

(ff) intensivo e marc.

Ped. * Ped.

53

gradually diminish intensity and dynamic

gradually diminish intensity and dynamic

* Ped. * Ped. * Ped. Ped. * Ped. * Ped. *

56

level to - - - - - p

level to - - - - - p

Ped. * Ped. *

59 7 (♩ = 60) poco rit.

warm tone

mf espress. 1 + 2 + 3 + 4 + 5 + *mp*

Ped. * Ped. * Ped. * Ped. * Ped. * Ped. *

63 $\text{♩} = 96$ (as at first) *p*

(as at first) *p*

Ped. * Ped. on each l.h. chord

68 [8] *mp*

72 warmer tone *p* (thin tone) *p*

Ped. * Ped. * Ped. * senza Ped.

77 *poco sf* *p* *poco sf* *p*

p *attacca*

III

Lively, with bounce (♩ = 138)

The musical score is written for piano and includes the following elements:

- Tempo and Meter:** Lively, with bounce (♩ = 138), 4/4 time signature.
- Key Signature:** Two sharps (F# and C#).
- Dynamic Markings:** *f* (forte) and *molto sf* (sempre) (piano fortissimo).
- Performance Instructions:** "(press down silently)" and "- - - (Ped.) - - *".
- Measure Numbers:** 5, 9, and 12 are indicated at the start of their respective systems.
- First Ending:** A bracketed section labeled "1" begins at measure 5.
- Articulation:** Accents (^) and slurs are used throughout the piece.
- Ornaments:** Small 'h' symbols above notes indicate ornaments.

2 (♩ = 126)

15

mf (don't hurry)

mf (don't hurry)

f

8---

Ped. Ped. Ped. Ped. Ped. Ped. Ped. Ped.

3 a tempo (♩ = 138)

18

mp *mf* *f*

mp *mf* *f*

Ped. sim.

21

4

24

mp (lightly, dryly)

sf mp (lightly, dryly)

16

28

31

mf *p* *più f* *f marc.*

mf non legato *più f* *f*

5

(♩ = 126)

35

(exaggerate the accented notes)

f *stacc. e marc.*

(exaggerate the accented notes)

42

6

49 7

56 8

(f) more relaxed

mf
lightly marked

63 9

f

f marc.

69

f (marc. sempre)

(*marc. sempre*)

18

75

10

82

11

89

non legato

sim.

94

(♩ = 138)

12

ff

8

16

99

f

102

105

13 (♩ = 126) as before

108

a tempo (♩ = 138)

111

114

14

20

117

f (*non legato*)

ff (*legato*)

Ped. *

120

f

15

Ped. * Ped. * Ped. *

124

f

f

Ped. * Ped. * Ped. * Ped. *

128

16

marc. e stacc. *ff*

Ped. * Ped. * Ped. * Ped. *

132 *non legato* *mf* *stacc.* *f* *mf* **17** *sim.*

Ped. *

137 *f* *mf*

142 *cresc.* *ff* (*don't hurry*) *sfz* *sf* **18**

Broaden tempo somewhat

146 *sf* *ff marc.* *sfz*

The score reproduced in this appendix is reprinted by permission from Boosey & Hawkes, Inc.

Duo for Flute and Piano by Aaron Copland
© 1971 by The Aaron Copland Fund for Music
Boosey & Hawkes, Inc., sole licensee.
Reprinted by Permission.

P

Pb

Po

Py

Y

poco marc. (dryly) Y-1

Y_{ex}

Y_{ex}-1

Yo

G

G²

Gb

G_{ex}

Gy

Y_r

O

O_{ex}

O_{ex}²

O_{ex}³

O_r

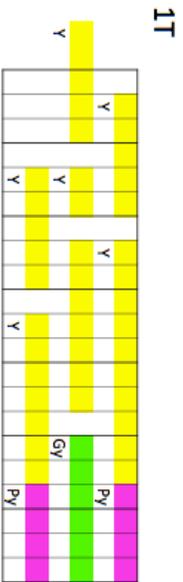
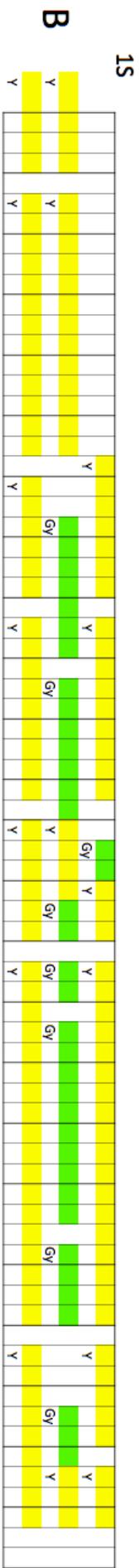
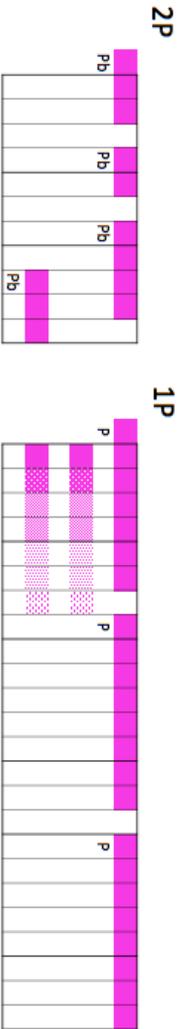
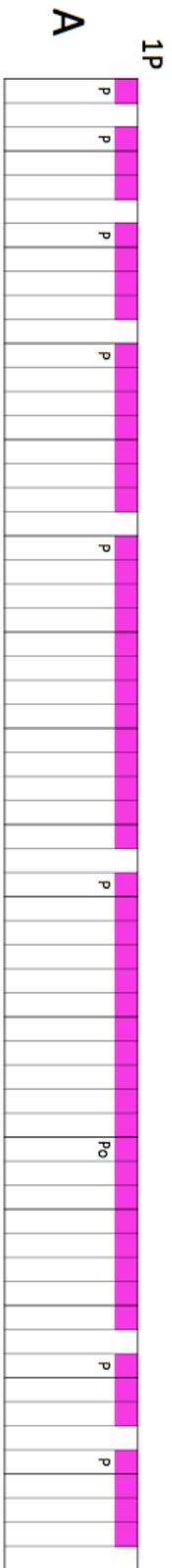
B

B-1

B²

B_{ex}

By



$$A \quad 1P \left[\begin{array}{c} a^{[X]} \quad a^{-1} \quad a^{[X]} \quad a^{-1} \quad a^{[W]} \quad a^{-1} \quad a^{[X]} \quad b^{[X]} \quad a^{[X]} \quad [W] \\ \hline 3 + (\sqrt{2} + \sqrt{2}) + (\sqrt{2} + (\sqrt{1} + \sqrt{1})) + \sqrt{4} + \sqrt{2} + \sqrt{1} \\ \text{Ped: cm} \quad B \quad \text{cm} \\ \text{CM} \quad \text{CM} \quad \text{CM} \end{array} \right]$$

$$B \quad 1T \left[\begin{array}{c} a^{[Aa]} \quad b^{[Z]} \quad b^{[Z]} \quad s_2 \quad s_3 \quad s_4 \\ \hline 1\sqrt{} + 2 + (1 + 1 + 1 + 1) \\ \text{Ped: } C^7 \end{array} \right]$$

$$A' \quad 1P \left[\begin{array}{c} c^{[Aa]} \quad a^{[X]} \quad a^{-1} \quad a^{[X]} \quad a^{-1} \quad a^{[W]} \quad a^{-1} \quad b^{[X]} \quad a^{[X]} \quad a^{ex} \\ \hline 1 + |\sqrt{1}| + (\sqrt{2} + \sqrt{2}) + (\sqrt{2} + (\sqrt{1} + \sqrt{1})) + \sqrt{4} + \sqrt{2} \\ D^bM \quad \text{Ped: } D^bM \quad C \quad D^bM \\ D^bM \end{array} \right]$$

$$C \quad 2T \left[\begin{array}{c} a \quad b^{[B]} \quad a^{-1} \quad b \\ \hline 2 + \sqrt{2} + 2 + \sqrt{1} \\ \hline \wedge \wedge \wedge \end{array} \right] 2P \left[\begin{array}{c} a^{[P]} \quad a^{[B]s1} \quad s_2 \quad s_3 \quad s_4 \quad s_5 \quad s_6 \quad [W]^{-1} \\ \hline 2 + (\sqrt{1} + \sqrt{1} + \sqrt{1} + \sqrt{1} + \sqrt{1} + \sqrt{1}) + \sqrt{1} \\ \hline \wedge \wedge \wedge \end{array} \right] 3T \left[\begin{array}{c} C \\ \hline (\sqrt{1} + 1) + 1 \\ \hline b^bM \quad E^bM \end{array} \right]$$

$$A \quad 1P \left[\begin{array}{c} a^{[X]} \quad a^{-1} \quad a^{[X]} \quad a^{-1} \quad a^{[W]} \quad a^{-1} \quad a^{[X]} \quad b^{[X]} \quad a^{[X]} \quad [W] \\ \hline 2 + (\sqrt{2} + \sqrt{2}) + (\sqrt{2} + (\sqrt{1} + \sqrt{1})) + \sqrt{4} + \sqrt{2} + \sqrt{2} \\ \text{CM Ped: cm} \quad B \quad \text{CM} \\ \text{CM} \end{array} \right]$$

APPENDIX 2

MOVEMENT 1:

Mid-Scale Form:

Large-Scale Form:

Section	Measure number	Area	Measure number
		1P	1
		2P	17
A	1	1P	20
B	26	1S	26
C	57	1T	50
B'	104	2T	57
A	126	3T	76
Coda	148	4T	93
		1S	104
		1P	126
		2P	139
		1P	142
		1S	148

MOVEMENT 2:

Mid-Scale Form:

Large-Scale Form:

Section number	Measure	Area	Measure number
		1P	1
		1T	19
A	1	1P	26
B	19	2T	44
A'	26	3T	51
C	44	4T	60
A	63	1P	63

MOVEMENT 3:

Large-Scale Form:

Mid-Scale Form:

Section	Measure number	Area	Measure number
A	1	1P	1
B	35	1S	15
A	97	1P	20
Coda	133	2P	27
		1T	35
		2T	68
		1P	97
		1S	107
		1P	111
		4T	119

Symbol	Meaning
P	primary thematic area
S	secondary thematic area
T	transition area
1, 2, 3, etc.	iteration of designated area eg. 1P/2P are separate primary areas

Figure 24: Mid-scale form- labeling restarts at the beginning of every movement

Symbol	Meaning
1	one measure phrase
^1	one measure phrase with anacrusis
(2 + 2)	four measure phrase divided into two, two measure phrases
a ^[P]	"a" phrase, based on "P" motive
a ^{[Y]s1}	"a" phrase, based on "Y" motive, the first in a series
s3	the third in a series, phrase remains as first in the series
a ^{[Bc]-1}	"a" phrase, based on "c" phrase of section "B", inverted
d ^{[B]_r}	"d" phrase, based on "B" motive, rhythmically transformed
G.P.	structural silence
:^1:	exactly repeated one measure phrase with an anacrusis

Figure 25: Small-scale form legend. Motivic labels are consistent throughout the analysis. Phrase lettering restarts in each large section of each movement

Symbol	Meaning
B ^b :	key of B ^b , defined by prolonged tonality, continues until section end or new harmonic designation
a ^b m	brief tonal centering around a ^b m (note the lack of colon)
V	chordal area in key
V -> iv	harmonic progression in key
C [^] ^C	contrapuntal harmony
/\/\	significant harmonic instability
Ped:	pedal point

Figure 26: legend for harmonic structure labeling in timelines

READING MOTIVIC MAPS:

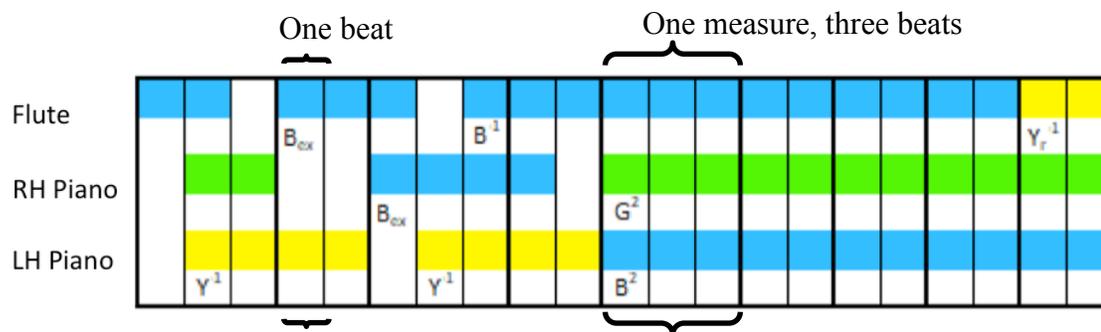


Figure 27: Excerpt from movement 1 motivic map. See results section or appendix 1 for complete motivic map



Figure 28: Excerpt from key to motivic map. For complete motivic development chart, refer to results section or appendix 1