Spring 5-10-2024

Pedal Points: Harmony and the Double-Action Pedal System in Modern Harp Music

McKenna Jennings
musicalmckenna1@gmail.com

Pedal Points: Harmony and the Double-Action Pedal System in Modern Harp Music

Creative Commons License

Pedal Points:

Harmony and the Double-Action Pedal System in Modern Harp Music

By

McKenna Jennings (BMus)

Presented to the Faculty of the Graduate School of Music

Stephen F. Austin State University

In Partial Fulfillment

Of the Requirements

For the Degree of

MM in Music Theory

STEPHEN F. AUSTIN STATE UNIVERSITY

May 2024

Pedal Points:

Harmony and the Double-Action Pedal System in Modern Harp Music

By

McKenna Jennings (BMus)

APPROVED:

_____
Dr. Samantha Inman, Thesis Director

_____
Dr. Jaymee Haefner, Committee Member

_____
Dr. Stephen Lias, Committee Member

_____
Dr. Kathryn Fenton, Committee Member

_____
Forrest Lane, Ph.D.
Dean of Research and Graduate Studies

ABSTRACT

Pedals are an invisible guide in chromatic harp repertoire. While the evolution of tonality and rise in chromaticism incentivized the invention of the double-action pedal harp, the unique restraints and extensions of this technological system influence harmony and pitch collections in chromatic harp music. This thesis explores the pedal harp and the influence the affordance and idiomacy of the pedal layout exerts onto chromatic harp repertoire. It draws on embodiment and schema theory to describe patterns of pedal motion in harp music, thus presenting and demonstrating an original theory of pedal schemas. Pedal schemas are patterns of motion defined by the pedaling movements on the left and right sides of the pedal layout and on the horizontal and vertical planes. The musical examples analyzed through the lens of pedal idiomacy and schemas in this thesis include transcriptions, staples of the canon, and modern experimental music. Following the legacy of pedal idiomacy from its origins to its expansions, the repertoire presents a survey of pedals in harp music from the late 19th century to the late 20th century. This thesis examines the use of harp pedals as crucial tools, not only for playing harmonies and pitch-class collections, but also in generating and inspiring them. For harpist-composers with tangible knowledge of the harp, pedals point the way forward.

ACKNOWLEDGEMENTS

Thank you to my thesis advisor, Dr. Samantha Inman. Her expertise and insight helped me organize my ideas and achieve my research goals. I appreciate her attention to detail and contributions of time, ideas, and support. I am also grateful to Dr. Jaymee Haefner for sharing her knowledge of harp history and repertoire, and helping me refine the presentation of my ideas. Thank you to Dr. Stephen Lias and Dr. Kathryn Fenton for their valuable comments and encouragement.

Thank you to my parents and grandparents whose love of music sparked a passion in me. Thank you to Annabelle Stanley, who taught me harp from a beginner level until the end of my Bachelor’s degree. Her kindness to students and commitment to the harp continues to inspire me. Thank you to my husband for encouraging and believing in me. This thesis stands as a milestone in my academic journey, enriched by everyone's contributions. I am grateful for all of you.

TABLE OF CONTENTS

ABSTRACT ……ii

ACKNOWLEDGEMENTS ……...iii

TABLE OF CONTENTS ……..iv

LIST OF TABLES……viii

LIST OF FIGURES ……..ix

INTRODUCTION ……..1

CHAPTER 1 ……..4

Introduction: The QWERTY Effect……4

Embodiment……..5

Grounded Cognition……..…8

Embodied Analysis Case Study: De Souza and the Guitar…….……10

Image Schemas……..13

Organology and the Harp……..……15

Affordance and Idiomacy……..…17

Conclusion: The QWERTY Effect on the Harp……..19

CHAPTER 2……21

Introduction……..……21

Similarities Between the Harp and Piano…….……..23

The Pedal Layout on the Harp…….……26

Differences Between the Harp and Piano…….....29

Transcriptions: Claude Debussy's *Claire de Lune*……31

Arrangements: J.S. Bach's *Violin Partita* no. 1, "Sarabande".....39

Common Pitch Collections……..……43

Scheuregger and "the Physicality of the Instrument Itself"……..……..…50

Pedal Pairs: "Fire Dance" by David Watkins.....……..……...56

Conclusion……...63

CHAPTER 3……..…….....65

Introduction……..65

Pedal Schemas……...66

Pedal Timing in Alphonse Hasselmans' *La Source* ……..73

Pedal Adjacency and Oblique Motion ……79

Pedal Voice-Leading and Leading Single Pedals ……84

The Pedaling Motif and the Contrary Horizontal Schema:
Nocturne by Alan Hovhaness……..……..86

Contrary Vertical Motion and Disjunct Horizontal Leaps:
Carlos Salzedo's *Chanson de la Nuit*..……91

The Adjacent Single Pedal Cluster……..97

Motivic Development in Schemas:
Six Noels by Marcel Tournier…… 99

"Noel I": Adjacent Single Pedals in the Melodic Minor Scale……100

"Noel II": Adjacent Single Pedals in
Wedge Progressions and Tonicizations..……..100

"Noel III": Pedal Pairs in the Melodic Minor Scale…….. 101

"Noel IV": Pairs of Adjacent Single Pedals
in Chromatic Harmonies and Modulations……..……. 103

"Noel V": Adjacent Single Pedals and Pedal Pairs in
Tonicization and Distant Modulation……..105

"Noel VI": Adjacent Single Pedals in Modal Collections..…….. 107

Conclusion…… 110

CHAPTER 4..... 112

Introduction: Redefining Pedal Idiomacy Beyond the Schema……112

Bernard Andrés *Absidioles*…..……115

Luciano Berio's *Sequenza II*..……125

Anne LeBaron's *Harpestra*……135

Conclusion: Diverging Paths…….. 147

CONCLUSION..... 150

Conclusion…….150

Further Research……. 153

BIBLIOGRAPHY……...156

VITA ……161

LIST OF TABLES

Table 2.1. Similarities between the piano and harp ……..25

Table 2.2. Differences between the piano and harp……..31

Table 2.3. Pedal pairs in David Watkins' "Fire Dance" ……63

Table 3.1. An overview of pedal schemas ……..71

Table 3.2. Every pedal change in Alphonse Hasselmans' *La Source* ……83

Table 3.3. Every pedal change in Carlos Salzedo's *Chanson de la Nuit* ……..96

Table 3.4. A summary of all adjacent single pedal clusters and variant pedal motions in Marcel Tournier's *Six Noels* ……110

Table 4.1. A formal, textural, and pitch-class set summary of Bernard Andrés' *Absidioles* ……116

Table 4.2 A formal and textural summary of Luciano Berio's *Sequenza II*……...126

Table 4.3. The pitch-class sets in Anne LeBaron's *Harpestra* ..……143

LIST OF FIGURES

Figure 1.1. Timothy Koozin's "Fret-Interval Type" ……12

Figure 2.1. The diatonic arrangement of harp strings ..……27

Figure 2.2. The harp pedal layout ……28

Figure 2.3. Debussy's *Claire de Lune*, mm. 18-20 ……34

Figure 2.4. Carlos Salzedo's *Claire de Lune* transcription*,* mm. 18-20 ……35

Figure 2.5a. The muffling solution……36

Figure 25b. The enharmonic equivalent solution ……..36

Figure 26. Salzedo's *Claire de Lune* transcription*,* mm. 18-20..……37

Figure 2.7. Victor Coeur's *Claire de Lune* transcription, mm. 18-20 ……..38

Figure 2.8. Olga Erdeli's *Claire de Lune* transcription, mm. 19-20.……39

Figure 2.9a. J.S. Bach's *Violin Partita* no. 1, *Sarabande*, mm.1-4 ……42

Figure 2.9b. Grandjany's *Sarabande* arrangement, mm.1-4..……42

Figure 2.10. J.S. Bach's *Violin Partita* no. 1, *Sarabande*, mm. 40……..44

Figure 2.11. A pedal setting with a cardinality of 4 ……47

Figure 2.12 A pedal setting with two simultaneous chromatic clusters ……48

Figure 2.13 Four possible scales from 6-34(013579)..……50

Figure 2.14. Martin Scheuregger's *Be Still*, Fragment V., mm. 1-4 ……53

Figure 2.15. The two modes from Scheuregger's compositional concept ……54

Figure 2.16. Scheuregger's compositional concept, mm. 1-22……...55

Figure 2.17. Pedal pairs on the harp……...59

Figure 2.18. The pedal pairs in David Watkins' "Fire Dance," mm. 12-16…….60

Figure 2.19. "Fire Dance," mm. 61-65……60

Figure 2.20. "Fire Dance," mm 68-69……..61

Figure 2.21 ""Fire Dance," mm 85……62

Figure 3.1. Robert Gjerdingen's Do-Re-Mi Schema ……69

Figure 3.2a. *La Source* by Alphonse Hasselmans
with the original pedal markings, mm. 16-25 ……77

Figure 3.2b. *La Source* with chronologically-ordered
pedal markings, mm. 16-25 ……..79

Figure 3.3. The oblique adjacent horizontal, parallel vertical
schema in mm. 19-21 of *La Source*……80

Figure 3.4. Inner and medial pairings for the F and G pedals……81

Figure 3.5. The pedal pairs and delayed pairs
in mm. 1-8 of *Nocturne* by Alan Hovhaness ……..90

Figure 3.6. Contrary motion in m. 44 of *Nocturne* ……91

Figure 3.7a. The opening pedal setting
in *Chanson de la Nuit* by Carlos Salzedo...……93

Figure 3.7b. The pitch collection in mm. 1-3 of *Chanson de la Nuit* ..……94

Figure 3.8. The first pedal pair in *Chanson de la Nuit*, mm. 1-6 ……94

Figure 3.9. Pedal schemas in mm. 8-12 of *Chanson de la Nuit* ……95

Figure 3.10. A leftward and rightward cluster on the pedal layout ……99

Figure 3.11. A rightward pair that simulates a single pedal cluster ……99

Figure 3.12. Single adjacent horizontal motion
in Marcel Tounier's "Noel I," mm. 14-27……101

Figure 3.13. Single adjacent horizontal motion in "Noel II," mm. 27-35 ……..102

Figure 3.14a. The B-A pedal pair in "Noel II," mm. 7-27 ……103

Figure 3.14b. The approximate adjacency in the rightward pair B–A……..103

Figure 3.15a. Two adjacent single clusters in "Noel IV," mm. 13-18……104

Figure 3.15b. The F–G cluster in "Noel IV," mm. 19-24 ……105

Figure 3.16. A single pedal cluster in "Noel V," mm. 1-13 ……106

Figure 3.17. A leftward pair approximating
horizontal adjacency in "Noel V," mm. 14-23……...107

Figure 3.18. The adjacent cluster and
leftward pair in "Noel V," mm. 29-44……..108

Figure 3.19. A leftward cluster in "Noel VI," mm. 10-17 ……109

Figure 4.1. Mm. 14-15 and 80 of Bernard Andrés' *Absidioles* ……...118

Figure 4.2. Mm. 8-10 and 20-23 of *Absidioles*……120

Figure 4.3. M. 58 of *Absidioles*.…… 121

Figure 4.4. Mm. 65-69 of *Absidioles* ……122

Figure 4.5. Mm. 132-134 and 159-160 of *Absidioles* ……123

Figure 4.6. Mm. 90-94 of *Absidioles* ……124

Figure 4.7. Mm. 1-20 of Luciano Berio's *Sequenza II* ……128

Figure 4.8. Mm. 111-115 of *Sequenza II*……...129

Figure 4.9. Mm. 153-159 of *Sequenza II*……..131

Figure 4.10. The extended techniques key in *Sequenza II*, p. 1 ……..131

Figure 4.11. Mm. 211-220 of *Sequenza II* ……132

Figure 4.12. Mm. 216-222 of *Sequenza II*……134

Figure 4.13. Mm. 294-303 of *Sequenza II*……134

Figure 4.14a. The two pedal settings at the beginning
of Anne LeBaron's *Harpestra*, m. 1 ……...138

Figure 4.14b. Mm. 34-36 of *Harpestra*……..138

Figure 4.15. Mm. 45-49 of *Harpestra* ……140

Figure 4.16. Mm. 108-109 of *Harpestra*……141

Figure 4.17a. Mm. 41-44 of *Harpestra*……..142

Figure 4.17b. Mm. 50-51 of *Harpestra*..……142

Figure 4.18a. Option 1 for pedal resets on a double pedal layout……145

Figure 4.18b. Option 2 for pedal resets on a double pedal layout……145

Figure 4.18c. Option 3 for pedal resets on a double pedal layout……146

Figure 4.19. The last pedal setting in *Harpestra* ……146

INTRODUCTION

Tools have manifold effects on how their users view the world and participate in it. This thesis explores the double-action pedal harp and the influence the pedals' affordance and idiomacy exerts onto chromatic harp repertoire. This thesis engages with the topics of embodiment, idiomacy, and affordance, and draws on schema theory to describe patterns of pedal motion in harp music. It presents, develops, and demonstrates the original theory of pedal schemas: patterns of motion defined by the relative pedaling movements on the left and right sides of the pedal layout and on the horizontal and vertical planes.

The musical examples this research explores demonstrate a lineage of harp idiomacy and pedal schemas over the 19th and 20th centuries. This thesis follows the establishment, development, and eventual breakdown of pedaling conventions through representative works and composers of the mainstream classical harp canon. Chapter 1 provides a basis for this discussion through a wide-ranging literature review of embodiment, grounded cognition, affordance, and idiomacy. Chapter 2 introduces readers to the double-action pedal system, its resulting pitch proclivities, and the foundational concept of pedal pairs. Harp transcriptions

of music by Debussy and J.S. Bach provide a backdrop for discussing the idiomatic needs of the instrument compared to the more familiar compositional idioms of the piano and violin. Chapter 3 defines and illustrates pedal schemas through staple harp repertoire from the last decade of the 19th century to the mid-20th century. It examines the concepts of pedal pairs, leading-single pedals, adjacent pedal clusters, and pedaling motifs. Chapter 4 delves into repertoire from the late 20th century that constitutes a movement toward the expansion of the harp idiom. This chapter explores a range of compositional experimentation, from artful extensions of the traditional harp lineage to treatments of pedals that redefine their function and even alter their physical layout.

This research fills a gap in the field of embodiment by focusing on a relatively unknown and unique instrument. While the research of this instrument is constantly growing, it has a significantly smaller body of research on its repertoire and idiomacy than other instruments, such as the piano, trumpet, or guitar.[1] Understanding how pedals impact harmony in chromatic harp music can aid composers wishing to employ this pedal system to explore composition within and outside tonality. This thesis also explores the interactions between the pedal system and music theory at large. It provides a new perspective for composers

[1] See: Jonathan De Souza, *Music at Hand: Instruments, Bodies, and Cognition* (New York: *Oxford University Press*, 2017).

Huron and Berec, "Characterizing Idiomatic Organization in Music: A Theory and Case Study of Musical Affordances," *Empirical Musicology Review* 4, no. 3 (2009): 103–122, https://doi.org/10.18061/1811/44531.

unfamiliar with the instrument and a novel framework from which to analyze harp music.

The examination of harp pedals throughout this thesis reveals that they are crucial tools, not only for playing various harmonies and pitch-class collections, but also in generating and inspiring them. For harpist-composers with embodied knowledge of the harp, pedals point the way forward.

Chapter 1

Grounded Cognition, Embodiment, and Affordance: A Literature Review

Introduction: the QWERTY Effect

The first typing machines were modeled from piano keyboards in the early 1840s.[2] The order and placement of the letters on these early typewriters varied greatly until the 1878 QWERTY patent. Created to improve ease and efficiency of typing, this model soon became the standard keyboard layout on all typing devices in multiple languages. However, the emergence of typing as a common practice among literate language-users and the convergence of all typing activity around a single spatial layout has had profound effects on language.

A 2012 study found a relationship between the physical procedure of typing and the perceived meanings of words across English, Spanish, and Dutch.[3] For both left- and right-handed participants, words that contained more letters on the right side of the keyboard were associated with more positive

[2] Koichi Yasuoka and Motoko Yasuoka, "On the Prehistory of QWERTY," *Zinbun* 42, no. 1 (March 2011): 161-174, https://doi.org/10.14989/139379.

[3] Kyle Jasmine and Daniel Cassanto, "The QWERTY Effect: How Typing Shapes the Meaning of Words," *Psychon Bull Review* 19, no.1 (March 2012): 499-504, https://doi.org/10.3758/s13423-012-0229-7.

meanings and emotions.[4] Even when the participants were away from the keyboard, the QWERTY layout remained mapped onto their dealings with language. The participants' perceptions of the very meaning of words were affected by the typing ease and number of right-side letters of each word.

The authors of this study concluded that "language is frequently produced by the fingers, and for millions of people, it is filtered through QWERTY. As people develop new technologies for producing language, these technologies shape the language they were designed to produce."[5] The physical qualities and layout of the tools we use everyday influence the results of our tasks and even our perceptions of them. This concept of embodiment is also studied in music theory and is the field in which this thesis is situated.

Embodiment

The research in this thesis is founded on the topics of grounded cognition, embodiment, and image schemas. In music theory, embodiment is the centering of the performer's and composer's physical reality in the process of analysis. The study of embodiment began to flourish around the 1980s and quickly found

[4] Jasmine and Cassanto, "The QWERTY Effect," 501.

[5] Jasmine and Cassanto, "The QWERTY Effect," 504.

application in numerous different fields, providing an entirely new perspective for approaching theory.[6]

The theory of embodiment draws from the ideas of philosopher Maurice Merleu-Ponty (1908-1961). In his *Phenomenology of Perception*, Merleu-Ponty posits that the "lived body," not the conscious mind, is the origin of subjectivity.[7] He maintains that the world gains its meaning through our tangible interaction with it, and our bodily experience surpasses our conscious thoughts in bringing meaning to our perception of the world.

Merleu-Ponty anticipates music theorists' applications of his theories by employing musical performance as a fruitful example for expounding upon his ideas. The philosopher writes about an organist who

> …does not learn objective spatial positions for each stop and pedal, nor does he commit them to 'memory.' During the rehearsal, as during the performance, the stops, pedals and manuals are given to him as nothing more than possibilities of achieving certain emotional or musical values, and their positions are simply the places through which this value appears in the world.[8]

---

[6] George Fischer and Judith Lochhead, "Analyzing from the Body," *Theory and Practice* 27 (2002): 37–68, http://www.jstor.org/stable/41054335.

[7] Maurice Merleau-Ponty, *Phenomenology of Perception* (London: *Routledge & K. Paul*, 1974), 140.

[8] Merleau-Ponty, *Phenomenology of Perception*, 145-46.

For Merleu-Ponty and theorists of musical embodiment, the physical presence of the instrument and the player's movements do not only interact with musical meaning, but create and constitute that meaning.

George Fischer and Judith Lochhead survey the past and future of embodied music theory, discussing the areas of music theory, psychology, and philosophy that feed into this theory.[9] They introduce their readers to both the philosophical and cognitive groundings for considering gesture as fundamental to musical meaning. They first call on a cognitive linguistic theory of the partnered expression between hand and arm gestures and speech.[10] Neither the speech nor the gestures alone communicate the entire idea, but each brings part of the meaning to the communication. In their meaning-making, gestures adjoin with the "linear-segmented, hierarchical linguistic structure of speech and thought."[11] In a similar way, the gestures that form music making are actually part of the music rather than a means by which to create it.

Fischer and Lochead finally demonstrate their process of analyzing from the body with Joan Tower's *Fantasy (those harbor lights)* and Johannes Brahms' Sonata for Clarinet and Piano in E-flat (Op. 120, no. 2). The authors discuss how

---

[9] Fischer and Lochhead, "Analyzing from the Body," 37–67.

[10] David McNeil, "Hand and Mind: What Gestures Reveal about Thought," *The American Journal of Psychology* 107, no. 1 (June 1994), 149-155.

[11] McNeil, "Hand and Mind," 105, 111.

the gestural idioms of rising, rocking, and upward resolution relate to the "remembering" narrative in Tower's piece.[12] They also follow Brahms' various transformations of the opening gestures in his Sonata. These gestures are musical, but also physical, as musical contour and texture create shared meaning with physical direction and muscular tension.[13]

Grounded Cognition

While Fischer and Lochhead provide an exemplary summary and demonstration of embodiment, Lawrence Barsalou's "Grounded Cognition: Past, Present, and Future" is a compact summary of the history of grounded cognition.[14] Barsalou explains that grounded cognition is the tangible and experiential basis of knowledge and concepts, while embodiment bases knowledge on the body specifically. In other words, grounded cognition studies how the environment affects one's cognition and perceptions, while embodiment studies how one's body affects one's cognition and perceptions.

Grounded cognition is a growing field. Multiple researchers in the field of cognitive psychology have found that the brain's internal map and external

---

[12] Fisher and Lochhead, "Analyzing from the Body," 13-18.

[13] Fisher and Lochhead, "Analyzing from the Body," 27-33.

[14] Lawrence Barsalou, "Grounded Cognition: Past, Present, and Future" *Topics in Cognitive Science* 2, no. 7 (September 2010): 716–24, 10.1111/j.1756-8765.2010.01115.x.

experience of the physical world affect cognitive tasks in perception, action, memory, knowledge, and language.[15] Because grounded cognition relates to the way the physical realities of the world inform cognition, it is the lens through which music researchers can study the physical-musical implications of instruments. Embodiment further informs this study, as human bodies interact with these instruments. This thesis involves both grounded cognition and embodiment.

That knowledge originates from the tangible world is not a recent concept. In a Socratic dialogue in *Memorabilia*, Xenophon (c. 430-355 BC) distinguishes between the types of knowledge he calls *epistêmê* and *technê*. The first involves theoretical knowledge while the other connotes skill and know-how. Seeing a friend change in the way he carried himself after military training, Socrates remarks,

> Don't you think, sirs…that our friend looks more 'majestic,' as Homer called Agamemnon, now that he has learnt generalship? For just as he who has learnt to play the harp is a harper even when he doesn't play, and he who has studied medicine is a doctor even though he doesn't practise, so our friend will be a general for ever, even if no one votes for him.[16]

The embodied knowledge of *têchnê* changes the way one holds themself and interacts with the world, infiltrating into the very mannerisms of a person. The

---

[15] Barsalou, “Grounded Cognition: Past, Present, and Future,” 2.

[16] Xenophon, *Memorabilia and Oeconomicus*, translated by E.C. Marchant (Cambridge: *Harvard University Press*, 1979), 169.

term and concept of *têchnê* was often linked with music in ancient philosophical thought. The hands of a musician were said to carry their musical knowledge at all times.[17] The philosopher Martin Heidegger links this physical know-how to the affordance of tools. He claims that "*têchnê* is the name not only for the activities and skills of the craftsman, but also for the arts of the mind…*Têchnê* belongs to bringing-forth."[18] As a guiding knowledge carried within someone, *têchnê* affects the decisions of composers bringing forth music for specific instruments.

Embodied Analysis Case Study: De Souza and the Guitar

The grounding of musical *têchnê* in a specific instrument can have manifold effects on composition. Jonathan De Souza's book *Music at Hand* explores an array of rich body-instrument interactions.[19] De Souza presents several case studies of different instruments' physical properties impacting musicians' perceptions and actions. De Souza studies embodiment with the violin, harmonica, banjo, and keyboard instruments, but not the harp. This thesis aims to add another perspective to this discussion through the harp.

---

[17] Xenophon, *Memorabilia and Oeconomicus*, 169.

[18] Martin Heidegger, *Basic Writings* (San Francisco: *HarperSanFrancisco*, 1993), 12–13.

[19] De Souza, *Music at Hand*.

One instrument that De Souza has studied extensively is the guitar.[20] De Souza's "Fretboard Transformations" explores the intersection of frets and strings on the guitar from a transformational perspective through "Cathedral" by Eddie Van Halen. Treating fretboard shapes as harmonies and their transformations, De Souza follows harmonic progressions through the fretboard space. He examines how fretboard shapes are transposed and inverted in Van Halen's "Cathedral." Expanding upon Lewinian transformation in music and Maurice Merleau-Ponty's phenomenology philosophy, De Souza explores how strings and frets intersect in space and harmony.[21]

In his study, De Souza makes use of Timothy Koozin's "fret-interval type": a six-position vector."[22] As shown in Figure 1.1, the fret-interval type involves six spaces, each marked with a number to represent a guitar string (from lowest to highest) and the fret position of each string. A dash marks a string that is not played. With this notation, De Souza follows Van Halen's main thematic gesture

---

[20] Jonathan De Souza, "Fretboard Transformations," *Journal of Music Theory* 62, no. 1 (April 2018), https://doi.org/10.1215/00222909-4450624.

Jonathan De Souza, "Guitar Thinking," *Soundboard Scholar* 7, no. 1 (2022), https://digitalcommons.du.edu/sbs/vol7/iss1/1.

[21] For more information on Lewin's theories, see: David Lewin, *Generalized Musical Intervals and Transformations* (London: *Yale University Press*, 1987).

[22] De Souza, "Fretboard Transformations," 6.

Timothy Koozin, "Guitar Voicing in Pop-Rock Music: A Performance-Based Analytical Approach," *Music Theory Online* 17, no. 3 (October 2011), http://www.mtosmt.org/issues/mto.11.17.3/mto.11.17.3.koozin.html.

as a series of fretboard transformations of transposition and inversion. Employing fretboard intervals as a transposition system, De Souza explores hand shapes in "Cathedral," discussing all the idiomatic operations that happen to those shapes. He shares an embodied analysis of harmony, thinking of "space as interval."[23]

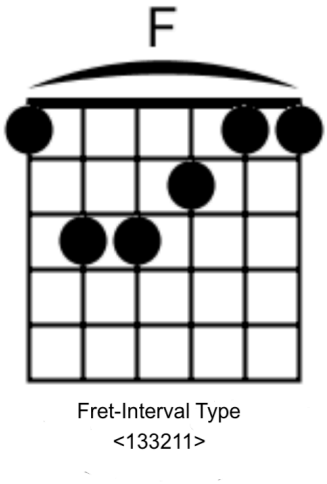


Figure 1.1. The fret interval type for an F Major barre chord shown below a fretboard diagram.

De Souza's "Guitar Thinking" studies how the affordances of the guitar can affect composers' musical choices.[24] De Souza focuses particularly on Leo Brouwer's "Simple Studies."[25] When examining the score alone, one may be baffled as to how Brouwer came to compose its harmonies. However, the

[23] De Souza, "Fretboard Transformations," 37.

[24] De Souza, "Guitar Thinking."

[25] Leo Brouwer, *Études Simples 1st Series: No's I-V* (Paris: *Eschig*, 1972).

diagrams De Souza presents makes it apparent: these studies repeat the same fretboard shapes, transposed and inverted to different frets and strings, so that the guitarist's hand streamlines across the frets and strings. Carrying forward De Souza's fretboard shapes, this thesis discusses pedal shapes, schemas, and their transformations in harp music.

Image Schemas

The concept of the image schema is central to this thesis and its conceptualization of the pedal space as a place of harmonic meaning. Maxine Sheets-Johnstone delves into the taxonomy of embodied cognition in "What Are We Naming?"[26] She argues that the terms "body image" and "body schema" are insufficient and misleading, establishing a false premise for the discussion of embodiment and affordance.

First, these terms connote a strictly visual-cognitive representation in our minds, despite image schemas being mental maps that go beyond the visual into all the senses. Image schemas are corporeal and somatic. They involve the brain's procedural rather than declarative memory. These deep, instinctive memories are formed through repeated action and transcend conscious

[26] Maxine Sheets-Johnstone, "What Are We Naming?" In *Body Image and Body Schema: Interdisciplinary Perspectives on the Body*, ed. Helena de Preester and Veroniek Knockaert (Amsterdam: *J. Benjamins*, 2005): 211–32, https://doi.org/10.1075/AICR.62.

thought.[27] Because image schemas rely on procedural memory and employ the subconscious mind, they often circumvent merely visual representations.

Second, the term implies a fixed image, while these image schemas are actually dynamic. An image schema can encompass numerous steps and operations, and change over time with new experiences. One may have an image schema of a certain temporal idiomatic procedure, such as moving from one fretboard shape to the next. These schemas involve processes and interactions between variables, and are more active than a still image. Further, since schemas are built from experience, experience can change them. The addition of new techniques, repertoire, and musical experiences can modify and revise these schemas over time.

Finally, Sheets-Johnstone cites neurobiology findings that emphasize how grounded cognition and embodiment are the primary way humans learn and contextualize themselves in the world, even before birth. She discusses the prevalence of movement in infant/child development research and describes numerous findings indicating that psychomotor development comes first in a human's growing perception of the world.[28]

---

[27] Michael T. Ullman, *Neurobiology of Language*, ed. Gregory Hickok and Steven L. Small, (London: *Academic Press*, 2016), 953-968, https://doi.org/10.1016/B978-0-12-407794-2.00076-6).

[28] Sheets-Johnstone, "What Are We Naming?," 3-5.

Image schemas have also been studied from an empirical approach, with researchers exploring the neuroscience behind this phenomenon. Barry Tuckwell's "Action Priming by Briefly Presented Objects" works with the established and documented basis that visual stimulus will trigger a hand shape.[29] For instance, seeing a rounded object compels the brain to trigger a rounded grasp type in the hands.

Tuckwell's new findings show that subjects do not need concurrent visual stimuli to produce these internal reactions. Simply mentioning the object is enough to create the same effect. The author concludes that action priming is more than just a visual phenomena; the images and schemas that affect cognitive affordance are dependent on the person's internal schema, not outside visuals. This finding is foundational for discussing harp pedal schemas, given their physical rather than visual nature. It is also an important comparison for this thesis' inference that, for many harpist-composers, harmonies may become associated with pedal settings. Much like the connection between words and hand shapes, harpists' physical knowledge of harmony through the pedal space may interlace with, and even supersede, their theoretical knowledge.

[29] Barry Tuckwell, "Action Priming by Briefly Presented Objects" ed. Yehudi Menuhin Music Guides, *Acta Psychologica* 116 (2002): 185–203, 10.1016/j.actpsy.2004.01.004.

Organology and the Harp

Musical organology is the study of instruments–their construction, history, and culture.[30] John Tresch and Emily Dolan's "Toward a New Organology" proposes a novel viewpoint where musician and instrument share influence over the created music.[31] In this view, agency is shared between the physical reality of the instrument and the body that interacts with it. They also discuss the ethics of instruments, defining ethics as knowledge that goes beyond a set of ideas to inform life, activities, and understandings of the self.

Tresch and Dolan present four analytical categories that apply to any instrument and its ethics. First, the *material disposition* of the instrument includes the materials of the instrument and which parts are necessary to define that instrument as itself. For the pedal harp, the material disposition comprises the strings, pedals, and sound board.

Second, the instrument's *mode of mediation* involves the actions required to play it, whether autonomous or passive, hidden or visible. The modes of mediation on the harp include hand and foot motion, which occur both independently and in tandem. Third, the instrument is part of a larger *map of*

[30] For more information, see: Wesley Oler et al., "Definition of Organology," *The Galpin Society Journal* 23 (August 1970): 170-174, https://doi.org/10.2307/842101.

[31] John Tresch, and Emily Dolan, "Toward a New Organology: Instruments of Music and Science," *Osiris* 28 (January 2013). 78–98, http://www.jstor.org/stable/10.1086/671381.

mediations including the air and sound involved, and the composers, players, and listeners. Fourth, the *telos* of the instrument's activity involves its social context, concepts, and use of the instrument.

The segmentation in the physical design of the harp makes its organology particularly complicated. While the actual sounded music originates from the strings, a spatially separate part of the instrument (the pedals) governs the harmonies and pitch-collections. These sequestered pedals are invisible to both the performer and audience, but covertly exert agency on the music through their physical affordance and idiomacy.

Affordance and Idiomacy

The word "idiom" can connote a phrase or verbal expression distinctive to a certain language, a unique manner of interaction, or even a physical circumstance.[32] When applied to music, this term refers to the unique resources and resulting customs of a particular instrument. The theorists David Huron and Jonathon Berec explain that

> …mechanics of musical instruments commonly influence how the music itself is organized. Like spoken utterances, musical passages can be characterized as more or less idiomatic depending on the extent to which the music relies on instrument-specific effects.[33]

[32] Huron and Berec, "Characterizing Idiomatic Organization in Music."

[33] Huron and Berec, "Characterizing Idiomatic Organization in Music," 1.

For instance, a passage profuse with five-finger patterns is highly idiomatic on the piano. On a four-finger instrument like the harp, it would be unidiomatic. As this thesis proposes, idiomacy affects not only melodic patterns, but also harmonic patterns on the pedal harp.

Huron and Berec's "Characterizing Idiomatic Organization in Music" provides a foundational model for discussing the elements of idiomacy.[34] Using B-flat trumpet as an example, they present four categories of difficulty in performance specifically for that instrument. They also discuss the crucial differences between difficulty and idiomacy. A difficult passage can still be idiomatic if the challenges posed by that passage remain within what is expected as normal technique on the given instrument. As Huron and Berec note,

> A difficult work may be defined as a work that places stringent demands on the performer…By idiomatic, we mean that, of all the ways a given musical goal or effect may be achieved, the method employed by the composer/musician is one of the least difficult.[35]

Most of the harp-centric studies of idiomacy and affordance this thesis engages with concentrate on transcriptions and pitch collections. Liu-Hsiu Kuo's "Transcribing for the Harp: a Study of Debussy's *Claire de Lune*" compares nine different harp transcriptions of Claude Debussy's "Claire de Lune" to educate

[34] Huron and Berec, "Characterizing Idiomatic Organization in Music," 1.

[35] Huron and Berec, "Characterizing Idiomatic Organization in Music," 13.

composers and arrangers on the idiomatic needs of the instrument.[36] From a more mathematical perspective, Mark Gotham and Iain Gunn present a comprehensive overview of all possible pitch collections for the double action pedal harp in their "Pitch Properties of the Pedal Harp."[37] Another important point of reference is Martin Scheuregger's "Redefining Idiomatic Writing for the Pedal Harp."[38] Particularly useful to this research is Scheuregger's demonstration that the physicality of the pedal system can inspire new horizons for set pitch classes in highly chromatic and non-tonal music.

Conclusion: The QWERTY Effect on the Harp

The QWERTY keyboard reordered the original sequence of letters in the alphabet for millions of users, creating a new spatial map of the languages these users speak, write, and think in everyday. The keyboard is a tool for communication, but it also shapes that communication. The 1801 double-action pedal system still used on harps today is a comparable piece of technology. In order to take part in a system of tonality with a preexisting order and rationality to

[36] Liu-Hsiu Kuo, "Transcribing for the Harp: a Study of Debussy's *Claire de Lune*" (Cincinnati: University of Cincinnati, MA diss., 2006).

[37] Mark Gotham and Iain Gunn, "Pitch Properties of the Pedal Harp, with an Interactive Guide" *Music Theory Online* 22, no. 4 (December 2016), 10.30535/mto.22.4.3.

[38] Martin Scheuregger, "Redefining Idiomatic Writing for the Pedal Harp," *Contemporary Music Review* 38, no. 6 (January 2019): 553-576, 10.1080/07494467.2019.1706343.

it, this system reordered its physical access for the user.[39] The pitches of the diatonic chromatic scales were reordered into seven pedals, divided between the left and right sides of the instrument. This system enabled harpists to participate in the increasingly complex world of harmony and tonality developing at the time, but it also forged connections and associations between the physicality of the pedal system and the greater meaning of musical language it interacts with.

Typing creates associations between a language and the physical dimensions of the keyboard. A fluent typist will have the habits and physical reality of the keyboard mapped onto their word choice, even while far away from it. Like the general who has learned the *têchnê* of war, this embodied knowledge goes with the typist everywhere, invisibly guiding their frame of reference as they interact with language and expression.

In a similar way, every instrument engages with the infinite spectrum from a unique set of technical traditions, idioms, and affordances. The greater world of music is filtered through the lens of this instrument. The instrument both allows the musician to participate in the world of music and asserts a distinct paradigm on their experience of this world. Like any composer, the harpist-composer paints from a specific pallet of options. The idioms and affordances of the instrument create a filter through which the composer interacts with the world. Because the

[39] Pierre Erard, “The Harp in its Present Improved State Compared With the Original Pedal Harp” (London: *Dossier Erard*, 1820).

affordance of the harp has uniquely substantial effects on pitch collections, chromaticism, and harmony compared to other instruments, its personal QWERTY effect yields fascinating implications for chromatic harp repertoire.

Chapter 2

The Pedal System, Pitch Proclivities, and Pedal Pairs

Introduction

This chapter explores the pedal system of the double-action pedal harp through several transcriptions and two harp compositions. Familiarity with the limitations, possibilities, and idiomatic use of the pedal layout is foundational to this thesis. The backdrop for this chapter's description of the intricacies of the harp will be an examination of harp transcriptions and the changes that must be made to music that was originally written for other instruments. The transcriptions in this chapter are of Claude Debussy's *Claire de Lune* and J.S. Bach's "Sarabande" from *Violin Partita no. 1*. Topics include a comparison of the harp with the piano, the restrictions of the pedal system, and the creative changes that must be made when adapting piano music to the harp. The purpose of this chapter is to introduce the pedal system of the harp and examine it in real repertoire, surveying its influence on available chromatisms and the way transcribers exploit the system to solve problems involving chromaticism.

This chapter also delves into the effects of the pedal system on the harmonic propensities of the harp. It examines Mark Gotham and Iain Gunn's valuable data on the pitch collections available on the pedal harp. These theorists provide explanations from set theory for why certain cardinalities can be accessed in more transpositions than others on the harp. This chapter also discusses the most prevalent pitch set on the harp and the significance of its lack of correlation with any scale in the common practice era. Gotham and Gunn's theory of "minimum distance, distinct routes" provokes insights on the difference between the physical possibilities of the instrument alone and the idiomacy of the human performers whose bodies interact with the instrument.

Two original compositions by Martin Scheuregger both apply Gotham and Gunn's data to real music and demonstrate the many harmonic avenues open to composers working directly with the pitch propensities of the instrument. Scheuregger discusses two typical approaches to chromatic composition on the harp: to create a fixed pedal setting that minimizes pedal changes, and to impose extraneous and unidiomatic chromaticism onto the instrument. He also demonstrates a third method through a compositional sketch, in which chromatic sets and modulations between them are organized directly around the pitch propensities of the instrument.

Finally, "Fire Dance" by David Watkins illustrates the concept of pedal pairs and their crucial role in pedal idiomacy. Beyond abstractions of pitch set

prevalency and Gotham and Gunn's theory of minimum distances, pedal pairs exert a pivotal influence on which of these "routes" occur the most in real repertoire. The coordination involved in human interactions with the instrument give rise to the concept of pedal pairs: the physical operations that invisibly guide and govern the real-world manifestations of pedal harp pitch proclivities.

Similarities Between the Harp and Piano

This practical exploration of harp organology begins with comparison through transcription and arrangement. Harp transcriptions are ample settings for testing out the influence of the instrument on its repertoire. Examining what must be changed to pre-existing repertoire in order to suit the needs of the instrument generates clear examples of the idiomacy of that instrument.

Transcriptions refer to a copy of a musical work that makes minimal changes to suit the music to a new instrument. For instance, a piece originally written for piano can be transcribed for the harp while retaining the fundamental content of the original work. Arrangements make fundamental changes to the score, with the arranger coloring the work with their own artistic style and perspective. This chapter explores both transcriptions and arrangements, employing those terms to connote the level and nature of the changes made to the scores.

Most harp transcriptions and arrangements made from other repertoire are taken from the canon of piano music because of the many similarities between the two instruments.[40] These instruments are so alike that one can often play piano music on the harp without any alteration. Table 2.1 summarizes the main similarities between harps and pianos.

Table 2.1. Similarities between the piano and harp.

Double-Action Pedal Harp	**Piano**
Music is notated on the grand staff.	Music is notated on the grand staff.
Generally plays a treble-clef melody in the right hand and a bass-clef accompaniment in the left.	Generally plays a treble-clef melody in the right hand and a bass-clef accompaniment in the left.
Can play in any traditional major or minor key	Can play in any traditional major or minor key
The volume and articulation of a note cannot be changed once the string is plucked.	The volume and articulation of a note cannot be changed after the attack on the key.

The idiomatic needs of the harp are numerous and complicated. When transcribing, the music must be made playable by including pedaling for each change of harmony and creating new fingerings for the four-finger patterns that are traditional on this instrument. The piano is the most comparable instrument to the harp because they both separate the musical texture into right and left hands

[40] Kuo, “Transcribing for the Harp,” 23.

using the same treble and bass clefs, involve similar melodic and accompanimental figures, and have similar capacities for chordal sonorities. Because of these similarities between the two instruments, piano music is central to the history of harp transcriptions. In adapting piano music, important harpist-composers such Henriette Renié, Carlos Salzedo, and Marcel Grandjany created staples in the repertoire while setting a precedent for transcriptions.[41] In addition to making a piece playable on the harp, these composers raised expectations for creating transcriptions that harnessed the unique possibilities of the harp. Harp arrangers following in their footsteps may add special harp effects to the original scores, such as harmonics, glissandi, and enharmonic spellings.[42]

As the following transcriptions will illustrate, the harp differs from the piano in many crucial ways. The most relevant difference is the physical layout of chromatic and diatonic pitches on the instruments. The piano features a chromatic spread of notes, with all twelve pitches of the chromatic scale equally accessible. Harp strings are arranged diatonically, with each octave containing only seven notes (Figure 2.1).

[41] Kuo, “Transcribing for the Harp,” 22.

[42] Kuo, “Transcribing for the Harp,” 21.

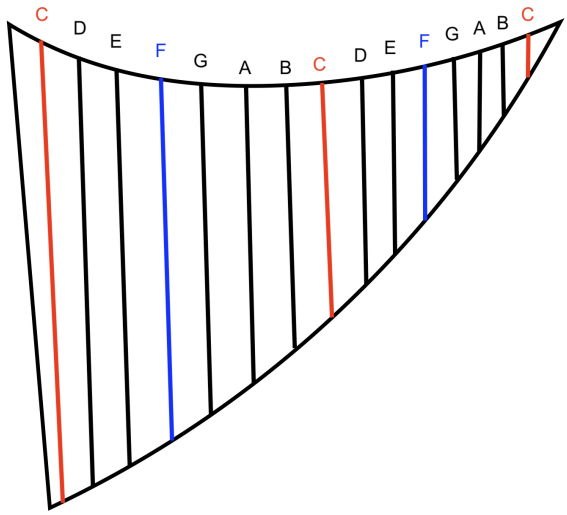


Figure 2.1. The diatonic arrangement of harp strings.

The Pedal Layout on the Harp

The pedal harp has seven pedals, each altering a single pitch class. The pedals have three notches and can be set in three positions: flat, natural, and sharp (Figure 2.2). These pedal notches follow the reverse of what one would intuitively assume: to move any pitch chromatically upward, the pedal must be pressed downward. When a pedal moves upward, its associated pitch-class is set down a semitone. In its state of least tension, with the pedals positioned in their upper notches, the home key of the harp is C-flat Major, containing the pitch classes [11, 1, 3, 4, 6, 8, 10]. While this set is more commonly known as B Major, the playing experience is understood as C-flat, as the colors of the strings orient the player toward an enharmonic understanding of the key.

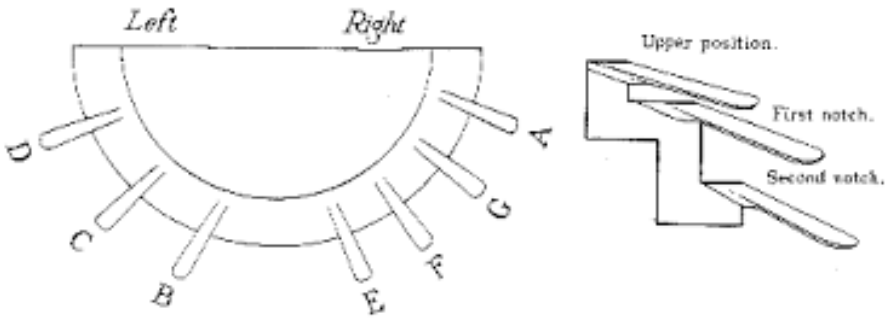


Figure 2.2. The harp pedal layout. Taken from Albert Zabel, “Method for the Harp” (Leipzig: *Zimmermann*, 1900), 6.

Pedals allow the harpist to play any pitch from the chromatic scale, but only seven at one time before a pedal change must be made. The possible intervals from one string to its adjacent string ranges from a unison to a major third. Therefore, the diatonic layout of the strings can easily be distorted. Each string on the harp can be set to produce a major third away from its adjacent string, but can also be doubled enharmonically to play the same pitch as its adjacent string. The only pitch-classes from the chromatic scale that cannot be enharmonically doubled in this way are D, G, and A. This limitation puts considerable restrains on harpist-composers and has abundant consequences on key, harmony, and pitch collection choices for those composing specifically for the instrument.

The dynamic nature of the string layout has limiting consequences. Because pedals affect all strings of the same pitch class, the harp cannot be set

to play one pitch and its chromatic variant at the same time. For instance, the A pedal can be set to play either an A or an A-flat, but cannot accommodate both simultaneously. Therefore, a passage requiring the sounding of an A and A-flat simultaneously must be accommodated by setting the pedals to produce an A and a G-sharp; however, that setting then limits one's use of the pitch G. The limitations in simultaneous chromatisms in this system is both restricting and expanding for harpist-composers making arrangements, and it often drives them to ingenuity.

The harpist has only two feet with which to navigate the seven pedals. The way the pedals are divided between the two sides of the harp affects the division of labor. One can change two pedals at a time to modulate, but only if those pedals consist of one from the right side of the harp and one from the left. The right foot governs the E, F, G, and A pedals, while the left foot governs the D, C, and B pedals (Figure 2.2). While one could concurrently move any one of the right pedals with any one of the left pedals, moving two pedals from the same side of the harp simultaneously (G and A, for instance) has not been a mainstream technique since the classical era.[43]

The distance from one pedal to the next also influences the speed and options for modulation. For instance, moving an A pedal after an E pedal requires

[43] See: Park Stickney, "Giant Steps for Harp: New Approaches to the Pedals" (London: *Trinity Laban Conservatoire of Music and Dance*, PhD diss., 2021).

the harpist to move a relatively far distance, taking more time or more skill in fast footwork. This thesis employs a generalized embodiment model, analyzing music from the perspective of a body with the median of leg lengths and body weight among harpists. Individual body factors, especially leg length, may significantly effect a harpist's pedaling speed and how they perceive the distances between pedals.

Differences Between the Harp and Piano

Several features distinguish the harp from the piano (Table 2.2). As previously stated, the harp strings are arranged diatonically, but the pedals allow for great flexibility in this layout. The piano is laid out in a static chromatic order. The methods of attack also vary greatly, with the harp being a highly sensitive string instrument with typically no mediation between player and string. The first truly modern guidebook for harp technique codified thirty-seven different timbres harpists could create by plucking the strings at different points with both fingertips and nails.[44] Since then, with new tools and electronic means, the number of unique timbres available on the harp have increased exponentially.[45]

[44] Carlos Salzedo, *Modern Study of the Harp* (New York: *Schirmer*, 1921), 1-26.

[45] For more information, see: Mathilde Aubat-Andrieu et al., *Guide to the Contemporary Harp* (Bloomington: *Indiana University Press*, 2019), 52-86.

Harps are also highly resonant instruments. Each string continues to vibrate until it decays, unless the harpist muffles or mutes it. Quick pedal changes involving a string that is already vibrating can produce a pedal slide: an often unfavorable metallic pitch-bending sound that is avoided by muffling the string with the hand(s). Finally, visibility on the harp is markedly different from the piano. Visual contact with the strings is necessary, but visual contact with the pedals is impossible while playing. Multiple pedals and complicated, asymmetrical movements raise the risk of pedaling errors, which are almost impossible to diagnose without stopping the performance to look at the pedals.

Table 2.2. Relevant differences between the harp and piano.

Double-Action Pedal Harp	**Piano**
Smaller pitch range: C1 to G7.	Larger pitch range: A0 to C8.
The strings are arranged diatonically.	The keys are arranged chromatically.
The sound starts to decay instantly (and much faster in the harp's higher range).	The sound starts to decay instantly but can be prolonged with the damper pedal.
The harpist plucks the strings without mediation and can produce many different timbres.	The piano strings are struck by hammers that mediate the pianist's motions on the keys.
The harpist can only use eight fingers to play. The fifth finger (the pinky) is too short to effectively pluck the strings.	The pianist uses all ten fingers.
The harpist uses two feet to control seven pedals.	The pianist uses two feet to control three pedals.

Table 2.2 Continued

Double-Action Pedal Harp	**Piano**
The same fingering can be used for a passage no matter what key it is transposed to, as all strings on the harp feel the same.	Transposition necessitates different fingerings as the pianist navigates the raised terrain of the keys.
Every string is sustained until it fully decays, unless one muffles it. Muffling can be time-consuming and limits the freedom of the hands.	Every string is dampened unless one depresses the sustain pedal.
Replacing the fingers on a recently plucked string can create a buzzing sound that is traditionally avoided.	One can rapidly play and replay a key without any buzzing sounds to avoid.
Visibility is necessary to play the harp, since all strings feel the same.	The pianist does not need constant visual contact with the piano to play, as the keys have a tactile pattern to them.
A harpist cannot see what position the pedals are in, so they must keep track of them mentally and move them by feel. Pedal errors result in pitch errors.	The pianist must also pedal tactilely. Pedaling errors do not result in pitch errors.

Transcriptions: Claude Debussy's *Claire de Lune*

Liu-Hsiu Kuo's DMA dissertation examines nine transcriptions of Claude Debussy's (1862-1918) *Claire de Lune* (1905).[46] Among those nine, this section explores the four transcribed for the pedal harp. The transcriptions written for the lever harp are outside of the scope of this thesis.

[46] Kuo, "Transcribing for the Harp," 14.

Kuo notes that certain niche instruments, including the harp, “have not been favored with original solo compositions.”[47] With a rich yet scarce body of original repertoire, harpists often turn to harp transcriptions, especially if they are searching for pieces before the 19th century. These transcriptions clearly highlight the transcriber’s level of embodied knowledge of harp idiomacy, as transcribing for the harp requires a specific set of knowledge that is flexible enough to surmount unexpected complications. The transcriptions of *Claire de Lune* by Victor Coeur (1929), Olga Erdeli (1957), Marcel Grandjany (1963), and Yolanda Kondanassis (2003) exemplify the importance of this flexible embodied knowledge.

Claude Debussy’s music is aesthetically well-suited for the harp. His Impressionistic style and penchant for soft sounds is well suited to the traditional image of the harp. Debussy’s writing delves into tonal ambiguity, nonrestrictive uses of dissonance, and quartal and quintal sonorities. The interactions between the harp’s distinct chromatic possibilities in the string layout and restrictions in the pedaling abilities with the music of Debussy are fascinating. *Claire de Lune* employs a D-flat Major key signature throughout, except for the C-sharp minor

[47] Kuo, “Transcribing for the Harp,” 15.

key signature from mm. 37-43.[48] The harp transcriptions discussed below solve the same pitch- and pedal-related problem in various ways.

An easily overlooked reality of the pedal harp system is that pedals that are set to produce a chromatic note must be set back when its diatonic variant returns. In other words, pedal changes are permanent without further invention. The need for these pedal resets is apparent from the first three measures of *Claire de Lune* (Figure 2.3). Measure 1 features an A-flat, m. 2, an A-Natural, and m. 3 returns to the A-flat. To play this original spelling, the harpist must move the A pedal twice, as each chromatic note must be "canceled" or reverted to its diatonic counterpart.

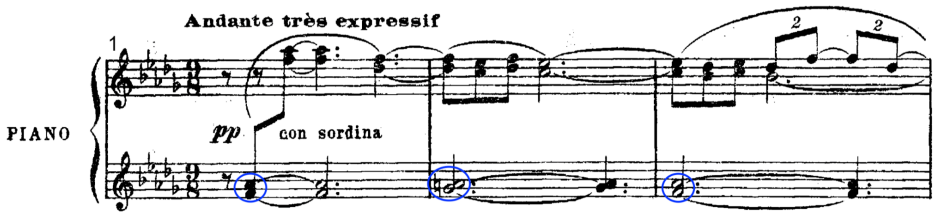


Figure 2.3 The oscillating A-flat and A in Debussy's *Claire de Lune*, mm. 1-3.

These harp transcriptions do not only take into account frequent alternations between a chromatic pitch and its diatonic version. They also find solutions for simultaneous soundings of a chromatic pitch and its diatonic version. Common solutions involve enharmonic equivalents between adjacent

[48] Claude Debussy, *Clair de lune*, from *Suite bergamasque* for piano (Paris: Durand, 1905).

strings. Kuo's study discusses several instances of these enharmonic changes. In particular, m. 20 poses an issue, where a G-flat, an A-flat, and an A-natural all occur within the same measure (Figure 2.4). Because the A-natural is plucked on beat one and the A-flat at the end of beat two, the harpist would need to change the A pedal extremely quickly.

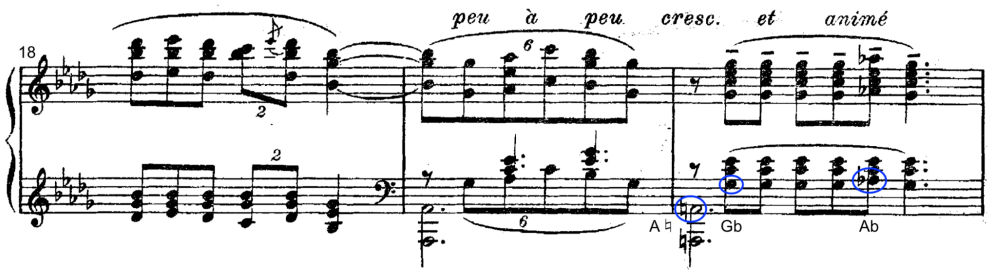


Figure 2.4. Debussy's *Claire de Lune*. Mm. 18-20.

These low A strings would unfortunately ring for an extended amount of time. The transcriber might indicate a muffling before the appearance of the A-flat to enable a quick pedal change while avoiding a pedal slide (Figure 2.5a). However, muffling would cut off this doted half note, which ideally should ring for the entire measure.

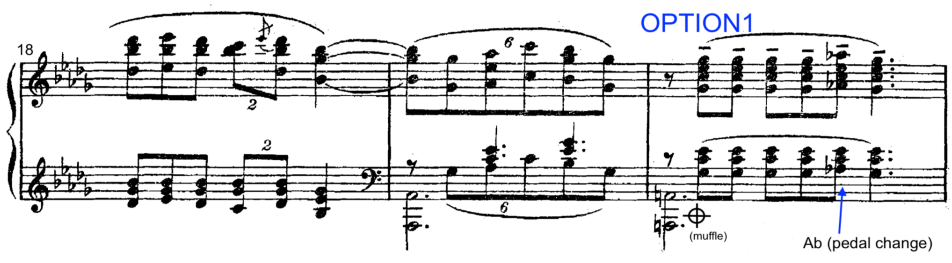


Figure 2.5a. The first option: muffling the low A string and quickly changing the A pedal to make A-flat.

Another option is to replace the A-flats with G-sharps at the end of beat two, enabling the A string to resonate for the entire measure (Figure 2.5b). However, because of the repeated use of G-flat up until the occurrence of the A-flat, the harpist would need to make a *double pedal change* (depressing a single pedal two notches, from G-flat to G-sharp) in the span of a single beat division. This extremely quick pedal change would likely produce a pedal slide because there would be no time to mute the ringing strings. Therefore, both the option of muffling the low A and depressing the A pedal and the option of using the G-sharp enharmonic equivalent are poor solutions.

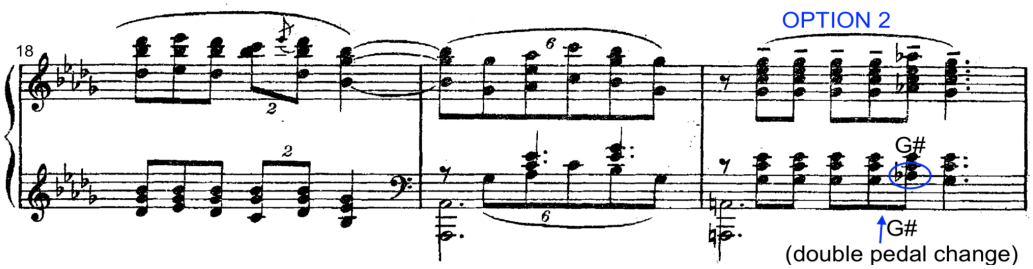


Figure 2.5b. The second option: quickly changing the G pedal to play a G-sharp in lieu of an A-flat.

Carlos Salzedo's transcription solves this chromatic conundrum through a different set of enharmonically equivalent pitches.[49] In m. 19, he indicates for the harpist to change the F pedal to F-sharp. Then he indicates for A-natural and G-sharp pedal changes in m. 20. As shown in Figure 2.6, Salzedo exchanges

[49] Claude Debussy, *Clair de lune*, transcribed for harp by Carlos Salzedo (New York: Southern Music Pub. Co., 1962).

Debussy's G-flat pitches for F-sharps and A-flats for G-sharps, and is able to keep the low A-natural resonating for the entire measure. Kondanassis' transcription does the same.[50] This figure also illustrates the standard notation for pedal changes: letter names on the bottom of the grand staff (or sometimes above or between the staves).

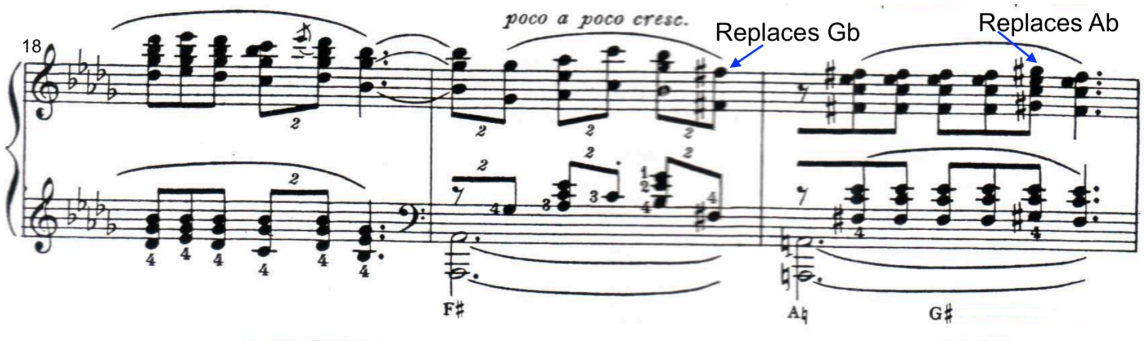


Figure 2.6. The enharmonic solutions in Carlos Salzedo's transcription of *Claire de lune,* mm, 18-20.

Victor Coeur takes a different approach, completely avoiding the issue by changing the home key of the piece.[51] Coeur's transcription is set to D Major, raising the piece by a half-step. This change voids the issue in m. 20, turning the three previous problem notes, G-flat, A-flat, and A-natural, into G, A, and B-flat. The only pedal change necessary in m. 20 is now a B-flat. (Figure 2.7).

---

[50] Claude Debussy, *Clair de lune*, in *The Yolanda Kondonassis Collection: Transcriptions, Arrangements and Original Works for the Harp*, transcribed by Yolanda Kononasis (New York: Carl Fischer, 2004).

[51] Claude Debussy, *Clair de lune*, transcribed by Victor Cœur (Paris: *Jean Jobert*, 1929).

The only downfall to Coeur's deft solution is the effect of the new key signature on the resonance of the harp. Since the harp is most resonant in keys with flats, where the strings are under the least tension from depressed pedals, a D-flat Major *Claire de Lune* would have a warmer, more befitting tone than a D Major *Claire de Lune*. The bargain between sound quality and ease of playing is an individual decision between transcribers. Figure 2.7 shows another notational option for pedal markings, where pedal changes are indicated with fixed-do symbols. Harp music that is written by French composers or is otherwise in the French tradition often shows pedal markings in this way.

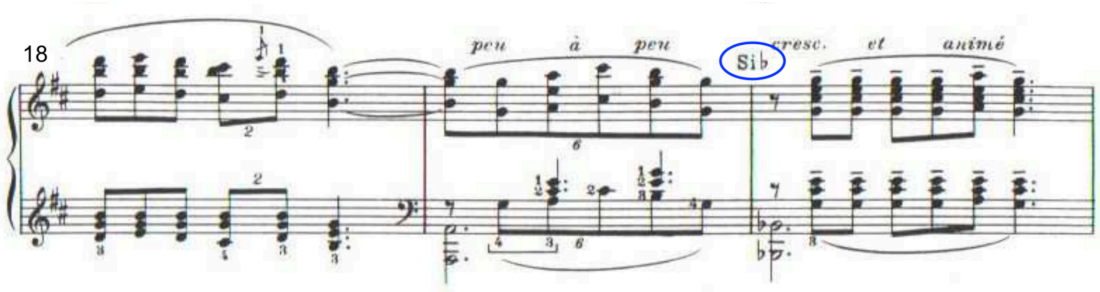


Figure 2.7. G, A, and B-flat in Coeur's transcription of *Claire de lune,* mm, 18-20.

Olga Erdeli's solution also bypasses the chromatic issue with notable downfalls.[52] In m. 20, she indicates for the harpist to make a quick change with the A pedal (Figure 2.8).[53] As discussed in Figure 2.5a (Option 1), this solution

[52] Claude Debussy, *Clair de lune*, in *Piat' p'es* by Olga Erdeli (Moscow: *Gos. muz. izd-vo*, 1957).

[53] The pedal annotation in this figure is my own. For Erdeli's editing style, this particular pedal change is too obvious to mark. Her transcriptions and

necessities the muffling of the low A string to avoid a pedal slide on this ringing string. This solution limits the resonance of the bass note, making an unfortunate change to Debussy's original intentions. The muffle would have to occur directly after playing the A-natural octaves, as this would be the only opportunity before the left hand is occupied playing eighth-note chords (Figure 2.8).

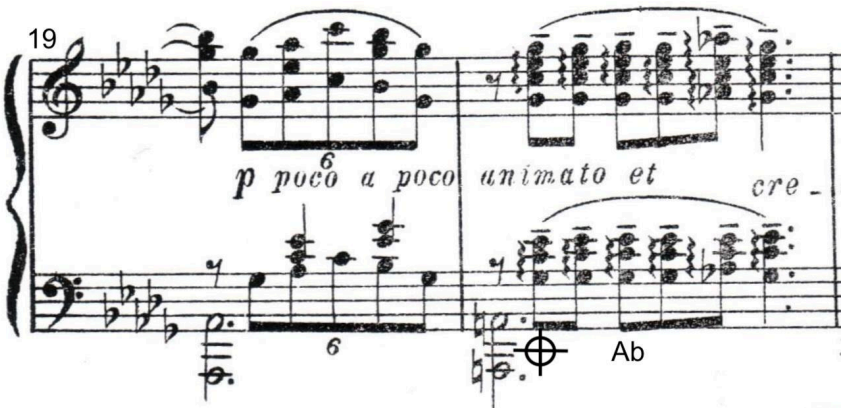


Figure 2.8. The quick pedal change in Erdeli's transcription of *Claire de lune,* mm, 19-20.

These four transcriptions of *Claire de Lune* illustrate the varied ways harp transcribers find idiomatic solutions to challenges posed by repertoire composed for the piano. Each chromatic pitch introduced to the pitch set must be "canceled" with another pedal change, which can create difficulties in rapid alternation between a note and its chromatic variant. Multiple different enharmonic

---

compositions often leave apparent pedal changes unmarked, just as composers for other instruments assume the performer's proficiency in discerning obvious fingering patterns.

equivalent options are often available, whereas changing the key of the piece may eliminate this issue entirely.

Arrangement: "Sarabande" from J.S. Bach's *Violin Partita* no. 1

The following arrangement of Bach's "Sarabande" from *Violin Partita* no. 1 (1720) moves far beyond transcription to transform a piece for violin into highly-idiomatic harp music. Marcel Grandjany (1891-1975) was a well-established and influential French harp composer.[54] Grandjany composed staple pieces in the larger body of harp repertoire, but also produced many arrangements.[55] His arrangement of the Sarabande from J.S. Bach's *Violin Partita* 1 (BWV 1002) is a prime example of how harp affordances impact every area of the musical content, especially harmonies and spellings.[56] The changes Grandjany made in the arrangement involve key choice, enharmonic equivalents, and the texture of the piece.

The pedal system strongly impacts spelling in "Sarabande." Although the majority of the music featured in this thesis is from an era much later than that of Bach, harp arrangements of Bach's music generate prime examples of how the

---

[54] Ann Griffiths, "Grandjany, Marcel," *Grove Music Online* (2011), https://doi.org/10.1093/gmo/9781561592630.article.11617, 1.

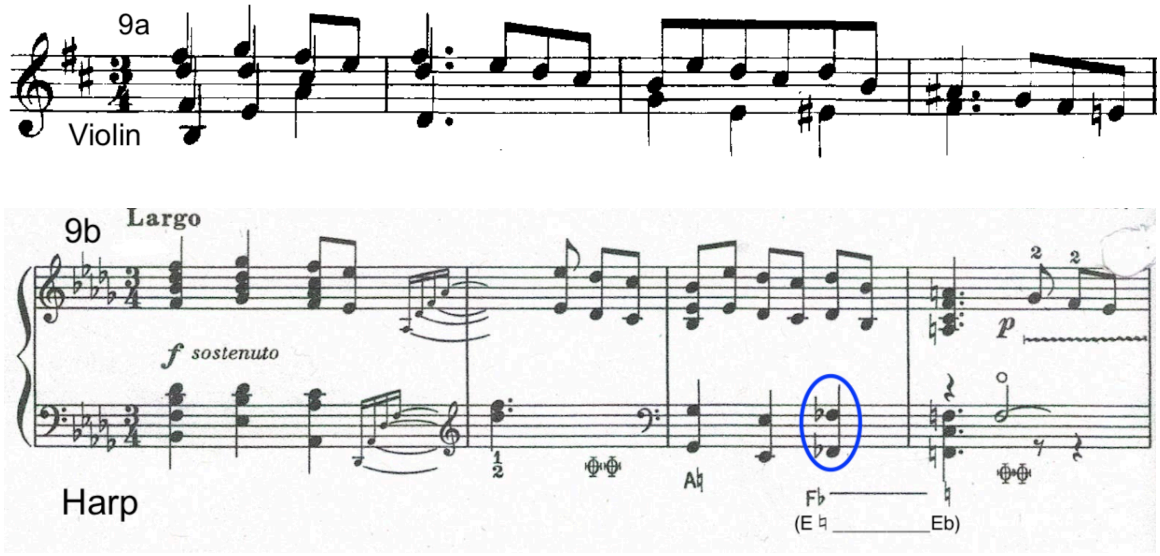
[55] Griffiths, "Grandjany, Marcel," 1.

[56] Marcel Grandjany, *Bach-Grandjany Etudes for Harp* (New York: *Carl Fischer Music*, 1970).

pedal system interacts with common-practice period tonality, which are indicative of its limitations and needs.

The original Sarabande is in B Minor, but Grandjany's arrangement is in Bb Minor. Keys with many flats are prevalent in harp repertoire both for the increased resonance of the harp when its strings are disengaged from the tuning disks and for the wider range of enharmonically equivalent pitches afforded by these keys. While the transcription moves the Sarabande down a semitone, the relative pitch content remains the same, albeit with the melody and bass split between the hands and filled in with more chord tones.

The original Sarabande involves many double stops on the violin throughout, creating multiple voices in the texture. However, a single hand on the harp could play these voices and their pitches. Grandjany’s arrangement adds several chord tones to thicken the texture and occupy the harpist’s both hands (Figures 2.9a and 2.9b). Because of the large number of added notes throughout, Grandjany’s piece functions more as an arrangement than a transcription. The composer adapted this Sarabande to fit a more harp-centric style of texture.



Bb Minor: i iv^{7} v^{6} III iv^{6} ii^{06} vii^{o7}/ V V

Figures 2.9a and 2.9b. The original and Grandjany's arrangement of J.S. Bach's *Violin Partita* no. 1, *Sarabande*: mm.1-4.

Beyond the substantial thickening of the texture (which is outside of the scope of this thesis), Grandjany made two enharmonic changes. The spellings of two chords in this piece are altered enharmonically to allow for ease of playing and to shorten the time needed for pedal changes. In m. 3, an F-flat doubled in an octave forms a lowered 5th scale degree (Figure 2.9b). The chord implied with this F-flat is an applied chord: vii^{o7}/V. The root of this chord was originally E (taking the transposition into account), but Grandjany's arrangement spells the chord with an F-flat.

The score employs the lowered 5th scale degree instead of the raised 4th. In either scenario (an E or an F-flat root), a single pedal on the harp would need

to be moved twice with virtually the same timing involved. The E pedal could be depressed to make an E, then set back up to E-flat for the next measure, or one could raise (F-flat) and then lower (F-natural) the F pedal.

The second scenario was Grandjany's chosen option, likely because it is more idiomatic. The right foot was just previously on the A pedal, raising the leading tone for the V chord. The distance from the A pedal to the E pedal is four pedals long, quite a span to move within a single measure (Figure 2.2). Conversely, the distance from the A pedal to the F pedal is only three pedals long. The physical distance to travel from the previous pedal change to the next is integral in composing for harp, especially for pedal changes that must be made quickly. The enharmonic equivalent F-flat allows for the necessary chromaticism by adhering to the physical logic of the pedal harp, but defying logic according to traditional music theory.

The second enharmonic change occurs at the end of the piece. In the penultimate measure of “Sarabande,” Grandjany’s arrangement reinterprets the tonic as the doubly-raised leading tone (Figure 2.10). This maneuver is also baffling if one does not account for the affordances of the harp. The finger span from F2 to B-flat 3 (an 11th) is quite large for many harpists, especially considering the two other pitches in between. Spelling this lush chord with an A# rather than the B-flat allows for more accessible playing. This enharmonic equivalent is employed to avoid an uncomfortably large finger span.

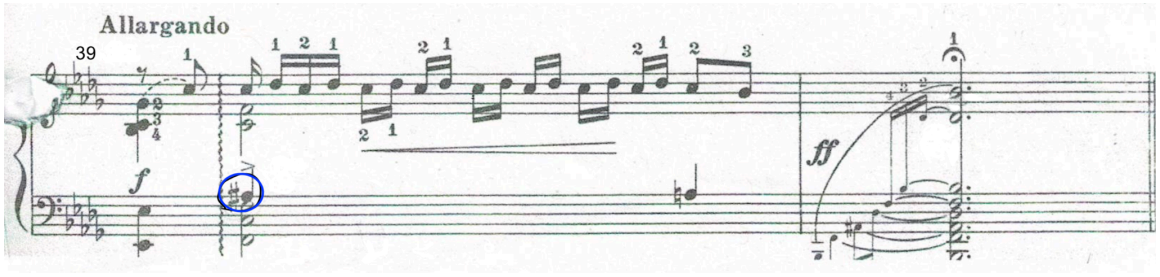


Figure 2.10. A-sharp replaces B-flat in m. 40 of Marcel Grandjany's arrangement of J.S. Bach's *Violin Partita* no. 1, *Sarabande*.

Marcel Grandjany's arrangement of Bach's "Sarabande" illustrates the various differences in textural idiomany between the harp and violin, while offering two fascinating examples of the inverted logic of the harp's pedal system. The enthralling rationale of this pedal system often results in harp music defying reason according to common-practice music theory. This disconnect between theoretical and physical logic grows starker in harp music with further chromaticism.

Common Pitch Collections

The double-action pedal system heavily impacts the pitch sets available on the harp and has the most striking influence on highly chromatic and nontonal repertoire. The string layout of the harp is fundamentally diatonic. Yet, modern harp music is often chromatic. This thesis employs pitch-class set theory extensively to describe the intersection between diatonicism and chromaticism that features prominently in modern harp music. Set theory is best suited for the

analyses in this thesis because it is an analytical method that transcends the boundaries of style and instrumentation across all equal temperament music.

Mark Gotham and Iain Gunn's "Pitch Properties of the Pedal Harp" is the first empirical study and overview of all possible pitch collections on the harp. As a mathematical pursuit, their research is based on the affordances of the instrument alone, calculating all possible pitch sets without considering the human element of physical idiomacy. However, their perspective is highly valuable in providing raw data and observations on the "very materiality of the instrument itself."[57]

Gotham and Gunn developed an interactive guide where one can change pedals and generate information on the set class of pitches they create. In the guide and accompanying article, the authors narrow their focus by basing their calculations on the assumption that only one pedal can be moved at a time. While harp composers often make pedal changes in sets and pairs (a key concept in this thesis), the interactive guide does not have the scope to recreate the experience of moving two pedals simultaneously.

Because there are seven pedals with three possible settings each (three notches), the number of distinct pedal settings on the harp is 2,187 (3^7). These different configurations allow the harpist to play multiple pitch-class sets with

[57] Gotham and Gunn, "Pitch Properties of the Pedal Harp," 1.2.

cardinalities between four and seven without changing pedals, with subsets included within them.[58] Cardinalities above seven extend beyond the limits of the number of distinct strings per octave on the harp. Because each pedal governs all strings of its associated note name (affording three possible pitch classes per pedal), only seven different pitch classes are available at a time.[59] Sets with cardinalities higher than seven require making pedal changes while playing.

Pedals can also be set to make adjacent strings double each other enharmonically, making four the lowest cardinality for pitch-class sets.[60] One example of a set with this cardinality is the pedal configuration: C♯, D ♭ , E♯, F, G♯, A ♭ , B (Figure 2.11). The resulting pitch-class collection can produce a V^7 chord. Pedal settings like this one are highly effective and idiomatic for glissandi, where running the fingers along the full span of the harp strings produces this single sonority or limited pitch set.

[58] Gotham and Gunn, “Pitch Properties of the Pedal Harp,” 3.2.

[59] That is, without *scordatura* (individually retuning a string).

[60] Gotham and Gunn, “Pitch Properties of the Pedal Harp,” 3.4.

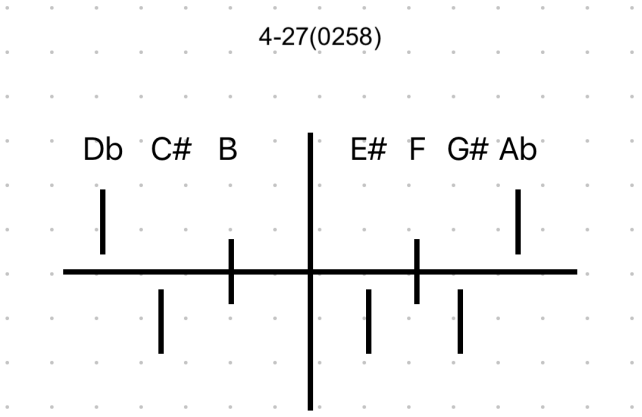


Figure 2.11. A pedal diagram of one possible pedal setting that results in a pitch-class set with a cardinality of 4.

The limitations in available cardinalities arise partly because of the diatonic arrangement of the harp strings. The harp strings are arranged with maximally even organization, which affects its participation in nontonal music. Particularly, cardinalities with excessive clustering pose difficulties for the pedal system. Because each string has only three chromatic settings, no more than four consecutive semitones are available.[61] Figure 2.12 shows an example of one such pedal setting. Pedal changes are required to make clusters of five or more consecutive semitones accessible on the harp.

[61] Gotham and Gunn, “Pitch Properties of the Pedal Harp,” 3.9.

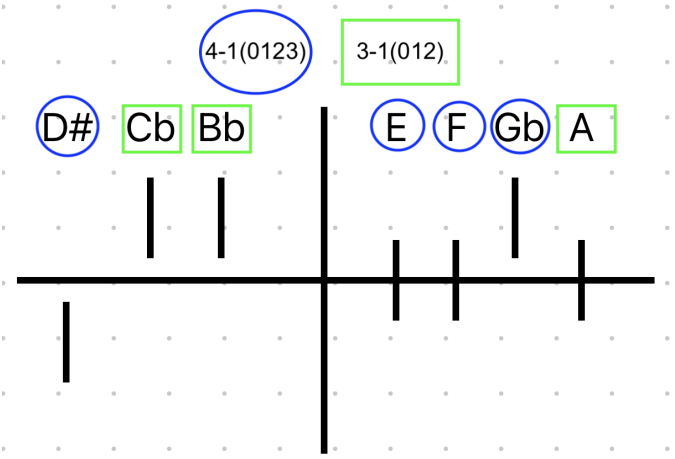


Figure 2.12. A pedal diagram showing one possible setting with two simultaneous chromatic clusters. One cluster is shown in blue circles, the other in green squares.

Pitch sets that feature many gaps also pose challenges due to the same restraints. The largest intervallic span available between two adjacent strings is interval class 4 (a major third). For instance, a setting with C-flat and D-sharp can produce ic 4 between the C and D strings (Figure 2.12). Because the maximum intervallic gap is ic 4, most pitch class sets with multiple gaps or larger gaps are only accessible on the harp through pedal changes.

Gotham and Gunn's calculations provide a set theory explanation for the propensity of pc sets with cardinalities below 7. Tetrachords employing enharmonic equivalents are abundant in chromatic harp repertoire. Doubling pitches by setting two adjacent strings to play the same enharmonically-equivalent pitch is a major idiom in traditional harp repertoire. On

the pedal harp, there are 42 possible pedal positions that create sets containing four pitches, despite the seven strings per octave. Figure 2.11 showed just one of 42 possibilities where three pairs of strings out of the seven can be tuned to the same pitch, with the seventh unpaired.

The division of the octave affects possible options for tetrachord pitch sets. Pairs of B/C and E/F strings offer a choice of which pitch to double. For instance, B-sharp can double C or C-flat can double B. However, the pairs of F/G, G/A, A/B, and C/D can only access the semitone between them. For instance, the only doubling option between F and G is F-sharp/G-flat. The 42 distinct tetrachords that are possible are often employed to create glissandi that sound different qualities of seventh chords. They are also employed for passages with plucked strings.

The string layout and the number of pedals on the pedal harp were constructed with the diatonic configuration and its maximal evenness. Because of this design, all set classes from 7-6 to 7-38 are available. However, the most prevalent sets on the harp are not the most maximally even. Although the harp strings are organized for maximal evenness, the spatial layout of the pedals complicate the matter. Gotham and Gunn observe that none of the most prevalent pitch sets on the harp - those that can be transposed the most times - are maximally even.[62]

[62] Gotham and Gunn, “Pitch Properties of the Pedal Harp,” 3.13.

6-34(013579) is the most prevalent pitch set on the harp. Although this set creates Scriabin's Mystic Chord, it is neither maximally even nor corresponds to any scale in common practice period (Figure 2.13).[63] The most prevalent pitch sets on the harp require extensive nomenclature with numerous alterations to relate to any common practice scales. While the harp strings were originally arranged to participate in a diatonic world, the addition of pedals to a previously diatonic instrument created unexpected results in the affordances of the instrument.

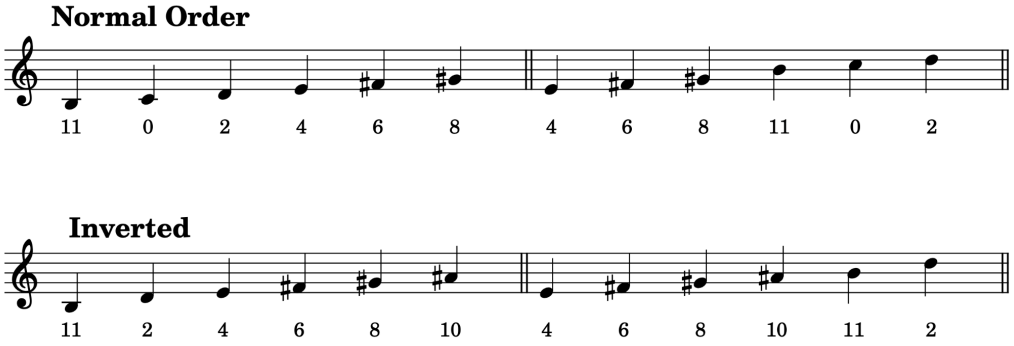


Figure 2.13. Four possible scales from 6-34(013579), the most prevalent pitch set on the harp.

Moving beyond static calculations where the pedals must remain unmoved, Gotham and Gunn propose a theory of "minimum distance and distinct routes." In this theory, they conjecture that the probability of each modulatory path from one pitch set to the next depends only on the individual intervallic

[63] Gotham and Gunn, "Pitch Properties of the Pedal Harp," 3.13.

distance each pedal must travel and how many pedals must be moved.[64] Gotham and Gunn calculate the different modulatory paths as identical in probability, as long as they involve moving the same number of pedals the same distance. The authors provide the following example:

> [T]o move from G major (one sharp) to F major (one flat), one could cancel F, and add B. That would be the most usual route in the context of a major-key tonality (through the cycle of fifths via C major), but one could have added the flat first and then removed the sharp, perhaps in the context of moving between the relative minors.[65]

The authors' calculations are valuable for theoretical observations on the abstract possibilities on the harp and are intended to inspire composers wishing to write for the pedal harp.[66] However, the following section complicates their calculations by introducing the performer's physical dimensions into the abstraction. The harp alone may not favor any distinct route from many of the same minimum distance. However, the performer's body certainly does.

Scheuregger and "the Physicality of the Instrument Itself"

Martin Scheuregger, a composer and theorist at Lincoln University, wishes to free the harp from "unhelpful idiomatic baggage."[67] His composition, *Be Still*

---

[64] Gotham and Gunn, "Pitch Properties of the Pedal Harp," 3.30.

[65]Gotham and Gunn, "Pitch Properties of the Pedal Harp," 3.29.

[66] Gotham and Gunn, "Pitch Properties of the Pedal Harp," 4.18.

[67] Scheuregger, "Redefining Idiomatic Writing for the Pedal Harp," 1.

(2015), challenges the French impressionist tropes that have become associated with the harp. It also employs a set theory approach, utilizing idiomatic pitch sets to create a harmonic landscape defined by the harp's pedal system.

Be Still consists of ten short fragmental movements. It employs sparse sounds and timbres, far from the lush qualities associated with the harp.[68] Many of the fragments lack muffling or muting for the harp, leaving the strings to vibrate until the sound naturally decays. Because pedal slides occur if a moving pedal cuts off a vibrating string, the instruction to not muffle in the score works in tandem with Scheuregger's approach to pitch collections in many fragments of *Be Still*. Without the aid of the muffling technique, some fragments feature limited pitch sets and pedal changes.

Scheuregger composes with two approaches to pitch in *Be Still.* Some fragments treat the harp as a chromatically-robust instrument, carefully planning pedal changes to create a wealth of diverse pitch collections. His second approach takes inspiration from the diatonic layout of the harp strings, treating the instrument as solely diatonic and imploying fixed pedal positions.[69]

The fifth fragment of *Be Still* employs a fixed pedal position. Scheuregger allows this pedal setting to define the modality of the instrument, linking the material of the music to the materiality of the instrument. His pedal setting

---

[68] Scheuregger, "Redefining Idiomatic Writing for the Pedal Harp," 3.

[69] Scheuregger, "Redefining Idiomatic Writing for the Pedal Harp," 10.

creates the mode A-flat Harmonic Minor with a raised fourth scale degree. The clusters of minor seconds in this mode (D–E-flat–F-flat) allow the composer to create ambiguity around the pitch center (Figure 2.14).

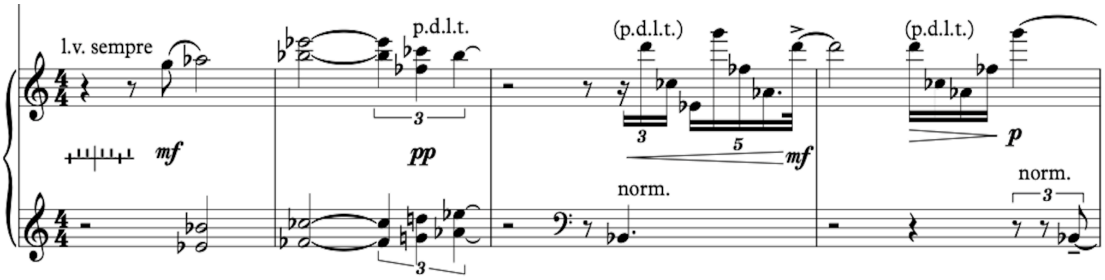


Figure 2.14. Tonal ambiguity in the first 4 measures of Martin Scheuregger's *Be Still*, "Fragment V."

In "Fragment V," The harp resonates without any muffling or muting, keeping pitch at a stasis that "is at odds with the potential for chromatic dexterity that is so often exploited by composers."[70] The fifth fragment of *Be Still* avoids traditional stylistic idioms and works instead with the inherent pitch properties of the harp. Challenging enforced chromaticism, the fixed pedal setting defines the pitch content of the work.

In an unpublished work, Scheuregger proposes a middleground between imposing extraneous chromaticism on the harp and employing fixed pedal positions.[71] Using the most commonly occurring set with seven pitches on the

[70] Scheuregger, "Redefining Idiomatic Writing for the Pedal Harp," 10.

[71] Scheuregger discusses this work and reproduces parts of it in "Redefining Idiomatic Writing for the Pedal Harp," 13-23.

harp, 7–20(0124789), Scheuregger created two inversionally-related modes (Figure 2.15).

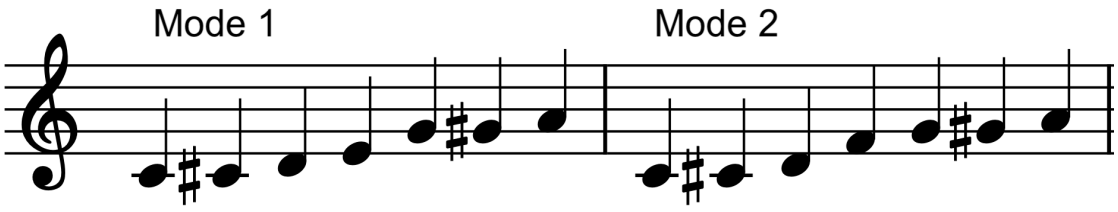


Figure 2.15. The two modes from Scheuregger's solo harp work.

Organizing the pitch collections so that transpositions of these modes are separated by a single pedal change, Scheuregger creates a custom "cycle of fifths."[72] Much like the circle of fifths, it organizes the modes for this composition transpositionally, but the two trichords within the pitch set of the modes, (012), add much more repetition of pitches and less linearity to the relationships.[73] In the opening passage of his unpublished work, Scheuregger employs the two modes on C-sharp and G-sharp respectively (Figure 2.16). The predominance of fifths creates a tonally ambiguous space where the "pitch material has been derived from the physicality of the instrument itself."[74]

[72] Scheuregger, "Redefining Idiomatic Writing for the Pedal Harp," 10.

[73] Scheuregger, "Redefining Idiomatic Writing for the Pedal Harp," 19.

[74] Scheuregger, "Redefining Idiomatic Writing for the Pedal Harp," 20.

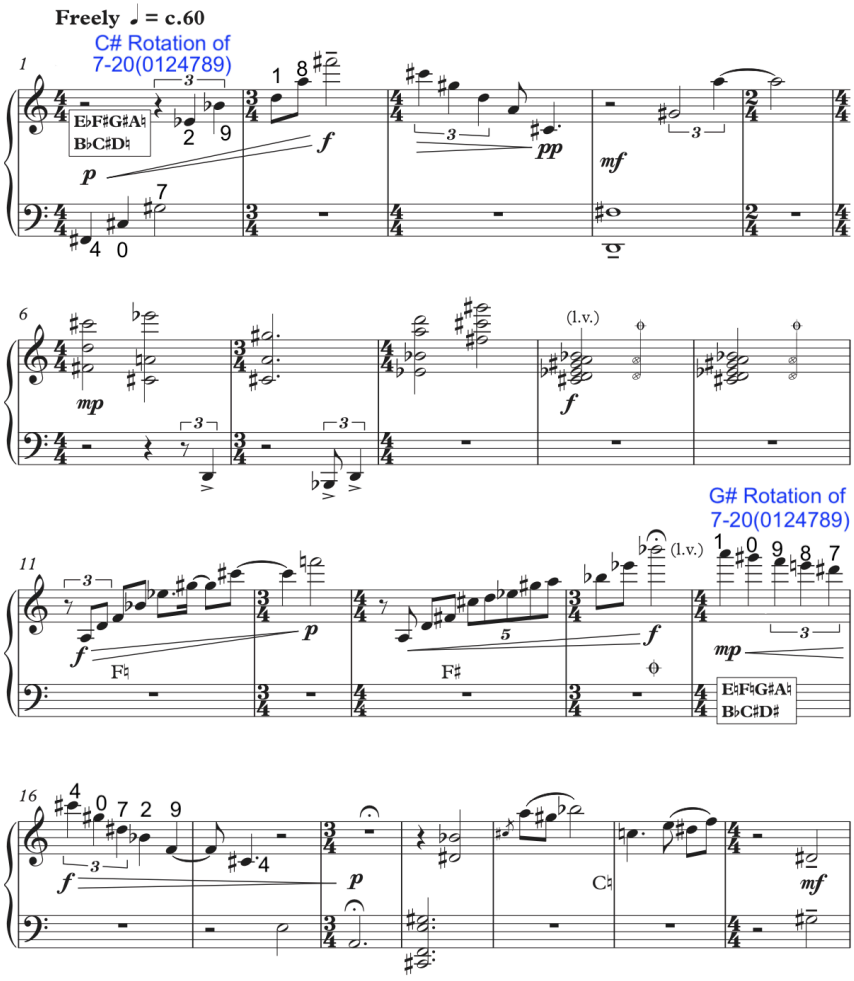


Figure 2.16. The opening measures of Scheuregger's compositional concept where Modes 1 and 2 are employed, transposed a fifth apart.

Martin Scheuregger's *Be Still* and other compositional concept employ a set theory approach to the harmonic qualities of the harp, utilizing idiomatic pitch sets to create a harmonic landscape defined by the harp's pedal system. Leveraging the harmonic propensities of the harp, Scheuregger demonstrates a new transpositional system, cycling through chromatic pitch material that is

idiomatic to the pedal harp. Through this modified circle of fifths, Scheuregger generated the first system of harmony based solely on the physical properties of the pedal harp.

Scheuregger shows that the internal logic of the pedal system subverts the tonal system in many ways. The pedals assert their own harmonic and tonal guidance to the perceptive composer. However, his composition employs the pedal proclivities suggested by Gotham and Gunn, following their calculations that present all chromatic distances as equals. The T_5 operation in m. 15 requires three pedal changes (F-natural, E-natural, D-sharp), which is not impossible but not ideal for a single measure.

In Gotham and Gunn's minimum distance, distinct routes theory, pedal changes are calculated as idiomatic due to the small number of changes necessary to arrive in another mode, not the distance between each pedal change. These calculations are most reasonable for a harp without a harpist. Therefore, this theory of minimum distance and distinct routes may not hold the same relevance in traditional harp repertoire. The distance from one semitone to another, while equal from a theoretical standpoint, can be entirely different when mapped onto the harp pedals. The distance the harpist's foot must travel from its position from one pedal to the next can vary greatly when making a semitonal change, depending on which specific pitch is being changed. As seen in Grandjany's doubly-raised leading-tone (Figure 2.10), pitch choices and

modulatory routes (i.e. the ones involving pedals that are closer together) are closer than others, despite being theoretically equivalent. Gotham and Gunn visualize pedal changes on the harp as dictated by music theory. In reality, pedal changes are governed more by the affordance of the physical distance between pedals. Further complicating matters, pedals are often moved in tandem in standard repertoire, with one pedal change on each side of the layout. In addition to factors of distance, the idiomacy of pedals is heavily effected by the relative motion between two simultaneous pedals.

Pedal Pairs: "Fire Dance" by David Watkins

"Fire Dance" from *Petite Suite* (1961) by David Watkins exemplifies the concept of the internal logic of the pedal system with both pedal distance and pedal pairs.[75] In an interview with the *American Harp Journal*, Watkins shared that he wrote this chromatically adventurous piece in thirty minutes, describing his compositional method as intuitive and improvisatory.[76] He did not methodically plan this piece, but rather "rattled it out."[77]

---

[75] David Watkins, "Fire Dance" (England: *UnitedMusic Publishers Ltd*., 1984).

[76] John Browne, "David Watkins: An Intimate Portrait," *American Harp Journal* 26 no. 2 (Winter 2018): 1-9.

[77] Browne, "David Watkins," 4.

"Fire Dance" makes striking harmonic changes and employs surprising non-tonal pitch collections. However, these harmonic changes correspond perfectly to a pedal-based logic. A major principle in the logic of the pedal system is the symmetry between the right and left sides of the harp. It is more intuitive for limbs to move together and with synchronized motions.[78] If a harp composer makes two pedal changes, these changes would be most idiomatic moving together, not only vertically, but also horizontally. Both the vertical movement of the pedals (up or down) and the horizontal movement of the feet from one pedal to the next (inward and outward along the rounded base of the harp) are most idiomatic when made symmetrically and together.

Symmetry on the harp can be defined as the position of the feet relative to the pedal system and to each other. As Figure 2.17 shows, the symmetrical connections between pedals make three pairs: E and B, C and F, and A/G and D. The harp system thus involves three categories: inner pedals, medial pedals, and outer pedals. Their symmetry plays an integral role in the harmonies in "Fire Dance."

[78] Britta Worringer and Robert Langner, "Common and distinct neural correlates of dual-tasking and task-switching: a meta-analytic review and a neuro-cognitive processing model of human multitasking" *Brain Structure & Function* 224, no. 5 (April 2019): 1845-1869, https://doi.org/10.1007/s00429-019-01870-4.

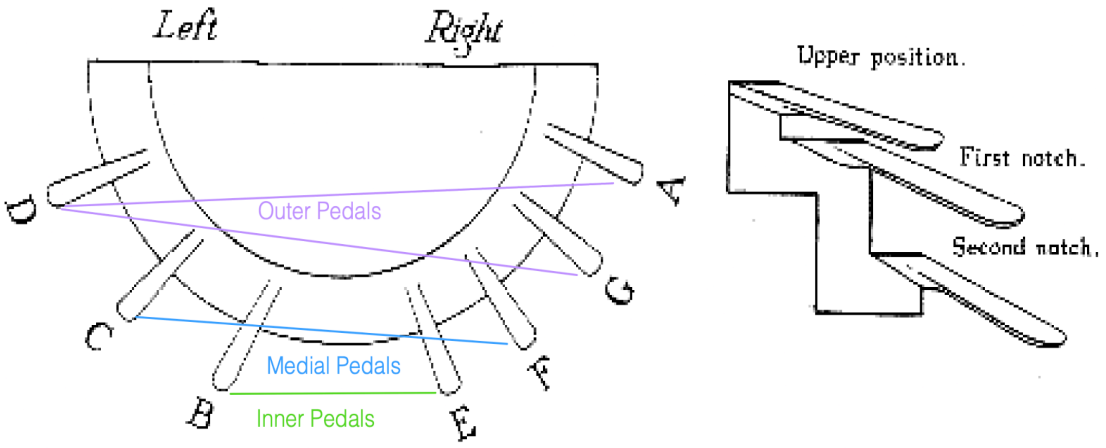


Figure 2.17. Pedal pairs on the harp. From Albert Zabel, “Method for the Harp” (Leipzig: *Zimmermann*, 1900), 6. My colored annotations.

“Fire Dance” begins in D Major, but soon navigates to the key of the Neapolitan. Modulating from D Major to E-flat Lydian on the harp entails four pedal changes. On the left side, the C and B pedals on the left side need to be raised one notch, from C-sharp and B-natural to C-natural and B-flat. On the right, E-natural and F-sharp need to be raised one note to E-flat and F-natural. By physical necessity, a harpist would connect these pedal changes in pairs of C with F and E-flat with B-flat, allotting one pedal each to their right and left feet. In Figure 2.18, the pedal pair C–F (m. 12) changes the pitch collection to D Minor, while the pair B–E (m. 14) creates the E-flat Lydian collection.

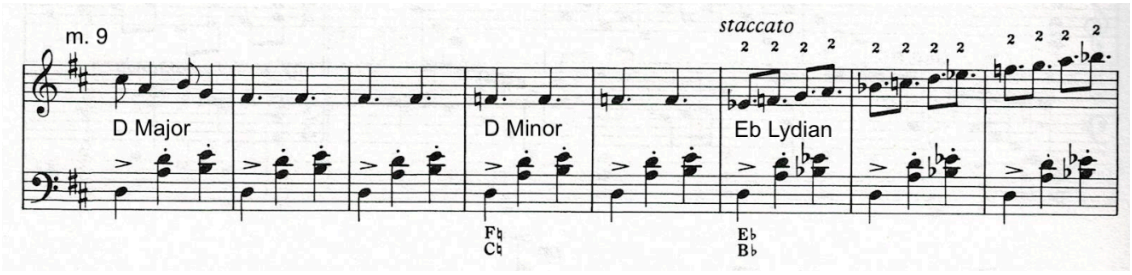


Figure 2.18. The pedal pairs required to move from D Major to E-flat Lydian in mm. 12-16 of “Fire Dance” by David Watkins.

Soon, the pitch collection gives way to D-flat major, as another pair of pedals, D and A, are raised. In m. 61, the E/B pair is depressed again to create the double harmonic major scale shown in Figure 2.19: 6-Z44(012569).

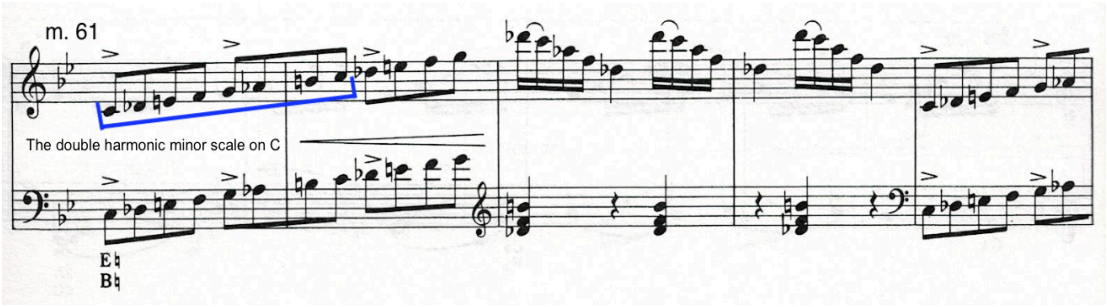


Figure 2.19. The double harmonic major scale in mm. 61-65 of “Fire Dance” by David Watkins.

In mm. 68-69, the same pedal pair is depressed again, to add B-sharp and E-sharp to the pitch collection (Figure 2.20). The resulting collection in this passage is the pentachord 5-27(01358). While six separate strings are played during this passage, the enharmonic pairs B-sharp/C and E-sharp/F reduce the resulting pitch set.

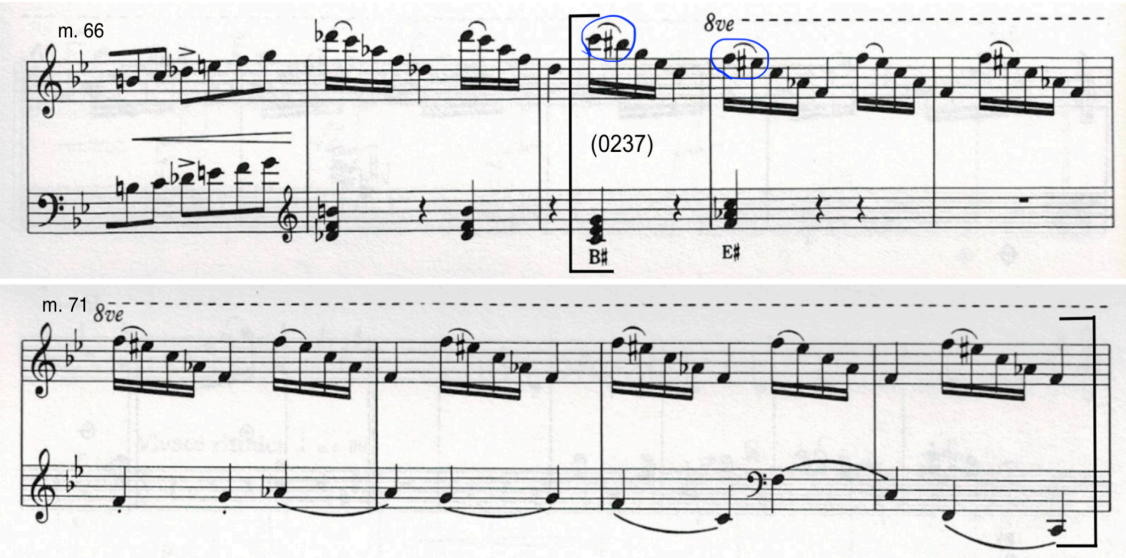


Figure 2.20. The pentachord 5-27(01358) in mm. 68-69 of “Fire Dance” by David Watkins. Enharmonic equivalents are circled in blue.

Measure 85 involves another symmetrical pedal pair: F-flat and C-flat. Harmonically, this move results in a surprising and propulsive pc set that launches the music into a new pitch center. The new set, 4-18(0147), employs enharmonic equivalents to obscure the standard pitch of two strings. The F strings are set to F-flat (sounding E), while the E strings are set to E-sharp (sounding F). This pedal change subverts the diatonic layout of the strings, reversing the order of E and F (Figure 2.21).

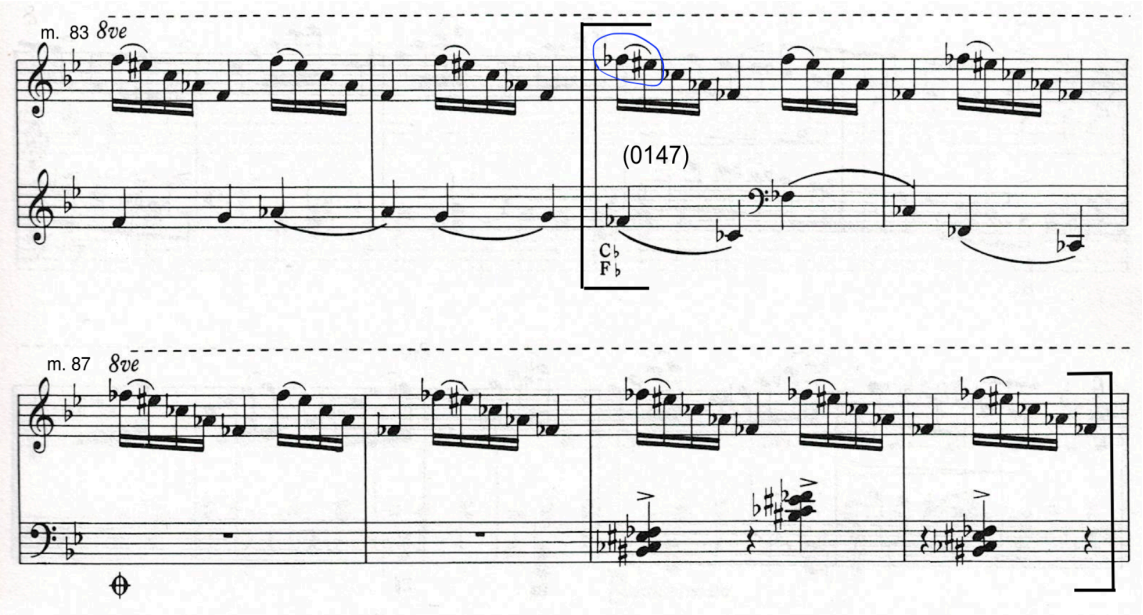


Figure 2.21. The pedal pair F and C create the tetrachord (0147) in m. 85 of "Fire Dance" by David Watkins. The reversed string order F-flat and E-sharp are circled in blue.

This pitch set and its reordering of diatonic order find logic within the physical idiomacy of the harp. Physically, each pedal change in "Fire Dance" is far from surprising, as it continues the pedaling pattern of symmetry that Watkins follows throughout the piece. Table 2.3 summarizes all the pedal changes and resulting pc sets in "Fire Dance." Arrows indicate the vertical movement of the pedals (which is opposite to the chromatic movement of the pedals' associated pitches). As the table shows, this piece visits many different modes and pitch sets, all of them resulting from pedal changes made intuitively in pairs. These symmetrical pairs are just one type of pedal schema. Chapter 3 discusses these

schemas as pedal changes that transcend their harmonic ends as embodied knowledge for the harpist-composer.

Table 2.3. Pedal Pairs in “Fire Dance” by David Watkins.

mm.	Pitch Collection	Left Pedal Change	Right Pedal Change
1	D Major		
12	D Minor	C♮↑	F♮↑
14	Eb Lydian	Bb ↑	Eb ↑
22	D Minor	B♮↓	E♮↓
24	D Major	C# ↓	F# ↓
37	D Minor	C♮↑	F♮↑
41	Eb Lydian	Bb ↑	Eb ↑
54	Db Major	Db ↑	Ab ↑
61	6-Z44(012569)	B♮↓	E♮↓
68	5–27(01358)	B# ↓	E# ↓
85	4-18(0147)	Cb ↑	Fb ↑
93	4-14(0237)	C♮↓	F♮↓
105	4-19(0148)	B♮ ↑	E♮ ↑
107	D Minor	D♮↓	A♮↓
119	D Major	C# ↓	F# ↓
146	Eb Lydian	Bb ↑	Eb ↑
148	D Major	B♮↓	E♮ ↓

Conclusion

Harp arrangers and transcribers demonstrate a high level of flexibility and creativity in working with pitch- and harmony-related challenges. The physical layout of the strings and pedal system sometimes create difficulties with chromaticism. However, these limitations and difficulties create an environment where novel perspectives flourish. When a pitch and its chromatic variant are not simultaneously available, an enharmonic equivalent may often be used. As seen in the transcriptions of *Claire de Lune*, the intricacies of enharmonic spelling provide manifold options for transcribers and arrangers. As in Grandjany's "Sarabande" transcription, these respellings illustrate the great disunion between the internal logic of the pedal system and the tonal system it takes part in.

From a more empirical perspective, Gotham and Gunn present the harmonic possibilities and propensities of the harp that influence this internal logic. The unique combination of a diatonic string layout and the spatialization of chromatic access from the pedal layout have fascinating effects on the pitch class propensities of the harp. The harp's unique relationship with harmony can be observed through the harp arrangements of preexisting music by harp composers.

Composers creating music specifically for the harp in response to its distinctive chromatic propensities amplify this unique relationship. Martin

Scheurreger's compositions apply empirical knowledge of the pedal system in creative ways, exploring the different avenues available to those who compose for the specific physicality of the instrument.

"Fire Dance" by David Watkins presents an intuitive approach that reveals the composer's deep familiarity with the physical operations of the instrument and the harpist's embodied interactions with it. Employing the most idiomatic motions possible to attain harmonically propulsive and exhilarating results, Watkins demonstrates the instinctual and embodied harmonic logic of the pedal system. The next chapter expands the discussion of this embodied harmonic reasoning, designating and describing a theory of pedal idiomacy through the analytical frame of the pedal schema.

Chapter 3:

Pedal Schemas, Pedal Transformations,

and Motivic Development in Pedal Motion

Introduction

This chapter outlines, justifies, and demonstrates a new theory of pedal schemas with a plethora of examples from staples in harp repertoire. Because of the harp's unique relationship to chromaticism, as it operates with a diatonic string layout and a chromatic pedal layout, pitch sets and transitions between sets can occur in unusual ways that require a new theory to explain them. One theoretical model is the pedal schema – an embodied mode of analysis that follows the relative motions of harp pedals.

This chapter demonstrates the power of this framework through analyses of *La Source* by Alphonse Hasselmans, *Nocturne* by Alan Hovhaness, *Chanson de la Nuit* by Carlos Salzedo, and *Six Noels* by Marcel Tournier. Through these works, this chapter follows the pedagogical and compositional lineage of pedal idiomacy. Each of these representative works provide a real-life example of a particular pedal schema and its motions along the vertical and horizontal planes of the pedal space.

An analysis of *La Source* introduces the concepts of pedal adjacency, oblique horizontal motion, delayed pairs, oscillating pairs, and leading single pedals. *Nocturne* by Alan Hovhannes is the backdrop for an introduction to the pedaling motif and contrary horizontal and vertical motion. *Chanson de la Nuit* expounds upon the harmonic results of contrary vertical motion, with its pitch-class sets of low cardinalities through doubled strings. This piece is also a representative case of disjunct horizontal leaps and expounds upon the differences between high skill level and lack of idiomacy in writing.

Finally, this chapter presents an analysis of Marcel Granjany's *Six Noels* that follows the motivic development of a single schema – the adjacent single pedal cluster – over the course of this cycle of pieces. This chapter provides an overview of pedal motion and its schemas, and displays the analytical value of the pedal schema while following the simultaneous thread of its development through the historical harp idiom.

Pedal Schemas

In "Fire Dance" by David Watkins from Chapter 2, each pedal change in the piece occurs in a symmetrical pair, producing surprising and unusual pitch sets and transitions between sets. The phenomenon of pedals appearing to follow embodied patterns, sometimes unrelated to common-practice harmony or other post-tonal systems, highlights the need for an embodied theory of harmony

and pitch for the harp. One possible theory to explain such patterns involves the pedal schemas.

The theory of pedal schemas proposed and developed in this thesis takes inspiration from Robert Gjerdingen's Galant schemas. Gjerdingen's *Music in the Galant Style* explores how Galant composers employed stock phrases to build their compositions and conform to idiomatic styles.[79] This pedagogical tradition was passed down to composers from Neapolitan conservatories. It allowed them to learn the grammar of Galant music and utilize preexisting building blocks to create new music.[80] One example of a galant schema is the Do-Re-Mi Schema, an opening figure that establishes the tonic (Figure 3.1).[81]

[79] Robert Gjerdingen, *Music in the Galant Style* (Oxford: *Oxford University Press,* 2007).

[80] Gjerdingen, *Music in the Galant Style*, 6.

[81] Gjerdingen, *Music in the Galant Style*, 78.

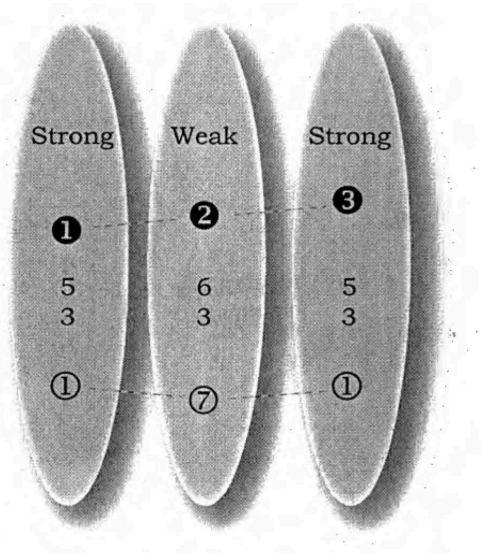


Figure 3.1. The Do-Re-Mi Schema. From Robert Gjerdingen, *Music in the Galant Style*, 78.

Gjerdingen takes the term *schema* from psychology and cognitive science, where schemas are studied as patterns of thought and behavior that organize pieces of information and the relationships between them.[82] Because schemas are preconceived frameworks of aspects of the world, they can influence a person's perception of the world. Thus, schemas are the lenses through which we assess our environment.[83]

---

[82] Paul DiMaggio, "Culture and cognition," *Annual Review of Sociology* 23, no. 1 (August 1997): 263–287, 10.1146/annurev.soc.23.1.263.

[83] Andrei Boutyline and Laura Soter, "Cultural Schemas: What They Are, How to Find Them, and What to Do Once You've Caught One," *American Sociological Review 86* no. 4 (July 2021): 728–758, 10.1177/00031224211024525.

In a comparable way to the psychological schema, pedal schemas are the lens through which harpists and harpist-composers may view pitch and harmony. Like Gjerdingen's Galant schemas, pedal schemas are the patterned building blocks that comprise those harmonies and pitch collections. Pedal schemas lie in the junction between legacy and agency, arising from harmonic changes in harp music and in turn influencing them. Much like the QWERTY keyboard, the patterns resulting from the pedal system can be analyzed as both results of and agents in the processes from which they arise.

Pedal schemas are defined by the different levels of directionality in the pedal space. They encompass both the vertical distance a pedal must move up or down in the notches of the pedal system and the horizontal distance the harpist's foot travels from one pedal change to the next. Table 3.1 shows all major pedal schemas in this thesis. Each row describes one schema, combining the information from the left and right columns. Additional labels may be added to these schemas in analysis, showing whether or not the horizontal motion is adjacent. The movement of a single pedal is not complex enough to qualify as a schema, since schemas involve multiple interacting moving parts.[84] Instead, the relationship between the motions of two simultaneous pedal changes involving both sides of the pedal layout (pairs), or consecutive pedal changes on one side of the pedal layout (clusters), creates a schema.

[84] Gjerdingen, *Music in the Galant Style,* 12.

Table 3.1. An overview of pedal schemas, labeled by their relative horizontal and vertical motion.

Paired Schemas	
Horizontal Motion (Pedal-to-Pedal)	**Vertical Motion (Notch-to-Notch)**
Parallel	Parallel
Parallel	Similar
Parallel	Contrary
Similar	Parallel
Similar	Similar
Similar	Contrary
Contrary	Parallel
Contrary	Similar
Contrary	Contrary
Oblique	Parallel
Oblique	Similar
Oblique	Contrary
Single-Pedal Schemas	
Adjacent Single Cluster	
Leading Single Pedal	

Pedal schemas are comprised of motions that occur on both the horizontal plane and the vertical plane of the harp pedal layout. These movements are often considered in tandem. To move a new pedal vertically, one must access it with a

horizontal movement. In other words, a harpist's foot must move to a new pedal before raising or depressing it. Only vertical movements can occur alone, when a single pedal is set and reset multiple times. Horizontal movements do not occur on their own in pedal schemas, as these operations always lead to vertical movements.

Pedal schemas describe horizontal and vertical motions through the familiar voice leading terms: parallel, similar, contrary, and oblique. Parallel motion involves both feet moving the same distance and direction to new pedals. Similar motion involves both feet moving in the same direction, but different distances to new pedals. Oblique motion occurs when one foot moves to a new pedal while the other remains on its current pedal. Contrary motion occurs when the feet move in opposite directions, outward or inward on the pedal layout.

The same explanation applies to vertical motion, which is described with the same terms. Vertical motion can be parallel (where the feet move the pedals down or up the same number of notches), similar (when the feet move the pedals in the same direction but a different number of notches), or contrary (when the feet move the pedals up or down the notches in different directions and possibly different distances). Oblique motion does not occur vertically in pedal pairs, as that motion would then be described as a single pedal, not a pair.

Pedal schemas represent and embody the harmonies to which they relate. As embodied blueprints of harmonic motion, these schemas represent the

general harmonic changes they produce. However, each schema can function as an analytical symbol for many different harmonic changes. A single schema can generate various harmonic changes when used in composition. The pedal schema enables theorists and composers to group and organize changes in harmony according to physical parameters, rather than any number of standard theoretical parameters.

Pedal schemas also transcend the harmonies they represent. To associate changes in pitch class with certain spatialities is to give them a new, hybrid meaning. For instance, to place all changes in the pitch class E on the right side of one's instrument and body is to create new associations and meanings for that pitch and harmonies involving it. As this chapter illustrates, related pedal schemas may be unrelated according to a common practice theory framework, and related harmonies in the common practice may be represented by entirely different pedal schemas. Rather than treating changes in pitch collection or harmony as disembodied positions on a pre-existing hierarchy, pedal schemas treat them as physical operations of connections between each dimension in space and each other. These connections may yield recognizable harmonies, but they also transcend them by creating a new web of meanings. As

sets of categorized motions with any number of combinations and sequences, these schemas can stand completely alone as analytical frameworks.[85]

Pedal schemas are also entirely silent operations. They affect the pitches and harmonies available, but do not produce those pitches themselves. The following section shows how the movements of the pedals and the sounding pitch material do not always align chronologically. Many pedal changes occur in advance of upcoming harmonies or occur in different orders than the harmonies that employ the associated pitch classes, while others create enharmonic harmonies that function differently from what the pedals alone suggest. Pedal motion is at the forefront of the compositional and performance processes of the harp, but remains largely unnoticed by listeners. As analyzable events on the same level as pitch, but not always coordinated with pitch, pedal changes require a framework of analysis that takes their unique relation to the rest of the score into consideration.

[85] The pedal schemas defined and developed in this thesis are the result of my intuition and experience as a harpist. Claims about motions being idiomatic or standard require support from corpus studies on pedal schemas: an analysis of a large corpus of harp repertoire to generate data on how often these schemas occur. However, this thesis takes the first steps toward these studies through its engagement with a variety of harp repertoire from different composers and eras. The postlude discusses this subjectivity and the need for further studies.

Schemas and Pedal Timing in *La Source* by Alphonse Hasselmans

One of Alphonse Hasselmans' (1845-1912) most enduring harp compositions is *La Source* or "The Brook" (1898), a staple concert etude in advanced harp repertoire.[86] As a professor at the Paris Conservatoire and composer of numerous technical studies, Hasselmans was an important figure in the development of harp technique.[87] The texture of descending arpeggios and pedaling tones in low octaves in *La Source* is demonstrative of the developing harp idiom at the time. The pedal changes similarly exemplify traditional idiomatic pedaling motion, revealing the pervasiveness of schemas in historical harp repertoire.

The first pair of pedals in *La Source* employ parallel vertical motion to change a G and B-flat to a G-sharp and B-natural (m. 17). This pedal pair is moved in advance: the impending change in pitch collection from the home key of F Major that requires this G-sharp and B-natural appears five measures later. Mysteriously, three measures after, another pitch-class change requires the C

---

[86] Alice Lawson Aber-Count, "Hasselmans, Alphonse," *Grove Music Online* (January 2001), https://doi.org/10.1093/omo/9781561592630.013.90000380952, 1.

Alphonse Hasselmans, *La Source: Etude pour la Harpe, Op. 44* (Paris: A. Durand, 1898).

[87] Aber-Count, "Hasselmans, Alphonse," 1.

and F pedals to descend and create C-sharp and F-sharp. Yet, the pedal markings indicate for the G and B pitches that are required later to be changed first.

Hasselmans' curious order of operations engages with the physical reality of the pedal system, its idiomatic timing requirements, and the pervasiveness of pedal pairs. Two measures after the C-sharp and F-sharp pedal change, and in the impending fifth measure from the first pedal change, the collection changes to require C- and G-natural, while employing the previously-set B-natural. Rather than compose six separate pedal changes that require moving back and forth from different pedals in a single measure, the pedals are completed in three pairs over mm. 17-21 (Figures 3.2a and 3.2b).

In Figure 3.2a, each pedal change from mm. 17-25 is made in a pair, except for two. These original pedal changes from the score feature a highly idiomatic order of changes to the associated pitch classes. The figure shows each pedal change and the associated change in pitch set circled in the same color. The paired pedal changes are made far in advance and in a different chronological order from how they occur in the sounding music. However, they create an ease of playing, allowing the harpist to change one pedal pair at a time and avoid moving back and forth between the same pedals. These pedal pairs and smooth, conjunct motion are methodical deployments of schemas, but do not follow the changes in pitch class as they chronologically sound in the piece.

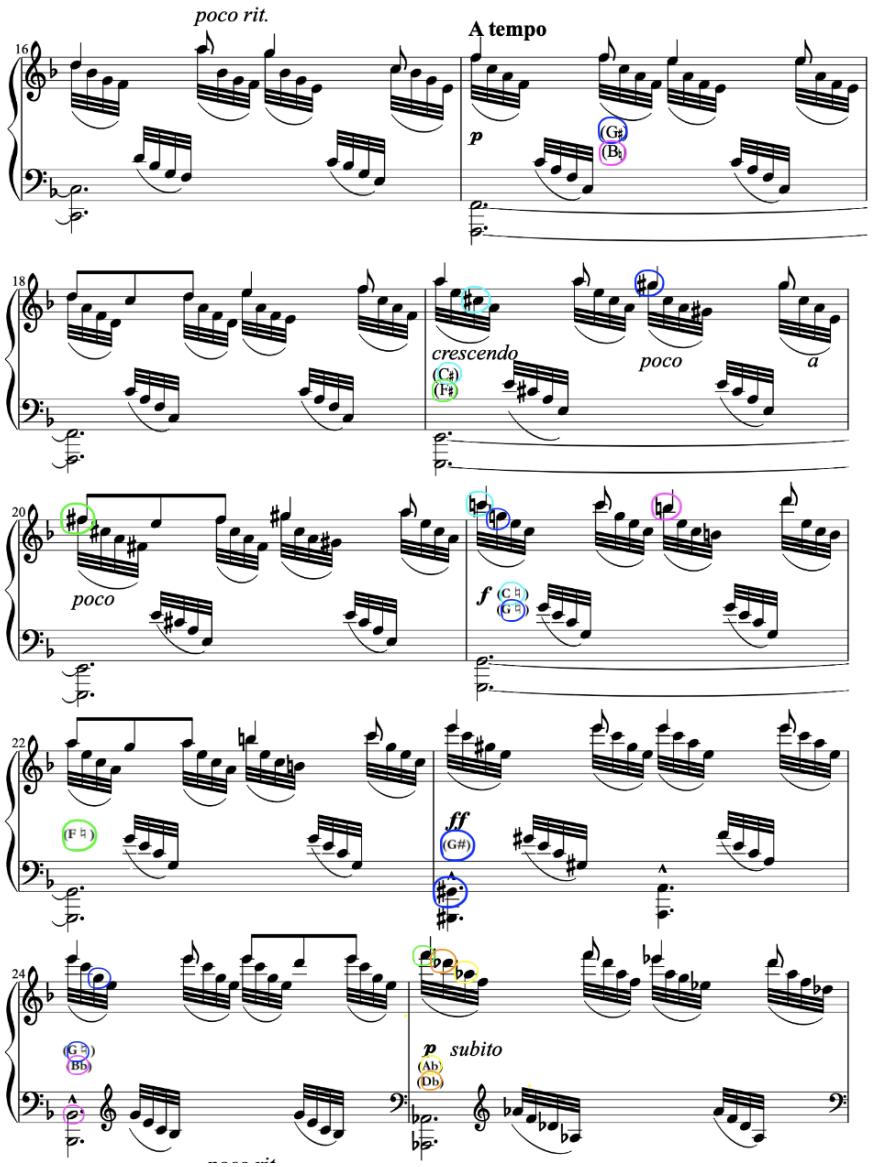


Figure 3.2a. Mm. 16-25 of *La Source* by Alphonse Hasselmans with the original pedal markings. The pedal change and its associated change in the pitch set are circled in the same colors.

My pedal markings in Figure 3.2b illustrate the difficulties in attempting to align pedal changes with the chronology of the pitch classes in the score. Rather

than Hasselmans' idiomatic order, each pedal aligns with the ordering in which the associated pitch-change appears. These pedal changes feature far fewer pairs (there are five single pedal changes), require the harpist to move inefficiently back and forth between pedals, and feature measures where up to four pedal changes are made. The fewer pedal changes made per measure, the more idiomatic the music is. Depending on the tempo of the piece, large amounts of pedal changes made in a single measure may be physically impossible for the harpist to complete in time.

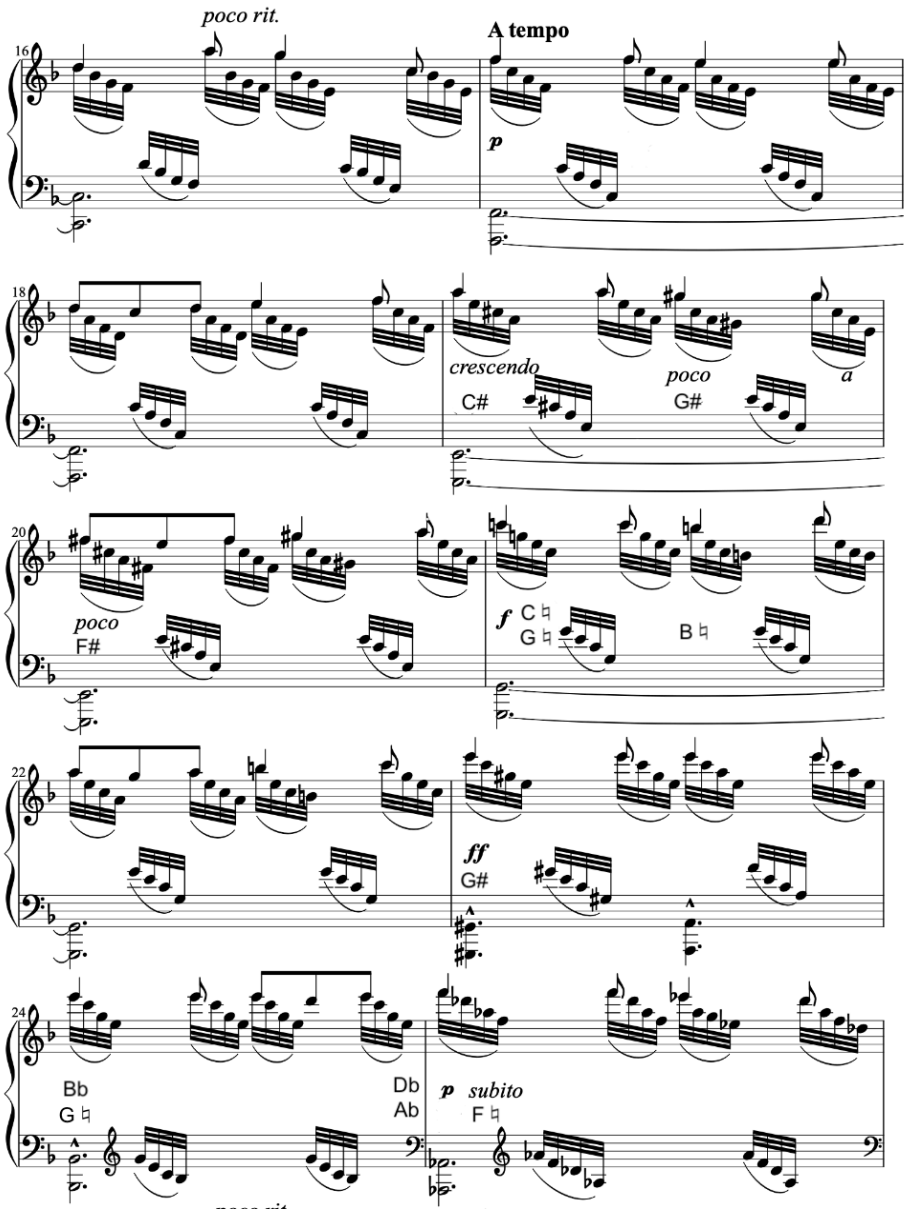


Figure 3.2b. Mm. 16-25 of *La Source* by Alphonse Hasselmans with my chronologically-ordered pedal markings.

Pedal Adjacency and Oblique Motion

Significantly, the pedal pairs C-sharp/F-sharp, and C/G demonstrate the relatedness of adjacent pedals and how this concept can be employed in a similar way to parsimonious voice leading. As shown in Figure 3.3, F and G both pair in a near-equidistant way with C, which lies on the other side of the pedal layout. In mm. 19-20, the movement from this first pair to the second can be categorized as oblique adjacent horizontal, parallel vertical (Figure 3.3). This oblique adjacent movement is a common schema, where one foot of the pedal pair moves to an adjacent pedal while the other remains on the same pedal. Figure 3.3 shows how only the right foot moves to a new pedal, from the top of the diagram to the bottom. The vertical motion is parallel, with each pedal being depressed (to raise the pitches to their sharp position) and then raised (to lower the pitches to natural).

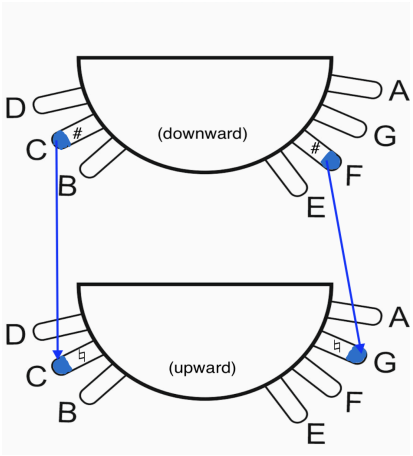


Figure 3.3. The oblique adjacent horizontal, parallel vertical schema mapped onto mm. 19-21 of *La Source* by Alphonse Hasselmans.

Schemas with oblique adjacent horizontal motion take advantage of the interchangeability of adjacent pedals. Depending on which pedal it is paired with, the F pedal can function as an inner or medial pedal. Similarly, the G pedal can function as medial or outer (Figure 3.4). The context and use of these borderline pedals determine their function. The left side of Figure 3.4 shows F in an Inner Pedal Pair with B and a Medial Pedal Pair with C. The right side shows G in a Medial Pedal Pair with C and an Outer Pedal Pair with D.

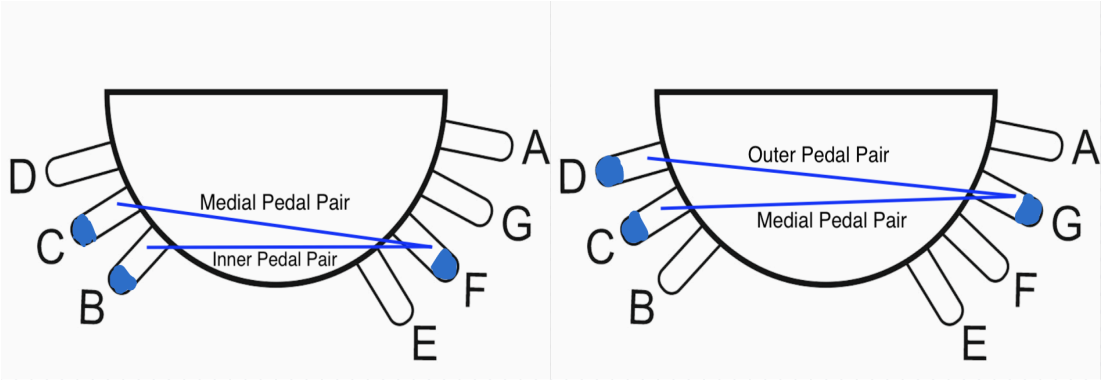


Figure 3.4. Inner and medial pairings for F and G on the pedal layout.

La Source is a chromatically-agile piece, progressing through many unexpected tonicizations and episodes of modal mixture. Out of all the pedal pairs, only five feature horizontal movements of large, disjunct distances. Importantly, these larger leaps occur in single pedal changes or oblique pedal pairs. There are no pedal pairs that require the harpist to move both feet further than the adjacent pedal simultaneously. Almost all movement between two

simultaneous pedals occurs in smooth, adjacent motion, creating a set of spatial transformations. The nearness and farness of these pedal transformations are dictated by an embodied, instrument-dependent layout rather than the harmonies themselves.

Table 3.2 summarizes every schema and single pedal change in *La Source*. The five pedal changes that require larger leaps are in bold font. The pedal changes in this table are separated into rows based on their location on the right and left sides of the pedal layout. The arrows in the table show the vertical direction the pedal travels. The first pedal change in the piece does not feature horizontal motion, since there is no motion from a previous pedal. Similarly, pedal schemas marked “Vertical Only” describe pedal changes requiring no horizontal motion because the harpist's foot was already on that pedal from a previous change.

Measure 35 features a delayed pedal pair, marked with an asterisk. This pair contains two pedals that occur within the same measure or adjacent measures, but cannot occur simultaneously due to timing with the changing pitch set or the risk of pedal slides. Horizontal movement toward this pair will most often be in tandem or only with a slight offset. Therefore, delayed pairs remain their pair status and temporal relationship, despite the offset vertical movement. There is another delayed pair in mm. 79-80.

Table 3.2. Every pedal change in *La Source* by Alphonse Hasselmans.

mm.	Pedal Schema	Pitch Change (Left Side)	Pitch Change (Right Side)
17	Parallel Vertical	B♮↑	G# ↓
19	Parallel Horizontal, Parallel Vertical	C#	F# ↓
21	Oblique Adjacent Horizontal, Parallel Vertical	C♮↑	G♮↑
22	Single Adjacent		F♮↑
23	Single Adjacent		G# ↓
24	Oblique Adjacent Horizontal, Parallel Vertical	Bb ↑	G♮ ↑
25	**Contrary Adjacent Horizontal, Parallel Vertical**	Db ↑	Ab ↑
25	Single		Eb ↑
27	**Single**		A♮↓
28	**Single**		E♮↓
31	Single (Vertical Only)		Eb ↑
33	Single (Vertical Only)		E♮↓
33	Single (Vertical Only)		Eb ↑
35	Parallel (Vertical Only)*	D♮ ↓	E♮↓
37	Single Adjacent	C# ↓	
45	Single (Vertical Only)	C♮↑	
45	Similar Adjacent Horizontal, Parallel Vertical	B♮↓	G# ↓
48	Parallel (Vertical Only)	Bb ↑	G♮↑
49	**Single**	Db ↑	

Table 3.2 Continued

mm.	Pedal Schema	Pitch Change (Left Side)	Pitch Change (Right Side)
50	Oblique Adjacent Horizontal, Parallel Vertical	D♮ ↓	F# ↓
51	Single Adjacent		Eb ↑
52	Single Adjacents		E♮ ↓, F♮↑
53	Similar Adjacent Horizontal, Parallel Vertical	B♮ ↓	G# ↓
54	Parallel (Vertical Only)	Bb ↑	G♮↑
55	Single Adjacent	C# ↓	
56	Oblique Horizontal, Parallel Vertical	C♮ ↑	Ab ↑
57	Oblique Horizontal, Parallel Vertical	B♮↓	A♮↓
59	**Single**		F# ↓
60	Oblique Horizontal, Parallel Vertical	Cb ↑	F♮↑
61	Single Adjacents	C♮↓, Bb ↑	
62	**Oblique Horizontal, Parallel Vertical**	D# ↓	F# ↓
67	Parallel (Vertical Only)	D♮↑	F♮↑
80	Oblique Adjacent Horizontal, Parallel Vertical*	Db ↑	Eb ↑
81	Single (Vertical Only)		E♮↓, Eb ↑
84	Parallel (Vertical Only)	D♮↓	E♮↓
87	Oblique Horizontal, Parallel Vertical	B# ↓	E# ↓

Pedal Voice Leading and Leading Single Pedals

La Source is representative of the developing idiomatic tradition, not only in its rampant pedal pairs and the offset order of pedal changes compared to the corresponding changes in pitch collection. Several common pedal operations or transformations also engender the pervasive smoothness and idiomacy of its pedal motion. These transformations are the embodied equivalent of smooth voice-leading on the harp. The first operation is the oscillating pair. As shown in Table 3.2, mm. 45-48, 53-54, and 62-67 feature pedal pairs marked “Vertical Only.” At these points in the piece, the harpist oscillates up and down pedal notches without moving to new pedals, as the same pitches are altered and re-altered by semitone. The motions that give rise to this oscillating pedal operation are highly idiomatic, as they feature no horizontal movement. The single pedals marked with “Vertical Only” are especially idiomatic and create ease of playing, as they involve the vertical movement of only one foot in the pedal space.

While most individual pedal changes not in a pair are not pedal schemas as this thesis defines them, they play an integral role in the formation of pedal pairs. *La Source* features many representative instances of single pedals preparing the way for imminent pedal pairs. These leading singles are single pedal changes that require one foot to traverse a greater, more disjunct distance, so that the distance the succeeding pair travels is small or nonexistent. In mm.

25-33, the harpist's right foot moves across four pedals and back twice, oscillating between A and E. While effortful, these motions occur with a single pedal instead of a pair, greatly reducing the facility required to complete them.

These disjunct motions prepare the way for the next pedal pair in m. 35, D/E. In m. 35, the previous left-side pedal was D, and the right foot has just moved back to E, meaning no horizontal movement is required for this pedal change. The effort of the previous measures is not only balanced by the ease of the next few pedal pairs, but this disjunct motion ushers in the next pedal pair and reduces the effort required to complete this motion. Similarly, in mm. 48-49, the left foot moves across three pedals, from B to D. This horizontally-disjunct single pedal prepares for the next pedal pair (D/F), which is now adjacent oblique in its horizontal motion.

La Source is not only highly idiomatic in its pedaling motion; it represents Hasselmans' key role in the historical development of pedal idiomacy. In this piece, oblique adjacent horizontal motion creates ease of playing, while leading single pedals usher in new pedal pairs. Delayed pairs and oscillating pairs take advantage of the entanglement between pedals across from each other on the pedal layout. These smooth pedal movements are comparable to common-practice voice leading and parsimonious transformations.

While *La Source* makes a case for the ubiquity of oblique motion in historical harp repertoire, it is impossible to clearly rank the relative idiomacy of

each pedal schema. Much like the schemas themselves, which are complex temporal operations, the idiomacy of one schema depends on its preceding and succeeding schemas, and the continuity of the schemas and pedal motions across the entire piece.[88] For instance, oblique adjacent horizontal motion and leading single pedals create highly easeful motion and comprise a larger motivic scheme of motion in *La Source*. However, contrary horizontal motion is prominent in the pedal motion scheme of the following repertoire and is employed in highly idiomatic ways.

The Pedaling Motif and the Contrary Horizontal Schema:

***Nocturne* by Alan Hovhaness**

Nocturne (1937; rev. 1961) by Alan Hovhaness (1911-2000) employs the contrary horizontal schema and its variants to generate pitch sets with lower cardinalities.[89] Although not a harpist himself, this prolific 20th century composer completed over one hundred works featuring the harp. He employed highly idiomatic pedal work in his harp music was commissioned to write pieces by the prodigious and world-renowned harpist Nicanor Zabaletta.[90] *Nocturne* features

[88] A corpus study is necessary to rank the commonality of individual pedal schemas, which factors into the evaluation of their idiomacy.

[89] Alan Hovhaness, *Nocturne* (Leipzig: *Edition Peters*, 1937).

[90] Richard Howard, *The Works of Alan Hovhaness: A Catalog, Opus 1 – Opus 360* (Michigan: *Pro Am Music Resources*, 1983).

instances of contrary horizontal and contrary vertical motion to create highly idiomatic pitch sets.

Contrary vertical motion is a common schema in modern chromatic harp repertoire. Because this type of motion always involves semitonal motion in contrary directions, it often creates or eliminates one sharp pitch and one flat pitch from the pitch set. These contrary schemas often function to either produce or eliminate enharmonic equivalents in the resulting pitch class, reducing or enlarging its cardinality. Therefore, this pedal schema can be often found in climactic moments in a piece or used to create evocative glissandi. Unlike other schemas, those with contrary vertical motion yield relatively uniform harmonic results, regardless of the transposition or pedal pair involved.

The first eight measures of *Nocturne* feature an unexpected modal progression of harmonies all generated by the contrary horizontal schema and its variations. This use of a single pedal schema is an example of a pedaling motif, where the same horizontal or vertical motion and its variations are explored and developed in similar ways to traditional motivic development.

Although the score features a plethora of single pedal changes, careful inspection reveals that each successive pedal change comprises a pair with one pedal from each side of the pedal layout (Figure 3.5). These successive pedal

---

Arnold Rosner and Vance Wolverton, "Hovhaness, Alan," *The New Grove Dictionary of Music and Musicians*, 2nd ed., ed. Stanley Sadie and John Tyrrell (London: *Macmillan Publishers*, 2001), 762.

changes can be made simultaneously without creating consequences for the associated changes in pitch set. Thus, these pedal changes can be understood to be delayed pairs. These pairs may or may not be made simultaneously, depending on the performance choices of the harpist. They qualify as pairs regardless.

Beginning in the D Dorian mode, the first pedal change is a delayed pair (C/G), arising in E Dominant-Seventh (m. 5) and C# Phrygian (m. 6) harmonies. In mm. 6-7, a delayed contrary horizontal, parallel vertical schema raises the B/E pedal pair to create one measure of an E-flat dominant seventh harmony, spelled enharmonically. Rather than add another pedal change to provide access to D-flat, the score indicates to use the C string and the C-sharp that already exists in the pitch collection. The resulting descending bassline is functionally C–C-sharp–D-flat–C, but is practically performed using two C-sharps.

The reverse of the previous delayed contrary horizontal, parallel vertical schema causes a return to the Delayed Pair C/G, resulting in one measure of C natural minor harmonies.The result of this sequence of various Parallel Vertical motions is a sequential passage, where mm. 7-8 repeat mm. 5-6, down a semitone (Figure 3.5).

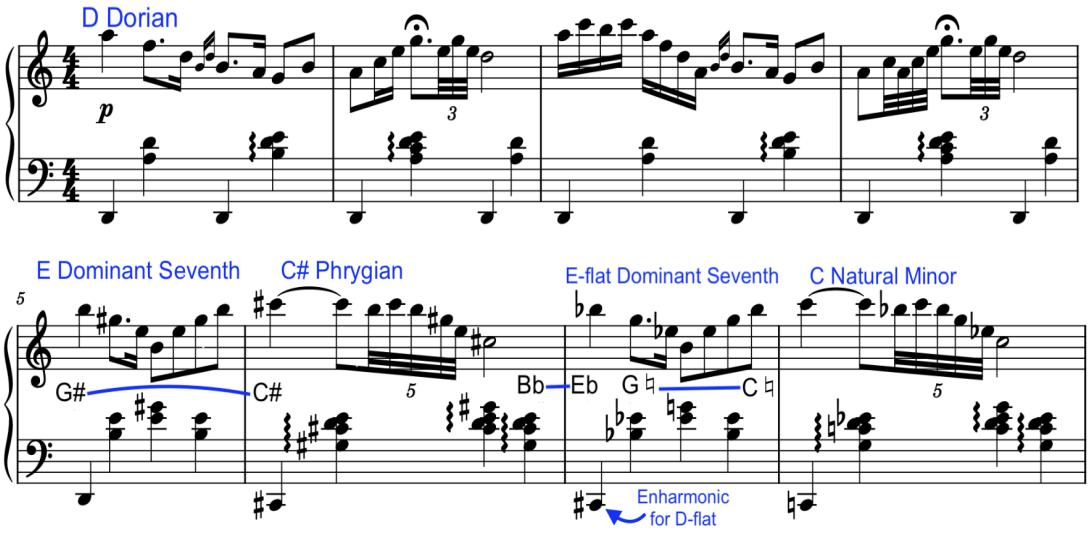


Figure 3.5. The pedal pairs and delayed pairs with their resulting harmonies and modes in mm. 1-8 of *Nocturne* by Alan Hovhaness.

After a B section exclusively in D Dorian, the return to the A section features the same pedal pairs, but progresses further through this pedaling motif of contrary motion. After the repeated B/E and C/G pairs, and further oblique horizontal motion creates a C/E pair, the contrary motion motif passes into the vertical plane. Parallel horizontal, contrary vertical motion emerges with the pair B/F (Figure 3.6). In m. 44, the resulting pitch collection is the maximally-even pentatonic set 5-35(02479). As is typical for contrary vertical motion, this pedal change produces a set where B-sharp doubles C and F-flat doubles E, reducing the cardinality to 5. Multiple enharmonic doublings are possible, and the score leaves the choice of which enharmonic strings to access to the individual performer. For instance, a performer with smaller hands would likely use the F

string to play the E pitch circled in Figure 3.6, resulting in a smaller intervallic span for their hand.

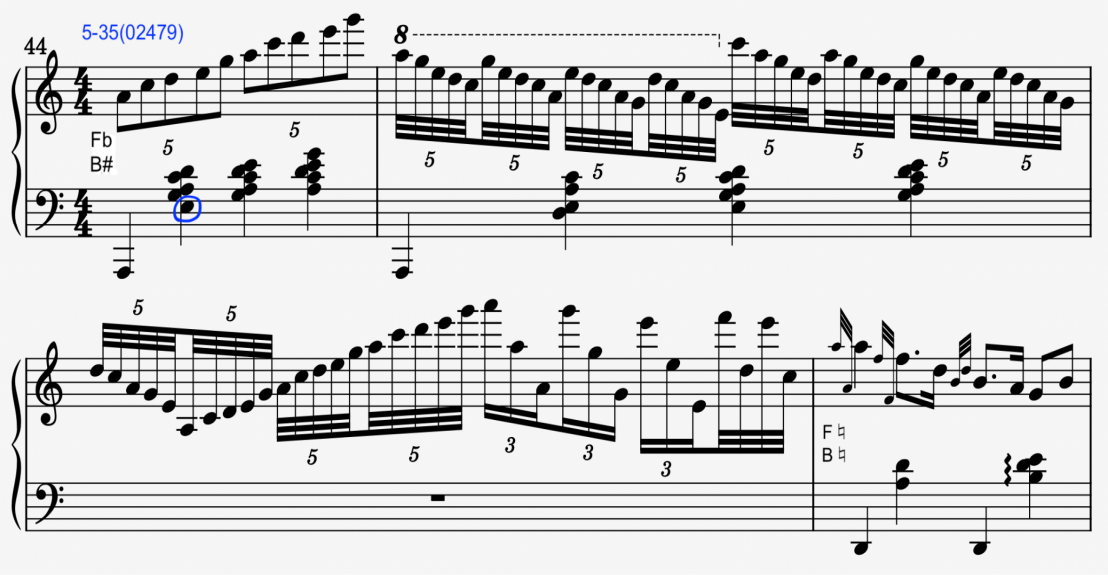


Figure 3.6. The final contrary motion pair in m. 44 of *Nocturne* by Alan Hovhaness.

In *Nocturne*, horizontal and vertical contrary motion produce a variety of modal and pitch collection changes beyond what the tranquil opening anticipates. The twists and turns of each new pitch collection and mode spring from synchronized and coordinated pedal motions. While the aural results are surprising, the motions are familiar to the performer as a continuation of a long lineage of embodied idiomacy. Contrary motion develops throughout this piece as a motive, occurring in both the horizontal and vertical planes of the pedal layout.

Contrary Vertical Motion and Disjunct Horizontal Leaps:

Carlos Salzedo's *Chanson de la Nuit*

Another example of contrary vertical motion occurs in Carlos Salzedo's (1885–1961) *Chanson de la nuit* (1929).[91] Salzedo was a pupil of Alphonse Hasselmans at the Conservatoire de Paris, and his prolific compositional output ushered in a new virtuosic era of harp music.[92] During his compositional, performing, and pedagogical careers, Salzedo defined idiomatic language for the harp, set new technical standards, and explored the harmonic and timbral possibilities of the harp. His 1921 treatise *Modern Study of the Harp* initiated a new world of technical possibilities.[93] As a manual and manifesto for the future of harp music, this text remains the first published guide to various extended techniques that Salzedo personally developed.

Because *Chanson* was written by a virtuoso who redefined the technical reputation of the harp, the pedal changes in it feature larger leaps and faster pedal work. These pedal changes still employ idioms of pedal voice leading and pedal transformations. The pedaling motions in *Chanson* display the

---

[91] Salzedo, Carlos, *Chanson de la Nuit* (Bloomington: *Vanderbilt Music Comp.*, 1929).

[92] Gwendoline Laksmi Pannetier, "Carlos Salzedo and the Development of Harp in North America: Modern Timbres, Techniques, and New Music Networks" (Texas: University of Texas, PhD. diss., 2022), 14, 36.

[93] Carlos Salzedo, *Modern Study of the Harp* (New York: *Schirmer*, 1921).

extraordinary chromatic potential of the harp and employ the smoothest motions to achieve this technical difficulty.[94]

Figures 3.7a and 3.7b show the initial pedal setting and the corresponding first three measures of *Chanson*. The initial pitch set is 4-26(0358), which yields a minor seventh chord. This set employs doubling to create a low cardinality, with the doubled pitches B/C-flat, D-sharp/E-flat, and F-sharp/G-flat. *Chanson* begins with a leftward pair, D and E. As shown in Figure 3.8, this pair is first employed simultaneously (m. 5) and then delayed (mm. 6 and 8).

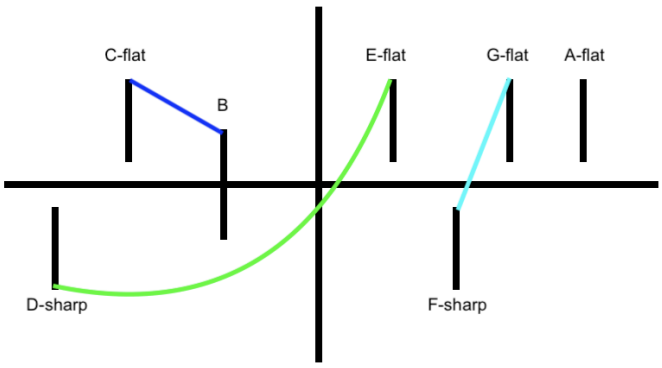


Figure 3.7a. A pedal chart of the opening pedal setting in Carlos Salzedo's *Chanson de la Nuit*. Doubled pitches are connected with lines.

[94] For the difference between difficult and unidiomatic writing, see: Huron and Berec, "Characterizing Idiomatic Organization in Music Theory."

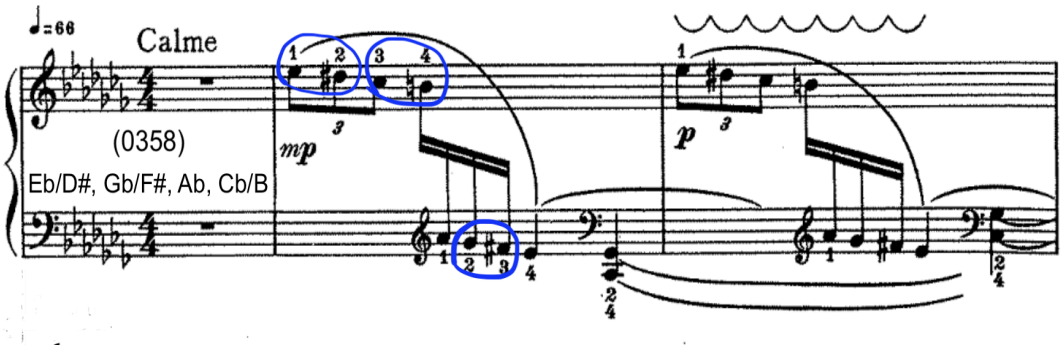


Figure 3.7b. The pitch collection in the first three measures of Salzedo's *Chanson de la Nuit* with doubled pitches circled.

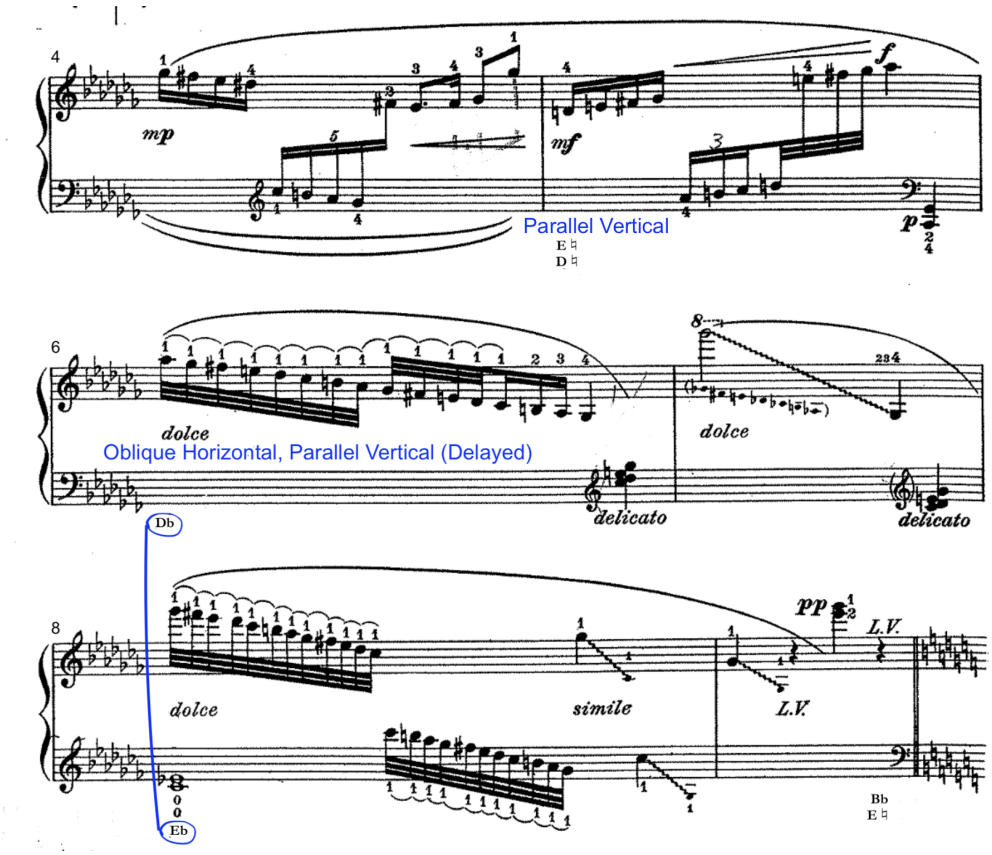


Figure 3.8. The first pedal pair and its simultaneous and delayed employment (connected with a line) in Salzedo's *Chanson de la Nuit*, mm. 1-6.

As Figure 3.9 shows, the next section of *Chanson* employs the contrary vertical schema to reduce the cardinality of the pitch-class set while balancing extremely disjunct horizontal motion with a formal break that allows more time to traverse this distance. Measures 9-10, contain three more pedal pairs moving in contrary motion. On the downbeat of m. 10, contrary horizontal motion provides access to a D/A pair. Although this motion from B–E to D–A is the most extreme distance to travel and features simultaneous Contrary Horizontal motion, the temporal pause built around it is highly idiomatic.

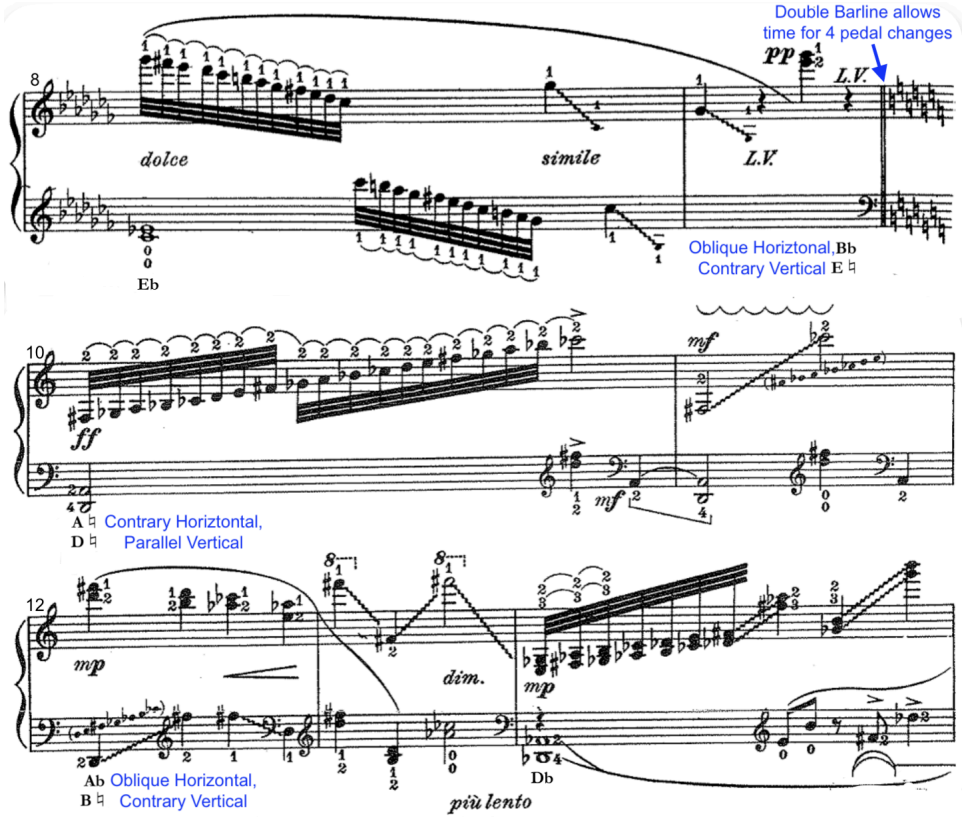


Figure 3.9. The pedal changes and the schemas they comprise from mm. 8-12 of Salzedo's *Chanson de la Nuit*.

The contrary vertical motion in m. 12 drastically changes cardinality of the pitch class, moving one of the pitches up and the other down by a semitone. The pitch class before this change was 6-Z48(012579). The change from B-flat to B-natural and A-natural to A-flat reduces the intervallic span and cardinality of the set, creating 5-34(02469), a pentachord of mostly whole tones. As is typical of the contrary vertical schema, the resulting pitch set the pedal layout makes available has a reduced cardinality with drastic effects on the harmonies available.

Table 3.3 shows all pedal pairs and single pedals in *Chanson*. A prominent characteristic of the pedals in this piece is the juxtaposition between large horizontal leaps (in bold font) and smooth parsimonious pairs created through oblique horizontal motion (in italicized font). The pedals in *Chanson* exist in two extremes of effort level, balancing each other and creating memorable motions for the performer.

Table 3.3. Every pedal change in *Chanson de la Nuit* by Carlos Salzedo.

mm.	**Pedal Schema**	**Pitch Change (Left Side)**	**Pitch Change (Right Side)**
	Initial Pedal Setting from Left to Right: D# Cb B // Eb F# Gb Ab		
5	Parallel Vertical	D♮↓	E ♮↓
6-8	Parallel Vertical	Db ↑	Eb ↑

Table 3.3 Continued

mm.	Pedal Schema	Pitch Change (Left Side)	Pitch Change (Right Side)
8-9	*Oblique Horizontal, Contrary Vertical*	Bb ↑	E♮↓
10	**Contrary Horizontal, Parallel Vertical**	D♮↓	A♮↓
12	*Oblique Horizontal, Contrary Vertical*	B♮↓	Ab ↑
14	Single	Db ↑	
16	**Contrary Horizontal, Parallel Vertical**	Bb ↑	Eb ↑
17	Single Adjacent		G♮↓
17-18	Contrary Horizontal, Parallel Vertical (Delayed)	D♮↓	A♮↓
19	Oblique Horizontal, Parallel Vertical (Delayed)	C♮↓	A# ↓
20-21	Singles		F♮↓, E♮↓
22	Single		E# ↓
24	Single		E♮↑
26	Single		E# ↓
28	Single		E♮↑
32	Single		A♮↑
33	Single		A# ↓
34	Single		E# ↓
35	Single		E♮↑
36	Single		E# ↓

Table 3.3 Continued

mm.	Pedal Schema	Pitch Change (Left Side)	Pitch Change (Right Side)
38	Single		E♮↑
41	Single		E# ↓
57	Single		A♮↑
59	*Single*		Eb ↑
59	*Oblique Horizontal, Contrary Horizontal (Delayed)*	C# ↓	Gb ↑
60	Single Adjacent		F# ↓

The Adjacent Single Pedal Cluster

The adjacent single cluster is one of the only schemas in this thesis to involve single pedal changes rather than pairs. Single pedal changes occur on one side of the harp layout, not coupled with pedals on the other side to make pairs. The single pedal cluster involves horizontal movement from directly adjacent pedals, and originates in the ascending melodic minor scale. Figure 3.10 shows two possible clusters of consecutive pedal changes: a cluster comprised of two pedals and a cluster of three. Transposed to different keys and clusters, the harmonic result of this motion between adjacent pedals results in various harmonic outcomes, often propelling the music into a new key, mode, or other pitch collection with great impetus.

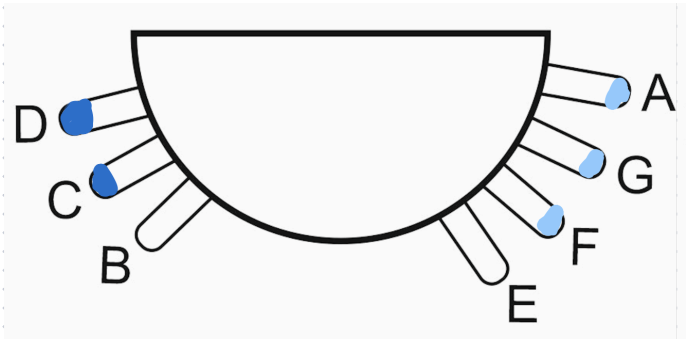


Figure 3.10. A leftward cluster (D/C) and a rightward cluster (F-G-A).

A variant of this clustered motion occurs when a pedal pair shares the same relative direction on each side of the layout. For instance, in Figure 3.11, both pedals on the left and right side of the harp occur on the right side of their relative section of the layout. This type of positioning forms a tactile variant of the pedal cluster, where the relative position of each foot on its side of the pedal layout corresponds from across the harp. The result is a cluster from further across the harp, in corresponding quadrants.

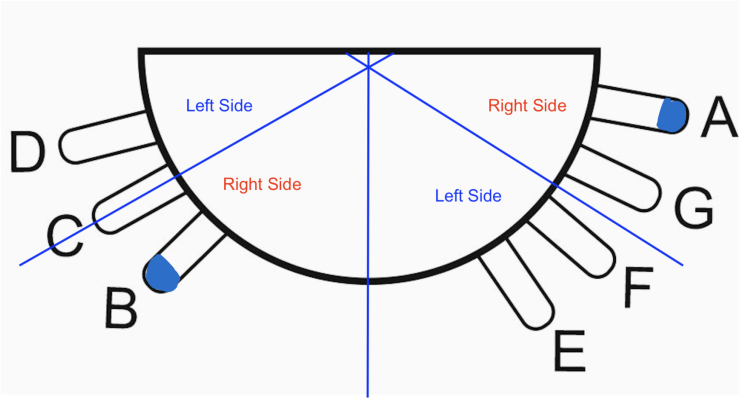


Figure 3.11. A rightward pair that simulates a single pedal cluster. The two left and two right quadrants of the pedal space are shown.

Motivic Development in Schemas: *Six Noels* by Marcel Tournier

Marcel Tournier (1879-1951) was a French harpist, composer, teacher, and key figure in the succession of harp idiomacy.[95] Contributing to the harp's rise from parlor status to concert status, his repertoire is chromatically rich and steeped in the impressionistic tradition.[96] As part of the pedagogical and compositional lineage this chapter follows, Tournier was a student of Alphonse Hasselmans and teacher of Carlos Salzedo and Marcel Grandjany.[97] Training two generations of harpists from France, other European countries, and the U.S., Tournier's approach to pedaling and the lush harmonies it creates provide a crucial example of the developing tradition of pedal idiomacy.[98] In Tournier's cycle *Six Noels* (1926), the music nimbly leaps from unrelated keys, explores modal mixture and modality, and highly features the adjacent single cluster schema.[99]

---

[95] Angela Schwarzkopf, "Marcel Tournier: Artist, Composer and Teacher," *American Harp Journal* Vol. 25 no. 3 (Summer 2016), 1.

[96] Kimberly Ann Houser, "Five Virtuoso Harpists as Composers: Their Contributions to the Technique and Literature of the Harp" (Arizona: University of Arizona, D.M.A. diss., 2004), 55.

[97] Schwarzkopf, "Marcel Tournier," 3.

[98] Schwarzkopf, "Marcel Tournier," 22.

[99] Tournier, Marcel, *Six Noëls*, Op.32 (Paris: *Editions Henry Lemoine*, 1926).

“Noel I”: Adjacent Single Pedals in the Melodic Minor Scale

The first noel is in B-flat Minor and features the first statements of a pedaling motif that pervades the rest of the cycle. In mm. 17-23 and 23-24, the rightward cluster G–A raises and lowers scale degrees 6 and 7 (Figure 3.12).

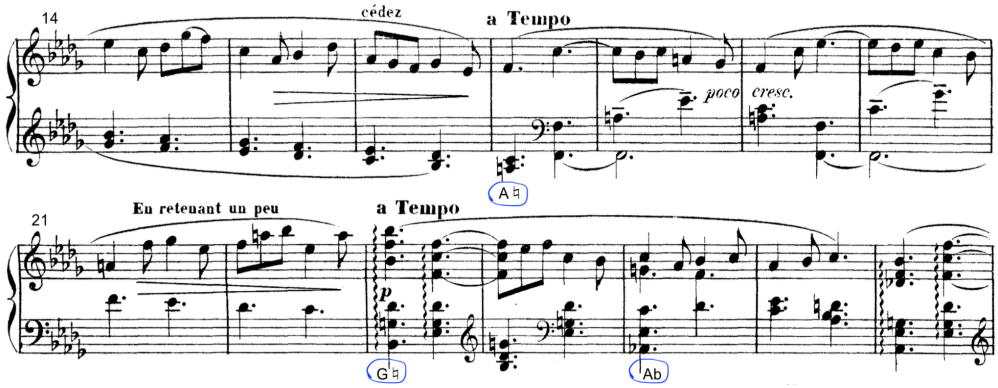


Figure 3.12. Single Adjacent Horizontal Motion in Marcel Tournier’s “Noel I” in B-flat Minor, mm. 14-27.

“Noel II”: Adjacent Single Pedals in the Wedge Progressions and Tonicizations

The second noel is in A-flat Major and features the same adjacent motion, now on the left side of the pedal layout. While these adjacent pedals do not make up the 6th and 7th scale degrees nor are part of a minor tonality, they function as the exact schema from the previous noel, even oscillating in the same temporal order. “Noel I” features the pedal order: A-G-A, while “Noel II” contains the equivalent now on the left side of the pedal layout: C-D-C. This schema of motion is being developed through transposition. The first use of the C pedal creates a

small chromatic wedge progression, prolonging a vii^{ø7} harmony in mm. 31-32 (Figure 3.13). Directly after, further horizontal adjacent motion initiates a tonicization of V in mm. 33-34.

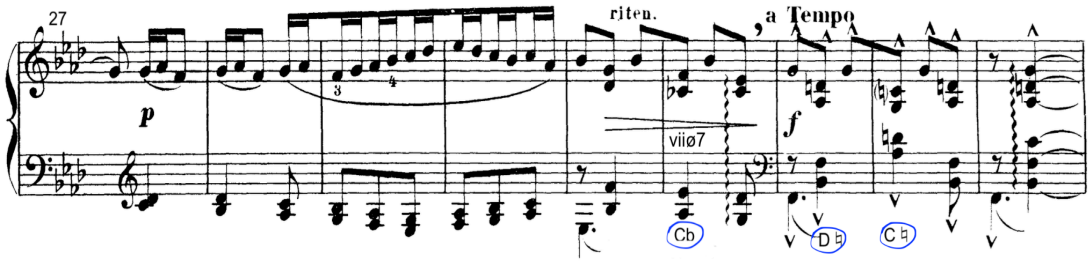


Figure 3.13. single adjacent horizontal motion with the C–D cluster in Marcel Tournier's "Noel II" in A-flat Major, mm. 27-35.

"Noel III": Pedal Pairs in the Melodic Minor Scale

The third noel expands the adjacent motion scheme to create a cluster on either side of the pedal layout that functions in the same way as the previous adjacent clusters. In C Minor, the A and B pedals are raised and lowered to adjust the sixth and seventh scale degrees (Figure 3.14a). The A and B are both rightward pedals, and produce a tactile variant of single-side adjacency (Figure 3.14b). This expansion of the adjacent cluster stretches the definition of the developing motif, but succeeding development soon combines both variants of this motive.

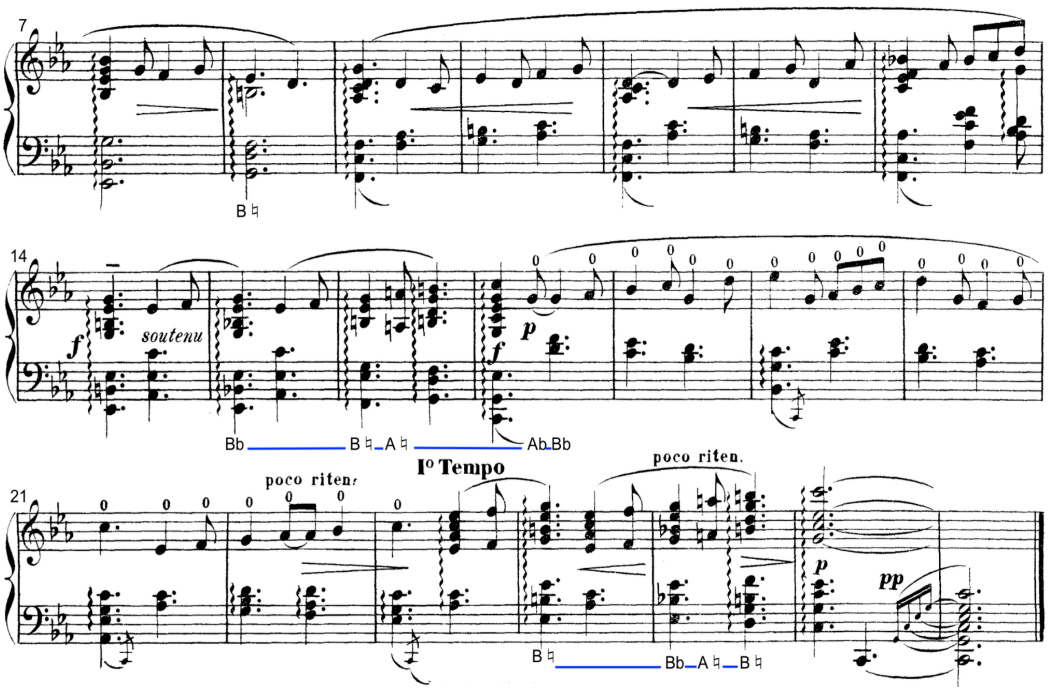


Figure 3.14a. The B-A pedal pair in Marcel Tournier's "Noel III" in C Minor, mm. 7-27.

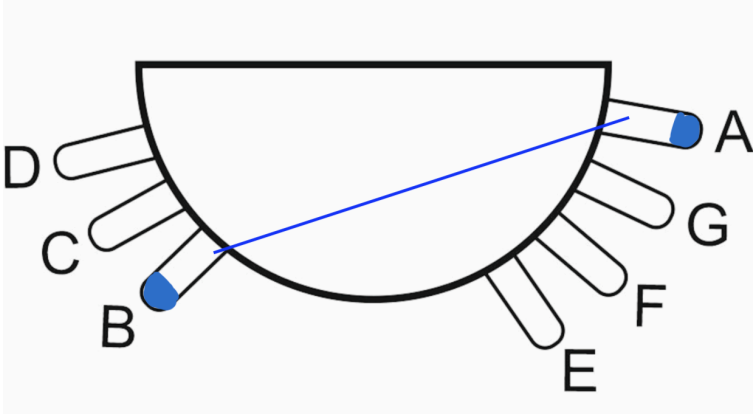


Figure 3.14b. The approximation of adjacency in the rightward pair B–A.

“Noel IV”: Pairs of Adjacent Single Pedals in Chromatic Harmonies and Modulations

The fourth noel combines the previous pedaling motifs of horizontal adjacency and clusters, employing adjacent single clusters on both sides of the pedal layout. Pedals F–G and C–B are connected through adjacent horizontal motion on the left and right sides of the harp. In mm. 13-14 an adjacent cluster on the right side of the harp joins the F and G pedals to change the E Major collection to D Melodic Minor (Figure 3.15a). Shortly after, a cluster on the left side of the harp creates the D Natural Minor collection (m. 17). A return to the F-G cluster creates an augmented sixth harmony that is part of a modulation to A Major (Figure 3.15b).

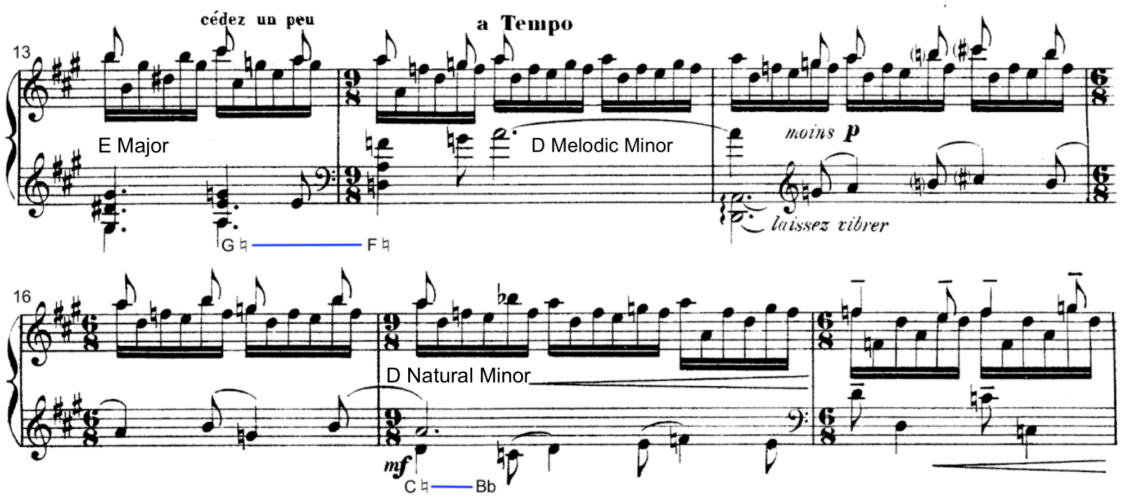


Figure 3.15a. Two Adjacent Single Clusters in Marcel Tournier’s “Noel IV” in E Major, mm. 13-18.

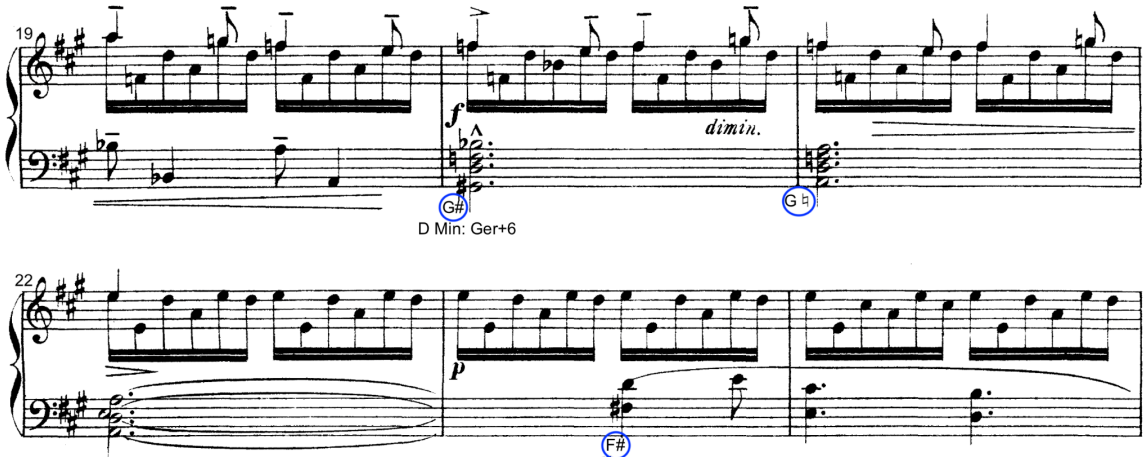


Figure 3.15b. A return to the F–G cluster in Marcel Tournier's "Noel IV," mm. 19-24.

The previous noels explored adjacent single horizontal clusters on the right and left sides of the pedal layout, and a tactile variant of this adjacency developed this motif. The use of these pedals often featured an oscillation between the two pedals, such as A-G-A in "Noel I." In this fourth noel, this oscillating motion within clusters, and the variant motions joining quadrants of the harp are combined, creating oscillating motion between single pairs: A-G—C-B—-A-G.

“Noel V”: Adjacent Single Pedals and Pedal Pairs in Tonicization and Distant Modulation

As the thematic and harmonic climax of the cycle, the fifth noel makes a final combination and development of the two pedal motion motifs from the previous four noels. Beginning in F Major, the noel visits the keys of D Minor (m. 5), G Minor (m. 13), G Major (m. 16), E Minor (m. 20), E Major (m. 29), and D-flat Major (m. 37), before cadencing in its home key (m. 43). After beginning in D Minor, an adjacent single cluster connecting E–F in mm. 12-13 tonicizes the key of the subdominant and establishes a pervasive cluster of pedaling motion on the right side of the harp (Figure 3.16). Second, the pair D–E approximates this adjacent motion by pairing two pedals from the leftward quadrants on the left and right sides of the pedal layout (mm. 16-20, Figure 3.17).

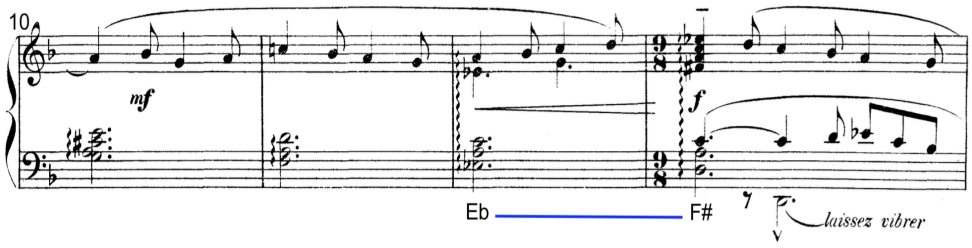


Figure 3.16. The first single pedal cluster in Marcel Tournier’s “Noel V” in F Major, mm. 1-13.

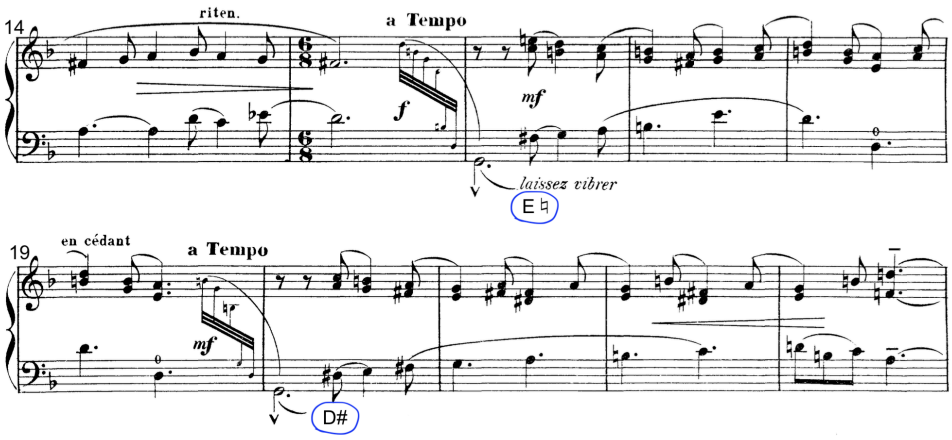


Figure 3.17. The first leftward pair approximating horizontal adjacency in Marcel Tournier's "Noel V," mm. 14-23.

The next adjacent movement on the right side of the pedal layout (mm. 31-35) creates the cluster F–G, developing the adjacent motion between E–F by pushing the cluster of pedals outward, like a linear voice-leading transformation (Figure 3.18). The pedals in m. 37 approximate this adjacent motion again by pairing two leftward pedals: D–E. In mm. 42-43, this D/E pair forms a combination with the single adjacent horizontal schema, coinciding with a C/D pair. This combination of pedal motifs represents its height of the motivic development, intertwining the adjacent clusters and adjacent-approximate clusters of motion.

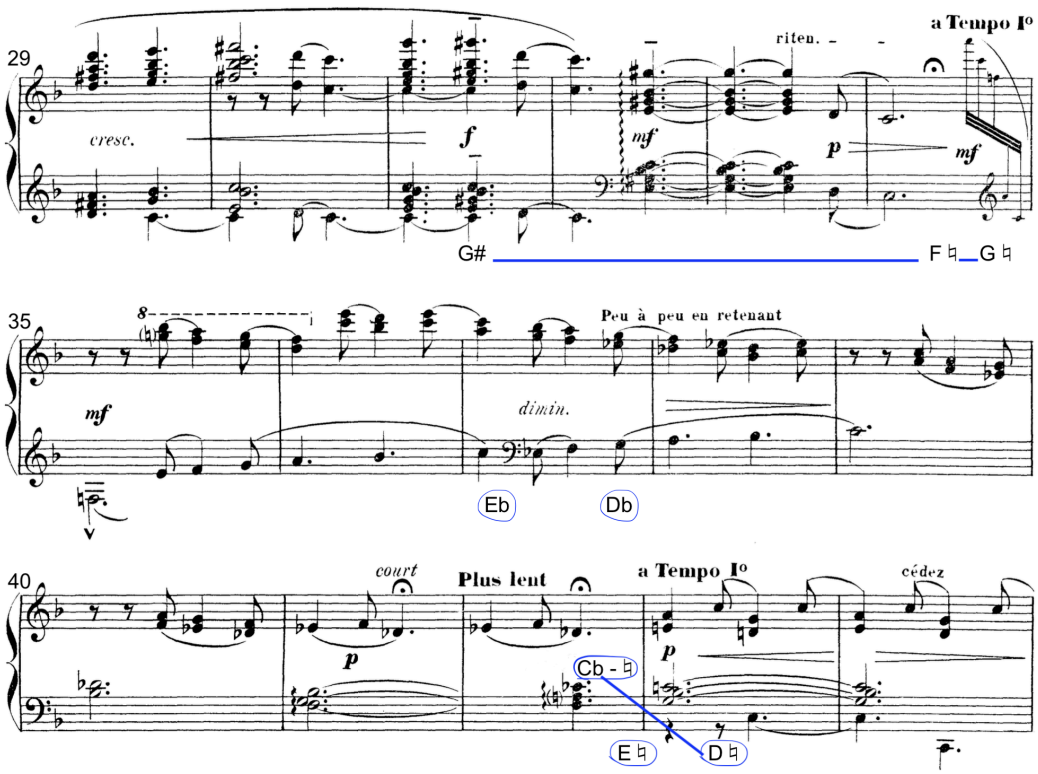


Figure 3.18. The adjacent cluster (F–G) and leftward pair (E–D) in Marcel Tournier's "Noel V," mm. 29-44.

"Noel VI": Adjacent Single Pedals in Modal Collections

The final noel returns to the schemas of the previous noels, combining the left-side clusters from the second, third, and fifth noels (B–C and D–C). From the initial D Major tonality, the cluster B–C changes the collection to D Mixolydian, then D Mixolydian b6 (Figure 3.19). An expansion of this cluster (D–C) near the end of the noel creates a tonicization before cadencing in D Major.

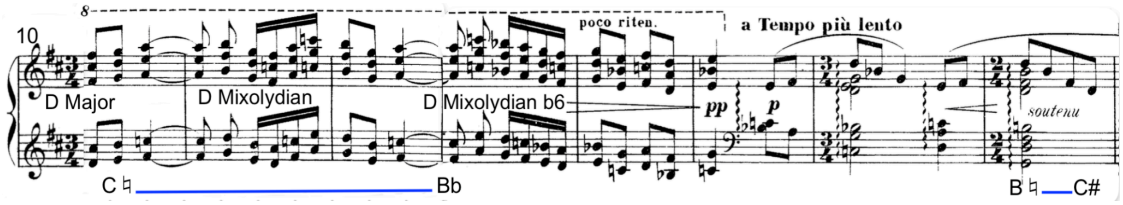


Figure 3.19. The B–C cluster in Marcel Tournier's "Noel VI" in D Major, mm. 10-17.

Tournier's *Six Noels* provide an abundant setting for presenting a unified analysis of how pedal schemas can repeat, develop, and combine in highly integrated harmonic schemes. Detailed inspection reveals that, while featuring other types of motion, this score is saturated Adjacent Single Cluster motion and its variants (Table 3.4). This motion between adjacent pedals results in varied harmonic reverberations, often working to propel the music into a new key, mode, or other pitch collection. This section explores the connections between a type of pedal motion and the diversity of harmonic results it can generate. Rather than claiming that Tournier implicitly composed with this pedal motion and its motivic development in mind, it models a unified analysis of a larger cycle of work through the lens of pedal schemas and their development.

Table 3.4. A summary of all adjacent single clusters and variant pedal motions in Marcel Tournier's *Six Noels.*

Noel	**Key of Noel**	**Leftward Adjacent Cluster**	**Rightward Adjacent Cluster**	**Variant (Pairs from the Leftward or Rightward Quadrants)**
Noel I	Bb Minor		A–G	
Noel II	Ab Major	C–D		
Noel III	C Minor			A–B
Noel IV	A Major	C–B	F–G	
Noel V	F Major	C–D	E–F, F–G	E–D
Noel VI	D Major	C–B, C–D		

Conclusion

Pedal schemas are the result of complex motion between levels of directionality in the pedal space. They factor in the combined movement of individual pedals and the motion that occurs between one pedal change and the next. When composed and performed in an idiomatic way, this compound motion creates an embodied set of movements and transformations similar to systems of voice leading, such as common practice era voice leading and parsimonious

voice leading. Pedal schemas can repeat and permeate through a piece of harp music. Schemas can also develop and expand into variants through the course of a larger work.

While claims that harp composers consciously work with pedal schemas are futile, these schemas represent a compelling analytical framework for a variety of pedal harp music. Pedal schemas are an embodied analytical response to the unique physicality of harmony on the harp. Each harmonic change in harp repertoire represents a distinct physical motion, which can be analyzed as a separate embodied movement. Recalling the QWERTY effect, the pedal layout was created to produce harmonies, but now provides productive grounds for an embodied analysis of the connections between the resulting pedal motions.

This chapter defined pedal schemas and demonstrated schema–based analysis of chromatic pedal harp repertoire from the early 20th century. Each of the representative works played a role in the historical development of pedal idiomacy. The next chapter explores harp music from the mid to late 20th century which expands the boundaries of pedal idiomacy and the harp's chromatic possibilities. It witnesses the tradition and structure of the pedal idiomacy lineage splinter into many diverging paths.

Chapter 4

Diverging Paths:

Modern Harp Repertoire of the Mid-to-Late Twentieth Century

Introduction: Redefining Idiomacy Beyond the Schema

This concluding chapter examines three late 20th century compositions for harp that represent some of the distinct paths harp composers forged that expanded the boundaries of harp idiomacy. While pedal schemas, voice leading, and motifs still occur in these pieces, each also employs pedals in new ways.

Bernard Andrés' *Absidioles* manipulates a long legacy of pedal idiomacy, exerting masterful control over its ties to it.[100] Fusing form and aesthetic with the very nature of the instrument, *Absidioles* blurs the line of causality between the needs of the pedals and the layers of compositional design. Employing early modern idioms at every turn, this piece alternates between lifting the curtain of mystery surrounding pedal mechanics and fusing pedal idiomacy so tightly with form so as to disguise it.

Luciano Berio's *Sequenza II* is the only piece in this chapter that was composed by a non-harpist.[101] Systematically questioning both the means and

[100] Bernard Andrés, *Absidioles* (Paris: *Éditions Durand*, 1974).

[101] Luciano Berio, *Sequenza II* (Austria: *Universal Edition AG*, 1963).

results of pedal idiomacy in each section, this piece tenders a new image of harp and harpist dismantled from the heavy burden of their conventionalized history. Employing indeterminacy where unspecified pedal motions exert their own choice on the pitch collection, *Sequenza II* abandons the careful pedaling idiomacy of the past. New pedal notation exchanges schema for gesture, carefully controlled harmony for indeterminacy, and the pedals of the past for those of the future.

Anne LeBaron's *Harpestra: Concerto for Two Harps (One Player)* expands the very definition of pedal idiomacy and the pedal layout.[102] Doubling both the possibilities and demands of the pedal layout, *Harpestra* explores the conditions that led to traditional pedal idiomacy and presents chromatic possibilities beyond that of the single harp.

In their varied dealings with pedals, the pieces presented in this chapter also mark a modern movement toward individual idiomacy. Where previous pedal markings presented one-size-fits-all schemas of motion, each of these pieces offers varying degrees of pedaling choices to the performer. For instance, several passages in Andrés' "Absidioles" list the pedal changes that must be made in the next few measures but leaves the order and pairings of these pedals to the performer's choice. Rather than indicating a lack of investment from the

[102] Anne LeBaron, *Harpestra – Concerto for Two Harps (One Player)* (Washington: *Golden Croak Music*, 1995).

composer, these passages allow personalization for the individual proclivities of the performer.

Berio's *Sequenza II* likewise provides pedal charts throughout, but features no explicit pedal markings. Expecting the performer to plot out the timing of their pedal changes according to their personal idiomacy and preference, Berio forms a collaboration between performer and composer. Further, pedal markings that indicate for the player to shift through all pedal positions randomly leave the pitch-class sets to chance, with the pedals generating harmonies neither composer nor performer plan themselves.

LeBaron's *Harpestra* delves into personal idiomacy extensively, challenging the harpist to move pedals in a unfamiliar layout. The physical novelty of the fourteen-pedal layout lies in the lack of standardized pedaling techniques to move one's feet around two harps. Quadrants and pairings that were previously grouped are now rearranged, as the left and right sides of the pedal layout lie adjacent to each other. The schemas once formed between the sides of one harp double in complexity, as motions from four sides interact.

The eras of the harp and its idiomacy detailed in the previous chapters of this thesis involved a universal view of each body and performer. The repertoire from the late 20th century discussed in this chapter entrusts idiomacy and corporeal preference to individual performers as they make decisions about their pedaling motions, timing, and coordination to suit themselves.

Finally, this chapter offers suggestions for further research in this developing topic where embodiment meets pedal idiomacy. It lists particularly interesting repertoire that holds potential insights into pedal idiomacy and pedal schemas. A concluding summary draws insights from the ubiquitous strands within the varied presentations of pedal idiomacy and their effects on pitch-class sets and harmony on the harp.

Absidioles by Bernard Andres

Bernard Andrès (b. 1941) is a harpist-composer from France whose music interacts with and subverts the complex lineage of harp idiomacy. Having studied harp at the Conservatoire national supérieur de musique de Paris, Andrés' music inhabits the lush expressionist tradition of French harp music. However, his use of traditional building blocks in his composition, *Absidioles* (1974), is far from conventional. In *Absidioles*, the pedal motion goes beyond the harmonic and pitch-related plane to inform and affect the rhythm, formal organization, and texture of the music.

Absidioles provides is a neoclassical perspective on traditional harp idioms, featuring, developing, and modernizing the harp idioms discussed in the previous chapter. It employs multiple pitch-class sets with reduced cardinalities due to doubling, but uses doubled strings as prominent melodic surface elements

rather than to discretely support the melody and harmony. Most pedal changes occur in delayed and simultaneous pairs, while a few passages include Single Adjacent Clusters. As a chromatically adventurous piece, several sections begin with an entirely new pitch set and require extensive pedal changes. In the legacy of Salzedo, the form and texture in *Absidioles* is built around these pedal changes and the need for time to dampen the strings. Table 4.1 summarizes the fragmentary form, pitch-class sets, and textures in *Absidioles*.

Table 4.1. A formal, textural, and pitch-class set summary of Bernard Andrés' *Absidioles.*

Section	**Pitch-Class Set**	**Texture**
Introduction (mm. 1-3)	6-Z38 (012378)	Single-line runs
a (3-65)	6-Z38 (012378), 6-Z41(012368)	Arpeggiated bass, triadic and quartal chords with melody
Transition (66-69)	B (0)	Low repeated octaves in the bass
b (70-86)	7-20(0124789)	Melody and chordal accompaniment, alternating clusters and melody.
c (87-130)	7-31(0134679)	Melody with scalar accompaniment, alternating melody with quartal chords.
Transition (131-134)	Chromatic scale descending from B-E	Single low octaves

Table 4.1 Continued

Section	**Pitch-Class Set**	**Texture**
d (135-158)	7-31(0134679). Enharmonically presented from last use of the set.	Alternating rolled chords with melodic fragments.
Transition (158-159)		A tacet bar with a fermata.
$\mathbf{a_1}$ (160-182)	6-Z41(012368) 6-Z42(012369)	Melody with scalar accompaniment.
Coda (183-194)	6-Z42(012369)	Scalar runs, low octaves.

Pedal idiomacy runs through the very fabric of *Absidioles*. One example of this integration is how the timing considerations concerning the mitigation of pedal slides are built into the rhythmic and formal features of the music. For instance, a beat's rest or sudden registral shift will often allow room for a pedal change in this piece, giving the buzzing strings enough time to stop ringing before the next pedal change (Figure 4.1). The physical necessity of space around pedal changes informs the rhythmic contour of the phrase. Technique and aesthetic are highly integrated, the harp's mechanics not being employed in taxing ways, but rather giving rise to the idiosyncrasies in the piece. The rhythmic features, the contour and how the intensity of the piece waxes and wanes are all highly integrated with the pedals.

Figure 4.1 shows one of the unconventional key signatures in *Absidioles*. Harp music that features non-tonal collections often employs key signatures that mark only the non-natural pedals in the setting.

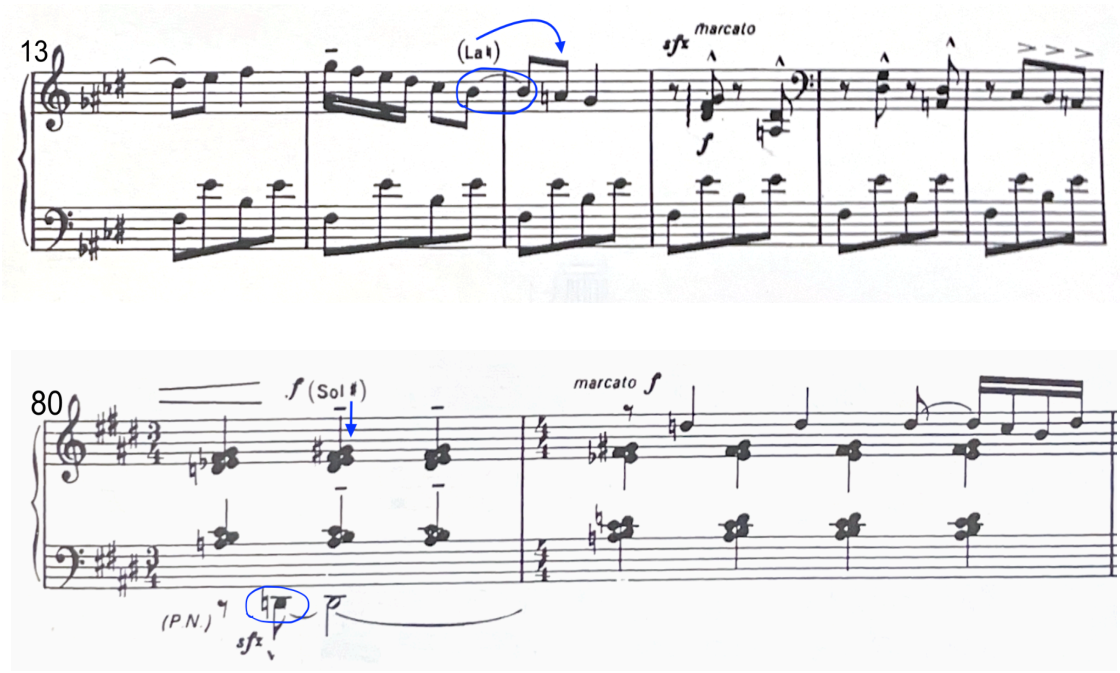


Figure 4.1. Mm. 14-15 and 80 of Bernard Andrés' *Absidioles*. A tied note and a sudden registral shift each make space around a pedal change.

Rather than being a burden, the technical needs of the instrument are featured on the musical surface of *Absidioles*. Aspects of harp idiomacy that are hidden in early chromatic repertoire are featured in this piece. The space required to make quick pedal changes and avoid pedal slides result in appealing rhythmic details and compellingly abrupt shifts in register, not impeding the rhythmic or formal flow of the piece but informing it.

Another aspect of harp writing that employs harp idioms in neoclassical ways is the use of enharmonic equivalents in this piece. While enharmonic equivalency is often utilized to double the pitches of adjacent strings, the prominence of doubling in the melodic surface raises this pedaling trick from its typically hidden status to a stylistic feature in its own right.

The first pedal setting, 6-Z38 (012378), has a cardinality below seven due to doubling between the B and C strings (with C-flat). In the early chromatic repertoire of the previous chapter, doubled strings were employed discretely, often used as alternatives to their enharmonic equivalent or to “eliminate” a pitch from the string layout and create a set of a lower cardinality. In Absidioles, the doubled strings act as a prominent melodic feature.

As shown in Figure 4.2, emphasized doubled pitches occur in a variety of melodic settings in both of the A sections. Rather than working as a rare effect of disguise, doubled pitches feature prominently in the melody. The melodic weight of the doubled pitch B/C-flat lays bare the mechanics of the harp, pulling back the curtain of mystery that doubled notes are normally steeped in.

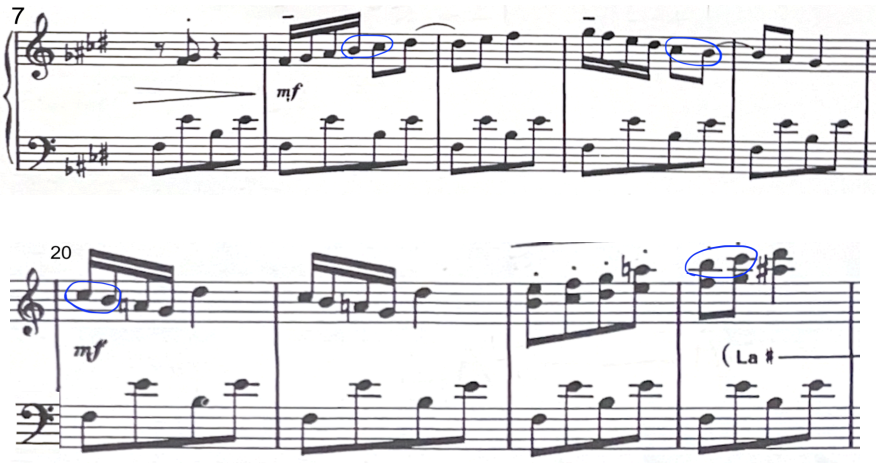


Figure 4.2. Mm. 8-10 and 20-23 of Bernard Andrés' *Absidioles*. The doubled pitches B and C-flat function as melodic devices.

Another expanded harp idiom is oscillating vertical motion. Oscillating motion involves no horizontal motion - just the vertical setting and resetting of the same single pedal or pair of pedals. First introduced in *La Source* from Chapter 3, through the Oscillating Pair, this motion is highly idiomatic and easeful. The first three pages of *Absidioles* feature oscillation of the A pedal, between its A and A-sharp settings. Horizontally static pedal positions like this are typically highly idiomatic. However, the frequent and volatile use of this single pedal developes the oscillating motion beyond its original scope. The oscillation of this pedal is highly capricious, sometimes being set and reset on two consecutive beats (Figure 4.3). The speed with which the performer must make these consecutive pedal changes undermines the idiomacy of the vertical-only motion.

The use of the oscillating pedal in *Absidioles* undermines its idiomacy, stretching the principles of smooth motion from which it originates to the breaking point.

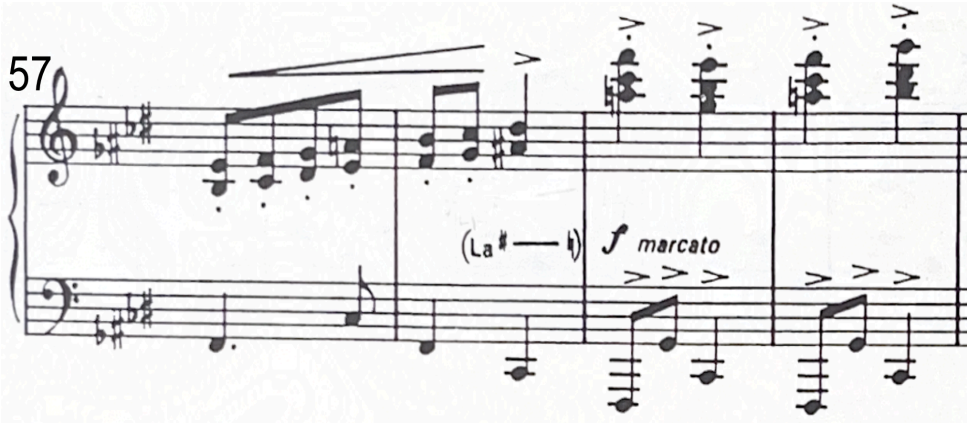


Figure 4.3. The quick pedal resetting in m. 58 of *Absidioles* by Bernard Andrés.

In stark contrast, the rest of the pedals in *Absidioles* are highly easeful. The multiple transitional passages between formal sections in *Absidioles* allow the performer ample time to complete pedal resets. Resets occur when the harpist must change a significant number of pedals at one time, virtually resetting the pitch-class collection. In *Absidioles*, a single pitch collection is often sustained for a few pages before a major reset occurs. The formal design of the piece consolidates the necessity for dampening strings and extra time to make multiple pedal changes with its fragmentary form. New themes and formal breaks occur every few pages alongside these pedal resets. Musical form and technical specifications are unified in the scheme of the piece.

The first transitional passage occurs from mm. 66-69. As shown in Figure 4.4, after the music reaches a climax, four sparse measures of a single pedaling tone in octaves make way for an entirely new pitch set. The low octave pedal in the bass delays the onset of the next section, providing time for four pedal changes and also aiding the shift in character for the impending passage. The order of the exact pedal changes is not provided. Rather, the pedal markings are grouped in a single bracket atop the new section (m. 70) and the performer must decide on the order that suits their individual idiomacy. As one exception to this individual idiomacy, a pedal marking in m. 69 indicates that the C pedal should be moved from C-flat to C-natural last. The low C string would likely resonate until that measure and cause a pedal slide if the pedal were changed any earlier.

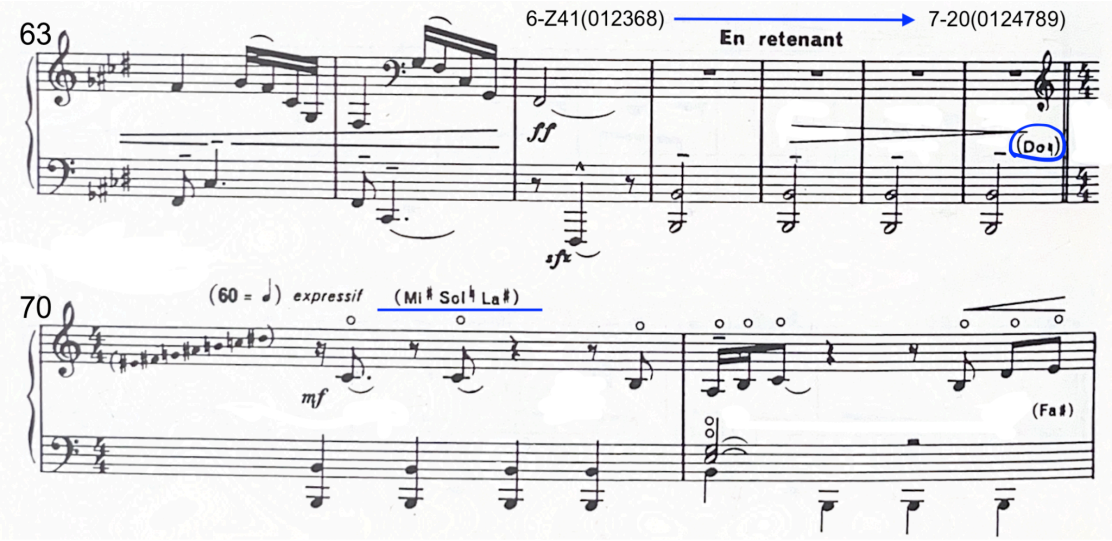


Figure 4.4. The pedal reset in mm. 65-69 of Bernard Andrés' *Absidioles*.

In its texturally sparse transitional passages, *Absidioles* boasts a formal feature that appears in multiple compositions by Carlos Salzedo and other influential harpist-composers. In Chapter 3, a pedal reset coincided with a double barline and fermata in Salzedo's *Chanson de la Nuit* making time for multiple pedal changes. Andrés continues this tradition but makes much more extensive use of it than what is traditional. Figure 4.5 shows the remaining two formal transitions that aid pedal resets. In this highly integrated compositional style, technical necessity joins formal feature and the space given to pedals grows into a tacet motif.

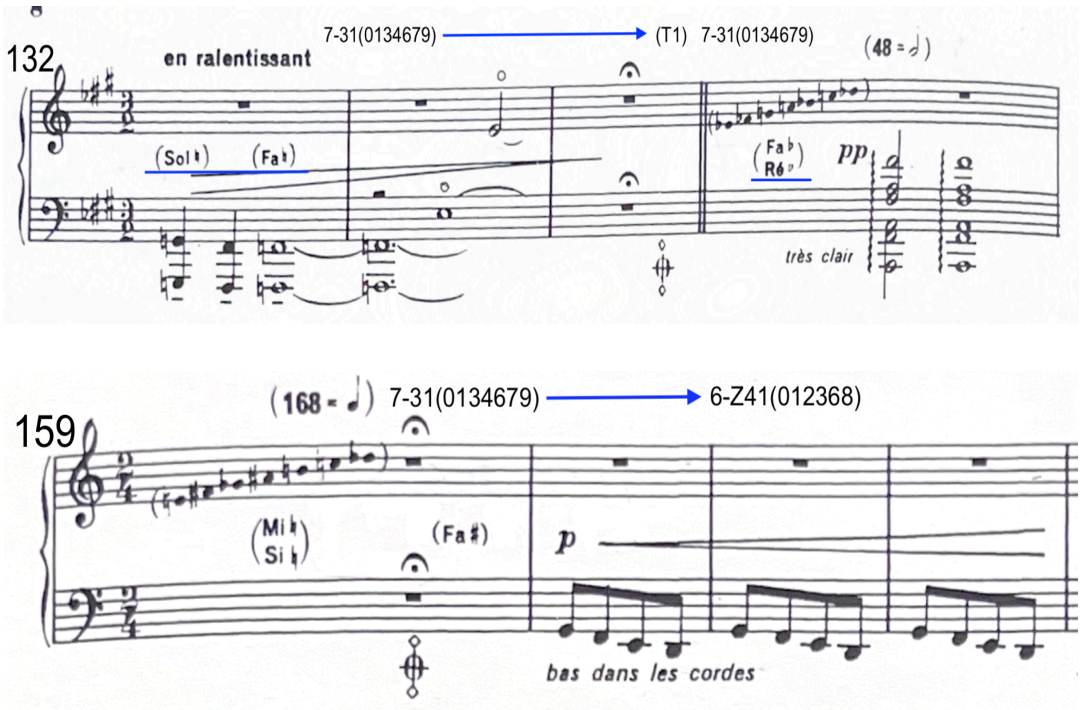


Figure 4.5. The pedal resets in mm. 132-134 and 159-160 in Bernard Andrés' *Absidioles*.

Absidioles ends with a final enharmonic pedal quirk. The enharmonic E-sharp spares the performer from an octave span, which is quite large at the low range of the harp where the wire strings are further apart to allow for the larger vibrations. Yet another measure of silence makes way for this final pedal change, completing the development of this thematic idea (Figure 4.6).

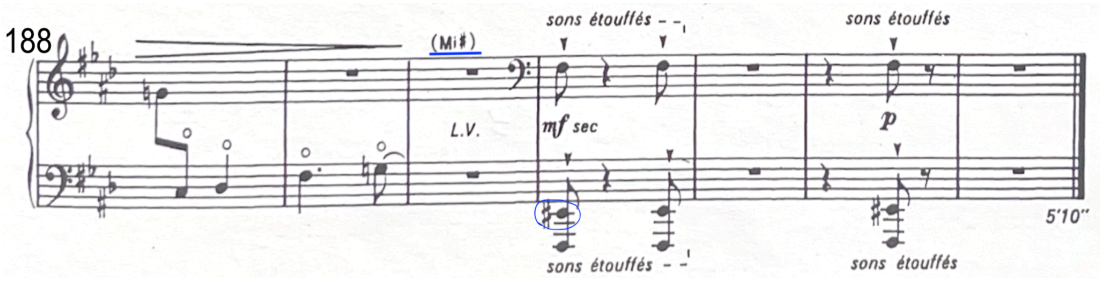


Figure 4.6. The final pedal change and its enharmonic realization in mm. 90-94 of in Bernard Andrés' *Absidioles*.

In *Absidioles*, Andrés exerts tactful control over the presentation of the pedal system's bestowals and demands. Where doubled pitches are typically concealed, *Absidioles* features them in melodic prominence. Where extra time and dampening is needed to make multiple resets, the form of the piece incorporates that need and grows it into a formal feature. Both form and aesthetic are rooted in the mechanics of the pedal system in this piece. The pedals are not accessories to the music; they comprise its very form and nature.

Sequenza II by Luciano Berio

Far from the sleek, natural integration of harp idiomacy and pedal mechanics in *Absidioles*, Luciano Berio's *Sequenza II* (1963) turns idiomacy on its head. Berio was an experimental composer of the 20th century who worked with indeterminacy in his later compositional years. Each of his fourteen Sequenzas explore a different instrument, testing the limits of its virtuosity, challenging its idioms and traditions, and proposing new musical and technical vocabularies for it.[103] Berio's *Sequenza II* circumvents harp idioms, stretching, developing, and challenging them. It also employs pedals in an entirely new way: as tools of indeterminacy. Several passages involve the random setting and resetting of pedal pairs, with only the direction being to move both pedals through all three notches of the vertical space.

Berio's work acts as a discourse on the traditional harp idiom, deconstructing and reconstructing a specific technique in each of its five sections.[104] In a 1995 interview, Berio asserted that his *Sequenza II* "extends the possibilities of the instrument," but reported coming up against "certain limitations

[103] Kirsty Whatley, "Rough Romance: *Sequenza II* for Harp as Study and Statement," *Berio's Sequenzas*, ed. J. K. Halfyard (Aldershot: *Ashgate*, 2007), xiv.

[104] Whatley, "Rough Romance," 42.

of the instrument."[105] While each section of the sequenza presents and later develops a single idiomatic or anti-idiomatic idea on the harp, the lines between sections constantly blur together. Differing compositional ideas are presented in close proximity, vying for dominance. The juxtaposition of themes of pitch sparsity (through enharmonic doubling) and pitch proliferation (through indeterminacy in the performer's hands and feet) comprises the body of the composition. Table 4.2 shows a formal overview of the piece, with the techniques, idioms, and the pitch-class sets in each section.

Table 4.2. A formal summary of Luciano Berio's *Sequenza II* that shows the main formal divisions and the pitch-class sets, techniques explored, and textural contrasts of each section.

Section	**Pitch-Class Set**	**Harp Technique / Idiom**	**Texture**
Exposition a mm. 1-60	"Mystic Chord" 6-34(013579) Multiple 7- pitch-class sets	- Explores single pitches - C, E, and Gb are each produced with four strings: two enharmonic equivalents and their natural harmonic soundings on the string an octave below	Sparse
Exposition b mm. 61-72	7-20(0124789) Indeterminacy involving all seven pedals	- Explores the sound mass - Glissandi, and bisbigliandi make a sound-cloud texture, while pairs of pedals moving randomly work their way through the entire pedal layout	Dense

[105] Theo Muller, "'Music Is Not a Solitary Act': Conversation with Luciano Berio," *New Series* 199 (Spring 1997), 18.

Table 4.2 Continued

Section	Pitch-Class Set	Harp Technique / Idiom	Texture
Development a mm. 119-172	Multiple 7- pitch-class sets Indeterminacy involving all seven pedals	- Explores the single pitch further - Individual pitches are produced through a variety of percussive timbres	Sparse
Development b mm. 173-290	“Petrushka Chord” 6-30(013679) 7- pitch-class sets Indeterminacy involving all seven pedals	- Explores the sound mass further - Indeterminacy through extended and simultaneous glissandi and bisbigliandi in both hands with randomized pedal motion	Dense
Coda mm. 291-306	7- pitch-class sets, Indeterminacy involving all seven pedals 7-26 (0134579)	- Triadic chords spread over all ranges of the harp and in a array of extreme dynamics. - Closes with a single glissando running from the middle range of the harp to the bottom of the bass clef staff.	Sparse

The sequenza is comprised of the juxtaposition between two chromatic possibilities of the pedal system: a limited pitch set through duplication and indecipherable chromaticism through constantly-shifting indeterminate pedals. Along with these pedal techniques, various extended techniques present sharp, percussive timbres that challenge the traditional sound of the harp.

The first exposition on p.1 produces a study on the chromatic adaptability of each harp string. The individual pitches C, E, and G-flat are produced by four strings each. Figure 4.7 shows the first two systems of p.1. Starting with G-flat,

this pitch is produced with the G and F strings, and through natural harmonics on the harp (accessed by plucking the string an octave below with part of one's hand cutting the string in half). During this section, the pitch-class sets change frequently. In a movement toward more individual performance choices, only pedal charts are provided. The order of pedal changes to progress from one chart to the next is unspecified and a measure of silence facilitates these frequent resets. The first page and its exposition of the first theme ends with a fermata, formally separating it from the exposition to follow.

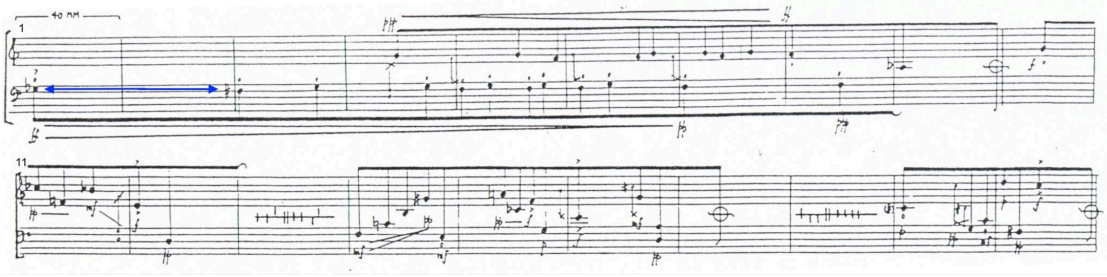


Figure 4.7. The duplication of G-flat in mm. 1-20 of Luciano Berio's *Sequenza II*.

The second page presents an exposition on the theme of chromatic abundance and the sound cloud through copious randomizations of pedal movements and multiple types of glissandi.[106] Berio's approach to indeterminacy in this section relies on the harp's unique relationship to chromaticism. While indeterminacy of pitch sets is typically generated through systems of chance and

[106] Berio employs single and doubled lines of one-handed glissandi. He also employs *bisbigliandi*: the harp's version of tremolo through constant plucking of alternate enharmonically-equivalent strings. Bisbigliandi can be produced with single pitches and chords.

then applied to an instrument, the harp is already segmented between melodic gesture and chromatic realization. In other words, Berio was able to compose the melodic contour while allowing unspecified pedaling motions to generate the specific chromatic pitches of the melody.

In order to realize this indeterminacy, Berio developed the new pedal notation shown in Figure 4.8. Lines after a letter (indicating which pedal the motion concerns) show three levels of movement. For instance, the lines succeeding A and D in Figure 4.8 show an upward line, a plunge below the initial middle level, and then a shorter ascent back to the middle level. This graphic indicates the upper/flat, lower/sharp, and middle/natural notches of the pedals.

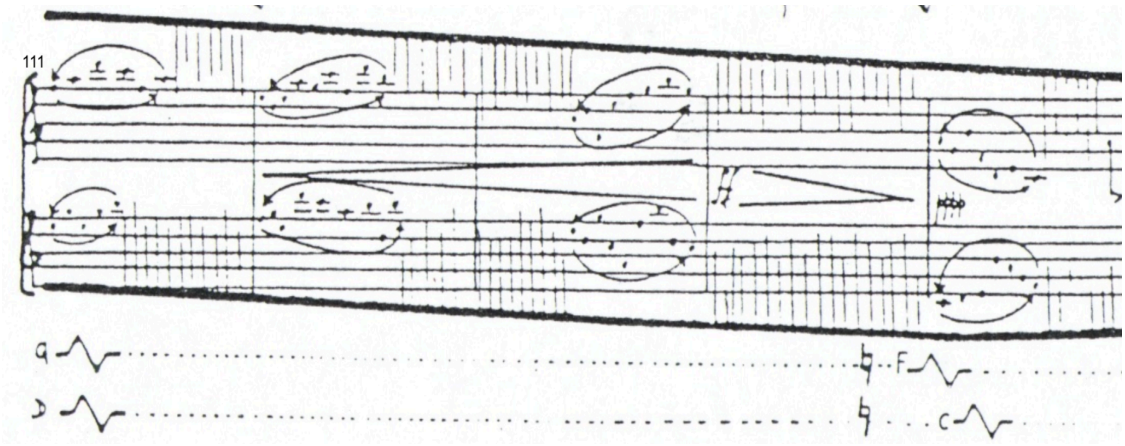


Figure 4.8. The indeterminate pedal notation in mm. 111-115 Luciano Berio's *Sequenza II*.

Figure 4.8 shows the different degrees of indeterminacy created by the pedal markings in *Sequenza II*. In mm. 111-114, both pedals move in tandem.

The pedal pair shares the same indeterminate movements. Conversely, the last measure of the figure shows a new pedal pair with offset motions, the F pedal beginning its cycle through the three notches before the C pedal. The schemas produced by these indeterminate pairs would be vertical parallel (mm. 111-114) and vertical contrary (mm. 115–), but the resulting pitch collections (especially in the latter) depend entirely on the individual performer's pedaling speed. The timing of both the pedal and finger motion and how they align have an extensive impact on the resulting pitch collection. The combination of the two pedals with their three notch options could each produce many results dependant on speed. The speed of the indeterminate melodic gestures shown above compounds this indeterminacy further.

After the second Exposition, p. 3 presents the first Development. This highly percussive section vacillates between varied presentations of single pitches (through different fingerings, timbres, and enharmonic spellings) and the thrumming block chords shown in Figure 4.9. This section overturns the order of the normally pitch- and harmony-dominated compositional view of the harp, and offers a soundscape of color and percussion. Pitch is outshined by the array of buzzings, rattlings, and knockings on the strings and soundboard. Figure 4.10 shows a key for some of the effects in the Sequenza.

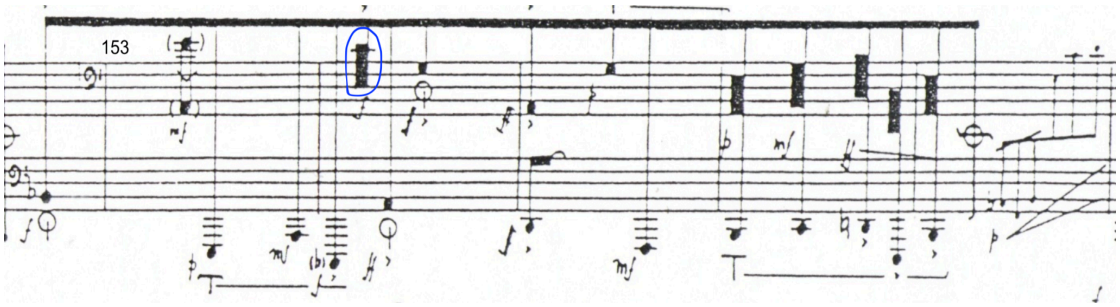


Figure 4.9. Percussive block chords in mm. 153-159 of Luciano Berio's *Sequenza II*.

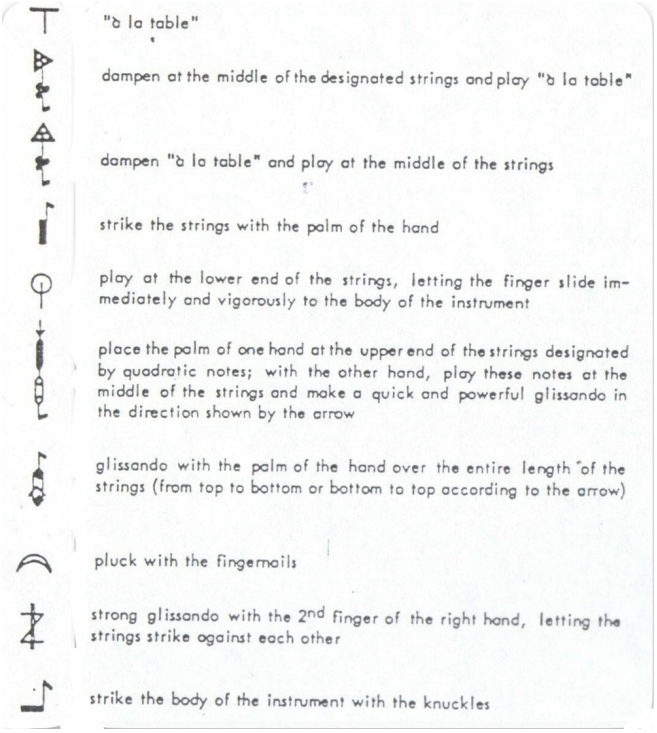


Figure 4.10. A key for the extended techniques in Luciano Berio's *Sequenza II*, p. 1.

During the first development, indeterminate glissandi and trills interject into the sparse pointed texture of doubled pitches and block chords. This second theme of indeterminate soundmasses finally overtakes the first in the last system

of p. 3, through forte waterfalls of indeterminate glissandi. The succeeding second development expands the bouts of indeterminacy from the previous three pages, presenting a wash of sound so compounded, pitches lose their individual significance (Figure 4.11).

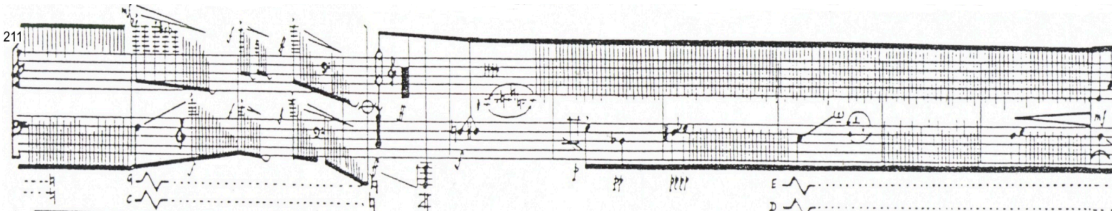


Figure 4.11. A section of indeterminate glissandi and trills from the second development of Luciano Berio's *Sequenza II*, mm. 211-220.

Berio's indeterminate pedal markings constitute an entirely new compositional use of pedals; however, the remaining elements of this section draw from conventional idioms, carrying on the harp's compositional legacy. Berio was connected to this legacy through his friend, Edgard Varèse, who knew Carlos Salzedo.[107] All indeterminate pedal markings involve pedal pairs with mostly adjacent motion from one pair to the next. Further, the trills that create the sound clouds in *Sequenza II* are a direct advancement from Salzedo's modern trilling technique.

Carlos Salzedo played a key role in expanding the technical possibilities of trilling on the harp — an evolution that Berio advances even further in *Sequenza*

[107] Fernand Ouellette, *Edgard Varèse: A Musical Biography* (London: *Calder and Boyars*, 1973), 66.

II. In his *Modern Study of the Harp*, Salzedo acknowledges that dividing a trill between two hands “is undoubtedly the most efficacious” and has been the predominant trilling method in conventional harp playing.[108] However, later in the study, the virtuoso inserts an etude with several consecutive measures of one-handed trills while the other hand simultaneously presents another line of music.[109] Berio’s long-term involvement with harp composition boasts a writing style that undauntedly makes demands of the instrument beyond what is conventional, but alludes to a knowledge of these conventions.

Furthering Salzedo’s evolution from two-handed to one-handed trills, Berio’s sequenza features extensive passages of simultaneous one-handed trills in both hands (Figure 4.12). Paired with the constant oscillation of the pedals, which mimic trills themselves, the resulting soundmass approximates micropolyphony on a single instrument.

With all four limbs making breathless indeterminate motions, the muscle memory of pedal and hand idiomacy would undoubtedly guide the performer. These sections allow the long legacy of pedal idiomacy to speak for itself, giving voice to chromatic sets and harmonies entirely decided by the trained and familiar gestures of the performer. The principles of motion behind the pedal

[108] Salzedo, *Modern Study of the Harp,* 10.

[109] Salzedo, *Modern Study of the Harp,* 40-45.

schema lose all direct harmonic meaning, turning pitch and harmony into abstract gesture.

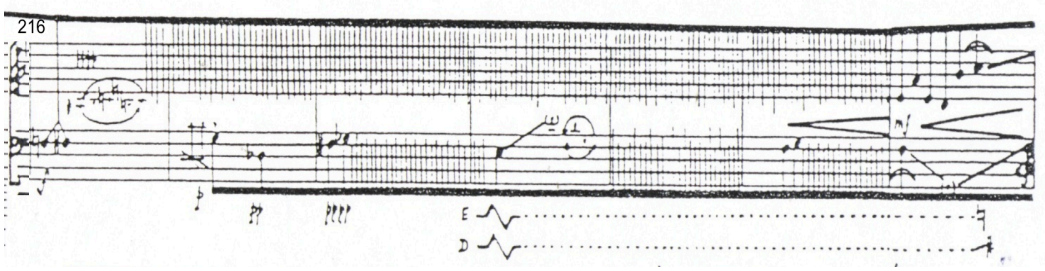


Figure 4.12. Simultaneous one-handed trills in mm. 216-222 of Luciano Berio's *Sequenza II.*

The coda begins at the end of p. 5, providing relief from the constant juxtaposition of themes of pitch sparsity and pitch proliferation. This closing section instead presents a stumbling series of tertian harmonies in a variety of ranges, harmonies, and dynamics (Figure 4.13). The score does not indicate to roll any of these chords as is customary. It also specifies to mute each chord after plucking, marked with a circle with intersecting lines. The resulting dry tone presents one final modern and alternate image of the harp, a distorted refraction of its stylistic and idiomatic legacy.

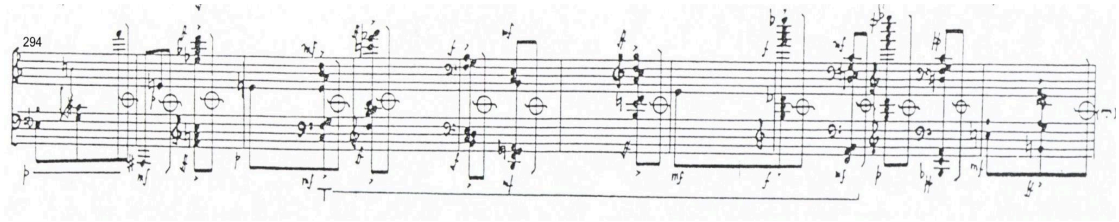


Figure 4.13. The muted and solid chords in the coda of Luciano Berio's *Sequenza II*, mm. 294-303.

Harpestra by Anne LeBaron

Anne LeBaron's *Harpestra* (1994) expands the definition of harp and harpist by doubling the pedal layout. As a concerto for orchestra and one harpist who plays two harps, this work requires great skill and experience from the soloist. Simultaneously, this concerto subverts and challenges the performer's pre-existing skills with its unique technical demands. The soloist's previous embodied knowledge of the idiomacy of navigating seven pedals from a seated position is challenged, as they are tasked with standing and kneeling in between two harps, and sitting behind them with a harp on each shoulder.

LeBaron wrote *Harpestra* to "explore, and exploit, the potential of combining chromatic possibilities between two harps."[110] The chromatic possibilities of the instrument layout of *Harpestra* are double that of a typical piece for harp. The previous number of distinct pedal settings was 2,187 (3^7).[111] With that layout doubled, combinations of any two possible settings can occur simultaneously. Beyond combinations of already possible pitch-class sets, sets that were previously impossible are now available. All twelve pitches of the chromatic scale, plus two doublings are accessible through the fourteen different pedals on the combined layouts of the harps.

---

[110] LeBaron, *Harpestra*, 1.

[111] Gotham and Gunn, "Pitch Properties of the Pedal Harp," 2.2

Chapter 2 discussed Mark Gotham and Iain Gunn's findings that many highly clustered pitch sets are not possible on the harp. For instance, a set with a C, C-sharp, and D cluster is not possible on a single harp. To access the pitches C and C-sharp simultaneously, the D pedal would be set to D-flat, barring access to the D from this set. With two harps, all pitches of the chromatic scale are available. Any two of the special sonorous effects of glissandos with doubled pitches (those that yield pitch-class sets with cardinalities lower than 5) are also simultaneously possible.

On one harp, the enharmonic doubling of one pitch limits the options for the rest of the pitch set. For instance, a single harp set to create the doubling C-sharp/D-flat cannot also make the doubling B/C-flat. Only three pairs of enharmonic doublings can be produced on a single harp. These doublings greatly limit the options for pitch content, tying up strings in sharp or flat pedal positions. Two harps allow for six different pairs of enharmonic doublings and increase the options available to the composer. LeBaron's use of two harps employs multiple enharmonically doubled strings. Her highly idiomatic use of these doublings maintains the traditional legacy and image of the harp in their construction but simultaneously expand its chromatic possibilities.

Harpestra is as much a mathematical coordination of chromaticism as it is a theatrical show. In her program notes, LeBaron describes the concerto as anticipation of her stylistic movement toward "'concert theater,' where visual

aspects are critical to the composition."[112] One of the main stylistic features of the harp writing in this concerto is the contrast between the two harps. When this contrast cannot be tracked aurally, the audience can still see the conflict between the two harps as the performer physically shifts between them. Aurally, the harps are pitted against each other; they engage in call-and-response dialogue with each other and combine into an amalgamated texture. The two harps remain in different pedal settings throughout, never matching in their pitch-class sets.

Harpestra begins with a combination of two sets with doubled pitches (Figure 4.14a). In fact, in keeping with the unique harmonic possibilities of the instrument and in dialogue with its stereotypical sonorities, all individual pedal settings in the concerto have cardinalities of 5 or below. The first harp is set to 5-33(02468), with the doubled pairs C/B-sharp and G-sharp/A-flat making a cardinality of 5. Harp 2 is set to 5-29(01368), with the doubled pairs D-sharp/E-flat and B/C-flat. On their own, each harp creates specialty glissandos, announcing their entrance with stereotypical harpistic effects (Figure 4.14b). The superset of the two harps, 9-8 (01234678t), inhabits a chromatic space far beyond what is possible within the image of the soundscape that they evoke.

[112] LeBaron, *Harpestra*, 1.

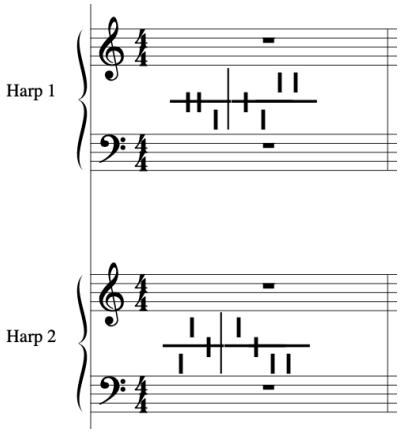


Figure 4.14a. The two pedal settings at the beginning of Anne LeBaron's *Harpestra*, m. 1.

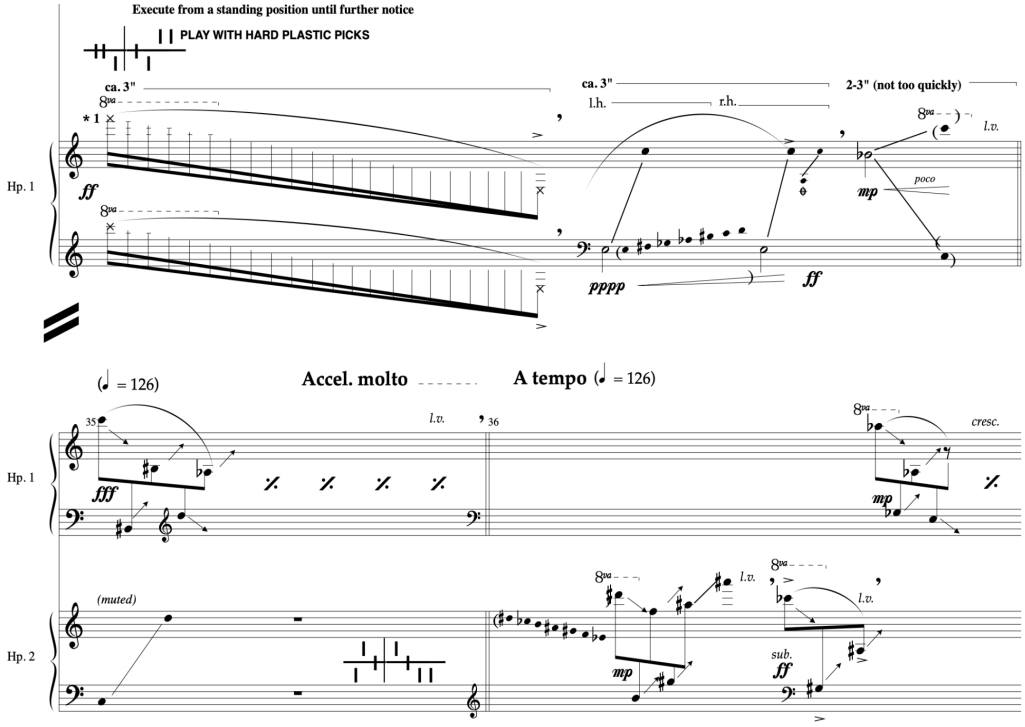


Figure 4.14b. The highly gestural entrances of the two harps in Anne LeBaron's *Harpestra*, mm. 34-36.

The harps enter the concerto with thrilling glissandi gestures evoking their stereotypical image. Each harp produces a pitch-class set with lower cardinalities through doubling while harmonically producing results that are impossible within the idiom that they evoke. The two harps' harmonic expansion of their traditional image and the gestural theater inherent to these motions continue throughout the concerto.

Along with the task of pedaling two harps, the expanded physical possibilities in *Harpestra* include tools with which to pluck, strum, and glide along the strings. While not a new technique, the number of glissandos the soloist must perform with a pick is unusual. Soft picks are sometimes used to mitigate blistering on the fingers and enable a louder sound in an orchestral setting while mimicking the softer sound of fingers on the strings. Harder plastic picks are used in more modern, avant-garde repertoire. In a dialogue with these softer and harder timbres of the harp, this concerto frequently interlaces these sounds, calling on the performer to not only play two harps, but also use two different types of picks. Similarly, sections of the concerto call for the performer to lace a paper mute between the harp strings of one of the harps, greatly changing the timbre of the instrument and slightly obscuring the clarity of its pitch content.

The first series of glissandi (mm. 34-51) are played with picks and employ LeBaron's original extended technique, the "Breaking Icicle Effect" (Figure 4.14b). In this technique, the performer slides the plastic pick along the strings

above the tuning disks. The resulting pitches indeterminate, producing sound effects that do not register as pitch. From their entrance, the two harps are thrust into vigorous dialogue, their different pedal settings and pitch sets alternating through rhythmically offset glissandi (Figure 4.15). The orchestra joins in, imitating the harp's extended techniques through their own glissandi and harmonics (Figure 4.16).

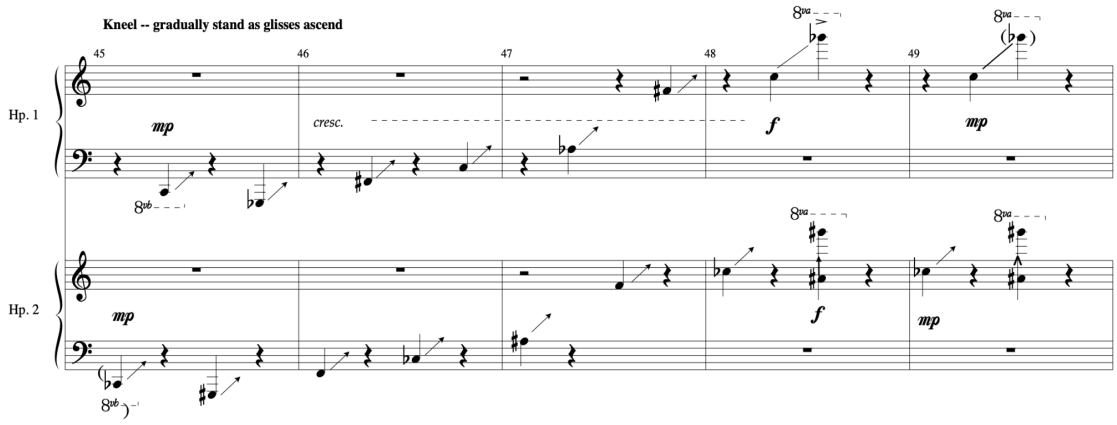


Figure 4.15. The call-and-response dialogue between the two harps in Anne LeBaron's *Harpestra*, mm. 45-49.

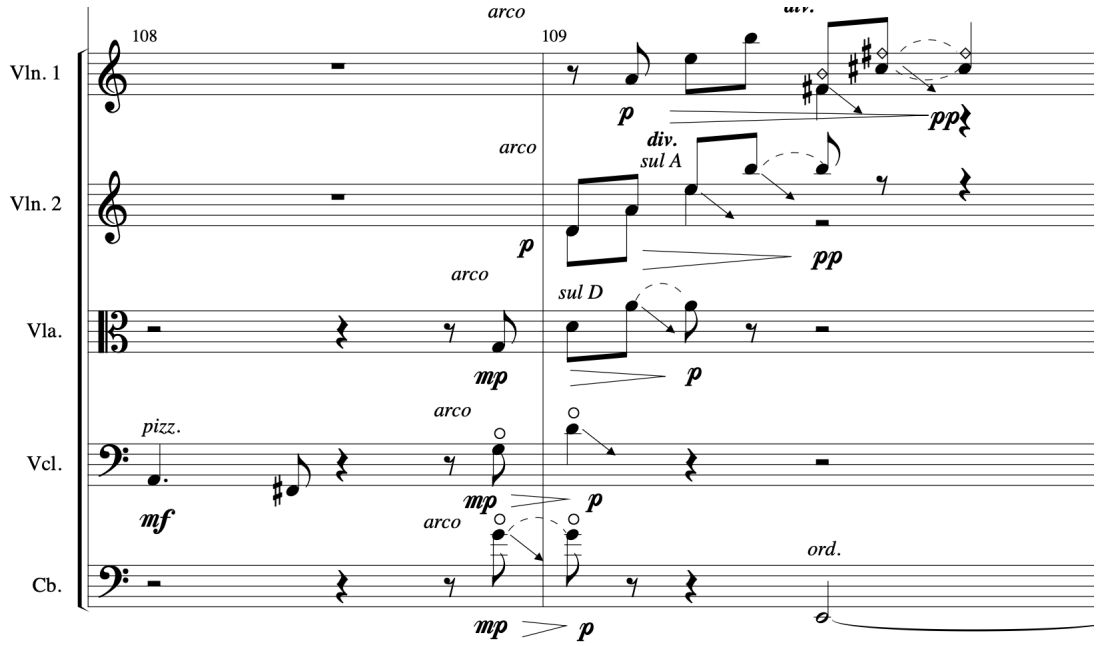


Figure 4.16. The harmonics and glissandi in one orchestral response to the harp's extended techniques from Anne LeBaron's *Harpestra*, mm. 108-109.

The dialogue and contrast between the two harps are marked by stark differentiations of pitch-class sets, timbres (through different picks and extended techniques), and contours. For instance, the ending of the harps' first entrance features a series of glissandi contrasting in pitch-class and contour, each descending glissando interrupting the previous ascending glissando (Figure 4.17a). Eventually reaching a consensus, these dueling harps make a final combined ascending gesture, only to contrast with the violin's descending mimick of the glissando (Figure 4.17b). Just as the image of a single harp is expanded through LeBaron's unique performing forces for the soloist, the contrast between

the two harps is further inflated as this dialogue between juxtaposed elements reaches the orchestra.

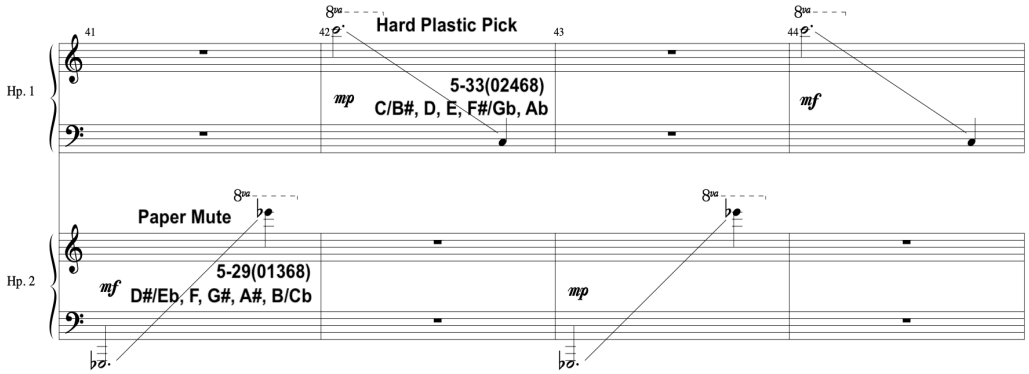


Figure 4.17a. The contrasting glissandi between Harp 1 and Harp 2 in mm. 41-44 of Anne LeBaron's *Harpestra.*

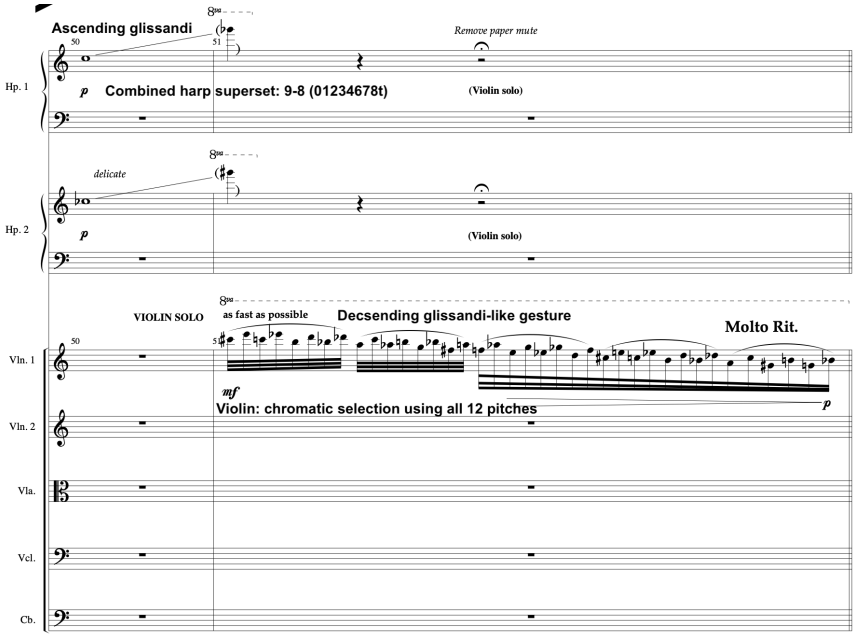


Figure 4.17b. The contrasting gestures between the harps and solo violin in mm. 50-51 of Anne LeBaron's *Harpestra.*

Throughout *Harpestra*, frequent pitch sets with doubled strings exploits the unique possibilities of the harp. Its main chromatic offering that other string instruments cannot produce is the glissandos set to specific pitch-class sets, especially those that employ doubling to gliss. on a cardinality lower than 7. *Harpestra* is monumental in its exploitation of the harp's unique harmonic strengths while decreasing its harmonic weaknesses by doubling the pedals on the layout. Table 4.3 shows a summary of the subsets and supersets of the dual pedal layouts in Harpestra.

Table 4.3. The Pitch-Class Sets in Anne LeBaron's *Harpestra*.

mm.	**Harp 1 PC Set**	**Harp 2 PC Set**	**Supersets (Hp 1 + Hp 2)**
m. 34	5-33(02468)		
m. 35		5-29(01368)	9-8 (01234678t)
m. 87	5-29(01368)	5-35(02479)	9-9(01235678t)
m. 115	5-26(02458)	4-19(0148)	superset 9-11(01235679t)
m. 131	5-29(01368)	5-29(01368)	7-29(0124679)

As shown in Table 4.3, there are four different pitch sets for each harp in *Harpestra*. Each pedal reset occurs on both harps at the same time. Following the modern tendency toward individual choice with pedal changes, all pedal

markings are given as lists during tacet measures, with no specification as to which pedals are changed in what order. The pedal changes in *Harpestra* are substantial, often requiring most of the seven pedals on each harp to be moved. Most often, six to eight tacit measures allow the soloist to completely reset the pedals of both harps. Therefore, the need for a pause or thinning in the texture to allow time for multiple pedals to be reset without pedal slides is eliminated: the orchestra continues playing as the soloist prepares for the next entrance.

With the expanded physical possibilities of the instrument, the performer is also tasked with expanding their idiomacy and embodied experience of the instrument. There are several possibilities for pedal change parings throughout this concerto. From the bench between the two instruments, the performer could reset the pedals of each harp individually, from left to right or right to left (Figure 4.18a). In this case, pedals would be reset in their usual pairs on each individual harp. The performer could also move from left to right or right to left, making clusters between the harps (Figure 4.18b). Finally, pairs across harps could be made together. The most outward pedals (the left side of theft harp and the right side of the right harp) would be reset in clustered pairs, while the inner pedals (the right side of the left harp and the left side of the right harp) would be set in pairs of pedals opposite to each other (Figure 4.18c).

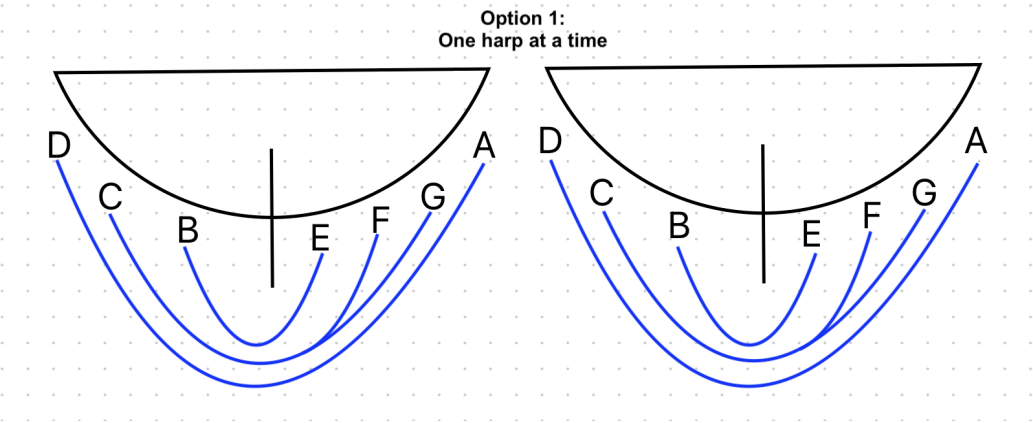


Figure 4.18a. Option 1 for pedal resets on a double pedal layout.

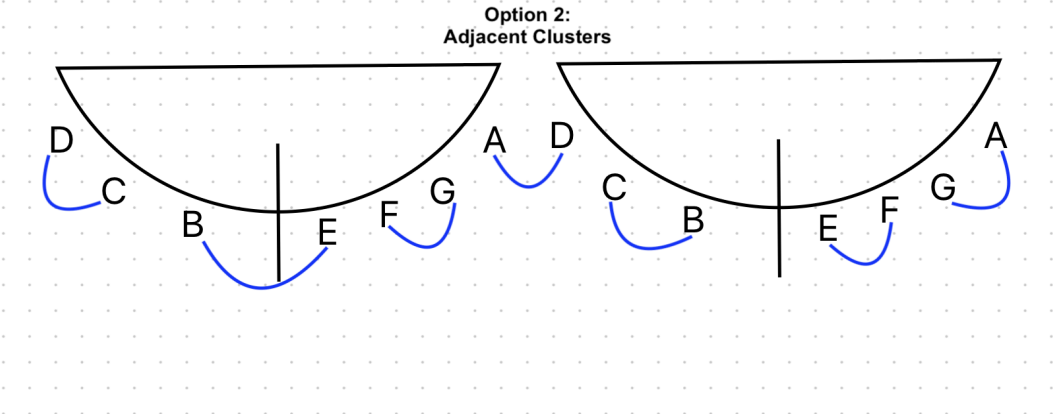


Figure 4.18b. Option 2 for pedal resets on a double pedal layout.

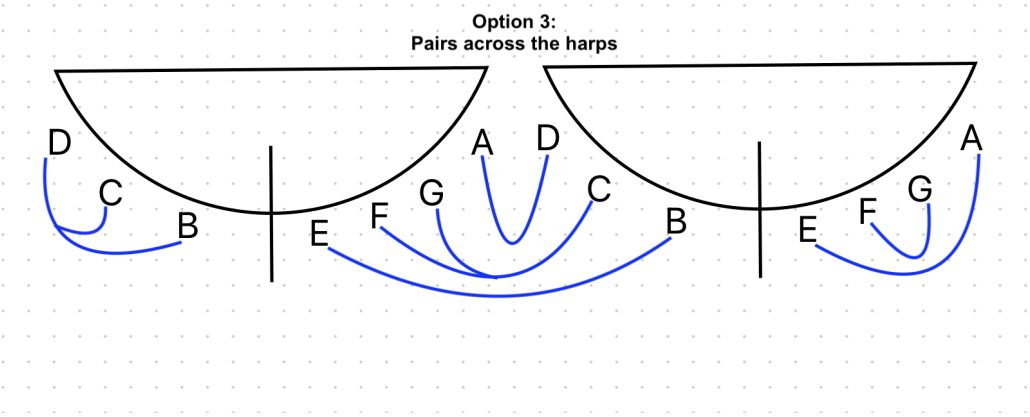


Figure 4.18c. Option 3 for pedal resets on a double pedal layout.

The combination of two pedal layouts allows for various doublings that would not be possible on a single instrument. In the last pedal setting from Figure 4.19, both harps create a 5-29(01368) set through different pedal settings. This figure shows the respective settings of the two harps, and their combined superset of 7-29(0124679). Enharmonically-doubled pitches are connected with lines.

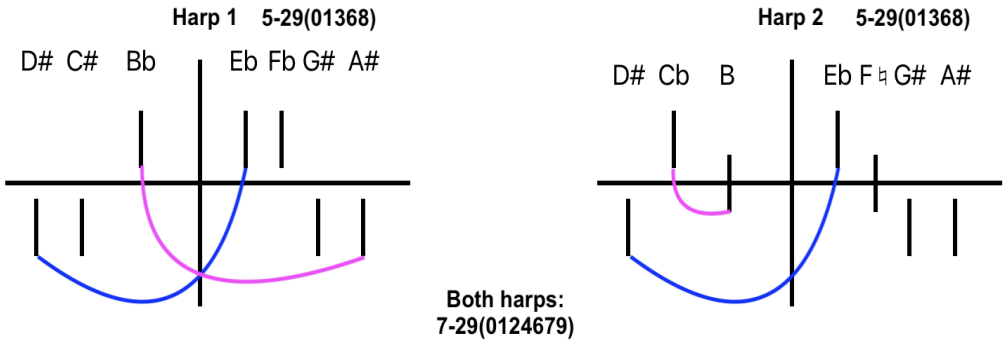


Figure 4.19. The last pedal settings in Anne LeBaron's *Harpestra*.

In this last pedal setting, each harp produces a different realization of the same pentachord, collectively producing a collection of pitches that a single harp could not produce alone. Yet, the combined superset does not have a cardinality beyond what a single harp produce. This last combination of pedal settings exemplifies LeBaron's artful exploitation of the double pedal layout. Each pedal setting in *Harpestra* continues to evoke and make use of the unique chromatic character of the pedal harp. Yet, in combination, these settings expand the chromatic possibilities of the instrument. Rather than creating a strangely assembled piano, where the two pedal layouts are fixed to yield the chromatic scale between them, both harps continue to act like harps while their sum transcends the limitations of a single harp. This concerto minimizes the chromatic challenges harp composers face without forfeiting the unique pitch-related possibilities the instrument has to offer. As a reframing of the pedal layout and its spacial structuring of pitch, *Harpestra* reimagines both harp and harpist.

Conclusion: Diverging Paths

This concluding chapter presented three compositional instances of the later modern pedal harp. The paths modern composers and harpist-composers have created in their journeys to expand upon the idiomacy, tradition, and possibilities of the instrument vary in their levels of adherence to the idioms of the past. With the fickle oscillating pedal motion in *Absidioles*, Bernard Andrés'

extended homages to pedal idioms border on satire at times. However, the sleek integration of mechanics and technique with form and aesthetic mark a complete realization of the idiomacy from the early modern era. The complex physicality of the instrument reaches its full potential as inspirer rather than burden. Andrés employs multiple traditional harp schemas and settings, and the rhythmic and formal surface of the piece reflect the sway of the pedals. In *Absidioles*, pedal idiomacy advances beyond pitch to encompass every aspect of the music.

The sway of the pedals also goes beyond its typical scope in Luciano Berio's *Sequenza II*. As an intentional distortion of idiomacy and convention, the timbres, colors, and effects in this piece challenge the traditional image of the harp and undermine the dominance of pitch and harmony. The use of pedals as indeterminate tools expand their initial purpose and offload compositional choices from the composer onto the performer and the instrument itself. While the premise behind the pedal indeterminacy in *Sequenza II* is highly unidiomatic and novel, its execution brings nothing but idiomacy and ease of playing, as the performer is tasked with moving the pedals at random in whichever motions and speeds suit them.

Harpestra by Anne LeBaron expands the chromatic possibilities of the harp while continuing to exploit the unique doubling features of the pedal layout. With the freedom to create pedal settings that yield lower cardinalities while having access to more pitches through the combination of both harps, this

concerto minimizes the chromatic challenges harp composers face without forfeiting the unique pitch-related possibilities the instrument has to offer. As a reframing of the pedal layout and its spacial structuring of pitch, *Harpestra* reimagines the embodied experience of the performer and necessities new pedal idiomacy.

Chapter 1 discussed how Sebastian Erard developed the double action pedal system to elevate the harp into the burgeoning chromatic world at which it sat at the sidelines. The pedals were devised to allow this instrument to take part in the music of the future. Over eras and generations, the compositional and pedagogical efforts of harpists forged a system of idioms, movements, and traditions that encased this pedal system. The repertoire in this chapter illustrates how that same legacy continues to grow beyond its initial scope. In this era of reinventing pedal idiomacy, the pedal system that was created to produce pre-existing harmonies and compositional ideas now inspires novelty.

CONCLUSION:

Conclusion and Further Research

Conclusion

From the preference of the QWERTY effect that manifests in the hands of keyboard-uses to the pedal schemas that occur in the feet of harpists, our experiences and interactions with the world are filtered through the tools we use. The study of embodiment, while finding early application in the writings of philosopher Maurice Merleu-Ponty, now reaches to manifold subjects and interdisciplinary approaches. Merleu-Ponty asserted that the world gains its meaning through our tangible interactions with it.[113] The physical layout of harp pedals extends the meaning of the pitches they produce, imbuing the previous hierarchy of tonality with novel mandates and preferences, and providing structure to the chromatic music that subverts that hierarchy.

The pedal layout and the human body's interactions with it do not merely interact with pitch-related musical meaning. They also take part in the creation of that meaning. As research from the field of grounded cognition has shown, our

[113] Merleau-Ponty, *Phenomenology of Perception*, 145-46.

brains create and refer to internal maps of the spaces, layouts, and tools we interact with.[114] The internal layout of the harp that exists in harpists' minds greatly effects their interactions with the instrument during performance, enabling them to make quick, instinctual motions that free up their concentration for other performance-related tasks. When composing, these same harpists carry that internal map with them, informing their decisions on the possibilities and preferences of the instrument. This research marks yet another offshoot of embodiment and grounded cognition, and demonstrates another instance of the insights and connections yet to be made in these fields.

This thesis proposed, explained, and illustrated the theory of pedal schemas. It justified the dire need for analytical frameworks like the schema in harp analysis, showing the crucial differences in the harmonic landscape of the harp through comparisons of piano and violin transcriptions. The transcriptions in Chapter 2 illustrated the multiple ramifications of the pedal layout on the harp's interaction with traditional harmony and tonality as a whole. With the differences in respellings, enharmonic equivalents, mufflings, and timing choices in pedal changes between arrangers and transcribers for the harp, the need for these alterations and diversity of choices available to achieve the same goal illustrated both the limitations of the pedal system and the unique possibilities it offers.

[114] Barsalou, "Grounded Cognition: Past, Present, and Future," 2.

Chapter 3 defined the Pedal Schema as patterns in the dynamic and complex interactions between the different levels of directionality within the pedal space. Employing familiar voice-leading terms to describe the interactions between the two sides of the pedal layout, these schemas encompass both horizontal and vertical motion across the seven harp pedals and their three respective notches. Repertoire like *La Source* by Alphonse Hasselmans illustrated how smooth, parsimonious motions are the most idiomatic on the harp. The discussion of "Fire Dance" by David Watkins showcased pedal pairs—the inner, medial, and outer pairings across sides of the harp. The final example in Chapter 3 followed the motivic development of pedal motion, showing how a single schema of pedal motion plays an integral role throughout *Six Noels* by Marcel Tournier.

This final chapter explored three compositions that expand harp idiomacy, exploiting the traditions and the materiality of the instrument that gave rise to them. It examined a range of departures from traditional idiomacy, from a masterful expansion of harp pedaling idioms, to employing pedals as tools of indeterminacy, and new specializations of the pedal system. While not a claim that schemas and the expansion of them are a design of composers' intentionality, this thesis observes how the combined necessities exerted by the physical layout of the instrument and the abilities of the human bodies which interact with it result in idioms and patterns of motion that, over centuries of harp

composition, have come to shape, inhabit, and give meaning to chromaticism on the harp.

A greater awareness of the pedal system and its schemas will help composers unfamiliar with the harp and performers making pedal choices. More central to this thesis, analysts may leverage their newfound knowledge of the pedal system and its schemas to prompt insights on the pitch components of harp repertoire. As composers continue to stretch the definition of the pedal layout, the image of the harp and harpist, and the chromatic possibilities of the instrument, these pedals point the way forward.

Suggestions for Further Research

The topic of harp pedal idiomacy and embodiment holds a wealth of untapped potential. Many insights that reach far beyond the harp undoubtedly await theorists who are willing and able to research this niche instrument and its repertoire. Contrary to appearances, the topics in this thesis are not obscure and extraneous to music theory at large. This research may have wide-ranging ramifications for embodiment as an exploration of the interactions between musical space and its relation to harmony and pitch collections. It certainly fills a gap in embodiment and affordance research by centering its discussion of musical space around a long-neglected instrument. As the first step in the study

of harp pedals and pitch collections, this thesis merely begins a long investigation.

Further research in this topic requires support from corpus studies. All claims about the idiomacy of certain pedal schemas in this thesis are reflections of my subjective experience as a harpist. While I was trained in conventional pedaling techniques that reflect the classical pedagogical tradition, my experience cannot speak to this tradition with absolute authority. Corpus studies that involve the analysis of a large selection of repertoire based on specific criteria would provide a more objective backing for further discussions of pedal schemas and their relative idiomacy. Data from these studies could aid in the confirmation of the ubiquity of these schemas and help generate more pedal schemas. Such corpus studies could identify the prevalence of the pedal schemas in this thesis in harp repertoire, the frequency of Gotham and Gunn's common pitch collections in harp repertoire, and which harmonic progressions are most pervasive in early chromatic harp music.[115]

Regardless of composers' intentions, pedal schemas are present in harp repertoire. However, data collected from interviews of a large number of living harpist-composers could provide further insight into the varied interplay between composers' intentions, the physical materiality of the instrument, and the lineage of pedal idiomacy from which each composer is situated.

---

[115] Gotham Gunn, "Pitch Properties of the Pedal Harp."

Further studies would also be enriched by a wider range of harp styles and traditions. This thesis focuses on narrow range of harp music and idiomacy, and did not have the scope to explore a diversity of harp traditions outside of the Western-European tradition. The similarities and differences between pedal and hand idiomacy across different harp traditions and musical cultures is a promising topic for further research.

Finally, further application of pedal schemas in more harp repertoire would continue the initial work of this thesis in codifying pedal movements and focusing on this motion as an analytical framework. The repertoire presented in this thesis is far from exhaustive. Several important harp works remain under-researched and analysis of them through the pedal schema framework may yield fruitful results. Many crucial historical works in the harp canon could be analyzed through schemas, as could the wealth of new repertoire that continues to expand the boundaries of both the idiomatic relationship of the performer to the instrument and the physical layout of the instrument.

Bibliography

Andrés, Bernard. *Absidioles.* Paris: *Éditions Durand*, 1974.

Arcambo, Shelley Batt. “Carlos Salzedo (1885-1961): The Harp in Transition.” Ph.D. diss., University of Kansas, Kansas, 1984. *ProQuest Dissertations & Theses Globa*l.

Aubat-Andrieu, Mathilde, Bancaud, Laurence, Barbé, Aurélie, and Breschand, Hélène. *Guide to the Contemporary Harp*. Bloomington: *Indiana University Press*, 2019.

Barsalou, Lawrence. “Grounded Cognition: Past, Present, and Future” *Topics in Cognitive Science* 2, no. 7 (September 2010): 716–24, 10.1111/j.1756-8765.2010.01115.x

Berio, Luciano. *Sequenza II*. Austria: *Universal Edition AG*, 1963.

Boutyline, Andrei and Soter, Laura. "Cultural Schemas: What They Are, How to Find Them, and What to Do Once You've Caught One.” *American Sociological Review 86,* no. 4 92021): 728–758. 10.1177/00031224211024525.

Browne, John. "David Watkins: An Intimate Portrait," *American Harp Journal* 26, no. 2 (Winter, 2018): 1-9. https://link.gale.com/apps/doc/A524433516/AONE?u=anon~ede512fb&sid=googleScholar&xid=f620a616.

Chen, Lee-Fei. “The Emergence of the Double-Action Harp as the Standard Instrument: Pleyel's Chromatic Harp and Erard's Double-Action Harp.” DMA diss., University of Miami, Florida, 2006. http://scholarlyrepository.miami.edu/oa_dissertations/109.

Debussy, Claude. *Clair de lune*. From *Suite bergamasque*, for piano. Paris: *Durand*, 1905.

_____. *Clair de lune*. Transcription pour harpe par Victor Cœur, Paris: *Jean Jobert*, 1929.

_____. *Clair de lune*. Transcribed by Marcel Grandjany. New York: *Lyra Music Co*., 1963.

_____. *Clair de lune*. Transcribed for harp by Carlos Salzedo. New York: *Southern Music Pub. Co.*, 1962.

_____. *Clair de lune*. In *The Yolanda Kondonassis Collection: Transcriptions, Arrangements and Original Works for the Harp*. Transcribed by Yolanda Kononasis. New York: *Carl Fischer*, 2004.

_____. *Clair de lune*. In Piat' p'es, arranged by for harp by K. Erdeli. Moscow: *Gos. muz. izd-vo*, 1957.

De Souza, Jonathan. *Music at Hand: Instruments, Bodies, and Cognition*. New York: *Oxford University Press*, 2017.

———. "Fretboard Transformations." *Journal of Music Theory* 62, no. 1 (2018). https://doi.org/10.1215/00222909-4450624.

———."Guitar Thinking." *Soundboard Scholar* 7 no. 1 (2022). https://digitalcommons.du.edu/sbs/vol7/iss1/1.

DeVale, Sue Carole, Bo Lawergren, Joan Rimmer, Robert Evans, William Taylor, Cristina Bordas, and Cheryl Ann Fulton. "Harp." *Grove Music Online*, *Oxford Music Online*, 2001. https://doi.org/10.1093/gmo/9781561592630.article.45738.

Erard, Pierre. "The Harp in its Present Improved State Compared With the Original Pedal Harp." London: *Dossier Erard*, 1820.

Fisher, George, and Lochead, Judith. "Analyzing from the Body." *Theory and Practice* 27 (2002): 37–67. http://www.jstor.org/stable/41054335.

Griffiths, Ann. "Grandjany, Marcel." *Grove Music Online,* 2011, https://doi.org/10.1093/gmo/9781561592630.article.11617.

Gjerdingen, Robert. *Music in the Galant Style*. Oxford: *Oxford University Press,* 2007.

Grandjany, Marcel. *Bach-Grandjany Etudes for Harp* (New York: Carl Fischer Music, 1970).

Gotham, Mark, and Gunn, Ian. "Pitch Properties of the Pedal Harp, with an Interactive Guide." *Music Theory Online* 22, no. 4 (December 2016). 10.30535/mto.22.4.3.

Hasselmans, Alphonse. *La Source: Etude pour la Harpe, Op. 44*. Paris: A. Durand, 1898.

Heidegger, Martin. *Basic Writings*. San Francisco: *HarperSanFrancisco*, 1993.

Houser, Kimberly Ann. “Five Virtuoso Harpists as Composers: Their Contributions to the Technique and Literature of the Harp.” Arizona: University of Arizona, D.M.A. diss., 2004. http://hdl.handle.net/10150/280708.

Hovhaness, Alan. *Nocturne.* Leipzig: *Edition Peters*, 1937.

Huron, David, and Jonathon Berec. “Characterizing Idiomatic Organization in Music: A Theory and Case Study of Musical Affordances.” *Empirical Musicology Review* 4, no. 3 (July 2009): 103–22. 10.18061/1811/44531.

Howard, Richard. *The Works of Alan Hovhaness: A Catalog, Opus 1 – Opus 360*. Michigan: *Pro Am Music Resources*, 1983.

Iversen, Evelyn J. “A Brief Historical Survey of the Harp and Its Literature with an Analysis of Selected Harp Compositions from the Mid-Twentieth Century to the Present.” Ph.D. diss., Michigan State University, 1981. *ProQuest Dissertations & Theses Global*.

Jasmine, Kyle and Cassanto, Daniel. “The QWERTY Effect: How Typing Shapes the Meaning of Words,” *Psychon Bull Review* 19, no.1 (2012): 499-504, https://doi.org/10.3758/s13423-012-0229-7.

Johnson, Mark L. “Embodied Musical Meaning.” *Theory and Practice* 22-23 (1998): 95-102.

Koozin, Timothy. “Guitar Voicing in Pop-Rock Music: A Performance-Based Analytical Approach.” *Music Theory Online* 17, no. 3 (2011), http://www.mtosmt.org/issues/mto.11.17.3/mto.11.17.3.koozin.html.

Kuo, Liu-Hsiu. “Transcribing for the Harp: a Study of Debussy’s *Claire de Lune*.” DMA diss., University of Cincinnati, 2006.

Laksmi Pannetier, Gwendoline. “Carlos Salzedo and the Development of Harp in North America: Modern Timbres, Techniques, and New Music Networks.” Texas: University of Texas, PhD. diss., 2022. *UT Electronic Theses and Dissertations.*

LeBaron, Anne. *Harpestra – Concerto for Two Harps (One Player).* Washington: *Golden Croak Music*, 1995.

McNeil, David. “Hand and Mind: What Gestures Reveal about Thought,” *The American Journal of Psychology* 107, no. 1 (June 1994), 149-155.

Merleau-Ponty, Maurice. *Phenomenology of Perception*. London: *Routledge & K. Paul*, 1974.

Muller, Theo. “‘Music Is Not a Solitary Act': Conversation with Luciano Berio” from *New Series* 199 (Spring 1997): 16-20.

Ouellette, Fernand. *Edgard Varèse: A Musical Biography*. London: *Calder and Boyars*, 1973.

Rensch, Roslyn. *Harps and Harpists, Revised Edition*. 2nd edition, *Indiana University Press*, 2017. https://doi.org/10.2307/j.ctt2005x7h.

Rosner, Arnold and Wolverton, Vance. "Hovhaness, Alan." *The New Grove Dictionary of Music and Musicians*, second edition, edited by Stanley Sadie and John Tyrrell. London: *Macmillan Publishers*, 2001.

Salzedo, Carlos. *Modern Study of the Harp*. New York: *Schirmer*, 1921.

_____. *Chanson de la Nuit*. Bloomington: *Vanderbilt Music Comp.*, 1929.

Saslaw, Janna. “Forces, Containers, and Paths: The Role of Body-Derived Image Schemas in the Conceptualization of Music.” *Journal of Music Theory* 40, no. 2 (Autumn 1996): 217–43. https://doi.org/10.2307/843889.

Scheuregger, Martin. “Redefining Idiomatic Writing for the Pedal Harp,” *Contemporary Music Review* 38, no. 6 (Winter, 2019): 553-576, 10.1080/07494467.2019.1706343.

Schwarzkopf, Angela. “Marcel Tournier: Artist, Composer and Teacher,” *American Harp Journal* Vol. 25. no. 3 (Summer 2016).

Sheets-Johnstone, Maxine. “What Are We Naming?” In *Body Image and Body Schema: Interdisciplinary Perspectives on the Body*, edited by Helena de Preester and Veroniek Knockaert, 211–32. Amsterdam: *J. Benjamins*, 2005.

Tournier, Marcel. *Six Noëls*, Op.32. Paris: *Editions Henry Lemoine*, 1926.

Tresch, John, and Dolan, Emily. “Toward a New Organology: Instruments of Music and Science.” *Osiris* 28 no. 1 (January 2013): 278–98.

Tuckwell, Barry. “Action Priming by Briefly Presented Objects.” *Acta Psychologica* 116, no. 2 (June 2004): 185–203. https://doi.org/10.1016/j.actpsy.2004.01.004.

Watkins, David. “Fire Dance.” England: *UnitedMusic Publishers Ltd.*, 1984.

Whatley, Kirsty. “Rough Romance: Sequenza II for Harp as Study and Statement,” in *Berio’s Sequenzas*, edited by J. K. Halfyard, 39–52. Aldershot: *Ashgate*, 2007.

Woods, Sylvia. *Teach Yourself How to Play the Folk Harp*. California: *Woods Music and Books Inc.*, 1978.

Worringer, Britta and Langner, Robert. “Common and distinct neural correlates of dual-tasking and task-switching: a meta-analytic review and a neuro-cognitive processing model of human multitasking.” *Brain Structure & Function* 224, no. 5 (April 2019). https://doi.org/10.1007/s00429-019-01870-4.

Xenophon. *Memorabilia and Oeconomicus*. Translated by E.C. Marchant. Cambridge: *Harvard University Press*, 1979.

Yasuoka, Koichi and Yasuoka, Motoko. “On the Prehistory of QWERTY,” *Zinbun* 42 (no 1, 2011): 161-174, https://doi.org/10.14989/139379.

Zabel, Albert. *Method for the Harp*. Leipzig: *Zimmermann*, 1900.

VITA

McKenna Jennings earned a diploma in Music Performance from Camosun College in 2020 and a BA in Musical Arts with Distinction in 2022. She has played the harp for a decade and loves to combine her passion for research and analysis with her practical experience with the instrument. She tutors music theory to undergraduate students and teaches harp and speech arts. She was honored to earn her Master's in Music Theory at Stephen F. Austin State University and will begin a PhD program at the University of Western Ontario in September 2024.

Style manual: Turabian, Kate L. *A Manual for Writers of Research Papers, Theses, and Dissertations*, 8th edition.

This thesis was typed by McKenna Jennings.