

ZACK BROWNING AND THE COMPOSITIONAL PROCESS
IN *BLOCKHOUSE, DOUBLE SHOT, AND SOLE INJECTION*

BY

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DISSERTATION

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Musical Arts in Music
with a concentration in Performance and Literature
in the Graduate College of the
University of Illinois at Urbana-Champaign, 2011

Urbana, Illinois

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ABSTRACT

This is the first study to focus exclusively on three compositions that include the violin by American composer, Zack Browning. The three compositions examined in this study are *Blockhouse* (2006), *Double Shot* (2000) and *Sole Injection* (1996). Browning has been continued an important figure in the development of contemporary music. The objective of this study is to familiarize performers and audiences with the three compositions by Browning.

This study is divided into five chapters. Chapter One includes a brief biographical sketch and a personal profile, as well as an overview of Browning's compositional career. Chapters Two, Three, and Four present an in-depth analysis of the three compositions by Browning that feature the violin: *Blockhouse* (2006) for violin, cello, and piano (Chapter Two); *Double Shot* (2000) for violin and piano (Chapter Three); and *Sole Injection* (1996) for violin and computer-generated sounds (Chapter Four). Each of these chapters is divided into three parts. The first part presents background information for each composition and provides a brief explanation of the magic square that is used in each composition. In Part Two, Browning's unique musical language based on his use of magic squares as a compositional determinant, is examined. Part Three focuses on the musical ideas used in the compositions and the assignment of these ideas to instrumental groupings and the use of pattern structures in each piece. In addition, the third part explores Browning's progressive layering techniques and how they interact with his musical ideas and structural patterns. Chapter Five serves as a conclusion and summarizes the analytical findings.

To
My father
Chang Joong Kim
and
My mother
Byung Soon Min

ACKNOWLEDGMENTS

The author would like to express my deepest gratitude to my adviser, Dr. Zack Browning, whose generosity, patience and flexibility with his valuable time, numerous readings of the drafts, and encouragement throughout the development of this document will never be forgotten.

The other members of my dissertation committee, Dr. Charlotte Mattax Moersch and Dr. Tom Ward, also gave generously of their time and expertise to better my work. I thank them for their contribution and good natured support. They must be acknowledged for their helpful advice which has broadened my perspective on music.

I also would like to thank Simin Ganatra. It has been a privilege to study the violin with her and be mentored by her. She set the highest of violinist standards for me and has graciously shared her gifts of musical expression.

Most importantly, none of this would have been possible without the love of my family. I am most appreciative to my parents for their sacrifices. Their love and patience have sustained and supported me throughout the entire period. I also want to thank my lovely brother, Sunwoo Kim, for his companionship. Finally, I thank my sweet and intelligent husband, Ho Jun Kong, for his love, strength, care and humor during the past four years.

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CHAPTER ONE

ZACK BROWNING AND MAGIC SQUARE

1.1 Introduction

This research focuses on three compositions by American composer Zack Browning who was born in Atlanta, Georgia in 1953. The compositions feature the violin and were written between 1996 and 2006. The author's participation as a violinist in the recording of Browning's *Blockhouse* for violin, cello, and piano for the compact disc "Venus Notorious" (Innova Recordings 769) provided the impetus for conducting research on his compositions for violin. The music of Zack Browning is the product of a complex compositional system that is often associated with layering techniques but whose aural result is accessible to audiences. This study examines the procedures used to create the music. The composer's original notes for each composition, interviews with the composer, background information for each composition, and important compositional influences are used to present a comprehensive examination of the selected works by Zack Browning.

Browning has used compositional methods of the past as a resource for his creative process and has also drawn upon new compositional procedures derived from abstruse formal structures such as magic squares. The role of a magic square in a given composition by Browning can vary from being a secondary influence on the structure of a composition to being the primary feature of a formal design. Browning is the author of an original series of experimental music compositions based on planetary magic squares, each of which are

associated with the seven planets of the Ptolemaic universe (Saturn, Jupiter, Mars, the Sun , Venus, Mercury, and the Moon).¹

A magic square is an arrangement of a series of numbers from 1 to n^2 (n-squared) in an $n \times n$ matrix, with each number occurring exactly once. It consists of a series of numbers arranged so that the sum of each row, column, and diagonal is the same amounts which is called the magic number. The sum must be $n(n^2+1)/2$.²

Browning explains that “routes through the square are mapped onto a musical structure that uses the properties of the square as a compositional model. The unique position of each number within the square becomes in the score a particular style, duration, rhythm, density, timbre and/or orchestration.”³ Browning’s musical structures based on magic squares are used for the juxtaposition and superimposition of motives. Magic squares, therefore, are critical in understanding the music of Zack Browning.

In the music by Zack Browning, the magic square is used to create the global structure that encompasses the local structure. It is in the local structure where musical ideas and patterns are presented. The global structure includes the primary sections based on routes through the magic square that usually structure the main part of Browning’s compositions. The local structure includes the smaller subsections within the larger ones, defined by the cells within the routes derived from the magic squares. It is in the local structure that the ideas and patterns are repeated and varied. Within the global structure derived from the magic square, Browning

¹ Browning, Zack. Personal Program notes of *Sole Injection*, 1996.

² Madachy, Joseph S. “Ch. 4 Magic and Antimagic Squares.” in *Madachy's Mathematical Recreations*. New York: Dover, 1979: 85-113.

³ Browning, Zack. “Banjaxed” Compact Disc Cover Notes. Capstone Records (CPS 8697), 2001.

assigns musical ideas represented by letters in his pre-compositional schemes. In the local structure, these ideas are not only repeated but also varied within their individual presentations.

This study will examine Browning's compositions by doing a comprehensive investigation of the role of numbers and patterns in his music. Special attention will be given to the compositional procedures underlying three of Browning's compositions that include the violin. The works to be examined in this study are *Blockhouse* (2006) for violin, cello and piano; *Double Shot* (2000) for violin and piano; and *Sole Injection* (1996) for violin and computer-generated sounds. The three pieces examined in this document are presented in chronological order based on the date of composition.⁴

This study is divided into five chapters. Chapter one includes a brief biographical sketch and a personal profile, as well as a survey of Browning's compositional career. Chapters two, three, and four present a detailed analysis of three compositions by Browning that feature the violin; *Blockhouse* (2006) in Chapter Two; *Double Shot* (2000) in Chapter Three; and *Sole Injection* (1996) in Chapter Four. Each of these chapters is divided into three parts. The first part presents background information for each composition and provides a brief explanation of the magic square that is used in the composition. In Part Two, Browning's unique musical language used in all three works and based on his use of magic squares as a compositional determinant is examined. Part Three focuses on the musical ideas used in the compositions and the assignment of these ideas to instrumental groupings and the use of pattern structures in each piece. In addition, the third part explores Browning's progressive layering techniques and how they interact with his musical ideas and structural patterns. Chapter Five summarizes the analytical findings.

⁴ A list of compositions by Zack Browning is provided in Appendix A.

1.2 Biography

Zack Browning was born in Atlanta, Georgia in 1953. He received the Bachelor's Degree in music composition from Florida State University, and the Master and Doctorate Degrees in composition from the University of Illinois at Urbana-Champaign. Browning's composition teachers included Krzysztof Penderecki and John Boda at Florida State University, and Benjamin Johnston and Salvatore Martirano at the University of Illinois. These composers had a profound effect on his musical development. During his formative years, Browning was also influenced by jazz and rock music. In several interviews and articles, Browning has discussed his fascination with jazz and pop musicians such as James Brown, Chick Corea, and John McLaughlin and the Mahanishnu Orchestra.

As a composer, conductor, and performer, Browning has played trumpet with the Atlanta Symphony Orchestra, and has served as co-director of the Atlanta New Music Ensemble. He also has served as Visiting Artist for the North Carolina Arts Council. Before teaching at the University of Illinois, he spent three years in Atlanta his hometown, playing trumpet and jazz piano in funk bands. There Browning founded a group called Tri-Star Jazz, which primarily performed the works of Chick Corea.

Browning has received several composition awards including two University of Illinois FAA Creative Fellowships and an Illinois Arts Council Composer Fellowship. He was granted a prestigious Chamber Music America Commission for the composition of *Back Speed Double Circuit* (2003) for the Bang On A Can All-Stars. His composition, *Sole Injection* for violin and computer-generated sounds, received first prize in the Arts '96 Midwest Composers Competition. *In Time* (1986) for violin, cello, DX-7, and drum set received Honorable Mention in the

International New Music Composers Competition. Browning's *Quintet for Winds* (1978) was a finalist for the Politis Composition Prize. In addition, *Impact Addiction* (1995) for violin, piano, drum set and computer-generated sounds received Honorable Mention for the 1998 Auros Group for Contemporary Music Composition Competition. *Impact Addiction* has received numerous performances by ensembles specializing in contemporary music including NUMUS with choreography by the Dance Theatre David Earle at Waterloo, Canada and by the Crash Ensemble of Ireland with performances at Expo 2000 in Germany the 1999 Skinnskateberg Festival of Electronic Music in Sweden and the 1998 UCC Festival of Contemporary Music at Cork, Ireland. Browning has received two Arnold O. Beckman Research Awards from the University of Illinois for music composition.⁵ Browning has also received grants from ASCAP, Meet the Composer, National Endowment for the Arts, and the Georgia, Illinois, and North Carolina Arts Councils. Browning's *Network Slammer* (1998) for flute and computer-generated sounds has been performed by flautist Chih-Hsien Chien at the National Conference of the Society of Electro-acoustic Music in the United States (SEAMUS) at the University of Iowa; the Florida Electro-acoustic Music Festival at the University of Florida; the Imagine 2002 Festival at the University of Memphis; the Society of Composers, Inc. (SCI) National Conference at San Antonio, Texas; and at several universities in China and Taiwan. In addition, Browning has received several performances of his music in Europe by the Crash Ensemble based in Dublin, Ireland. Browning's *Sole Injection* was performed at the 2001 Sonorities Festival in Belfast, Ireland by Brona Cahill of the Crash Ensemble. In 2010 *Sole Injection* was performed by Karen Bentley Pollick at the Birmingham Museum of Art in Birmingham, Alabama and at The Chapel at Good Shepard Center, Seattle, Washington; by Benjamin Sung at Seoul National University, Seoul, Korea; and by Jie Tao at Nanjing Normal University, Nanjing, China. His music has also

⁵ Browning, Zack. "Banjaxed" Compact Disc Cover Notes. Capstone Records (CPS 8697), 2001.

been performed at the Asian Contemporary Music Festival in Korea (Seoul), Atlanta New Music Festival, Bang On A Can (New York City), Festival of Contemporary Music (Cork, Ireland), Society of Composers, Inc. National Conferences in Miami and Indiana, PAIN New Music Festival (University of Illinois), Spark Festival (Minneapolis), International Computer Music Conference (New Orleans), Gaudeamus Music Week (Amsterdam), Composers Choice Festival (Dublin), SCAN 1997 (Small Computers in the Arts Network, Philadelphia), and the Bonk Festival of New Music (Tampa).

Browning is a member of ASCAP and his music is published by Manduca Music Publications and Brixton Publications. His music is recorded on Calcante Recordings, Capstone Records, Coronet Records, Innova Recordings, New Dynamic Records and Veriatza Records. His first solo compact disc "Banjaxed" contains eight original compositions for voice, instruments, and computer-generated sounds and was released by Capstone Records in May of 2001. Browning's second solo compact disc "Venus Notorious" was released by Innova Recordings in August of 2010 and contains six original compositions that feature the piano in various ensembles.

From 1983-2010, Browning taught music composition and theory at the University of Illinois at Urbana-Champaign. Browning continues to teach at the University of Illinois as an Associate Professor Emeritus. Browning founded the Salvatore Martirano Composition Award in 1997 in honor of his composition teacher and has served as its director since the establishment of the competition. The Salvatore Martirano Memorial Composition Award⁶ is an international composers' competition held annually in memory of Salvatore Martirano (1927-1995), who was

⁶ Personal e-mail correspondence with the composer, March 10, 2010.
<http://camil.music.uiuc.edu/CompTheory/Awards/Martirano.html>
Last Accessed April 7, 2010.

an internationally acclaimed American composer and served as professor of composition at the University of Illinois from 1963 to 1995. The first place prize consists of \$1,000 and a performance by the University of Illinois at Urbana-Champaign New Music Ensemble at the Krannert Center for the Performing Arts.

1.3 Magic Square

Browning uses new compositional methods derived from abstruse formal structures such as magic squares. A magic square is a rectangular array of numbers consisting of the distinct positive integers $1, 2, \dots, n^2$ arranged such that the sum of the n numbers in any vertical columns, horizontal rows or both diagonal lines are always the same number⁷, known as the magic number. The role of a magic square in a given composition by Browning varies from mere hints of a structure to a complete formal design. Browning is the author of an original series of experimental music compositions based on planetary magic squares, each of which are associated with the seven planets of the Ptolemaic universe (Saturn, Jupiter, Mars, the Sun, Venus, Mercury, and the Moon).⁸

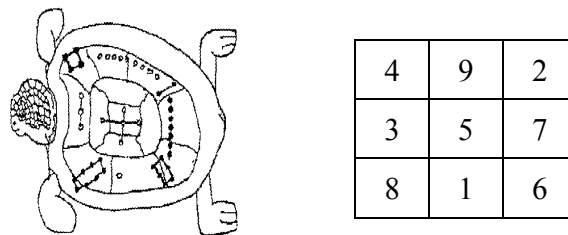
If every number in a magic square is subtracted from $n^2 + 1$, another magic square is obtained which is termed the complementary magic square. A square consisting of consecutive numbers starting with 1 is sometimes known as a "normal" magic square. The unique normal square of order three (3x3) was known to the ancient Chinese, who called it the *Lo Shu*. A brief history of the *Lo Shu* and the Dürer squares is now provided.

⁷ Ball, W. W. Rouse. "Ch. 7" in *Mathematical Recreations and Essays*, Thirteenth Edition, New York: Dover, 1987: 193.

⁸ Browning, Zack. Personal Program Notes of *Sole Injection*, 1996.

The history of magic squares dates back to at least 1000 BC in China. A Chinese book called *Lo Shu* (book of the River Lo) relates the story of how a magic square on the back of a turtle saved the city.⁹ When there was a huge flood in ancient China, the great King Yu tried to channel the water out to the sea, where then emerged from the water a turtle with curious circular dots on its shell. The numbers of circular dots were arranged in a three by three grid pattern such that the sum of the numbers in each row, column and diagonal was the same, 15. The number 15 is the number of days in each of the twenty-four cycles of the Chinese solar year. It was then recognized by King Yu that 15 sacrifices were needed to please the River God and that enabled the people to control the overflowing river.

Figure 1. Image of a turtle with *Lo Shu* Square and 3x3 Magic Square¹⁰



In the Western occult tradition, each planet has traditionally been associated with a series of numbers and particular organizations of those numbers. One such method of numerological arrangement and the association of numbers to the planets involved the magic square. The use of magic squares in this manner can be found in the theory of magic as presented by Marsilio Ficino (1433-1499). In Ficino's theory of magic, objects, sounds, and colors are all categorized

⁹ <http://mathsforeurope.digibel.be/Magic2.htm>
Last Accessed May 5, 2010.

¹⁰ *Ibid.*

as immortality.¹¹ The influences of Ficino come principally from the planets of Ptolemaic universe: the Sun, Moon, Mercury, Venus, Mars, Jupiter, and Saturn. The magic involves using the influence of a specific planet in order to achieve some end, for example, protection from a psychological illness.

In approximately 1510 Heinrich Cornelius Agrippa (1486-1535) wrote *De Occulta Philosophia*¹², drawing on the hermetic and magical works of Marsilio Ficino, and in it he explained the magical virtues of the seven magic squares of the orders 3 to 9. Each of the magic squares was associated with one of the astrological planets and became known as the planetary squares¹³. This book was very influential throughout Europe until the counter-reformation or Catholic Reformation.

One of the most famous appearances of a magic square is found in Albrecht Dürer's 1514 etching, *Melancholia*. The 4x4 magic square in Albrecht Dürer's etching is believed to be the first magic square seen in European art.¹⁴ The etching shows a person looking depressed under the 4x4 magic square which is associated with the planet Jupiter. The Jupiter magic square was believed to combat melancholy, hence its appearance in the etching by Dürer. The date of the woodcut 1514 appears as adjacent cells in the square in the middle of the last horizontal row. The magic number of the so called Dürer square is 34 and can be found in several groupings of numbers, including the rows, columns, diagonals, each of the quadrants, the center four squares,

¹¹ Kristeller, Paul Oskar. "The Theory of Immortality in Marsilio Ficino." *Journal of the History of Ideas*, Vol.1, no.3, June 1940: 299-319.

<http://www.jstor.org/pss/2707089>

Last Accessed August 3, 2010.

¹² Peterson, Joseph H. "Agrippa, Hienrich Cornelius. *Of Occult Philosophy(1531)*, Book I (part 1)", Digital Edition, 2000.

<http://www.esotericarchives.com/agrippa/agrippa1.htm>

Last Accessed May 5, 2010.

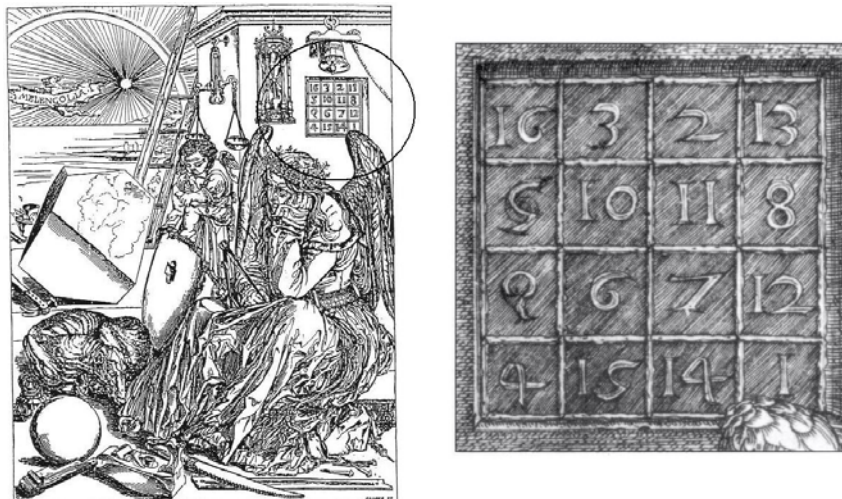
¹³ Magic Square associated with the seven planets of the Ptolemaic Universe is provided in Appendix B.

¹⁴ <http://mathsforeurope.digibel.be/Magic2.htm>

Last Accessed May 5, 2010.

and the corner squares (of the 4x4 as well as the four contained 3x3 grids). This magic number of 34 can also be found in the two sets of four symmetrical numbers (3+5+12+14 and 2+8+9+15), the sum of the middle two entries of the two outer rows and columns (5+8+9+12 and 3+2+15+14), the four outer numbers clockwise from the corners (3+8+14+9) and the four counter-clockwise numbers (2+5+15+12), and in the four cross shaped quartets (3+9+7+15, 2+6+12+14, 3+5+11+15, and 2+10+8+14).

Figure 2. *Melancholia*, Albrecht Dürer's 1514 wood carving¹⁵



It is still an unsolved problem to determine the number of magic squares of a random order, but the number of distinct magic squares (excluding those obtained by rotation and reflection) of order $n = 1, 2, 3, \dots$ are 1, 0, 1, 880, 275305224, ...¹⁶ The 880 squares of order four were numerated by Frénicle de Bessy in 1693. Recently the computer has been used to count the number of 5x5 magic squares which totals 275,305,224. The number of 5x5 magic squares was

¹⁵ *Ibid.*

¹⁶ Eric, W. Weisstein. *CRC Concise Encyclopedia of Mathematics*. Second Edition, Chapman & Hall, 2002: 87.

computed by R. Schroepel in 1973.¹⁷ The number of 6x6 magic squares has never been calculated.

Squares that are magic under multiplication, instead of addition, can be constructed and are known as multiplication magic squares. Squares that are magic under both addition and multiplication can also be constructed and are called addition-multiplication magic squares.¹⁸ Variations on magic squares have been constructed that use letters either as entries in the square or as a way to define the square. Examples include the alpha-magic squares and the templar magic squares. The Sator Square is a word square containing a Latin palindrome featuring the words [SATOR AREPO TENET OPERA ROTAS] written in the square. It may be read top to bottom, bottom to top, left to right and right to left. If the Sator Square is read in a reverse direction, then the words become [SATOR OPERA TENET], and the sequence or sentence is reversed.¹⁹

Figure 3. Sator Square²⁰



¹⁷ Eric, W. Weisstein. "Antimagical Square." <http://mathworld.wolfram.com/MagicSquare.html>
Last Accessed May 10, 2010.

¹⁸ Hunter, James A. H. "Ch. 3 Mystic Arrays." in *Mathematical Diversion.*, New York: Dover, 1975: 23-34.

¹⁹ Ceram, C.W. *The March of Archaeology.* New York: Alfred A. Knopf, 1958.

²⁰ <http://en.wikipedia.org/wiki/File:P8190074.jpg>
Last Accessed October 30, 2010.

CHAPTER TWO

BLOCKHOUSE

2.1 Background

Blockhouse for piano trio was written in 2006 and was commissioned by violinist Jie Tao and the Taipei Arts Trio. The world premiere took place on May 30, 2006 by the Taipei Arts Trio at the National Recital Hall of the National Chiang Kai Shek Cultural Center in Taipei (Taiwan). The recording of *Blockhouse* on Browning's solo compact disc "Venus Notorious", was released by Innova Records in 2010 and was recorded by the author on violin, Ann Zettervall on cello and Ling-Ti Huang on piano. The score has 390 measures and has duration of approximately 12 minutes. *Blockhouse* has also been performed at National Chiang Kai Shek National Recital Hall in Taipei (Taiwan) by Yao-Tsu Lu (violin), Jun-Ping Lo (cello) and Ling-Ti Huang (piano) on May 29, 2009 and at the Colwell Playhouse Theatre in the Krannert Center for the Performing Arts (Champaign, Illinois) by Sunjin Kim (violin), Ann Zettervall (cello) and Ling-Ti Huang (piano) on March 13, 2007. Critic Joshua Kosman wrote the following review of Browning's compact disc "Venus Notorious" in the San Francisco Chronicle on August 29, 2010.

The seven chamber works by composer Zack Browning on this disc are built around some kind of constructive process involving magic squares, feng shui and the movement of the planets. The details hardly matter, and in fact any halfway savvy listener will be able to detect the presence of a system just from the repetitions and variations that infuse the music. What counts, rather, is the surface play of the music, which is charming, ebullient, infectiously bright and also somewhat limited in scope. Browning's music is densely but unpredictably patterned, built around tiny rhythmic and melodic cells that repeat, join, scatter and stutter according to whatever rules are in

place behind the scenes, and because Browning's rhythmic palette is so bouncy and exuberant - some of the music sounds like dance tracks for androids with varying numbers of feet - it has a seductive sort of grace. But there's also a digital feel to the music that is underscored by the predominance of piano and percussion; a little more textural variety and even sensuality would have been welcome.²¹

Below are the program notes for *Blockhouse* provided by the composer.

Since 1995, I have written several works that belong to an original series of experimental music compositions that incorporate planetary magic squares, ancient Chinese magic squares and *feng shui* as compositional models. My approach to composition combines the use of magic squares with elements of classical art, popular culture and Chinese history. A magic square consists of a series of numbers arranged so that the sum of each row, column, and diagonal is the same amount. Routes through the square are mapped onto a musical structure that uses the properties of the square as a compositional model. The unique position of each number within the square is paralleled in the musical score by a particular style, rhythm, density, timbre and orchestration. Of the enormous number of magic squares it is possible to form, seven have been associated with the seven planets of the Ptolemaic universe (Saturn, Jupiter, Mars, the Sun, Venus, Mercury, and the Moon). Planetary squares are used for all of the compositions except for Thunder Roll. These "planetary magic squares" appear in *De Occulta Philosophia*, a book on magic by the renaissance polymath Heinrich Cornelius Agrippa von Nettesheim published in 1531.²²

Browning's program notes briefly describe his compositional process. During my interview with the composer, he emphasized that the program notes were written for the purpose of enhancing the public's appreciation of the music.²³ Browning gives the piece a descriptive title. He states that the title refers to the "blocks" that divide the "house (structure)" into 50

²¹ Kosman, Joshua. CD review: Zack Browning. San Francisco Chronicle, August 29, 2010. <http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2010/08/29/PKVI1F160B.DTL>
Last Accessed November 10, 2010.

²² Browning, Zack. Program Notes from compact disc "Venus Notorious." Innova Records. <http://innova.mu/notes/769.htm>
Last Accessed May 10, 2010.

²³ Personal e-mail correspondence with composer, March 10, 2010.

sections that are produced by ten routes through the magic square. In the discussion that follows of the individual sections of *Blockhouse*, the relationship between the music and the magic square as suggested by the program notes will be investigated.

2.2 Magic Square Structure of *Blockhouse*

Blockhouse continues a series of works by Browning that explore the application of magic squares to musical structure. The 5x5 Magic Square of Mars provides the framework for the composition. The magic sum of 65 can be found in the horizontal rows, vertical columns, and diagonals and even in the sum of any four numbers positioned symmetrically plus the middle number 13.

Figure 4. 5x5 Magic Square of Mars

11	24	7	20	3
4	12	25	8	16
17	5	13	21	9
10	18	1	14	22
23	6	19	2	15

The 5x5 Magic Square of Mars provides the overall structure for the main part of *Blockhouse*. The composition has three primary sections; the introduction (mm. 1-23), the main part (mm. 24-293) and the coda (mm. 294-390).

The introduction has 108 quarter notes at 120 a quarter note resulting in duration of 0.9 minutes or 54 seconds. In the main part which has ten routes through the magic square, each route has 100 quarter notes at 120 a quarter note. The duration of each route is 0.83 minutes or

50 seconds, so for 10 routes the duration is 8.3 minutes or 500 seconds. The duration of the Coda which has 166 quarter notes at 160 a quarter note is 1.0375 minutes or 62 seconds. Therefore the total duration of *Blockhouse* is 10.2375 minutes or 616 seconds.

The structure of the main part of the work is based on a numeric sequence derived from the Magic Square of Mars. The main part consists of ten different routes through the square. A route is defined as one of the horizontal, vertical, or diagonal paths through the square that equals the magic number of 65. These routes span the entire main part of the composition. In Table 1 which presents the structure of the main part of *Blockhouse*, the numbers 1-10 represent the routes, and the five decimals for each route represent the five subsections (cells) of each route through the square. The magic number of an unaltered 5x5 magic square is 65. However the magic number per route in *Blockhouse* is 100 because Browning has added seven to each number in the Magic Square of Mars. The properties of the magic square remain intact. The magic number of 100 is represented in *Blockhouse* as 100 quarter notes per route.

Figure 5. 5x5 Magic Square of Mars with seven added to each number and a magic number of 100

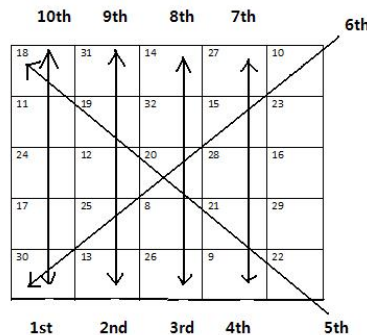
18	31	14	27	10
11	19	32	15	23
24	12	20	28	16
17	25	8	21	29
30	13	26	9	22

The ten routes through the square that form the main body of the piece are individually divided into groups of five subsections. These five subsections or cells per route form 50 subsections. In the program notes to *Blockhouse*, Browning states that the title refers to the

“blocks” that divide the “house (structure)” into 50 sections that are produced by ten routes through the magic square.²⁴

From the 5x5 magic square with seven added to each number, ten routes are used in the main part of *Blockhouse*. The first four routes used in the main part of *Blockhouse* are the first four vertical columns from the left and read from bottom to top. The fifth route is the diagonal read bottom right to top left. The sixth route is the diagonal read top right to bottom left. The last four routes for the main part of *Blockhouse* are the four vertical columns starting from the second right and read from top to bottom. This forms a symmetrical structure with a retrograde between routes 1-4 and routes 7-10, and the diagonals being used in the middle routes 5 and 6.

Figure 6. *Blockhouse*, Ten routes from 5x5 Magic Square



Within the structure of the magic square, Browning inserts six musical ideas represented in this study by the letters A to F. Each of Browning’s musical ideas consist of short motives and each of these motives has clearly defined autonomous properties for the musical parameters such as rhythm, register, and pitch. Browning composes different kinds of musical ideas and decides on the location of the ideas within the composition by assigning the ideas to individual cells

²⁴ Browning, Zack. Program Note for *Blockhouse*, 2006.
 Personal e-mail correspondence with composer, March 10, 2010.

within each route. The assignment of the ideas to the cells follows the density structure that is part of the global structure of the magic square plan. The placement of ideas also considers golden section proportions. The ideas are combined in such a way that each grouping of ideas is a unique combination and only appears once in the piece. Each individual idea will be discussed in detail.

In *Blockhouse*, density is defined by Browning as the number of instruments playing (trio, duo, or solo) and the number of ideas presented simultaneously (one or two ideas).²⁵ The number of instruments playing follows (with some variation) the basic pattern solo-duo-trio-duo-trio which is assigned to each of the five cells of a given route through the magic square. The number of instruments playing is also assigned a specific number of ideas to be performed following the pattern of 1-2-1-1-2 (again with some variations). The pattern of the number of ideas to be performed is also assigned to the five cells of the routes taken from the magic square. Following this density scheme which is assigned to each of the 50 cells (50 subsections) within the ten routes of the main part, Browning can then vary the foreground by deciding on the specific ideas to be presented while the background density structure remains for the most part constant. Browning juxtaposes the six musical ideas of *Blockhouse* within the 50 subsections following the density scheme. Individual and unique values for the musical parameters for each idea are presented as patterns that retain their identity even when superimposed with other patterns. The ordering of the ideas and the composition of patterns are then placed in a dramatic presentation. In the following table, durations in quarter notes are derived from the routes through the magic square.

²⁵ Personal e-mail correspondence with composer, July 6, 2010.

Table 1. *Blockhouse*, Overall structure of the main part, mm. 24-293 (- instrument is *tacet*²⁶)

Route/ Sub- section	Measures	Dura- tion J	Ideas/ Instrumentations (violin, cello, piano)	Route/ Sub- section	Measures	Dura- tion J	Ideas/ Instrumentations (violin, cello, piano)
1.1	24-32	30	C C C	6.1	159-161	10	- - E
1.2	33-36	17	B -E	6.2	162-165	15	F A
1.3	37-42	24	A A A	6.3	166-171	20	- D D
1.4	43-45	11	- C D	6.4	172-177	25	B E B
1.5	46-50	18	E E A	6.5	178-185	30	A A A
2.1	51-54	13	- B -	7.1	186-191	27	B - -
2.2	55-61	25	E - C	7.2	192-195	15	C C C
2.3	62-64	12	A A -	7.3	196-203	28	A A D
2.4	65-69	19	F F F	7.4	204-208	21	- F F
2.5	70-78	31	- B C	7.5	209-210	9	B B C
3.1	79-85	26	D - -	8.1	211-214	14	- D -
3.2	86-87	8	A A B	8.2	215-223	32	- C A
3.3	88-92	20	- E E	8.3	224-228	20	E E E
3.4	93-99	32	B B B	8.4	229-230	8	D F -
3.5	100-103	14	C C F	8.5	231-237	26	B - A
4.1	104-106	9	- - A	9.1	238-246	31	- - F
4.2	107-112	21	B - D	9.2	247-251	19	E D D
4.3	113-119	28	F F F	9.3	252-254	12	A A A
4.4	120-124	15	- A E	9.4	255-262	25	C C -
4.5	125-132	27	D B D	9.5	263-266	13	- D A
5.1	133-138	22	C - -	10.1	267-271	18	E E E
5.2	139-143	21	E F F	10.2	272-274	11	C - F
5.3	144-148	20	B - B	10.3	275-280	24	B B B
5.4	149-153	19	D D D	10.4	281-284	17	E - F
5.5	154-158	18	B F -	10.5	285-293	30	D C C

In the structure of *Blockhouse*, there seems to be a balance between the strict durations for the main body of the work whose durations are derived from the magic square, and the outside parts (introduction and coda) that were composed without any rigid durational plan. The introduction to *Blockhouse* serves to set up an opposition between ideas A and B that is only resolved by the entrance of idea C at the beginning of the main part of the work.

The introduction presents two ideas, A and B. Idea A is a quarter-note based and consists of two repeating chords that are presented in vertical opposition to idea B which is an eighth-note

²⁶ indicates that an instrument does not play during that section.

based horizontal melodic idea. Idea B consists of two versions, labeled as B and B'. Idea B' contains the pitches D, F, G on eighth-notes while idea B presents a melodic line based on six segments in the G Dorian mode. The segments of idea B will be presented in detail later. Idea B consists of duple and triple groupings of eighth-notes marked by accents. The chords in idea A are also marked by accents. In the introduction, the time signatures are always eighth-notes based and appear as 5/8, 7/8, 9/8, 11/8, 13/8, 14/8, 15/8 and 16/8. The speed of the eighth-note in the introduction is at eighth-note equals 215 so that the quarter-note equals 107.5. (see below Example 1 and Table 2)

Example 1. *Blockhouse*, introduction (mm. 13); idea A and idea B

The image shows a musical score for the introduction of 'Blockhouse' (mm. 13). The score is for Violin (Vn), Viola (Vc), and Piano (Pno). It shows two musical ideas: Idea B (segment f; 1-2-3-5-6) and Idea A. Idea B is a melodic line in the upper voice, and Idea A is a chordal accompaniment in the lower voice. The time signature is 5/8.

Table 2. *Blockhouse*, Overall structure of the introduction, mm. 1-23

Measures	Grouping	Ideas /Instrumentations			Total Duration (♩/♩)	Time Signature (♩)
		Violin	Cello	Piano		
1-6	Duo		B'	B' and A	44 / 22	5-7-11-5-7-9/8
7-17	Trio	B	B	B and A	121/60.5	7-11-13-11-14-7-15-7-11-16-9/8
18-23	Duo		B'	B' and A	50/25	5-7-11-5-7-15/8

The coda is a more linear-based section that allows for the resolution of the previous juxtaposition of ideas that took place in the main part of the work. Similar to the introduction, the coda presents two ideas; X and Y. The idea Y is a quarter-note based and consists of two

repeating chords that are presented in vertical-horizontal opposition to idea X, which is an eighth-note based melodic idea (see Example 2). Idea X consists of duple and triple groupings marked by accents. The chords in idea Y are also marked by *tenuto*. The two ideas X and Y are in opposition like ideas A and B of the introduction and the main part of *Blockhouse*. The opposing idea to X, idea Y is eliminated in the coda in order to form the final cadence for the piece. Browning inserts subtitles in the score to articulate four sections in the coda. Time signatures, which are a quarter and an eighth-note based, change frequently. A piano solo opens the first part of the coda, subtitled ‘Kick it!’, and then the strings join after five measures, at measure 299. In the coda, idea X starts only in the piano, and idea Y joins in strings and piano. For the first three parts of the coda, idea X and idea Y appear in slightly varied forms and are labeled as X1, X2, X3 and Y1, Y2, Y3 (see Table 3). In the last part of the coda marked as ‘Drive It Home!’, only idea X4 is used. Dynamics support the presentation of the ideas. At the beginning of the last part ‘Drive It home!’, the dynamic fades abruptly when the ideas decrease from two (ideas X and Y) to one (idea X). Like the introduction, time signatures are frequently changing and are based on eighth-note and quarter-note units. However, in the final part of the coda, 5/4 is used for all except the final two measures (which are in 4/4) thus stabilizing the cadential motion already present by the elimination of idea Y.

Table 3. *Blockhouse*, 4 sections of the coda, mm. 294-390

Subtitle	Measures	Duration	Ideas	Dynamics	Time Signature
Kick It!	294-305	73.5	X1 Y1	<i>ff</i>	7/4-7/8-6/4-/5/4-11/8-6/4-7/4-8/4-7/8-7/4-8/4
Heavy Accents	306-324	50	X2 Y2	<i>ff</i>	5/8-2/4-3/8-3/4-3/8-4/4-5/8-2/4-3/8-5/4-5/8-3/4-4/4-3/4-6/4
Push It!	324-352	68	X3Y3	<i>ff-fff</i>	2/4-4/4-3/4-2/4-4/4-3/4-4/4-3/4-2/4
Drive It Home !	353-390	186	X4	<i>mp-pp-p-mf-pp-fff</i>	5/4-4/4

Example 2. *Blockhouse*, section one of the coda (mm. 294); idea X1 and idea Y1

294 ♩ = ♩³ (♩ = 160) Kick it!

Pno

Idea X1

Idea Y1

Triple and Duple

As the subtitle, ‘Heavy Accents’ implies, the second section of the coda accents the opposition between the duple and triple groupings of eighth-notes that make up idea X2 and the quarter-notes based syncopations of idea Y2. Both ideas X2 and Y2 appear in all instruments.

Example 3. *Blockhouse*, section two of coda (mm. 306-310); idea X2 and idea Y2

306 Heavy Accents

Vn

Vc

Pno

Idea X2

Idea Y2

Duple and Triple marked by accents

In the third section of the coda, ‘Push It!,’ idea X3 has a repeating eighth-note duple rhythm with *staccato* and does not change pitch. This is in opposition to idea Y3 which has a quarter-note triplet rhythms marked *tenuto* and changes pitch.

Example 4. *Blockhouse*, section three of the coda (mm. 332-340); idea X3 and idea Y3

The fourth section of the coda, ‘Drive it home!,’ starts with a solo in the piano on idea X4, and after four measures, the violin joins and four bars later the cello. At measure 365, all instruments drop their dynamics from *mf* to *pp* and then the left hand in the piano finally enters. From measure 373 on, the dynamics gradually increase from *pp* to *ff*, and then for the last two measures, the instruments play in with a crescendo and finish with the dynamic of *ffff*. Through the final section of the coda, the pitch D forms a Dorian mode-like pedal point. The pedal on the pitch D, the repeating rhythmic figure in 5/4, and the elimination of idea X, all function to bring the composition to a final cadence. One could analyze the final measures of *Blockhouse* as a plagal cadence in D Dorian mode.

Example 5. *Blockhouse*, section four of the coda (mm. 386- 390); final Cadence (vi-i)

2.3 Musical Ideas, Patterns and Compositional Techniques in *Blockhouse*

Within the magic square structure in the main part of *Blockhouse*, Browning assigns six musical ideas (A-F) that are varied within their individual presentation. The ideas are marked with capital letters and the variations are labeled with small case letters (explained below). In *Blockhouse*, the density is defined as the number of instruments playing which are labeled as grouping (trio, duo, or solo) in Table 4 and the number of ideas presented simultaneously (one or two ideas). The number of instruments playing follows (with some variation) the basic pattern solo-duo-trio-duo-trio which is assigned to each of the five cells in a given route through the magic square. The grouping of instruments is also assigned a number of ideas that are performed in a section following the pattern of 1-2-1-1-2 (again with some variations).

Table 4. *Blockhouse*, Overall structure

Introduction (mm. 1- 23)

Measures	Grouping	Ideas / Instrumentations			Duration (♩ or ♪)	Time Signature
		Violin	Cello	Piano		
1-6	Duo		B´	B´ and A	44 ♩ or 22 ♪	5-7-11-5-7-9/8
7-17	Trio	B	B	B and A	121 ♩ or 60.5 ♪	7-11-13-11-14-7-15-7-11-16- 9/8
18-23	Duo		B´	B´ and A	50 ♩ or 25 ♪	5-7-11-5-7-15/8

Main Part (mm. 24-293) (* instrument is *tacet*²⁷) (the order of instrumentations = violin, cello and piano)

Section Number	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	2.5
Measures	24-32	33-36	37-42	43-45	46-50	51-54	55-61	62-64	65-69	70-78
Duration ♪	30	17	24	11	18	13	25	12	19	31
Grouping	Trio	Duo	Trio	Duo	Trio	Solo	Duo	Duo	Trio	Duo
Number of Ideas	1	2	1	2	2	1	2	1	1	2
Ideas/Instrumentations	CCC	Ba *E	AAAa	* CDa	EEAc	* Bd*	E*C	AA*	FFFa	*BbC

²⁷ indicates that an instrument does not play during that section.

Table 4 (cont.)

Section Number	3.1	3.2	3.3	3.4	3.5	4.1	4.2	4.3	4.4	4.5
Measures	79-85	86-87	88-92	93-99	100-103	104-106	107-112	113-119	120-124	125-132
Duration J	26	8	20	32	14	9	21	28	15	27
Grouping	Solo	Trio	Duo	Trio	Trio	Solo	Duo	Trio	Duo	Trio
Number of ideas	1	2	1	1	2	1	2	1	2	2
Ideas/Instrumentations	Da**	AABa1	*EE	BeBe Be	CCFb	**Aa	Bc*Db	FFFa	*EAb	DaBb Da

Section Number	5.1	5.2	5.3	5.4	5.5	6.1	6.2	6.3	6.4	6.5
Measures	133-138	139-143	144-148	149-153	154-158	159-161	162-165	166-171	172-177	178-185
Duration J	22	21	20	19	18	10	15	20	25	30
Grouping	Solo	Trio	Duo	Trio	Duo	Solo	Duo	Duo	Trio	Trio
Number of Ideas	1	2	1	1	2	1	2	1	2	1
Ideas/Instrumentations	*C*	EF Fc	Bd* Be	DaDa Da	FBc*	**E	F* Aa	*Db Db	BaEBe	AAAc

Section Number	7.1	7.2	7.3	7.4	7.5	8.1	8.2	8.3	8.4	8.5
Measures	186-191	192-195	196-203	204-208	209-210	211-214	215-223	224-228	229-230	231-237
Duration J	27	15	28	21	9	14	32	20	8	26
Grouping	Solo	Trio	Trio	Duo	Trio	Solo	Duo	Trio	Duo	Duo
Number of Ideas	1	1	2	1	2	1	2	1	2	2
Ideas/Instrumentations	Bd**	CCC	AADa	*FFc	BaBaC	*Da*	*CAb	EEE	DbF*	Bb*Aa

Section Number	9.1	9.2	9.3	9.4	9.5	10.1	10.2	10.3	10.4	10.5
Measures	238-246	247-251	252-254	255-262	263-266	267-271	272-274	275-280	281-284	285-293
Duration J	31	19	12	25	13	18	11	24	17	30
Grouping	Solo	Trio	Trio	Duo	Duo	Trio	Duo	Trio	Duo	Trio
Number of Ideas	1	2	1	1	2	1	2	1	2	2
Ideas/Instrumentations	**Fa	EDaDa	AaAA	CC*	*DbAc	EEE	C*Fb	BeBeBe	E*Fa	CDaC

Table 4 (cont.)

Coda (mm. 294-390)

Subtitle	Measures	Duration J	Grouping	Number of Ideas	Ideas
Kick It!	294-305	73.5	Duo	2	X1 Y1
Heavy Accents	306-323	50	Duo	2	X2 Y2
Push It!	324-352	68	Duo	2	X3Y3
Drive It Home!	353-390	186	Solo	1	X4

2.4 Idea A

Idea A in the main part of *Blockhouse* is divided into two types: one for the strings marked by idea A and the other for the piano marked as ideas Aa, Ab and Ac. Idea A for the strings consists of perfect fourths in eighth notes played as *glissandi* within a fifteen quarter-note pattern that is in parallel motion. The use of parallel motion is characteristic of Browning’s melodic gestures.

Browning uses a technique called “filtering” for idea A which involves silencing certain beats within the pattern by inserting rests for attacks. As shown in Example 6, the complete pattern of idea A is presented at first and then a variation using filters idea A(f) that replace the attacks with rests on the 1st, 5th, 8th and 13th quarter-notes of the pattern. The pattern starts over at the first beat of measure 41 and at the second beat of measure 200. Idea A appears simultaneously four times in the violin and cello at sections 1.3, 3.2, 6.5 and 9.3. Idea A(f) which is the filtered version of idea A appears two times in both strings at sections 2.3 and 7.3.

Example 6. *Blockhouse*, violin and cello, sections 1.3 (mm. 37-40) and 7.3 (mm. 196-200); ideas A and A(f) in strings with 15 J durations

Example 6 (cont.)

Idea A(f) filtered version

Vn

Vc

(1) 2 3 4 (5) 6 7 (8) 9 10 11 12 (13) 14 15 1 2

Idea A for the piano is divided into three parts, original pattern (ideas Aa) and filtered patterns (ideas Ab and Ac). Similar to the parallel motion of idea A in the strings, ideas Aa, Ab, and Ac in the piano remain rhythmic and harmonic unisons in both hands. Moreover, the pattern has fifteen quarter-notes like idea A in the string parts. In terms of a pitch center, ideas Aa, Ab and Ac are on G Dorian mode with a vertical emphasis on the G minor seventh chord (G-B flat-D-F) and the G minor triad (G-B flat-D) with a melodic emphasis on the sixth (E natural) from G Dorian mode. Idea A in the strings also emphasizes the pitch G. In piano, idea Aa appears five times in sections 1.3, 4.1, 6.2, 8.5 and 9.3, idea Ab appears two times in sections 4.4 and 8.2 and idea Ac appears three times in sections 1.5, 6.5 and 9.5.

Example 7. *Blockhouse*, piano, section 8.5 (mm. 231-235); idea Aa with 15 ♩ durations

Idea Aa

on G Dorian

vertical emphasis on the G minor 7th

on the G minor triad with melodic emphasis on E

Pno

f

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 1 2 3 4

Idea A in the piano is divided into two register types: (reg. 1) and (reg. 2). In the original version of idea Aa, register (1) has a two-octave interval between the two hands. In register (2),

there is a four-octave interval the between right and left hands because the right hand is now an octave higher and the left hand is an octave lower than register (1). The left hand of register (2) is a filtered version of the left hand of register (1). The left hand remains on the pitches F and G with a register change.

Example 8. *Blockhouse*, piano, sections 4.1 (mm. 104-106) and 1.3 (mm. 37-39); ideas Aa(reg.1) and Aa(reg.2)

The image shows two staves of music. The top staff is labeled 'Idea Aa(reg.1)' and the bottom staff is labeled 'Idea Aa (reg.2)'. The top staff has a dynamic marking of *ff*. The bottom staff has a dynamic marking of *ff*. The right hand of the bottom staff is marked 'octave higher' and the left hand is marked 'octave lower'. The music is in 4/4 time and features a sequence of chords and single notes.

In addition to the change of register, idea Aa is transformed to ideas Ab and Ac: idea Ab only appears in register (2) and idea Ac in register (1). Idea Ab(reg.2) is a filtered version of idea Aa(reg.2) in both hands and filters the 3rd, 4th, 10th and 11th quarter-notes of the fifteen quarter-note pattern. This is marked in Example 9 by parenthesis on the numbers in idea Ab(2). Idea Ab appears two times in sections 4.4 and 8.2.

Example 9. *Blockhouse*, piano, sections 1.3 (mm. 37-40) and 4.4 (mm. 120-124); ideas Aa(reg.2) (complete version) and Ab(reg.2) (filtered version)

The image shows two staves of music. The top staff is labeled 'Idea Aa(2) complete version' and the bottom staff is labeled 'Idea Ab(2) filtered version'. Both staves are marked 'Pno'. The top staff has a dynamic marking of *ff*. The bottom staff has a dynamic marking of *ff*. The music is in 4/4 time and features a sequence of chords and single notes. The filtered version has numbers 3, 4, 10, and 11 in parentheses, indicating they are filtered out.

Idea Ac(reg.1) in the piano is also a filtered version of idea Aa(reg.1) but not in both hands. In the left hand, two chords, the g minor seventh chord (G-B flat-D-F) and the G minor triad (G-B flat-D) with the pitch E natural from the G Dorian mode that have the duration of one quarter-note each, are filtered. This is marked in Example 10 by parenthesis on the numbers and by the circled rests in the left hand of idea Ac(reg. 1). In the right hand, the seventh chords in quarter-notes from the original version are changed to be only the top note D. For the right hand, the filtered version idea Ac(reg.1) inserts the pitch D, as a pedal point instead of the quarter-note rests in idea Aa(reg.1).

Example 10. *Blockhouse*, piano, sections 8.5 (mm. 231-234) and 6.5 (mm. 178-181); ideas Aa(reg.1) (complete version) and Ac(reg.1) (filtered version)

Table 5. *Blockhouse*, Appearances of idea A in the main part

Section number	Measures	Ideas A Instrumentations			Duration	Presentation of 15 J Pattern (filtering process indicated by parenthesis on the numbers)
		Violin	Cello	Piano		
1.3	37-42	A	A	Aa(reg.2)	24	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15][1-2-3-4-5-6-7-8-9]
1.5	46-50			Ac(reg.1)	18	[13-14-15][1-2-3-4-5-6-7-8-9-10-11-12-13-14-15]
2.3	62-64	A(f)	A(f)		12	[(1)-2-3-4-(5)-6-7-(8)-9-10-11-12]
3.2	86-87	A	A		8	[1-2-3-4-5-6-7-8]
4.1	104-106			Aa(reg.1)	9	[1-2-3-4-5-6-7-8-9]

Table 5 (cont.)

Section number	Measures	Ideas A Instrumentations			Duration J	Presentation of 15 J Pattern (filtering process indicated by parenthesis on the numbers)
		Violin	Cello	Piano		
4.4	120-124			Ab(reg.2)	15	[1-2-(3)-(4)-5-6-7-8-9-(10)-(11)-12-13-14-15]
6.2	162-165			Aa(reg.2)	15	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15]
6.5	178-185	A	A	Ac(reg.1)	30	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15][1-2-3-4-5-6-7-8-9-10-11-12-13-14-15]
7.3	196-203	A(f)	A(f)		28	[(1)-2-3-4-(5)-6-7-(8)-9-10-11-12-(13)-14-15][(1)-2-3-4-(5)-6-7-(8)-9-10-11-12-(13)]
8.2	215-223			Ab(reg.2)	32	[1-2-(3)-(4)-5-6-7-8-9-(10)-(11)-12-13-14-15][1-2-(3)-(4)-5-6-7-8-9-(10)-(11)-12-13-14-15][1-2]
8.5	231-237			Aa(reg.1)	26	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15] [1-2-3-4-5-6-7-8-9-10-11]
9.3	252-254	A	A	Aa(reg.2)	12	[1-2-3-4-5-6-7-8-9-10-11-12]
9.5	263-266			Ac(reg.1)	13	[15][1-2-3-4-5-6-7-8-9-10-11-12]

As shown in Table 5, all of the variations of idea A are presented in a fifteen quarter-note pattern. If one examines the order of the presentations of idea A in the piano, it alternates complete original patterns and filtered patterns, [a-c]-[a-b]-[a-c]-[b-a (retrograde)]-[a-c]. The order of idea A in the strings is symmetrical, [A-A(f)-A] : [A-A(f)-A]. The fifteen quarter-note pattern of idea A and its filtered patterns in *Blockhouse* have the following number of appearances; idea Aa 5.73 times, idea Ab 3.13 times, idea Ac 4.06 times, idea A 4.93 times and idea A(f) 2.67 times.

2.5 Idea B

Harmonically, idea B is centered on the pitch G (same as idea A) but with a horizontal rather than vertical emphasis. The primary pitches are D-F-G-B flat-E. Rhythmically, idea B uses all eighth-notes, which is different from the quarter-note based rhythmic cells of idea A. Idea B

consists of six rhythmic/melodic segments (labeled a, b, c, d, e and f) that are presented within an additive process using six cells (labeled 1-6; see below Example 11). The six segments of idea B are unequal in length but always begin on cell number 1. Each cell consists of the two (duple) and three (triple) groupings of eighth notes which are articulated by accents. Browning creates variety with the basic rhythmic cells 1 and 2 (♫♫ ♫♫) through an additive process using cells 3 and 4 (♫♫♫ and ♫♫♫). These rhythmic cells are reordered or filtered to make the six segments for idea B.

Example 11. *Blockhouse*, Six segments with cells based on 2 ♫ or 3 ♫

Example 12. *Blockhouse*, violin, section 6.4 (mm. 172-177); ordering of six segments and their cells

All variations of idea B are divided into five types marked by the small letter, iBa, Bb, Bc, Bd and Be. Idea Ba appears in the strings performed *arco* and is a melodic line consisting of the cells using two (♫ or ♫♫) or three (♫♫♫) eighth-notes. All cells labeled 1-6 are articulated by accents. Idea Ba is a compressed version of its appearance in the introduction. Harmonically idea B presents a G minor seventh with the sixth E from the G Dorian mode (same as idea A), but

with a horizontal rather than vertical emphasis: [D-F-G-B flat-E]. A variation of idea B, idea Ba1 for piano only, is a reordered version of idea Ba, [D-F-G] to the order of [G-D-F] in idea Ba1, and placed in a high register. This is marked in Examples 13 and 14 by the circled notes. Idea Ba appears once in the violin at sections 1.2 and 6.4 and idea Ba1 appears once in piano at section 3.2.

Example 13. *Blockhouse*, violin, section 1.2 (mm. 33-36); idea Ba with segments a-c-e-c

The image shows a musical score for violin in 4/4 time. The piece is in G Dorian mode. The score is divided into four segments: segment a (measures 33-34), segment c (measures 35-36), segment e (measures 37-38), and segment c (measures 39-40). The notes are circled in the original image. Annotations include 'Idea Ba horizontally on G Dorian', 'g minor 7th', and 'sixth E from G Dorian mode'. Fingering numbers 1-5 are indicated below the notes.

Example 14. *Blockhouse*, piano, section 3.2 (mm. 86-87); idea Ba1 (variation of idea Ba)

The image shows a musical score for piano in 4/4 time. The piece is in G Dorian mode. The score is divided into two segments: segment e (measures 86-87) and segment b (measures 88-89). The notes are circled in the original image. Annotations include 'Idea Ba1 horizontally on G Dorian', 'Idea Ba [D-F-G] → Idea Ba1 [G-D-F]', and 'Higher register than idea Ba'. Fingering numbers 1-5 are indicated below the notes.

Ideas Bb and Bc are filtered versions of idea Ba. They all share six rhythmic cells, the G minor seventh chord with the sixth E from G Dorian mode and alternating *pizzicato* and *arco* performance gestures. However, the filtering processes for these filtered versions of idea B are opposite. From the original segments of idea B, idea Bb only plays cell 1 (♩♩) and cell 3 (♩♩♩): [D-F-G] performed *pizzicato* and [C-B flat-C] performed *arco*. Contrary to idea Bb, idea Bc only plays cell 2 (♩), cell 4 (♩♩♩) and cell 5 (♩♩): [B flat-E] performed *pizzicato* and [D-B flat-G] / [D-G-E] performed *arco*. This is marked in Examples 15 and 16 by the circled notes. For the cello idea Bb appears two times at sections 2.5 and 4.5 and idea Bc appears once at section 5.5.

Example 15. *Blockhouse*, violin, sections 8.5 (mm. 231-237) and 4.2 (mm. 107-112); ideas Bb and Bc (filtered versions of idea Ba)

Idea Bb filtered version

Idea Bc filtered version

Example 16. *Blockhouse*, cello, sections 2.5 (mm. 70-78) and 5.5 (mm. 154-158); ideas Bb and Bc (filtered versions of idea Ba)

Idea Bb Filtered version of idea Ba

Idea Bc Filtered version of idea Ba

Idea Bd appears in the strings. Similar to idea Ba, the tonal scheme of idea Bd is based on a G minor seventh chord and has all six of the rhythmic cells articulated by accents. In the violin, idea Bd appears two time at sections 5.3 and 7.1. In the cello, idea Bd appears once at section 2.1.

Example 17. *Blockhouse*, violin, section 5.3 (mm. 144-148); idea Bd

Idea Bd

Example 18. *Blockhouse*, cello, section 2.1 (mm. 51-54); idea Bd

Idea Bd

Idea Be usually appears simultaneously in all of the instruments and contains the original segments without any filters or variations. This is marked in Example 19 by the circled notes in idea Be. When idea Be simultaneously appears in all of the instruments, the right hand in the piano plays with the violin and the left hand in the piano plays with the cello in a pitch and rhythmic unison. Idea Be appears two times with all of the instruments together in sections 3.4 and 10.3 and appears once in the piano at section 5.3.

Example 19. *Blockhouse*, trio, section 10.3 (mm. 275-280); idea Be

Idea Be horizontally and vertically on G Dorian

Trio

g minor 7th with sixth E from Dorian mode

If one examines the order of the presentations of idea B in Table 6, it has three parts: Part I has all of the possible variations with variation a repeated [a-d-b-a-e-c]-Part II has only three variations [b-e-d] - and Part III again has all of the possible variations of idea B with variation a repeated [c-a-d-a-b-e].

Table 6. *Blockhouse*, Appearances of idea B in the main part (accomp.: idea Ba with accompaniment)

Section number	Measures	Ideas B / Instrumentations			Duration ↓	Order of Segments
		Violin	Cello	Piano		
1.2	33-36	Ba			17	a-c-e-c
2.1	51-54		Bd		13	b-a-c-a
2.5	70-78		Bb		31	d-d-a-f-e-a-f
3.2	86-87			Bal	8	e-b
3.4	93-99	Be	Be	Be	32	a-d-a-f-d-e-c
4.2	107-112	Bc			21	c-b-d-a-f

Table 6 (cont.)

Section number	Measures	Ideas B / Instrumentations			Duration J	Order of Segments
		Violin	Cello	Piano		
4.5	125-132		Bb		27	e-a-d-f-b-c
5.3	144-148	Bd		Be	20	b-e-c-a-e
5.5	154-158		Bc		18	c-a-e-b-a
6.4	172-177	Ba (accomp.)		Be	25	f-b-a-c-a-d
7.1	186-191	Bd			27	b-d-e-f-a-c
7.5	209-210	Ba (accomp.)	Ba (accomp.)		9	c-a
8.5	231-237	Bb			26	e-b-d-a-c-e
10.3	275-280	Be	Be	Be	24	a-b-e-d-a-c

2.6 Idea C

Eighth-note triplets are used for every presentation of idea C in *Blockhouse* which is a 32 quarter-note pattern. The pattern is grouped into, duple or triple divisions and articulated by accents.

Example 20. *Blockhouse*, Duple division and Triple division of idea C



Harmonically, idea C emphasizes two pitches: E (with its tritone B flat) and C (with its tritone F sharp). Idea C is written for all instruments and appears as a trio at sections 1.1 and 10.5 with the duration thirty two quarter-notes. The quarter-note duration is continuous but the rhythmic divisions for idea C are interrupted by accents, thus creating more energy and unpredictability. Within these accents, the different gestures between *staccato* and slurred articulations again highlight Browning's musical characteristics: energy, a lively pulse, and forward musical direction. Idea C appears as a cello solo at sections 5.1 and 8.2 with the same duration of thirty two quarter-notes but appearing an octave lower than idea C in trio.

Example 21. *Blockhouse*, section 1.1 (mm. 24-32); idea C with 30 ♩ durations
 (leaves out final two quarter notes, 31 and 32)

Idea C complete version

24 on E (tritone with B \flat) on C (tritone with F \sharp)

Vn

Vc

Pno

1 2 3 4 5 6 7 8 9 10 11

27 two kinds of back and forth triplets ascending note triplet descending note triplet

Vn

Vc

Pno

12 13 14 15 16 17 18 19 20 21

30 Duple division Staccato VS Slur Triple division

Vn

Vc

Pno

22 23 24 25 26 27 28 29 30

Example 22. *Blockhouse*, cello solo, section 8.2 (mm. 215-223); idea C with 32 J durations

Idea C complete version

Vc *ff* 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

Vc 22 23 24 25 26 27 28 29 30 31 32

Variations of idea C basically have the same characteristics of the original idea C but the position of the accents in the variations are displaced or shifted. Idea C(var.1) has an eleven quarter-note duration and appears in all of the instruments at sections 2.5 and 7.2. Idea C(var.2) has the duration of twenty five quarter-notes and has a register change: the violin plays an octave higher and the cello an octave lower than the original version. Idea C(var. 2) only appears in the strings at sections 3.5 and 9.4.

Example 23. *Blockhouse*, trio, section 7.2 (mm. 192-195); idea C(var.1) with 11 J durations

Idea C variation version (1)

Vn *ff* 1 2 3 4 5 6 7 8 9 10 11 1 2 3 4

Vc *ff*

Pno *ff*

Example 24. *Blockhouse*, violin and cello, section 9.4 (mm. 255-262); idea C(var.2) with 25 J durations

Idea C Variation Version(2)

Vn *ff* 1 2 3 4 5 6 7 8 9 10 11

Vc *ff* 12 13 14 15 16 17 18 19 20 21 22 23 24 25

The filtered version of idea C, idea C(f), only appears in strings. The violin and cello versions of idea C(f) share the same rhythmic and melodic characteristics: pattern structure, the duration of eleven quarter-notes, and the same pitches but are written in different registers. Idea C(f) appears in the cello at section 1.4 and in the violin at section 10.2.

Example 25. *Blockhouse*, violin and cello, sections 1.1 (mm. 24-32), 10.2 (mm. 272-274) and 1.4 (mm. 43-45); ideas C (complete version) and C(f) (filtered version)

Idea C complete pattern

Vn *ff*

Vc *ff*

Idea C(f) filtered pattern

violin 272

cello 42

1 2 3 4 5 6 7 8 9 10 11

In the piano, the chordal version of idea C only appears in section 2.2 (mm. 55-61) with the duration of twenty five quarter-notes. The right hand in the piano plays original idea C, but in the left hand a filtering process appears and the position of accents are displaced or shifted.

Example 26. *Blockhouse*, piano, sections 1.1 (mm. 24-26) and 2.2 (mm. 55-61); ideas C (complete version) and C (chordal version)

Idea C complete pattern

ff

Idea C (chord)

Pno *ff*

Pno

As shown in Table 7, idea C has two parts: Part I [original-filtered-variations], and - Part II [variations-filtered-original]. The cello solo appears before or after variation (2). The order of the variations of idea C in Table 6 is symmetrical. Idea C appears 12 times: five times in the violin, eight times in the cello and six times in the piano.

Table 7. *Blockhouse*, Appearances of idea C in the main part

Section Number	Measures	Ideas C / Instrumentations			Duration ↓	Presentation of Pattern
		Violin	Cello	Piano		
1.1	24-32	C (ori.)	C (ori.)	C (ori.)	30	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30]
1.4	43-45		C(f)		11	[1-2-3-4-5-6-7-8-9-10-11]
2.2	55-61			C(chord)	25	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25]
2.5	70-78			C(var.1)	31	[1-2-3-4-5-6-7-8-9-10-11][1-2-3-4-5-6-7-8-9-10-11][1-2-3-4-5-6-7-8-9]
3.5	100-103	C(var.2)	C(var.2)		14	[1-2-3-4-5-6-7-8-9-10-11-12-13-14]
5.1	133-138		C(solo)		22	[11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32]
7.2	192-195	C(var.1)	C(var.1)	C(var.1)	15	[1-2-3-4-5-6-7-8-9-10-11][1-2-3-4]
7.5	209-210			C(orig.)	9	[1-2-3-4-5-6-7-8-9]
8.2	215-223		C(solo)		32	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32]
9.4	255-262	C(var.2)	C(var.2)		25	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25]
10.2	272-274	C(f)			11	[1-2-3-4-5-6-7-8-9-10-11]
10.5	285-293		C(orig.)	C(orig.)	30	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30]

2.7 Idea D

Idea D is a fourteen quarter-note pattern. Similar to idea C, idea D has two groupings of eighth-notes (duple or triple) that are articulated by accents or *tenuto* markings. Browning places

the accents and the *tenuto* markings on the beat or off the beat to create energy and musical direction. The order of the duple and triple groupings of eighth-notes is fixed and thus forms a pattern. Idea D appears in two forms indicated by the small letters, Da and Db (filtered version). Idea Da has continuous eighth-notes, especially in the violin. Idea Da is vertically and horizontally a mixture of E minor and E major. Idea Da appears eight times in sections 1.4, 3.1, 4.5, 5.4, 7.3, 8.1, 9.2 and 10.5.

Example 27. *Blockhouse*, section 5.4 (mm. 149-153); idea Da with 14 J durations

Idea D for the piano is divided into three different registers marked by the numbers, D(1), D(2) and D(3). All presentations of idea D in the piano have three octave intervals between the right and left hands. Idea D(1) is in the highest register, idea D(2) in the middle register and idea D(3) in the lowest register. These different registers appear in idea D and the filtered version of idea D, idea Db.

Example 28. *Blockhouse*, piano, sections 1.4 (mm. 43-45), 7.3 (mm. 196-199) and 5.4 (mm. 149-152); ideas Da(1), Da(2) and Da(3)

Example 28 (cont.)

Idea Da(2)
middle register
mp

Idea Da(3)
lower register
mp

Idea Db is a filtered version of idea Da. As shown in Example 29, idea Db in the strings substitutes rests for attacks for notes on the 1st, 7th, and 8th beats and the second half of the 3rd beat. Idea Db appears in the violin at section 8.4 and in the cello at sections 6.3 and 9.5.

Example 29. *Blockhouse*, violin, sections 3.1 (mm. 79-85) and 8.4 (mm. 229-230);
ideas Da (complete version) and Db (filtered version)

Idea Da complete pattern
Vn *mp*
1 2 3 4 5 6 7 8 9 10 11 12 13 14 1 2 3 4 5 6 7 8 9 10 11 12

Idea Db filtered version
Vn *arco*
1 2 3 4 5 6 7 8

Example 30. *Blockhouse*, cello, sections 8.1 (mm. 211-214) and 9.5 (mm. 263-266);
ideas Da (complete version) and Db (filtered version)

Idea Da Complete version
Vc
1 2 3 4 5 6 7 8 9 10 11 12 13 14

Idea Db filtered version
Vc
2 3 4 5 6 7 8 9 10 11 12 13 14

In the piano, the filtered idea Db substitutes rests for attacks on the 1st, 3rd, 7th, 8th, 11th and 12th quarter-notes of the fourteen quarter-note pattern. The filtered quarter-notes in idea Db are marked in Example 31 in idea Da. Idea Db appears in the piano at sections 4.2 and 6.3.

Example 31. *Blockhouse*, piano, sections 4.5 (mm. 125-130) and 6.3 (mm. 166-171); ideas Da (complete version) and Db (filtered version)

The image shows two musical staves for piano. The top staff is labeled 'Idea Da' and consists of two systems of music. The first system has a treble clef and a 2/4 time signature, with notes and chords numbered 2 through 14. The second system has a bass clef and a 2/4 time signature, with notes and chords numbered 1 through 7. The bottom staff is labeled 'Idea Db filtered version' and also consists of two systems. The first system has a treble clef and a 2/4 time signature, with notes and chords numbered 1 through 14. The second system has a bass clef and a 2/4 time signature, with notes and chords numbered 1 through 6. The notation includes various chords and rests, with some notes marked with a 'y' symbol.

Example 32. *Blockhouse*, piano, sections 7.3 (mm. 196-199) and 4.2 (mm. 107-110); ideas Db(reg.1) and Db(reg.2)

The image shows two musical staves for piano. The top staff is labeled 'Idea Db (reg.1) high register' and consists of two systems. The first system has a treble clef and a 2/4 time signature, with notes and chords numbered (1) through 14. The second system has a bass clef and a 2/4 time signature, with notes and chords numbered (1) through 14. The bottom staff is labeled 'Idea Db (reg.2) middle register' and also consists of two systems. The first system has a treble clef and a 2/4 time signature, with notes and chords numbered (1) through 14. The second system has a bass clef and a 2/4 time signature, with notes and chords numbered (1) through 14. The notation includes various chords and rests, with some notes marked with a 'y' symbol.

Table 8. *Blockhouse*, Appearances of idea D in the main part

Section number	Measures	Ideas D/Instrumentations			Duration J	Presentation of 14 J pattern
		Violin	Cello	Piano		
1.4	43-45			Da(reg.1)	11	[1-2-3-4-5-6-7-8-9-10-11]
3.1	79-85	Da			26	[1-2-3-4-5-6-7-8-9-10-11-12-13-14][1-2-3-4-5-6-7-8-9-10-11-12]
4.2	107-112			Db(reg.2)	21	[1-2-3-4-5-6-7-8-9-10-11-120-13-14] [1-2-3-4-5-6-7]
4.5	125-132	Da		Da(reg.1)	27	[2-3-4-5-6-7-8-9-10-11-12-13-14][1-2-3-4-5-6-7-8-9-10-11-12-13-14]
5.4	149-153	Da	Da	Da(reg.3)	19	[1-2-3-4-5-6-7-8-9-10-11-12-13-14][1-2-3-4-5]
6.3	166-171		Db	Db(reg.1)	20	[1-2-3-4-5-6-7-8-9-10-11-12-13-14][1-2-3-4-5-6]
7.3	196-203			Da(reg.2)	28	[1-2-3-4-5-6-7-8-9-10-11-12-13-14]
8.1	211-214		Da		14	[1-2-3-4-5-6-7-8-9-10-11-12-13-14]
8.4	229-230	Db			8	[1-2-3-4-5-6-7-8]
9.2	247-251		Da	Da(reg.3)	19	[1-2-3-4-5-6-7-8-9-10-11-12-13-14][1-2-3-4-5]
9.5	263-266		Db		13	[2-3-4-5-6-7-8-9-10-11-12-13-14]
10.5	285-293	Da			30	[1-2-3-4-5-6-7-8-9-10-11-12-13-14] [1-2-3-4-5-6-7-8-9-10-11-12-13-14][1-2]

As shown in Table 8, the presentation of idea D through the main body of the piece alternates complete original patterns (idea Da) with filtered patterns (idea Db) by the following scheme:[a-a-b]-[a-a-b]-[a-a-b]-[a-b-a], the last being a reordered a-a-b. The piano alternates its registers by [1-2]-[1-3]-[1-2]-[3- (leave out 1)], and is similar to the order of registers for idea A. In the piano part, the order of idea D is almost symmetrical, ideas D [a-b-a]-[a-b-a]-[a-(b omitted)-a].

2. 8 Idea E

Idea E has two contrasting gestures: a melodic gesture in the violin part and an accompaniment gesture in the cello and piano parts. Both gestures have the duration of eighteen

quarter-notes and appear four times (sections 2.2, 8.3, 10.1 and 10.4). The violin has a lyrical melodic line with continuous sixteenth notes and eighth notes with some slurs. In contrast to the violin, the piano has a short and rhythmic accompaniment in groups of repeating notes: sixteenth notes with *staccatos* in the right hand and eighth notes with *staccatos* and accents in the left hand. Harmonically idea E is based in C Dorian mode.

Example 33. *Blockhouse*, violin and piano, section 8.3 (mm. 224-228); idea E with 18 ♩ durations

Idea E Violin : Melodic gesture V. S. Piano : accompaniment gesture

Horizontally on C Dorian

Right hand : Vertically, Triads with 6th A from C Dorian

Left hand : Horizontally on C Dorian

There are two variations for idea E, labeled E(var.1) and E(var.2). The first variation appears in the piano at sections 1.2 and 6.1 and in the violin at 9.2. In idea E(var.1) in the piano, the right hand plays all of the same sixteenth notes but the left hand only plays the pitch B flat an octave lower than the original idea E and is a filtered version of idea E. The second variation of idea E only appears in the violin in sections 5.2 and 10.1. The materials for variation are marked in Example 34 by the circled notes in idea E.

Example 34. *Blockhouse*, violin, sections 8.3 (mm. 224-228), 9.2 (mm. 247-251), 10.1 (mm. 267-271); idea E (complete version) and ideas E(var.1) and E(var.2)

Idea E complete version

materials for idea E (var.1)

materials for idea E (var.2)

Example 34 (cont.)

Idea E (var.1)

Idea E (var.2)

The image shows two musical staves for violin. The first staff, labeled 'Idea E (var.1)', is marked 'mp' and 'arco'. It features a series of notes with stems pointing downwards, indicating they are played on the bridge. The second staff, labeled 'Idea E (var.2)', is marked 'ff' and shows a more complex rhythmic pattern with some notes beamed together.

Example 35. *Blockhouse*, piano, sections 8.3 (mm. 224-226) and 6.1 (mm. 159-161); ideas E (complete version) and E(var.1) (filtered version)

Idea E complete version

Idea E(var.1) filtered version

The image shows two piano accompaniment staves. The top staff is labeled 'Idea E complete version' and 'ff', showing a dense texture of chords and sixteenth notes. The bottom staff is labeled 'Idea E(var.1) filtered version' and 'ff', showing a similar texture but with some notes circled and a dashed line below them labeled 'octave lower'.

Idea E in the piano has two versions marked by small letters, Ea and Eb. Idea Ea appears only in the violin with the durations of eighteen quarter-notes. The violin plays only sixteenth notes *sul ponticello* similar to the right hand in the piano for idea E. Idea Ea appear once in section 1.5.

Example 36. *Blockhouse*, violin, section 1.5 (mm. 46-50); idea Ea

Idea Ea

The image shows a single musical staff for violin, labeled 'Idea Ea'. It is marked 'sul pont.' and features a series of sixteenth notes with stems pointing downwards, indicating they are played on the bridge.

Idea Eb only appears in the cello and has two versions, ideas Eb(1) and Eb(2). Based on the left hand in the piano for idea E, idea Eb(1) in the cello only plays the eighth notes with *pizzicato* and in an octave higher register. Idea Eb(2) in the cello is a filtered version of idea Eb(1). In the idea Eb(2), the cello only plays the pitch low C with a *Bartok pizzicato* and is also an octave higher than the piano. This is marked in Example 37 by the circled notes. Idea Eb(1) appears in sections 3.3, 4.4, 8.3, 10.1 and idea Eb(2) appears in sections 1.5 and 6.4.

Example 37. *Blockhouse*, cello and piano, sections 8.3 (mm. 224-228), 3.3 (mm. 88-92) and 1.5 (mm. 46-50); idea E (complete version) and ideas Eb(1) and Eb(2) (filtered versions)

Idea E complete version

Idea Eb(1) only play 8th notes from left hand of idea E

Idea Eb(2) filtered version of idea Eb(1) or only play C from idea E

Table 9. *Blockhouse*, Appearances of idea E in the main part

Section number	Measures	Ideas E / Instrumentations			Duration [J]	Presentation of 18 J Pattern
		Violin	Cello	Piano		
1.2	33-36			E(var.1)	17	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17]
1.5	46-50	Ea	Eb(2)		18	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18]
2.2	55-61	E(orig.)			25	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18][1-2-3-4-5-6-7]
3.3	88-92		Eb(1)	E(ori.)	20	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18][1-2]
4.4	120-124		Eb(1)		15	[4-5-6-7-8-9-10-11-12-13-14-15-16-17-18]

Table 9 (cont.)

Section number	Measures	Ideas E / Instrumentations			Duration]	Presentation of 18 J Pattern
		Violin	Cello	Piano		
5.2	139-143	E(var.2)			21	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18][1-2-3]
6.1	159-161			E(var.1)	10	[1-2-3-4-5-6-7-8-9-10]
6.4	172-177		Eb(2)		25	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18][1-2-3-4-5-6-7]
8.3	224-228	E(ori.)	Eb(1)	E(orig.)	20	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18][1-2]
9.2	247-251	E(var.1)			19	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18]
10.1	267-271	E(var.2)	Eb(1)	E(orig.)	18	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18]
10.4	281-284	E(orig.)			17	[2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18]

As shown in Table 9, idea E appears twelve times in the main part of *Blockhouse*: in the violin seven times, in the cello six times and in the piano five times. The violin alternates complete patterns and variations in the following scheme: [a]-[orig.-var.1]-[orig.-var.1]-[var.2-orig.], the last group being a retrograde of [orig.-var.]. The piano also alternates original patterns with variations in the following way: [var.1-orig.]-[var.1-orig.]-[orig.], the last leaving out the variation. In the main part of *Blockhouse*, the cello repeats the registers of idea E by [2-1-1]-[2-1-1].

2.9 Idea F

Idea F for the piano is composed of the consecutive triplets of quarter notes and emphasizes the pitch F but also contains the notes, F-A flat-B flat-B-D-E flat. In the piano, idea F uses two different registers marked as ideas F(reg.1) and F(reg.2). Idea F(reg.1) has a four-octave span between hands but idea F(reg.2) uses an octave higher in the right hand and an

octave lower in the left hand, thus producing a six octave interval between hands. The right and left hands move in parallel motion. Idea F has three versions: idea Fa which is the original version, and two filtered versions, Fb and Fc. Idea Fa consists of three rhythmic and melodic segments that are presented within an additive process. Each segment is broken up into individual cells labeled as 1, 2, 3, 4, 5, 6 and 7 and each cell has one pitch and the duration of one quarter note triplet. A segment consists of three, five or seven cells (segments are labeled as 3, 5 or 7) and is grouped together into periods consisting of all three segments each with a total duration for each period of ten quarter notes. There are six different orderings for the three segments which form the six periods. Idea Fa appears four times in the piano at sections 2.4, 4.3 and 10.4 on register (1) and at section 9.1 on register (2).

Example 38. *Blockhouse*, Idea Fa; six periods, three segments, and seven cells

Segment 3	Segment 5	Segment 7	
F F Ab	F F Ab F Bb	F F Ab F Bb F B	
1 2 3	1 2 3 4 5	1 2 3 4 5 6 7	

The Six Periods
1. 7 - 5 - 3
2. 5 - 7 - 3
3. 5 - 3 - 7
4. 3 - 5 - 7
5. 3 - 7 - 5
6. 7 - 3 - 5

Six different orders of segments

Example 39. *Blockhouse*, piano, section 9.1 (mm. 238-246); idea Fa(reg.2)

Idea Fa complete version

[5 7 3] [7 5 3] [5 3 7]

In the piano, ideas Fb and Fc are filtered versions of idea Fa. In idea Fb, the piano plays cells [2 and 3] of segment 3, cells [3, 4 and 5] of segment 5 and cells [3, 5, 6 and 7] of segment 7.

The filtering process is marked in Example 40 by parenthesis on the numbers of the cells silenced. Idea Fb appears two times in sections 3.5 and 10.2 on register (2). Idea Fc plays the pitch F from idea Fa and filters out the other pitches and appears two at sections 5.2 and 7.4 on register (2).

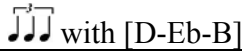

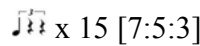
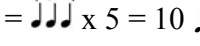
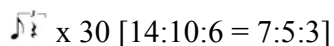
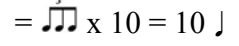
Example 40. *Blockhouse*, piano, sections 10.2 (mm. 272-274) and 7.4 (mm. 204-208); ideas Fb(reg.2) and Fc(2) (filtered versions)

The image displays two musical staves for piano. The top staff is labeled 'Idea Fb' and 'Filtered pattern'. It shows three measures of music in 4/4 time, with a dynamic marking of *pp*. The notes are grouped into triplets. Below the staff, the rhythmic patterns are indicated as: [(1) - 2 - 3], [(1) - (2) - 3 - (4) - 5 - 6 - 7], and [(1) - (2) - 3 - 4 - 5]. The bottom staff is labeled 'Idea Fc' and 'filtered pattern'. It shows six measures of music in 4/4 time, also with a dynamic marking of *pp*. The notes are grouped into triplets. Below the staff, the rhythmic patterns are indicated as: [3], [7], [5], [7], [3], [1], [7], and [1].

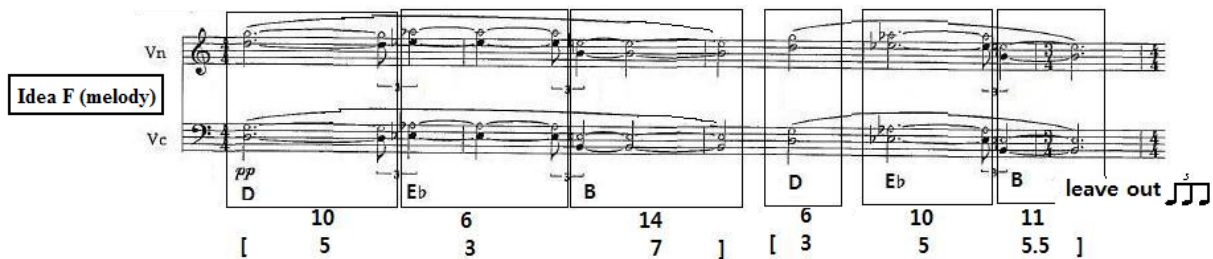
In the string, idea F is presented in two forms: a melodic gesture and a rhythmic/accompaniment gesture. Idea F(melody) always consists of three notes, the pitches [D- E- B flat] but appears in various registers. Like idea F in the piano part, idea F(melody) in the strings also has three melodic and rhythmic segments, [7-5-3], that is presented within periods lasting ten quarter notes. In Example 41, each segment has the different durations of eighth-note triplets: ten for the pitch D, six for the pitch E flat, and fourteen for the pitch B. The period of eighth-note triplets [10-6-14] is the same as a period of quarter note triplets of [5-3-7]. (see below Table 10) The three segments form six periods each with a different ordering of the segments: [7-5-3], [7-3-5], [5-7-3], [5-3-7], [3-7-5] and [3-5-7]. Idea F(melody) appears four

times with both strings together at section 2.4, in the violin at section 5.5 and in the cello at sections 5.2 and 8.4.

Table 10. *Blockhouse*, Segments of idea F for piano and idea F(melody) for strings

Idea	Ideas Fa, Fb and Fc	Idea F(melody)
Instrument	Piano	Strings (violin and cello)
Pattern	 with [D-Eb-B]	 with [D-Eb-B]
Segments [3-7-5] and Duration	 x 15 [7:5:3] =  x 5 = 10]	 x 30 [14:10:6 = 7:5:3] =  x 10 = 10]

Example 41. *Blockhouse*, strings, section 2.4 (mm.65-69); idea F(melody)



In idea F(melody), Browning employs a mysterious sound by using *harmonics* in the strings. The artificial harmonics in the strings produce a sound two octaves higher than notated in the score. The cello for idea F(melody) uses three different registers in sections 2.4, 5.2 and 8.4.

Example 42. *Blockhouse*, strings, sections 8.4 (mm. 229-230), 2.4 (mm. 65-66), and 5.2 (mm. 139-140); three different registers of idea F(melody) in cello



The rhythmic gesture of idea F also appears in the strings. Idea F(rhythm) in the violin has the four eighth-note triplets that repeat three times within every four quarter-notes and the cello has four quarter-note triplets that repeat three times within every eight quarter-notes (see below Table 11). The two rhythmic patterns are superimposed in the violin and the cello at section 4.3. Idea F(rhythm) appears in the violin at section 6.2 and in the cello at section 7.4.

Table 11. *Blockhouse*, Idea F(rhythm) with 4 ♩ durations in violin and 8 ♩ durations in cello












Idea F(rhythm)	
in violin part	
4 ♩ durations	1 2 3 4 1 2 3 4 1 2 3 4

Idea F(rhythm)	
in Cello part	
8 ♩ Durations	1 2 3 4 1 2 3 4 5 6 7 8

Example 43. *Blockhouse*, strings, section 4.3 (mm. 113-119); idea F(rhythm)

Idea F (rhythm)	
4 ♩ durations	1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
Vn	
Vc	
8 ♩ durations	1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4
Vn	
Vc	

Table 12. *Blockhouse*, Appearances of idea F in the main part

Section number	Measures	Ideas F/ Instrumentations			Duration J	Presentation of pattern
		Violin	Cello	Piano		
2.4	65-69	F(melody)	F(melody)		19	[5-3-7][3-5-5.5/7] /  segment
				Fa(reg.1)		[5-3][7-3-5][5] /  segment
3.5	100-103			Fb(reg.2)	14	[7-3-5][5] /  segment
4.3	113-119	F(rhythm)			28	[1-2-3-4][1-2-3-4][1-2-3-4][1-2-3-4][1-2-3-4][1-2-3-4][1-2-3-4][1-2-3-4] / 4 J durations
			F(rhythm)			[1-2-3-4-5-6-7-8][1-2-3-4-5-6-7-7-8][1-2-3-4] / 8 J durations
				Fa(reg.1)		[7-5-3][5-7-3][7-5] /  segment
5.2	139-143		F(melody)	Fc(reg.2)	21	[3-5-7][5-3-7] /  segment
5.5	154-158	F(melody)			18	[5-3-7][3-5-4/7] /  segment
6.2	162-165	F(rhythm)			15	[1-2-3-4][1-2-3-4][1-2-3-4][1-2-3] / 4 J durations
7.4	204-208		F(rhythm)		21	[1-2-3-4-5-6-7-8][1-2-3-4-5-6-7-8][1-2-3-4-5] / 8 J durations
				Fc(reg.2)		[3-7-5][7-3-5] /  segment
8.4	229-230		F(melody)		8	[5-3-4/7] /  segment
9.1	238-246			Fa(reg.2)	31	[5-7-3][7-5-3][5-3-7] /  segment
10.2	272-274			Fb(reg.2)	11	[3-5-7] /  segment
10.4	281-284			Fa(reg.1)	17	[7-3-5][7-3] /  segment

As shown in Table 12, idea F appears eleven times in the main part of *Blockhouse*. The string parts alternate the melodic gesture and rhythmic gesture of idea F: [melody-rhythm]-[melody-rhythm] in the violin and [melody-rhythm]-[melody-rhythm]-[melody-(rhythm omitted)] in the cello. The piano alternates complete original patterns (Fa) with filtered patterns (Fb and Fc) in the following pattern: [a-b]-[a-c]-[c-a (retrograde of a-c)]-[b-a (retrograde of a-b)]. This pattern produces the retrograde structure of [a-b-a-c]-[c-a-b-a]. The piano also alternates registers (1) and (2) in the presentation of idea F: [reg.1-reg.2]-[reg.1-reg.2]-[reg.2-reg.1 (retrograde)]-[reg.2-reg.1 (retrograde)].

2.10 Superimposition of Ideas in *Blockhouse*

Browning composes different kinds of musical ideas and then decides on the positioning of these ideas within the composition by assigning the ideas to the cells of the magic square. In *Blockhouse* the musical ideas are stated in horizontal juxtaposition or in vertical superimposition. The process in which ideas are superimposed in *Blockhouse* can be grouped into three different kinds of presentations: (1) two complete ideas superimposed, (2) one complete idea superimposed on a filtered version of an idea, and (3) two filtered versions superimposed on each other. An example of the superimposition of two complete ideas in a trio texture appears in section 7.5 where idea B in the strings is superimposed on idea C in the piano (Example 44).

Example 44. *Blockhouse*, section 7.5 (mm. 209-210); superimposition of the complete ideas B and C

The musical score for Example 44 consists of three staves: Violin (Vn), Viola (Vc), and Piano (Pno). The key signature is one flat (B-flat major/D minor) and the time signature is 3/4. The score is marked with a forte (*ff*) dynamic. Idea B is indicated by a box on the left, encompassing the Violin and Viola parts. Idea C is indicated by a box on the left, encompassing the Piano part. The Violin and Viola parts play a melodic line with eighth and sixteenth notes, while the Piano part plays a complex rhythmic pattern with triplets and sixteenth notes.

Another example of two complete ideas being superimposed can be found at section 10.4. Here the strings play idea E while the piano performs idea F (Example 45).

Example 45. *Blockhouse*, section 10.4 (mm. 281-284); superimposition of the complete ideas E and F

The musical score for Example 45 consists of two staves: Violin (Vn) and Piano (Pno). The key signature is one flat (B-flat major/D minor) and the time signature is 3/4. The score is marked with a forte (*ff*) dynamic. Idea E is indicated by a box on the left, encompassing the Violin part. Idea F is indicated by a box on the left, encompassing the Piano part. The Violin part plays a melodic line with eighth and sixteenth notes, while the Piano part plays a complex rhythmic pattern with triplets and sixteenth notes.

The superimposition of a complete idea with a filtered version of an idea appears at section 6.5 (see Example 46). A filtered version of idea A (idea Ac) in the piano is superimposed on the complete idea A in the strings.

Example 46. *Blockhouse*, section 6.5 (mm. 178-181); superimposition of the complete idea A and the filtered idea Ac

The musical score for Example 46 consists of three staves. The top two staves are for Violin (Vn) and Viola (Vc), both in 4/4 time. They play a melodic line with eighth and sixteenth notes, marked as 'Idea A'. The bottom two staves are for Piano (Pno), also in 4/4 time. They play a rhythmic accompaniment of chords and single notes, marked as 'Idea Ac'. The key signature has one flat (B-flat).

The example of two filtered ideas being superimposed can be found at section 4.4 where the filtered version of idea E (idea Eb) in the cello is superimposed on the filtered version of idea A (idea Ab) in the piano. (see Example 47)

Example 47. *Blockhouse*, section 4.4 (mm. 120-124); superimposition of the filtered ideas Eb(1) and Ab

The musical score for Example 47 consists of three staves. The top staff is for Cello (Vc) in 3/4 time, playing a melodic line marked as 'Idea Eb(1)'. It includes dynamics like *ff* and *mp*, and a *pizz.* marking. The bottom two staves are for Piano (Pno) in 3/4 time, playing a rhythmic accompaniment marked as 'Idea Ab' with a *ff* dynamic. The key signature has one flat (B-flat).

Another example of two filtered ideas appears in section 4.2. The violin plays the filtered version of idea B (idea Bc) while the piano plays the filtered version of idea D (idea Db).

Example 48. *Blockhouse*, section 4.2 (mm. 107-112); superimposition of the filtered ideas Bc and Db

The image shows a musical score for two staves. The top staff is labeled 'Idea Bc' and 'Vn' (Violin). It contains six measures of music with various articulations: 'pizz.' (pizzicato) and 'arco' (arco). The bottom staff is labeled 'Idea Db' and 'Pno' (Piano). It contains six measures of music, primarily consisting of chords and some melodic lines. The tempo/mood is marked 'mp' (mezzo-piano) in both staves. The key signature has one flat (B-flat major or D minor), and the time signature is 3/4.

By using the three different ways of superimposing ideas described above in *Blockhouse*, Browning is able to get maximum variety in his composition from a finite number of ideas and to use the different types of superimposition to clearly articulate the magic square structure.

CHAPTER THREE

DOUBLE SHOT

3.1 Background

Written in 2000, *Double Shot* was commissioned and premiered by renowned Romanian violinist Sherban Lupu who is Professor of Violin at the University of Illinois. The compact disc “Inner Visions” includes *Double Shot* and was published by Capstone Records (CPS 8711) in 2002. *Double Shot* was recorded by violinist Sherban Lupu and pianist David Psenicka. The score is for violin and piano and has 316 measures. Approximate playing time is 7 minutes and 3 seconds. In 2004, critic Robert Carl reviewed Browning’s *Double Shot* on the compact disc “Inner Visions.”

Zack Browning's *Double Shot* (2000) is an engaging *moto perpetuo* based, according to the composer, on material derived from magic squares. There's no way of knowing how this source relates specifically to the music, but it's just as well, because the energy and momentum of the piece are infectious on their own and, if nothing else, it's obvious the source gives a level of cohesion to the product.²⁸

3.2 Magic Square Structure of *Double Shot*

The structure of the *Double Shot* is derived from eighteen routes through the 4x4 magic square known as the “Dürer Square.” This 4x4 magic square has multiple symmetrical properties that are not shared by all magic squares. In the Dürer Square, the magic number of 34 can be

²⁸ Carl, Robert. Review of Compact Disc “Inner Visions” by Sherban Lupu (violin). Fanfare, June/July 2004.

found in all of the rows, columns, diagonals, each of the quadrants, the center four squares, and the corner squares (of the 4x4 as well as the four contained 3x3 grids). This sum can also be found in the four outer numbers clockwise counting from the second cell of the first line (3+8+14+9) and likewise the four counter-clockwise, the two sets of four symmetrical numbers (2+8+9+15 and 3+5+12+14), the sum of the middle two entries of the two outer columns and rows (5+9+8+12 and 3+2+15+14), and in four kite or cross shaped quartets (3+5+11+15, 2+10+8+14, 3+9+7+15, and 2+6+12+14).

Figure 7. 4x4 Dürer Magic Square

16	3	2	13
5	10	11	8
9	6	7	12
4	15	14	1

The 4x4 Dürer Square provides the source for the overall structure for *Double Shot*. The composition is divided into two parts; the main part (mm. 1-308), which follows eighteen routes through the 4x4 magic square, and the coda (mm. 309-316).

The structure of the main part of *Double Shot* is represented by the numeric sequence of the magic square, which is made up of eighteen different routes. These routes span the entire main part. The eighteen routes through the square are individually divided into groups of four-subsections which correspond to the four cells within each route through the square. In Table 13, the numbers 1-18 represent the number of routes and the four decimals per each route represent the four subsections (cells) of each route through the square. Originally the magic number of an unaltered 4x4 magic square is 34. In *Double Shot* the magic number is now 54 because Browning has added five to each number in the 4x4 Dürer magic square. The entire main part is

controlled by the duration of each route (54 quarter notes x 18 routes) and each route is subdivided by the duration of the four subsections or cells derived from the Dürer Square with five added to it.

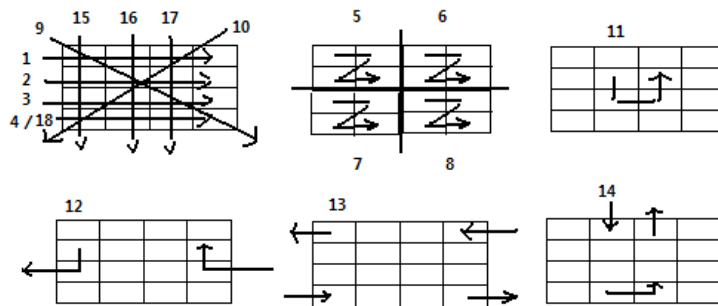
Figure 8. 4x4 Dürer Magic Square with five added to each number and a magic number of 54

21	8	7	18
10	15	16	13
14	11	12	17
9	20	19	6

The main part of *Double Shot* has 54 quarter notes per route (derived from the magic number) and has a pulse of 144 per quarter note which results in a duration of 6.75 minutes for the 18 routes. The coda has 25 quarter notes at the same pulse of 144 per quarter note and has duration of 0.17361 minutes or 10.416 seconds. The total duration for *Double Shot* is 6.92361 minutes or 415.416 seconds.

From the 4x4 magic square with five added to each number, eighteen routes are used for the structure of the main part. In the main part of *Double Shot*, the first four routes, labeled 1-4 in Figure 8, are the first four horizontal rows read left to right. The next four routes, routes 5-8 are derived from the four the quadrants. Routes 9 and 10 are the diagonals read top to bottom. Route 11 is the center four squares. Route 12 is the middle two entries of the outer columns read counterclockwise and route 13 is the four outer numbers read counterclockwise from the corners. Route 14 is the middle two entries of the outer rows read counterclockwise. Routes 15-17 are the vertical rows read top to bottom. The final route of the main part, route 18 is the last horizontal row, read left to right.

Figure 9. *Double Shot*, Eighteen routes from 4x4 Dürer Magic Square



Within the structure of the magic square, Browning inserts the five musical ideas represented by the letters A to E. Each of Browning’s musical ideas consists of short motives and these motives have clearly defined musical values for rhythm, register, and pitch. Browning composes different kinds of musical ideas and decides on the location of the ideas within the composition by assigning the ideas to individual cells within each route. The ordering of the ideas result in what Browning calls a “dramatic presentation” of the magic square.

The structure of the main section of *Double Shot* is derived from the eighteen different routes through the 4x4 magic square. The duration of these routes is always 54 quarter notes (the magic number) but the duration of the individual four cells of each route is different. The musical ideas are assigned to the subsections or cells of each route. Individual values for the musical parameters for each cell create quick changes and contrasting gestures. *Double Shot* layers patterns and ideas and uses a variety of techniques for the layering of the ideas.

The coda is composed outside of the magic square structure used in the main part but does use the same materials and gestures of the main part. In the coda, the violin and piano play unison and octaves on the pitch D using the thirteen quarter-notes pattern of musical idea C (musical ideas will be examined later in this chapter). As presented in Example 49 and Table 13,

the violin plays *sul ponticello* (cell w), *arco* (cell x) and the double stops, F-D (cell y) and D-F (cell y'). The piano plays the single note D (cell x), the octave D (cell x') and the interval D-F (cell y') and the interval A-D (cell z). The repeated pitch Ds gradually fade out to end *Double Shot*.

Example 49. *Double Shot*, analysis of the coda (mm. 309-316)

Table 13. *Double Shot*, Overall structure of the coda, mm. 309-316

Section	Measures	Duration J	Ideas/ Instrumentation	Presentation of pattern	Dynamic	Time Signatures
Coda	309-316	25 [1-13][1-12]	C (unison)	Violin [w, x, y, y'] Piano [x, x', y, z]	<i>p - ppp</i>	3/4-4/4-3/4

3.3 Musical Ideas, Patterns and Compositional Techniques in *Double Shot*

Within the magic square structure in *Double Shot*, Browning assigns five musical ideas (A-E) that are varied within their individual presentation. Time signatures are always over the quarter note (ex. 2/4, 3/4 or 4/4). The duration in quarter-notes for each subsection comes from the cells of the magic square.

In *Double Shot*, density is defined as the number of instruments playing (duo or solo) in Table 14 and the number of ideas presented simultaneously (one or two ideas).²⁹ The number of

²⁹ Personal e-mail correspondence with composer, July 6, 2010.

instruments playing follows the basic pattern solo-duo-duo-duo which is assigned to each of the four cells in a given route through the magic square. The number of instruments playing is also assigned the number of ideas performed following the pattern of 1-2-1-2. This pattern is also assigned the four cells of the routes from the magic square. Following this density scheme assigned to the four cells of a route through the magic square, Browning can diversify the foreground by deciding on the specific ideas to be presented while the background density structure remains for the most part constant. Browning juxtaposes the five musical ideas within the 72 subsections following the density scheme. Individual and unique values for the musical parameters for each idea are presented as patterns that retain their identity even when superimposed with other patterns.

Table 14. *Double Shot*, Overall Structure of the main part, mm. 1-308

Route Subsection	1.1	1.2	1.3	1.4	2.1	2.2	2.3	2.4	3.1	3.2	3.3	3.4	
Measures	1-7	8-9	10-11	12-17	18-21	22-26	27-31	32-35	36-40	41-43	44-47	48-53	
Duration J	21	8	7	18	10	15	16	13	14	11	12	17	
Grouping	Solo	Duo	Duo	Duo	Solo	Duo	Duo	Duo	Solo	Duo	Duo	Duo	
Number of ideas	1	2	1	2	1	2	1	2	1	2	1	2	
Ideas	Violin		C2a	Ca	B2b	C1a	Ab	Ea	B3b		E1a	A2b	Cb
	Piano	Aa	B1a	Ca	A1a		Ba	Ea	C2b	Da	C1a	Ab	Db

Route Subsection	4.1	4.2	4.3	4.4	5.1	5.2	5.3	5.4	6.1	6.2	6.3	6.4	
Measures	54-56	57-63	64-69	70-71	72-78	79-80	81-83	84-87	88-89	90-95	96-99	100-103	
Duration J	9	20	19	6	21	8	10	15	7	18	16	13	
Grouping	Solo	Duo	Duo	Duo	Solo	Duo	Duo	Duo	Solo	Duo	Duo	Duo	
Number of Ideas	1	2	1	2	1	2	1	2	1	2	1	2	
Ideas	Violin	B4a	A2c	B3a	Ac		C1b	B2a	D1b	A2a	Aa	C2c	B4b
	Piano		Da	B1b	Eb	C2a	Ea	Bb	Cb		D1c	C1a	Eb

Table 14 (cont.)

Route Subsection	7.1	7.2	7.3	7.4	8.1	8.2	8.3	8.4	9.1	9.2	9.3	9.4	
Measures	104-108	109-112	113-115	116-120	121-124	125-129	130-135	136-137	138-144	145-149	150-152	153-154	
Duration J	14	11	9	20	12	17	19	6	21	15	12	6	
Grouping	Solo	Duo	Duo	Duo	Solo	Duo	Duo	Duo	Solo	Duo	Duo	Duo	
Number of ideas	1	2	1	2	1	2	1	2	1	2	1	2	
Ideas	Violin		B2b	Aa	A2a	Ca	D1a	B4a	A2b		E1b	Cc	D1b
	Piano	Ba	Dc	Aa	B1a		C2a	Bc	C1b	A1a	B1c	C2c	Aa

Route Subsection	10.1	10.2	10.3	10.4	11.1	11.2	11.3	11.4	12.1	12.2	12.3	12.4	
Measures	155-160	161-165	166-169	170-172	173-177	178-180	181-183	184-188	189-191	192-196	197-202	203-206	
Duration J	18	16	11	9	15	11	12	16	10	14	17	13	
Grouping	Solo	Duo	Duo	Duo	Solo	Duo	Duo	Duo	Solo	Duo	Duo	Duo	
Number of ideas	1	2	1	2	1	2	1	2	1	2	1	2	
Ideas	Violin	B2a	D1c	B3b	C1a		Cb	D1a	Ea	A2a	Ca	Aa	B4a
	Piano		Ea	Ba	A1c	Ac	Ea	D1a	Bc		Bb	A1b	Db

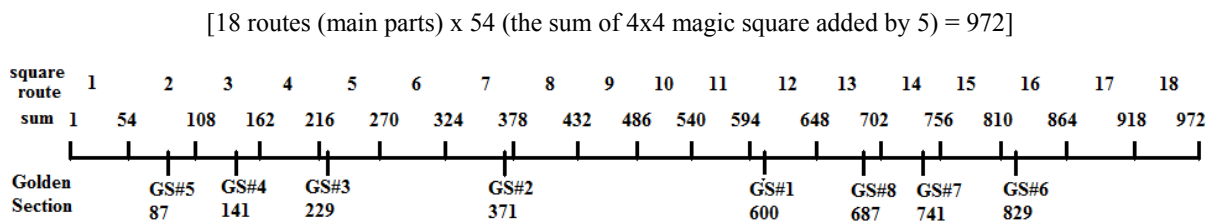
Route Subsection	13.1	13.2	13.3	13.4	14.1	14.2	14.3	14.4	15.1	15.2	15.3	15.4	
Measures	207-213	214-216	217-218	219-224	225-226	227-232	233-238	239-240	241-249	250-252	253-256	257-259	
Duration J	21	9	6	18	8	20	19	7	21	10	14	9	
Grouping	Solo	Duo	Duo	Duo	Solo	Duo	Duo	Duo	Solo	Duo	Duo	Duo	
Number of ideas	1	2	1	2	1	2	1	2	1	2	1	2	
Ideas	Violin		Ac	E1a	D1c	C2a	C1b	B4b	C2b		D1b	A2c	Eb
	Piano	B1b	Ca	Eb	A1a		D1b	B1a	Ab	C1a	B1c	A1b	Cc

Route Subsection	16.1	16.2	16.3	16.4	17.1	17.2	17.3	17.4	18.1	18.2	18.3	18.4	
Measures	260-261	262-266	267-270	271-276	277-278	279-282	283-286	287-292	293-295	296-300	301-306	307-308	
Duration J	8	15	11	20	7	16	12	17	9	20	19	6	
Grouping	Solo	Duo	Duo	Duo	Solo	Duo	Duo	Duo	Solo	Duo	Duo	Duo	
Number of ideas	1	2	1	2	1	2	1	2	1	2	1	2	
Ideas	Violin	B3a	B2c	D1a	E1b		D1a	C1a	Ea	Ab	B4a	B2a	B3a
	Piano		Ea	Da	A1c	Ca	Ba	Cb	Da		C1a	B1a	Aa

As shown in Table 14, each route begins with a solo and one idea. The first cell of each route has a solo that alternates between the violin and the piano. In the violin solos, the order of ideas demonstrates a symmetrical relationship when looking at the groupings of the ideas A, B, and C. Examining only the ideas used for the solo violin cells, the following scheme develops: [(ideas B and A omitted): C1a]-[B4a: A2a: Ca]-[B2a: A2a: C2a]-[B3a: Ab: (idea C omitted)]. The first and fourth groupings have an inverse relationship whereas the inner two groupings (2 and 3) have the same order of ideas.

Browning has again drawn upon compositional procedures of the past as a resource for his creative process including golden section proportions (0.618) in *Double Shot*. The sum of each route is 54 when the numbers of the 4x4 Dürer magic square are added by 5. Browning recalculated the numbers in each route so that the structure could accommodate a piano solo the golden sections.

Figure 10. *Double Shot*, The position of the applied Golden Section within the eighteen routes through the 4x4 Magic Square

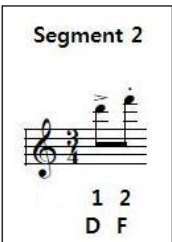
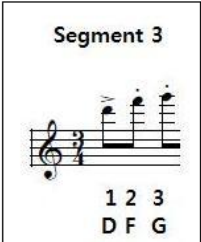
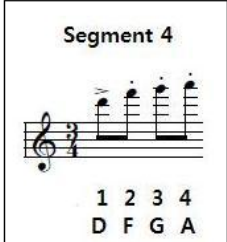
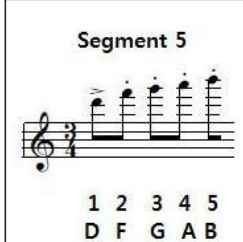


Golden Section	Sum (x0.618)	Section number	Instrumentations	ideas	Dynamic
1	600	11.1	piano solo	A	<i>f</i>
2	371	7.1	piano solo	B	<i>ff</i>
3	229	5.1	piano solo	C	<i>mp</i>
4	141	3.3	duo	A	<i>f</i>
5	87	2.3	duo	E	<i>ff</i>
6	829	15.1	piano solo	C	<i>mp</i>
7	741	13.3	duo	E	<i>pp</i>
8	687	12.3	duo	A	<i>f</i>

3.4 Idea A

Idea A consists of four rhythmic and melodic segments in eighth notes labeled as 2, 3, 4 and 5 in Example 50. Each segment is broken up into individual eighth notes numbered as 1, 2, 3, 4 and 5, and are assigned the pitches D, F, G, A and B respectively. Each segment always begins on eighth notes, labeled as 1-2, on interval D-F with the pitch D being accented, and then continues in order of the eighth notes, labeled as 1-5, according to which segment is being presented. The number of the segment equals its duration in eighth notes: segment 2 is two eighth-notes, segment 3 is three eighth-notes, segment 4 is four eighth-notes and segment 5 is five eighth-notes (see Example 50). The internal order of the segments as they appear in *Double Shot* is consistently permuted within a larger grouping of the four segments of idea A. This can be seen in the opening passage of *Double Shot* where the piano plays idea A with the segments [2-3-4-5] [4-3-2-5] [2-4-5-3] (see Example 51).

Example 50. *Double Shot*, Idea A; four segments based on 2♪-3♪-4♪-5♪

Segment 2	Segment 3	Segment 4	Segment 5
			
1 2 D F	1 2 3 D F G	1 2 3 4 D F G A	1 2 3 4 5 D F G A B

Idea A has three versions marked by the small letters, Aa, Ab and Ac and appears in the violin and piano. Idea Aa is the complete version while ideas Ab and Ac are filtered versions of the original idea Aa. Idea Aa appears in the violin in sections 6.2, and 12.3, and in the piano in sections 1.1, 9.4, and 18.4. Idea Aa is played by both the violin and piano only in section 7.3 where they perform the same segments in octaves. The progression of the melodic line of idea A

is simple and clear but the effect is a rhythmical, vivid, syncopated line that creates energy in the piece. A piano solo opens *Double Shot* with idea Aa (Example 51).

Example 51. *Double Shot*, piano, section 1.1 (mm. 1-7); idea Aa

Example 52. *Double Shot*, violin, section 6.2 (mm. 90-95); idea Aa

Idea Aa has two filtered versions marked by the small letters, Ab and Ac. Idea Ab only plays the odd number segments and silences the even number segments. Contrary to this, idea Ac only plays the even number segments and silences the odd number segments. This filtering process is indicated by parenthesis on the silenced segments in Example 53. The same filtering process appears in idea A1 which is a variation of idea Aa that only appears in the piano. Idea Ab only appears in the violin in section 18.1 and idea Ac appears in the violin in sections 4.4 and 13.2. Idea Ac only appears in the piano at section 11.1.

Example 53. *Double Shot*, violin, sections 18.1 (mm. 293-295) and 13.2 (mm. 214-216); ideas Ab and Ac (filtered versions of idea Aa)

The three versions of idea A (ideas Aa, Ab and Ac) can be also divided into two parts, ideas A1a, A1b and A1c and ideas A2a, A2b and A2c. Idea A1a in the piano only is based on idea Aa but, instead of being presented in unison between the two hands in the piano, it is presented as a hocket between the right and left hands of the piano. The pitch D is played by the left hand, the pitches F and G by the right hand, the pitch A by the left hand, and the pitch B by right hand. (see Example 54) The segments have the same cells as those of idea Aa, the pitches D-F-G-A-B, but the register of the cells is changed. When compared to idea Aa, the registers of idea A1a has the pitch D in the left hand an octave higher, the pitch F in the right hand is two octaves lower, and other pitches (G-A-B) in the right hand are an octave lower. This is marked in Example 54 by circles. Idea Aa1 appears in the piano in sections 1.4, 9.1, and 13.4.

Example 54. *Double Shot*, piano, sections 1.1 (mm. 1-7) and 9.1 (mm. 138-144); ideas Aa (complete version) and A1a (variation version)

The filtered versions of idea A1a in the piano are ideas A1b and A1c. The filtering process is indicated in Example 55 by parenthesis on the segments being silenced. Idea A1b appears in the piano in section 12.3 and idea A1c appears twice in sections 10.4 and 16.4.

Example 55. *Double Shot*, piano, sections 12.3 (mm. 197-202) and 16.4 (mm. 271-276); ideas A1b and A1c (filtered versions of idea A1a)

Idea A2 only appears in the violin part and consists of a melodic pattern built around *glissandi* of minor sixths and descending octaves. The pattern has duration of 14 quarter notes. It appears in the violin in sections 6.1, 7.4 and 12.1. In Example 56, idea A2a in the violin begins on the ninth quarter-note of the fourteen quarter-notes pattern.

Example 56. *Double Shot*, violin, section 7.4 (mm. 116-120); idea A2a with 14 ♩ durations

The filtered versions of idea A2a in the violin varies the number of double stops presented in succession and by the silencing of some of the double stops. The filtered versions of idea A2a are labeled as A2b and A2c. Idea A2b only plays the pitches, Gb and F, and idea A2c plays all of the notes of A2a except for the pitches, Gb and F. This is marked in Example 57 by the parenthesis on the attacks which are silenced. Idea A2b appears in the violin in sections 3.3 and 8.4 and idea A2c appears in sections 4.2 and 15.3.

Example 57. *Double Shot*, violin, sections 3.3 (mm. 44-47) and 4.2 (mm. 57-63); ideas A2b and A2c (filtered versions of idea A2a)

Idea A2b filtered pattern: 1 2 3 4 (5) 6 7 (8) (9) 10 11 12

Idea A2c filtered pattern: 11 12 13 14 (1) (2)(3) (4) 5 (6) 7 8 9 (10) 11 12 13 14 (1) (2)

Table 15. *Double Shot*, Appearances of idea A in the main part

Section Number	Measures	Ideas A/ Instrumentations		Duration ↓	Presentation of pattern (filtering process indicated by parenthesis on the numbers)
		Violin	Piano		
1.1	1-8		Aa	21	[2-3-4-5][4-3-2-5][2-4-5-3] / ♩segments
1.4	12-17		A1a	18	[2-5-3-4][3-2-5-4][5-3] / ♩segments
2.2	22-26	Ab		15	[5-(2)-3-(4)][(2)-5-(4)-3][(2)] / ♩segments
3.3	44-47	A2b		12	[1-2-3-4-(5)-6-7-(8)-(9)-10-11-(12)] / 14 ↓ pattern
			Ab		[(4)-3-5-(2)][5-3-(2)] / ♩segments
4.2	57-63	A2c		20	[11-12-13-14][(1)-(2)-(3)-(4)-5-(6)-7-8-9-(10)-11-12-13-14][(1)-(2)] / 14 ↓ pattern
4.4	70-71	Ac		6	[4-(3)-2-(3)] / ♩segments
6.1	88-89	A2a		7	[3-4-5-6-7-8-9] / 14 ↓ pattern
6.2	90-95	Aa		18	[5-3-2-4][3-4-2-5][3-5] / ♩segments
7.3	113-115	Aa	Aa	9	[2-5-4-3][4] / ♩segments
7.4	116-120	A2a		20	[9-10-11-12-13-14][1-2-3-4-5-6-7-8-9-10-11-12-13-14] / 14 ↓ pattern
8.4	136-137	A2b		6	[1-2-3-4-(5)-6] / 14 ↓ pattern
9.1	138-144		A1a	21	[3-2-5-4][2-5-3-4][5-4-2-3] / ♩segments
9.4	153-154		Aa	6	[2-3-4-3] / ♩segments
10.4	170-172		A1c	9	[(5)-2-4-(3)][4] / ♩segments
11.1	173-177		Ac	15	[2-(3)-(5)-4][(3)-2-4-(5)][2] / ♩segments
12.1	189-191	A2a		10	[7-8-9-10-11-12-13-14][1-2] / 14 ↓ pattern
12.3	197-202	Aa		17	[3-4-5-2][4-5-3-2][4-2] / ♩segments
			A1b		[3-(4)-5-(2)][(4)-5-3-(2)][(4)-(2)] / ♩segments
13.2	214-216	Ac		9	[(3)-4-2-(5)][4] / ♩segments
13.4	219-224		A1a	18	[5-3-2-4][3-2-4-5][3-5] / ♩segments
14.4	239-240		Ab	7	[(2)-3-(4)-5] / ♩segments
15.3	253-256	A2c		14	[(3)-(4)-5-(6)-7-8-9-(10)-11-12-13-14][(1)-(2)] / 14 ↓ pattern
			A1b		[3-(2)-(4)-5][3-(4)-5-(2)] / ♩segments
16.4	271-276		A1c	20	[4-(3)-2-(5)][2-4-(3)-(5)][4-(3)-2-(3)] / ♩segments
18.1	293-295	Ab		9	[(4)-5-(2)-3][(4)] / ♩segments
18.4	307-208		Aa	6	[3-4-5] / ♩segments

As shown in Table 15, idea A appear 13 times in the both the violin and piano, while ideas A1 in the piano and A2 in the violin appear a combined 13 times (idea A1 appear 6 times and idea A2 appears 7 times). Within the presentation of idea A, idea Aa appears 7 times and idea Ab and Ac each appear 3 times. The filtered versions of idea A [b:c] appear differently in the instruments: [1:2] times in the violin and [2:1] times in the piano. Ideas A1 and A2 equally appear 7 times through the piece and ideas A1 [a:b:c] and A2 [a:b:c] also equally appear [3:2:2] times. In the beginning and ending of the main part of *Double Shot*, the piano plays idea Aa and the violin plays idea Ab. There are three different orders for the presentation of the three versions of idea A in the violin: [b-c-a]-[a-b: omit c]-[a-c-b; presentation of retrograde]. The order for the three versions of idea A in the piano is: [a-b-c]-[a-b-a]-[c-a-b]-[c-b-c]. The first group of three versions of idea A in the piano [a-b-c] is altered in the second group by inserting a for c [a-b-a]. In the third group of three [c-a-b], the first group is altered and retrograded. In the final group of three, c replaces a [c-b-c] which is similar to the second group's alteration.

3.5 Idea B

Idea B is divided into five presentations labeled as B and B1 in the piano and B2, B3 and B4 in the violin. Idea B consists of four rhythmic cells, [w, x, y and z], that are articulated by accents on the music for left hand in the piano. The four rhythmic cells of idea B are unequal in length. Cell w has three eighth-notes, cell x has [three+two] eighth-notes, cell y has [three+two+two] eighth-notes and cell z has [three+two+two+two] eighth notes. Each cell always begins with [three] eighth-notes. These cells are ordered differently for every presentation of idea B. Example 58 in section 17.2 shows the ordering of the cells of idea Ba in the piano with the scheme of [y-x-w-z-x-w].

Example 58. *Double Shot*, section 17.2 (mm. 279- 282); rhythmic cells in idea Ba

Harmonically ideas B or B1 in the piano follow a three-part scheme (each part contains six harmonic cells) which is based on permutations consisting of two tetrachords out of three possible tetrachords. The (0157) tetrachords in Example 59 are built on C, E flat and F and are represented by the numbers 1, 2 and 3. In Table 16, the six harmonic cells that contain two (0157) tetrachords for each part of idea B or B1 are marked by small letters: a [labeled as 1-2, the interval C-Eb], b [labeled as 1-3, the interval C-F], c [labeled as 2-3, the interval Eb-F], d [labeled as 2-1, the interval Eb-C], e [labeled as 3-1, the interval F-C] and f [labeled as 3-2, the interval F-Eb]. Part I is [a-f-e-d-c-b], part II is [a-b-c-d-e-f] and part III is [a-e-d-f-b-c]. The three parts repeat within the presentations of ideas B and B1 throughout *Double Shot*. Each part starts over at nearest 1 or C and has twelve attacks. Example 60 shows the piano playing part II of idea B at section 8.3.

Example 59. *Double Shot*, (0157) tetrachords of ideas B and B1

tetrachord
3
on F

Table 16. *Double Shot*, Six harmonic cells of ideas B and B1

Cells	a	b	c	d	e	f
Numbering	1 – 2	1 – 3	2 – 3	2 – 1	3 – 1	3 – 2
Pitches	C – Eb	C – F	Eb – F	Eb – C	F – C	F – Eb

Example 60. *Double Shot*, piano, section 8.3 (mm. 130-134); Part II of idea B (six harmonic cells)

six cells of part II

C Eb 1 2 a
C F 1 3 b
Eb F 2 3 c
Eb C 2 1 d
F C 3 1 e
F Eb 3 2 f

Idea B appears in the piano part only and has three versions labeled as Ba, Bb and Bc.

Idea Ba is the complete version (Example 61) and ideas Bb and Bc are filtered versions of idea Ba. Idea Bb presents all of idea Ba except that the bass note on the pitch F is omitted. (Example 62) In idea Bc, the bass notes on the pitches, C and E flat, are omitted. (Example 62) Idea Ba appears in sections 2.2, 7.1, 10.3, and 17.2. Idea Bb appears in sections 5.3 and 12.2 and idea Bc appears in sections 8.3 and 11.4.

Example 61. *Double Shot*, piano, section 2.2 (mm. 22-26); idea Ba (complete version)

Idea Ba
complete version *ff*

Example 62. *Double Shot*, piano, sections 5.3 (mm. 81-83) and 11.4 (mm. 184 -188); ideas Bb and Bc (filtered versions of idea Ba)

Idea Bb
filtered version
of idea Ba
: no F bass
ff

Idea Bc filtered version
p

Similar to idea B, idea B1 appears in the piano only and has three versions labeled as B1a, B1b and B1c. Idea B1a is the complete version and ideas B1b and B1c are filtered versions of idea B1a. Idea B1b only presents the tetrachords on the pitches, C and F, replacing the tetrachord on E flat with rests. Idea B1c plays only the tetrachord on the pitch F and replaces the tetrachords on the pitches, C and Eb, with rests. Idea B1a appears in sections 1.2, 7.4, 14.3 and 18.3, idea B1b appears in sections 4.3 and 13.2 and idea B1c appears once in section 9.2.

Example 63. *Double Shot*, piano, section 1.2 (mm. 8-9); idea B1a (complete version)

Idea B1a
complete version
C Eb F

Example 64. *Double Shot*, piano, sections 4.3 (mm. 64-68) and 9.2 (mm. 145-149); ideas B1b and B1c (filtered versions of idea B1a)

Idea B1b
filtered version
of idea B1a
ff

Idea B1c
filtered version
of idea B1a
p

Harmonically idea B2 in the violin assigns pitches to the letters like the chord orderings of ideas B and B1 in the piano. The six pitch cells in part I of idea B2 in the violin are marked by small letters: a [C-Bb], f [Ab-G], e [F-C], d [Bb-c], c [Bb-Ab] and b [G-F]. Idea B2 in the violin also has three parts like idea B in the piano: part I [a-f-e-d-c-b], part II [a-b-c-d-e-f] and part III [a-e-d-f-b-c]. (see below Table 17)

Table 17. *Double Shot*, Pitch series for cells of ideas B, B1 and B2 in three parts

Part	I					
Cell	a	f	e	d	c	b
Ideas B or B1	C - Eb	F - Eb	F - C	Eb - C	Eb - F	E - F
Idea B2	C - Bb	Ab - G	F - C	Bb - C	Bb - Ab	G - F

Part	II					
Cell	a	b	c	d	e	f
Ideas B or B1	C - Eb	C - F	Eb - F	Eb - C	F - C	F - Eb
Idea B2	C - Bb	C - Ab	G - F	Eb - C	Ab - G	F - Eb

Part	III					
Cell	a	e	d	f	b	c
Ideas B or B1	C - Eb	F - C	Eb - C	F - Eb	C - F	Eb - F
Idea B2	C - Bb	Ab - G	Eb - C	Ab - G	C - Ab	G - F

Idea B3 in the violin follows the pitch scheme of idea B2, and is marked by accents. Occasionally idea B3 only presents the first two notes. Idea B3a in the violin appears in sections 4.3, 8.3, 16.1 and 18.4. Idea B3b, the filtered version of idea B3a, appears in sections 2.4 and 10.3. Idea B4 in the violin also follows the pitch scheme of idea B2 and is marked by groups of slurs. In idea B4, the violin begins a descending figure on the pitch C over tighten eighth-notes pattern [1-18]. Idea B4a in the violin appears in sections 4.1, 8.3, 12.4 and 18.2 and idea B4b, a filtered version of idea B4a, appears in sections 6.4 and 14.3. Ideas B3 and B4 are shown in Examples 65 and 66.

Example 65. *Double Shot*, violin, sections 16.1 (mm. 260-261) and 2.4 (mm. 32-35); ideas B3a (complete version) and B3b (filtered version)

Idea B3a

C B \flat A \flat G E \flat C
part III a

Idea B3b filtered version of idea B3a

C (G) (C) A \flat (G) F C (B \flat) (A \flat) f
part III part I

Example 66. *Double Shot*, violin, sections 18.2 (mm. 296-300) and 6.4 (mm. 100-103); ideas B4a (complete version) and B4b (filtered version)

Idea B4a complete pattern

1 2 3 4 5 6 7 8 9 10 11 12 13 1 2 3 4 5 6 7 8 9 10 11 1 2 3 4 5 6 7 8

Idea B4b filtered pattern

pp

Browning determined the number of eighth notes and the order of the cells for each presentation of idea B from the durations derived from the magic square.³⁰ The pitch series described above is then superimposed on the ordered rhythmic cells. This process is shown in Example 67. *Double Shot* starts with the piano going through the series in section 1.2 (mm. 8-9) playing part I of idea B1a [a-f-e-]. The series is resumed where it stopped in the piano by the violin in section 1.4 (mm. 12-17) who plays continuously part I of idea B1a. However, the series always resumes at the nearest pitch C or 1. In this case, it is the second part of cell e at measure 9. The violin plays the pitch C from cell e and then plays part I of idea B2b [-d-c-b] in measures 12-14. At measure 15, the violin begins part II of idea B2b [a-b-c-d-]. It is idea B2b which is a

³⁰ Personal email correspondence with composer on August 20, 2010.

filtered version of idea B2a so the violin has rests where the pitches, A flat and F would be played. The piano plays part II of idea Ba [e-f] at measure 22 and keeps going to part III [a-e-d-f] at measure 24. The violin plays the final cells of part III of idea B3b [-f-b-c] at measure 32 and completes the three-part series of idea B at measure 34.

Example 67. *Double Shot*, violin and piano, sections 1.2 (mm. 8-9), 1.4 (mm. 12-17), 2.2 (mm. 22-26) and 2.4 (mm. 32-35); complete three-part series for idea B

idea B1a

piano *ff*

Part I C a Eb F Eb F e C
 rhythmic cell 3 2 3 3 2 3
 x w x w

Idea B2b

violin *ff*

Part II C Bb C Bb (Ab) G (F) C Bb C (Ab) G (F) Eb C
 rhythmic cell 3 2 2 3 2 3 3 2 2 3 2 2 2
 y x w y x z

Idea Ba

piano *ff*

part III C F C F Eb C Eb C F f
 rhythmic cell 3 2 3 2 2 3 3 2 2 3 2 3
 x y w y x w

idea B3b

violin *ff*

part I C f (G) (C) Ab (G) F C (Bb) (Ab) f
 rhythmic cell 3 3 3 3 2 3 3 3 3
 w x w w w

Table 18. *Double Shot*, Appearances of idea B with its three-part series in the main part

Section Number	Measures	Ideas/Instrumentations		Duration	Presentation of three part series
		Violin	Piano		
1.2	8-9		B1a	8	I [a-f-e-]
1.4	12-17	B2b		18	I [-d-c-b]-II [a-b-c-d-]
2.2	22-26		Ba	15	II [-e-f]-III [a-e-d-f-]
2.4	32-35	B3b		13	III [-f-b-c]-I [a-f-]
4.1	54-56	B4a		9	I [-e-d-c-b]
4.3	64-69	B3a	B1b	19	II [a-b-c-d-e-f]-III [a-e-]
5.3	81-83	B2a	Bb	10	III [-d-f-b-c]
6.4	100-103	B4b		13	I [a-f-e-d-c-b]
7.1	104-108		Ba	14	II [a-b-c-d-e-f]
7.2	109-112	B2b		11	III [a-e-d-f-b-]
7.4	116-120		B1a	20	III [-b-c-a]-I [a-f-e-d-c-b]
8.3	130-135	B4a	Bc	19	II [a-b-c-d-e-f]-III [a-e-]
9.2	145-149		B1c	15	III [-e-d-f-b-c]-I [a-f-]
10.1	155-160	B2a		18	I [a-f-e-d-c-b]-II [a-b-]
10.3	166-169	B3b		11	II [a-b-c-d-e-]
			Ba		II [b-c-d-e-f-]
11.4	184-188		Bc	16	II [-f]-III [a-e-d-f-b-]
12.2	192-196		Bb	14	I [a-f-e-d-c-]
12.4	203-206	B4a		13	II [a-b-c-d-e-f]
13.1	207-213		B1b	21	III [a-e-d-f-b-c]-I [a-f-]
14.3	233-238	B4b		19	I [-e-d-c-b]- II [a-b-c-d-]
			B1a		
15.2	250-252		B1c	10	II [e-f]
16.1	260-261	B3a		8	III [a-e-d-]
16.2	262-266	B2c		15	III [f-b-c]-I [a-f-e-]
17.2	279-282		Ba	16	I [-d-c-b]-II [a-b-c-]
18.2	296-300	B4a		20	II [-d-e-f]-III [a-e-d-f-b-c]
18.3	301-306	B2a	B1a	19	I [a-f-e-d-c-b]-II [a-b-]
18.4	307-308	B3a		6	II [-b-c-d]

The three-part series of idea B is presented in consecutive order (but with interruptions) throughout its 26 presentations in *Double Shot*. As shown in Table 18, ideas B and B1 in the piano each appears eight times. Ideas B2, B3, and B4 in the violin appear six, five, and six times each. For both ideas B and B1 in the piano, the versions [a:b:c] appear [4:2:2] times. In the violin, ideas B2a and B3a each appear three times, and ideas B2b, B3b and B4b appears two times.

Contrary to the balanced presentations just described, in the violin idea B4a appears four times and idea B2c appears once in section 16.2.

3.6 Idea C

Idea C appears on the pitch D with different timbres and is a thirteen quarter-notes pattern. Idea C consists of four cells, w, x, y, and y' in the violin and x, x', y', and z in the piano. They are presented within changing timbres. In the violin, cell x is *arco* on the pitch D, cell y is on the interval F-D, cell y' is on the interval D-F, and cell w is played *sul ponticello* on the pitch D. In the piano, cell x is a single note on the pitch D, cell x' is an octave on the pitch D, cell y' is the interval D-F and cell z is the interval A-D. (see below Table 19 and Example 69)

Table 19. *Double Shot*, Cells of idea C

Cell	w	x	x'	y	y'	z
Violin	<i>sul ponti</i>	<i>arco</i>		F-D	D-F	
Piano		single note	octave		D-F	A-D

Example 68. *Double Shot*, violin and piano; idea C with 13 ♩ durations

Idea C complete version

violin

1 2 3 4 5 6 7 8 9 10 11 12 13
x y w x w y x y' w y x w y'

piano

1 2 3 4 5 6 7 8 9 10 11 12 13
x y w x w y x y' w y x w y'

Idea C has three versions indicated by lower case letters, Ca, Cb and Cc. In piano part, ideas Cb and Cc are filtered versions of idea Ca. Example 70 shows the filtering process which is marked by the parenthesis on the numbers of the quarter-notes within the thirteen quarter-notes pattern that are realized as rests rather than attacks. Idea Cb only plays cells y' (the interval D-F) and z whereas idea Cc only plays cell x. In the piano, idea Ca appears in sections 1.3, 13.2, and 17.1, idea Cb appears in sections 5.4 and 17.3, and idea Cc appears in section 15.4.

Example 69. *Double Shot*, piano, section 13.2 (mm. 214-216); idea Ca starting on beat 9 of the 13 J pattern

Idea Ca complete version

mp

z 9 y' 10 x' 11 x 12 z 13 y' 1 x 2 z 3 x 4

Example 70. *Double Shot*, piano, sections 5.4 (mm. 84-87) and 15.4 (mm. 257-259); ideas Cb and Cc (filtered versions of idea Ca)

Idea Cb filtered version of idea Ca

mp

z 13 y' 1 (x) (2) z 3 (x) (4) (x') (5) y' 6 z 7 (x) (8) z 9 y' 10 (x') (11) (x) (12) z 13 y' 1

Idea Cc filtered version of idea Ca

p

x' 5 (y') (6) (z) (7) x 8 (z) (9) (y') (10) x' 11 x 12 (z) (13)

In the violin, idea Ca plays all of the cells (w, x, y and y') within the thirteen quarter-notes pattern and appears in sections 1.3, 8.1 and 12.2 (Example 71). Filtered versions of idea Ca are ideas Cb and Cc. Like idea B in the piano, idea Cb only plays cell w (*sul ponticello*) and cell y' (the interval D-F) while idea Cc only plays cell w (*sul ponticello*). Idea Cb in the violin appears in sections 3.4 and 11.2 and idea Cc appears in section 9.3. (Example 72)

Example 71. *Double Shot*, violin, section 12.2 (mm. 192-196); idea Ca

Idea Ca

mp
 y' w y x w y' x y w x w y x y'
 8 9 10 11 12 13 1 2 3 4 5 6 7 8

Example 72. *Double Shot*, violin, sections 3.4 (mm. 48-53) and 9.3 (mm. 150-152); ideas Cb and Cc (filtered versions of idea Ca)

Idea Cb filtered version of idea Ca

mp
 y' w y (x) w y' (x) y w (x) w y (x) y' w y (x)
 8 9 10 (11) 12 13 (1) 2 3 (4) 5 6 (7) 8 9 10 (11)

Idea Cc filtered version of idea Ca

mf
 w (y') (x) (y) w (x) w (y) (x) (y') w (y)
 12 (13) (1) (2) 3 (4) 5 (6) (7) (8) 9 (10)

Idea C has two related ideas which are labeled, C1 and C2. Idea C1 has two versions marked by small letters, C1a and C1b. In the piano, idea C1a consists of two five white-note tone clusters. Idea C1a uses repeated duple and triple divisions marked by eighth rests at the end of each division. This is marked in Example 73 by the parenthesis on the numbers. Idea C1a appears in the piano four times (sections 3.2, 6.3, 15.1, and 18.2). Idea C1b (a filtered version of idea C1a), only plays the lower five-note cluster and substitutes rests for the quarter-notes which had the first white-note cluster. Idea Cb1 appears in the piano once at section 8.4.

Example 73. *Double Shot*, piano, sections 3.2 (mm. 41-43) and 8.4 (mm. 136-137); ideas C1a (complete version) and C1b (filtered version)

Idea C1a complete version

Idea C1b filtered version

Like idea C1 in the piano, idea C1 in the violin has almost the same rhythmic characteristics and patterns. Idea C1a in the violin consists of two double stops, a perfect 5th (the interval D-A) and a minor 6th (the interval A-F) and presents three elements with contrasting values: duple versus triple divisions marked by eight rests, *arco* on open strings versus *pizzicato* stopped strings, and *tenuto* versus *staccato* phrase markings. These are indicated in Example 74 by the parenthesis around the numbers. Idea C1b in the violin is a filtered version of idea C1a. It substitutes rests for all quarter-note *arco* attacks, the interval D-A. Idea C1a in the violin appears in sections 3.2, 6.3, 15.2 and 14.2 and idea C1b in the violin appears once in section 8.4.

Example 74. *Double Shot*, violin, sections 17.3 (mm. 283-286) and 14.2 (mm. 227-232); ideas C1a (complete version) and C1b (filtered version)

Idea C1a complete version

Idea C1b filtered version

Like idea C1, idea C2 in the piano uses repeated duple and triple divisions but it is articulated by eighth notes, not quarter notes. Idea C2 has three versions and is marked by lower case letters, C2a, C2b and C2c. In the music for left hand of idea C2a, two second inversion triads alternate between a minor triad on the pitch D (A-D-F) and a minor triad on the pitch E (B-E-G). This is presented against the right hand which has an unchanging open fifth on the pitch D (D-A-D). Filtered versions of idea C2a in the piano are labeled as C2b and C2c. In idea C2b for the piano, the right hand plays the open fifths and the left hand plays D minor triad. Idea C2c in the piano substitutes rests for all of the duple divisions and only plays the triple divisions with the open fifths in the right hand and the oscillating triads on the pitches D and E in the left hand. Idea C2a in the piano appears in sections 5.1, 8.2 and 2.3, and idea C2b appears in section 2.4. Idea C2c appears in section 9.3.

Example 75. *Double Shot*, piano, section 5.1 (mm. 72-78); idea C2a (complete version)

Example 76. *Double Shot*, piano, sections 2.4 (mm. 32-35) and 9.3 (mm. 150-152); ideas C2b and C2c (filtered versions of idea C2a)

Idea C2 in the violin has similar characteristics to idea C2 in the piano. In the violin, idea C2 has three versions marked by small letters, C2a, C2b and C2c. Idea C2a has duple and triple divisions marked by accents on the pitch D in the upper register played against the intervals C-F and D-G in the lower register. Filtered versions of idea C2a in the violin are ideas C2b and C2c. Idea C2b only plays the pitch D and the interval C-F with duple division while idea C2c substitutes rests for all duple divisions plays and the pitch D and the intervals C-F and G-D in triple divisions. Idea C2a appears in sections 1.2 and 14.1, idea C2b appears in section 14.4, and idea C2c appears in section 6.3.

Example 77. *Double Shot*, violin, section 1.2 (mm. 8-9); idea C2a

Idea C2a

complete version 1 2 1 2 3 1 2 1 2 1 2 3 1 2 1 2

Example 78. *Double Shot*, violin, sections 14.4 (mm. 239-240) and 6.3 (mm. 96-99); ideas C2b and C2c (filtered versions of idea C2a)

Idea C2b

filtered version 1 2 (1) (2) (3) 1 2 1 2 (1) (2) (3) 1 2

Idea C2c

filtered version 1 2 3 (1)(2) (1)(2) 1 2 3 (1)(2) 1 2 3 1 2 3 (1)(2) (1)(2) (1)(2) 1 2 3 (1)(2) 1 2 3

Ideas C and C1 has the durations of quarter note but idea C2 has the durations of eighth notes. Idea C has the thirteen quarter-note durations. Ideas C1 and C2 commonly has duple and triple divisions but are articulated differently by quarter notes and eighth notes.

Table 20. *Double Shot*, Appearances of idea C in the main part

Section Number	Measures	Ideas C/ Instrumentations		Duration ♩	Presentations of Pattern (D= duple division , T= triple division)
		Violin	Piano		
1.2	8-9	C2a		8	D-T-D-D-T-D-D / ♩
1.3	10-11	Ca	Ca	7	[1-2-3-4-5-6-7]
2.1	18-21	C1a		10	T-D-D-T / ♩
2.4	32-35		C2b	13	D-(T)-(T)-D-(T)-D-(T)-D-(T)-(T) / ♩
3.2	41-43		C1a	11	T-T-D-T / ♩
3.4	48-53	Cb		17	[8-9-10-(11)-12-13][(1)-2-3-(4)-5-6-(7)-8-9-10-(11)]
5.1	72-78		C2a	21	T-D-T-D-D-T-T-D-T-D-D-T-D-T-T-D-D / ♩
5.2	79-80	C1b		8	[(3)-(4)-5-(6)-7][(3)-(4)-5]
5.4	84-87		Cb	15	[13][1-(2)-3-(4)-(5)-6-7-(8)-9-10-(11)-(12)-13][1]
6.3	96-99	C2c		16	T-(D)-(D)-T-(D)-T-T-(D)-(D)-(D)-T-(D)-T / ♩
			C1a		D-D-T-D-T-D-D / ♩
8.1	121-124	Ca		12	[1-2-3-4-5-6-7-8-9-10-11-12]
8.4	136-137		C1b	6	T-T / ♩
9.3	150-152	Cc		12	[12-(13)][(1)-(2)-3-(4)-5-(6)-(7)-(8)-9-(10)]
			C2c		(D)-T-(D)-(D)-T-(D)-T-T-(D)-(D) / ♩
10.4	170-172	C1a		9	[6-7][1-2-3-4-5-6-7]
11.2	178-180	Cb		11	[10-(11)-12-13][(1)-2-3-(4)-5-6-(7)]
12.2	192-196	Ca		14	[8-9-10-11-12-13][1-2-3-4-5-6-7-8]
13.2	214-216		Ca	9	[9-10-11-12-13][1-2-3-4]
14.1	225-226	C2a		8	D-T-D-D-T-D-D / ♩
14.2	227-232	C1b		20	[(3)-(4)-5-(6)-7][(1)-2-(3)-(4)-5-(6)-7][(3)-(4)-5][(3)-(4)-5(6)-7]
14.4	239-240	C2b		7	D-(T)-D-D-(T)-D / ♩
15.1	241-249		C1a	21	D-D-T-D-T-T-D-D-D / ♩
15.4	257-259		Cc	9	[5-(6)-(7)-8-(9)-(10)-11-12-(13)]
17.1	277-278		Ca	7	[1-2-3-4-5-6-7]
17.3	283-286	C1a		12	[1-2-3-4-5-6-7][1-2-3-4-5]
			Cb		[(8)-9-10-(11)-(12)-13][1-(2)-3-(4)-(5)-6]
18.2	296-300		C1a	20	T-D-D-T-D-T-T-D / ♩

As shown in Table 20, idea C appears twelve times, idea C1 appears ten times and idea C2 appears eight times in *Double Shot*. All ideas equally appear in the violin and the piano. Thus, ideas Ca, Cb and Cc each appear six times in each instrument with each instrument having the following scheme for the different version of idea C: [a:b:c] = [three:two:one] times. Idea C2

also appears four times in each instrument and its distribution is [a:b:c] = [two:one:one] times.

Idea C1 appears five times in each instruments but its variants [a:b] appear [three:two] times in the violin and [four:one] times in the piano.

3.7 Idea D

Idea D in the piano consists of three unequal rhythmic and melodic segments, a, b, and c, that are presented in the quarter notes. Each of the individual segments is broken up into the individual quarter-note cells labeled as 1, 2, 3 and 4. Segment a has cells 1-2, segment b has cells 1-2-3, segment c has cells 1-2-3-4 (Example 79). Browning presents the segments of idea D by always beginning with cells 1-2 and then moving in succession through the cells. The order of the segments in idea D is constantly changed in *Double Shot*, and a filtering process is applied to create variations.

Example 79. *Double Shot*, piano, Idea D; three segments with cells based on ♩ durations

The image displays three musical segments labeled 'segment a', 'segment b', and 'segment c'. Each segment is written in a grand staff (treble and bass clefs) in 3/4 time with a mezzo-forte (mf) dynamic. Segment a consists of two cells, segment b of three cells, and segment c of four cells. The notation includes quarter notes, eighth notes, and chords, with some notes beamed together in groups of three. The segments are labeled 'segment a', 'segment b', and 'segment c' at the top of their respective staves. Below each staff, the individual cells are labeled 'cell 1', 'cell 2', 'cell 3', and 'cell 4' as appropriate.

In the piano, idea D has three versions marked by small letters, Da, Db and Dc. Idea Da in the piano contains all three segments and appears in sections 3.1, 4.2, 16.3 and 17.4 (Example 80). Ideas Db and Dc in the piano are the filtered versions of idea Da. Idea Db substitutes rests for segment a and plays segments b and c. Inversely, idea Dc in the piano only plays segment a and substitutes rests for segments b and c (Example 81). The chords for idea D are based on the

D Dorian mode. Idea Db appears twice in sections 3.4 and 12.4 and idea Dc appears once in section 7.2.

Example 80. *Double Shot*, piano, section 17.4 (mm. 287-292); idea Da

Example 81. *Double Shot*, piano, sections 12.4 (mm. 203-206) and 7.2 (mm. 109-112); ideas Db and Dc (filtered versions of idea Da)

Idea D1 appears in both instruments. Idea D1 is based on the Dorian mode and has 49 J^{\sim} attacks within the eighteen quarter-note pattern (Example 82).

Example 82. *Double Shot*, Idea D1; complete version with 18 J durations

Idea D1 follows the eighteen quarter-note pattern of idea D and has three versions marked by small letters, D1a, D1b and D1c. Idea D1a is a unison gesture in octaves and in unison triplet eighth-note rhythms. Idea D1a appears at section 11.3 and in the violin at sections 5.4, 8.2, 11.3, 16.3 and 17.2.

Example 83. *Double Shot*, violin and piano, section 11.3 (mm. 181-183); idea D1a (complete version)

The image shows a musical score for 'Idea D1a complete version' in 2/4 time. It consists of two systems: a violin part (top) and a piano part (bottom). Both parts feature a rhythmic pattern of eighth notes, with some notes beamed in triplets. The violin part starts with a dynamic marking of *ff*. The piano part also starts with *ff*. The score is numbered 1 through 12 for both parts. The violin part has a box labeled 'Idea D1a' above the first measure.

Idea D1b is a filtered version of idea D1a and substitutes rests for all attacks that have duration of two triplet eighth notes in idea D1a. This is marked in Example 84 by the circled notes in the idea D1a. Idea D1b appears in the violin at sections 9.4 and 15.2 and in the piano at section 14.2.

Example 84. *Double Shot*, piano, sections 5.4 (mm. 84-87) and 14.2 (mm. 227-232);
ideas D1a (complete version with 18 ♩ durations) and D1b (filtered version)

The image shows two systems of musical notation for piano. The top system is labeled 'Idea D1a complete version' and shows a single staff with 18 measures. The notes in measures 2, 7, and 13 are circled. The bottom system is labeled 'Idea D1b Filtered version of idea D1a' and shows two staves (treble and bass clef) with 14 measures. The first staff starts with a dynamic marking of *mp*. The notes in measures 13, 14, 15, 16, 17, and 18 of the first staff are circled, corresponding to the circled notes in the top system.

Idea D1c is a filtered version of idea D1a and substitutes rests for all attacks on beats 1, 4, 5, 6, 9, 10, 11, 15, 16, 17 and 18. In Example 85, this filtering process is marked by parenthesis on the quarter notes that are silenced and also shows the notes that are left out from the original pattern as circled notes. Idea D1c appears in the violin at sections 10.2 and 13.4 and in the piano at section 6.2.

Example 85. *Double Shot*, violin, sections 5.4 (mm. 84-87) and 13.4 (mm. 219-224); ideas D1a (complete version) and D1c (filtered version)

The image shows two musical staves. The top staff is labeled 'Idea D1a complete version' and contains measures 1 through 18. Measures 1-3, 4-6, 9-11, and 15-18 are grouped with brackets and numbered 1, 2, 3, and 4 respectively. The bottom staff is labeled 'Idea D1c filtered version' and contains measures 13 through 12. Measures 14, 15, 16, 17, and 18 are grouped with brackets and numbered (1), (2), (3), (4), and (5) respectively. Measures 2, 3, (4), (5), (6), 7, 8, (9), (10), (11), and 12 are also grouped with brackets and numbered 2, 3, (4), (5), (6), 7, 8, (9), (10), (11), and 12 respectively.

Table 21. *Double Shot*, Appearances of idea D in the main part

Section Number	Measures	Idea D /Instrumentations		Duration ↓	Presentation of Segments of D and Pattern of D1 (patterns in brackets and filtering process indicated by parenthesis on the numbers)
		Violin	Piano		
3.1	36-40		Da	14	2-3-4-3-2
3.4	48-53		Db	17	4-(2)-3-(2)-4-(2)
4.2	57-63		Da	20	3-2-4-2-4-3-2
5.4	84-87	D1a		15	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15]
6.2	90-95		D1c	18	[(16)-(17)-(18)][(1)-2-3-(4)-(5)-(6)-7-8-(9)-(10)-(11)-12-13-14-(15)]
7.2	109-112		Dc	11	(4)-2-(3)-2
8.2	125-129	D1a		17	[16-17-18][1-2-3-4-5-6-7-8-9-10-11-12-13-14]
9.4	153-154	D1b		6	[15-16-17-18][1-2]
10.2	161-165	D1c		16	[2-3-(4)-(5)-(6)-7-8-(9)-(10)-(11)-12-13-14-(15)-(16)-(17)]
11.3	181-183	D1a	D1a	12	[1-2-3-4-5-6-7-8-9-10-11-12]
12.4	203-206		Db	13	3-4-(2)-4
13.4	219-224	D1c		18	[13-14-(15)-(16)-(17)-(18)][(1)-2-3-(4)-(5)-(6)-7-8-(9)-(10)-(11)-12]
14.2	227-232		D1b	20	[13-14-15-16-17-18][1-2-3-4-5-6-7-8-9-10-11-12-13-14]
15.2	250-252	D1b		10	[15-16-17-18][1-2-3-4-5-6]
16.3	267-270	D1a		11	[7-8-9-10-11-12-13-14-15-16-17]
			Da		2-4-3-2
17.2	279-282	D1a		16	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16]
17.4	287-292		Da	17	4-2-3-2-4-2

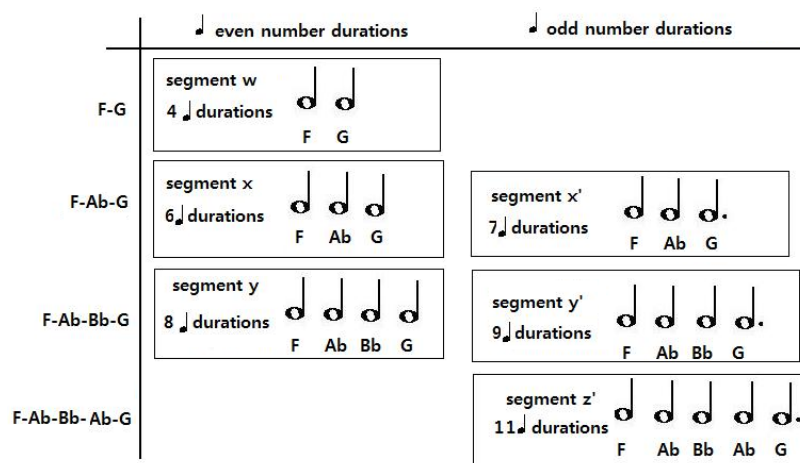
As shown in Table 21, idea D appear seven times in the piano with its three versions [a:b:c] appearing [four:two:one] times. Idea D1 appears nine times in the violin with its three versions [a:b:c] appearing [five:two:two] times. In the violin, idea D1 appears three times with

its three versions [a:b:c] appearing [one:one:one] times. Idea D1 appears symmetrically in the violin part. The appearance of idea D1 in the violin has the following symmetrical scheme: [a-a-b-c-a-c-b-a-a]. Complete version of ideas D1 (idea D1a) appears twice in the beginning and at the end, and once in the middle. Filtered versions of idea D1a (ideas D1b and D1c) appear two times between complete idea D1a and are ordered as [b-c] and then [c-b (retrograde version)].

3.8 Idea E

Example 86 shows idea E which consists of six rhythmic and melodic segments of unequal length: segment w (the four quarter notes), segment x (the six quarter notes), segment x' (the seven quarter notes), segment y (the eight quarter notes), segment y' (the nine quarter notes) and segment z' (the eleven quarter notes). The six segments of idea E are unequal in length but always begin on the pitch F and finishes on the pitch G. Each segment is broken up into individual cells that contain different numbers of pitches taken from the (0235) tetrachord (the pitches; F, A flat, B flat and G). These rhythmic and melodic segments are reordered or filtered to make variations for idea E.

Example 86. *Double Shot*, Six segments of idea E



Idea E has two versions marked by small letters, Ea and Eb. Idea Ea has all six segments that are constantly reordered and appears in the violin at sections 2.3, 11.4, and 17.4 and in the piano at sections 2.3, 5.2, 10.2, 11.2 and 16.2. Idea Eb is a filtered version of idea Ea. Idea Eb only plays the pitches F and G and substitutes rests for all of the pitches, A flat and B flat, entries within the six segments. Idea Eb appears in the violin at section 15.4 and in the piano at sections 4.4, 6.4 and 13.3.

Example 87. *Double Shot*, violin and piano, section 2.3 (mm. 27-31); idea Ea

Musical score for Example 87. The top staff is labeled 'violin' and the bottom staff is labeled 'piano'. A box labeled 'Idea Ea' is positioned above the violin staff. The violin part consists of two segments: 'segment y' (9 durations)' and 'segment x' (7 durations)'. The piano part also consists of two segments: 'segment y' (9 durations)' and 'segment x' (7 durations)'. The notes in the violin part are F, Ab, Bb, G, F, Ab, G. The piano part has a dynamic marking of *pp*.

Example 88. *Double Shot*, violin and piano, sections 15.4 (mm. 257-259) and 6.4 (mm. 100-103); ideas Eb and Ec (filtered versions of idea Ea)

Musical score for Example 88. The top staff is labeled 'Idea Eb filtered version' and the bottom staff is labeled 'Idea Ec filtered version of idea Ea'. The top staff has a segment 'segment y' (9 durations)' with notes F, (Ab), (Bb), G. The bottom staff has two segments: 'segment w (4 durations)' and 'segment y' (9 durations)'. The piano part has a dynamic marking of *p*.

In the violin, idea E1 has two versions marked by small letters, E1a and E1b. Idea E1a in the violin appears in sections 3.2 and 13.3 and a filtered version of idea E1a (idea E1b) appears in the violin in sections 9.2 and 16.4. The filtering process for idea E1b is marked in Example 90 by a parenthesis on the quarter notes which are silenced.

Example 89. *Double Shot*, violin, sections 3.2 (mm. 41-43) and 13.3 (mm. 217-218); idea E1a

Example 90. *Double Shot*, violin, sections 9.2 (mm. 145-149) and 16.4 (mm. 271-276); idea E1b

Table 22. *Double Shot*, Appearances of idea E in the main part

Section Number	Measures	Ideas E / Instrumentations		Duration ↓	rhythmic and melodic segments (patterns in brackets and filtering process indicated by parenthesis on the numbers)
		Violin	Piano		
2.3	27-31	Ea	Ea	16	9 [F-Ab-Bb-G]-7 [F-Ab-G] : y' - x'
3.2	41-43	E1a		11	11 [F-Ab-Bb-Ab-G] : z'
4.4	70-71		Eb	6	6 [F-(Ab)-G] : x
5.2	79-80		Ea	8	8 [F-Ab-Bb-G] : y
6.4	100-103		Eb	13	4 [F-G]- 9 [F-(Ab)-(Bb)-G] : w-y'
9.2	145-149	E1b		15	9 [F-(Ab)-(Bb)-G]-6 [F-(Ab)-G] : y' -x
10.2	161-165		Ea	16	7 [F-Ab-G] -9 [F-Ab-Bb-G] : x' -y'
11.2	178-180		Ea	11	11 [F-Ab-Bb-Ab-G] : z'
11.4	184-188	Ea		16	9 [F-Ab-Bb-G]-7 [F-Ab-G] : y' -x'
13.3	217-218	E1a		6	6 [F-Ab-G] : x
			Eb		6 [F-(Ab)-G] : x
15.4	257-259	Eb		9	9 [F-(Ab)-(Bb)-G] : y'
16.2	262-266		Ea	15	9 [F-Ab-Bb-G]-6[F-Ab-G] : y' -x
16.4	271-276	E1b		20	4 [F-G]-9[F-(Ab)-(Bb)-G]-7 [F-(Ab)-G] : w-y'x'
17.4	289-292	Ea		17	11 [F-Ab-Bb-Ab-G]-6 [F-Ab-G] : z' -x

As shown in Table 22, the violin and the piano alternate complete ideas and filtered ideas. The violin plays the versions of idea E in a symmetrical structure [E-E1: retrograde of E1-E]-[E1-E]-[E1-E]-[E1-E]; for idea E as [a-a-b-a] and for idea E1 as [a-b]-[a-b]. The piano plays the versions of idea E as [a-b-a]-[b-a]-[a-b-a] which is also symmetrical. Idea E appears eight times in each instrument. The violin plays idea Ea three times, Eb once, and E1a and E1b two times each; idea E [a:b]=[three:one] times and idea E1 [a:b]=[two:two] times. The piano plays idea Ea five times and idea Eb three times; idea E [a:b]=[five:three] times.

3.9 Superimposition of Ideas in *Double Shot*

Double Shot involves the vertical layering or superimposition of ideas. Browning layers *Double Shot* within two structures: one voice – solo with one idea in solo violin or solo piano; and two voices – both instruments (duo) playing one idea or two ideas. The solo or duo designation indicates the different ways of layering as it is applied to the magic square. The marking in the magic square structure of solo indicates a violin solo or piano solo. Duo-1 represents violin and piano playing one idea. Duo-2 is used for piano and violin playing two different ideas.

Within duo-1, Browning uses three types of superimposition for one idea; (1) superimposition of the complete idea, (2) the complete idea superimposed on a filtered version of the same idea, and (3) two filtered versions of the same idea are superimposed. An example of the superimposition of the two complete versions of the same idea can be seen in section 2.3 where both instruments play the complete version of idea Ea (Example 91).

Example 91. *Double Shot*, Duo-1, section 2.3 (mm. 27-31); superimposition of idea Ea

Example 92 in section 10.3 demonstrates the superimposition of the same idea using a filtered version (idea B3b) with the complete version (idea Ba).

Example 92. *Double Shot*, Duo-1, section 10.3 (mm. 166-169); superimposition of the filtered idea B3b and the complete idea Ba

The third type of superimposition involves the layering of two filtered versions of the same idea as in section 15.3 where two filtered versions of idea Aa (ideas A2c and A1b) are superimposed.

Example 93. *Double Shot*, Duo-1, section 15.3 (mm. 253-256); superimposition of two filtered versions of idea A, ideas A2c and A1b

Browning uses the same three types of superimposition for the layering of two different ideas (designated as duo-2 in the magic square structure). Two complete versions of two different ideas (ideas A and B) appear simultaneously in section 7.4 (Example 94).

Example 94. *Double Shot*, Duo-2, section 7.4 (mm. 116-120);
superimposition of two complete versions, ideas A2a and B1a

The musical score for Example 94 consists of two systems of staves. The first system, starting at measure 113, features two staves. The upper staff is labeled 'Idea A2a' and contains a melodic line with a forte (*ff*) dynamic. The lower staff is labeled 'Idea B1a' and contains a bass line with a forte (*ff*) dynamic. The second system, starting at measure 118, continues the superimposition of these two ideas. The notation includes various rhythmic values and accidentals, with the forte dynamic maintained throughout.

Example 95 shows section 11.2 where one complete version of idea Ea is superimposed on the different idea that is filtered version (idea Cb).

Example 95. *Double Shot*, Duo-2, section 11.2 (mm. 178-180);
superimposition of the filtered idea Cb and the complete idea Ea

The musical score for Example 95 consists of two systems of staves. The first system, starting at measure 178, features two staves. The upper staff is labeled 'Idea Cb' and contains a melodic line with a piano (*p*) dynamic. Above this staff are performance instructions: 'arco', 'sul pont.', 'ord.', 'sul pont.', and 'ord.'. The lower staff is labeled 'Idea Ea' and contains a bass line with a pianissimo (*pp*) dynamic. The second system continues the superimposition of these two ideas. The notation includes various rhythmic values and accidentals, with the piano and pianissimo dynamics maintained throughout.

Example 96 in section 3.4 presents the superimposition of two different filtered ideas (idea Cb and idea Db).

Example 96. *Double Shot*, Duo-2, section 3.4 (mm. 48-53);
superimposition of two filtered ideas Cb and Db

Idea Cb filtered version of idea Ca

Idea Db filtered version of idea Da

Browning juxtaposes and superimposes the five ideas of *Double Shot* within the 72 subsections dictated by the magic square structure. Nevertheless the individual and unique values for the musical parameters assigned to the musical ideas such as pitch, rhythm, dynamics and register retain their identity and character to create rich and diverse textures.

CHAPTER FOUR

SOLE INJECTION

4.1 Background

Zack Browning composed *Sole Injection* for violin and computer-generated sounds in the summer of 1996. The composition was commissioned by Carbondale Community Arts for performance at Arts in Celebration '96. The premiere performance took place at the 1996 Carbondale Community Arts Festival in Carbondale (Illinois) with Sally Wilson playing the violin. The recording of *Sole Injection* is on Browning's compact disc "Banjaxed" which was released on Capstone Records (CPS 8711) in 2001 and recorded by violinist Brona Cahill. Total playing time for *Sole Injection* is approximately 10 minutes and the score has 330 measures. GACSS³¹ developed by Benjamin Grosser³² was used to realize the electro-acoustic sounds. For the live performance of *Sole Injection*, many types of equipment are needed: one personal monitor (to hear the computer part), two speakers, compact disc playback, sound reinforcement of the violin (microphone or pick up), mixer and amplifier. The score to *Sole Injection* is conventionally notated with the computer part notated on the grand staff under the violin part. This is similar to the score for violin and piano, but the computer part sometimes needs multiple staves to show the layered sounds.

Sole Injection has been performed internationally with great success including at the Studio 2021 Concert of Seoul National University (Seoul, South Korea) by Benjamin Sung on

³¹ Genetic Algorithms in Composition and Sound Synthesis: Equipment and software used to realize the electro acoustic sounds.

³² Personal e-mail correspondence with composer, January 2010.

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June 15, 2010; at Nanjing Arts Institute (Nanjing, China) by Jie Tao on June 12, 2010; at the Depford Chamber Council Town Hall (New Cross, England) by Haruko Motohashi on June 21, 2007; and at the 1999 Skinneskatteberg Electronic Music Festival (Skinneskatteberg, Sweden) by Darragh Morgan on June 5, 1999. By the violinist Karen Bentley Pollick performances of *Sole Injection* in the United States include at the Birmingham Museum of Art (Birmingham, Alabama) on March 11, 2010 and at The Chapel at Good Sheppard Center (Seattle, Washington) on March 19, 2010. After the concert at the Birmingham Museum of Art, critic Michael Huebner wrote the following review in The Birmingham News on March 12, 2010.³³

Zack Browning used highly-charged sound masses in broad swashes to bring *Sole Injection* to an intense conclusion.

Additional reviews of Browning's music include critic Payton MacDonald's article in the November/December 2002 issue of American Record Guide on the compact disc "Banjaxed" which contains Brona Cahill's performance of *Sole Injection*.³⁴

Several of the cuts on "Banjaxed" use the magic square as a structural device. The magic square is a grid of numbers that all add up to the same sum, whether one adds the rows, the columns, or the diagonal lines. You can't hear this, of course, but I suppose it helped Browning organize his musical thoughts. All of the tracks are electro-acoustic. The acoustic instruments include trumpet, violin, alto saxophone, flute, and mixed ensemble. Browning combines pop and classical ideas. I complained in the last issue that this rarely works, but Browning seems to have pulled it off. Each piece has the thematic consistency of a pop tune. They are all instantly identifiable, with the same production polish and narrow dynamic range as most pop records. Browning blends all of this with the creative and structural sophistication of classical music.

³³ Huebner, Michael. *Virtuosity of the avant garde* (review of concert Alternating Currents by Karen Bentley Pollick) in The Birmingham News, by Michael Huebner, March 12, 2010.

³⁴ Mac Donald, Payton. The Newest Music (Review of compact disc "Banjaxed") in American Record Guide, November/December 2002.

In 2002, a review of the compact disc “Banjaxed” was published in *New Music Box*.³⁵

Browning's hyperactive, mathematical compositions unite live performance with edgy electronics (primarily tape parts), incorporating truncated, punchy rhythms that do not allow rest. Abrupt changes in sonority often break down into dialogues between the live musicians and the tape parts and often dissolve into a very ordered cacophony. Occasionally, Browning teases us with a traditional melody line but no sooner do you get used to it and he's off and running with a new idea.

Critic Michael Dervan's review of the Crash Ensemble's performances of Browning's *Impact Addiction* and *Sole Injection* appeared in *The Irish Times* on March 17, 1998.³⁶

The festival featured three visiting composers, 45 year-old Zack Browning was represented by *Impact Addiction* and *Sole Injection*, two works for live performers and tape, both highly energized pieces which represent the musicians, guided by click tracks, almost as pseudo-electronic puppets, and bringing together the procedures of high musical art with the taste of popular culture. These were the most impressive performances in the Crash Ensemble's full evening concert.

Browning's program notes briefly explain the compositional process for *Sole Injection*.

Program notes for *Sole Injection* are by the composer.³⁷

This composition is the fifth in a series of works by the composer, which uses the magic square of the sun as compositional model. Of the enormous number of magic squares it is possible to form, seven have been associated with the seven planets of the Ptolemaic Universe (Saturn, Jupiter, Mars, the Sun, Venus, Mercury, and the Moon). These “Ptolemaic Magic Squares” appear in *De Occulta Philosophia*, a book on magic by the Renaissance polymath Heinrich Cornelius Agrippa Von Nettesheim published in 1531. A magic square consists of a series of numbers arranged so that the sum of each row, column and diagonal is the same amount. Eleven different routes through the square (the middle nine each having a duration of 55 seconds) are mapped onto

³⁵ Review of *American Music Center* in *New Music Box* (“Banjaxed” compact disc, Capstone Records), 2002.

³⁶ Dervan, Michael. Review of the Crash Ensemble's performances of Browning's *Impact Addiction* and *Sole Injection* at the Second Annual University College Cork Festival of Contemporary Music, *The Irish Times*, March 17, 1998.

³⁷ Browning, Zack. Program Notes for *Sole Injection*, 1996.

a musical structure based in the musical score by a particular style, rhythm, density, timbre and orchestration. In the discussion that follows of the individual sections of *Sole Injection*, the relationship between the music and the magic square as suggested by the program notes is examined.

4.2 Magic Square Structure of *Sole Injection*

Sole Injection for violin and computer generated sounds belongs to a series of works that explore the application of magic squares to musical form. The 6x6 Magic Square of the Sun provides the framework for *Sole Injection*. As Browning mentioned in his program notes, eleven routes through the 6x6 magic square present the overall structure in which each number within the square is paralleled in the musical score by a particular style, rhythm, density, timbre and orchestration. This square consists of six rows and six columns and contains thirty-six numbers between 1 and 36. (Figure 11) It has many symmetrical properties. The sum total of each row, column and diagonal is 111 and known as the magic number.

Figure 11. 6x6 Magic Square of the Sun

6	32	3	34	35	1
7	11	27	28	8	30
19	14	16	15	23	24
18	20	22	21	17	13
25	29	10	9	26	12
36	5	33	4	2	31

The structure of *Sole Injection* is projected through the numeric sequence of the magic square, presented through eleven different routes through the square. *Sole Injection* is divided into three sections. The introduction consists of one route with six subsections (mm. 1-31). The

main part (mm. 32-296) presents nine routes through the square. The coda (mm. 297-330) uses one route like the introduction but has nine subsections.

The selection of the routes for the main section of *Sole Injection* reflects the following scheme. The even number routes (second, fourth, sixth, eighth and tenth) presented in *Sole Injection* are derived from the vertical column read top to bottom in the Magic Square of the Sun. The odd number routes (third, fifth, seventh and ninth) used in *Sole Injection* are derived from the horizontal rows of the magic square read left to right. (Figure 12)

Figure 12. *Sole Injection*, Routes through the Magic Square of the Sun for the Main section

Route		10	8	6	4	2
		↓	↓	↓	↓	↓
		6	32	3	34	35
3	→	7	11	27	28	8
5	→	19	14	16	15	23
7	→	18	20	22	21	17
9	→	25	29	10	9	26
		36	5	33	4	2
						31

In the main section of *Sole Injection*, nine routes through the square are divided into groups of six subsections which correspond to the six cells within each route of the square. The resulting fifty four subsections of the main section are shown in Table 23. The numbers 1-11 represent the number of routes and the six per each route in Table 23 represent the six subsections of each route through the square. The duration of each route, except for in the coda, is the 111 quarter-notes.

Within the structure of the magic square, Browning inserts the seven musical ideas used in *Sole Injection* which are represented by the letters A to G. Each of Browning's musical ideas consists of short motives and these motives have clearly defined musical characteristics such as rhythm, register, and pitch. Browning composes different kinds of musical ideas and decides on the location of the ideas within the composition by assigning the ideas to individual cells within each route. The assignment of the ideas to the cells follows the density structure that is part of the global structure of the magic square plan. In *Sole Injection*, density is defined as the number of instruments playing (trio, duo, or solo) and the number of ideas presented simultaneously (one, two or three ideas).³⁸ The process is the same as for *Blockhouse* and *Double Shot*. The number of instruments playing follows (with some variation) the basic pattern solo-duo-duo-solo-trio-duo which is assigned to each of the six cells in a given route through the magic square. The number of instruments playing is also assigned the number of ideas performed following the pattern of 1-2-2-1-3-2 (again with some variations). This pattern is also assigned to the six cells within each route taken from the magic square. Following this density scheme assigned to the six cells of a route through the magic square, Browning can then vary the foreground by deciding on the specific ideas to be presented while the background density structure remains for the most part constant. Browning juxtaposes the seven musical ideas within the fifty four subsections following the density scheme. Individual and unique values for the musical parameters for each idea are presented as patterns that retain their identity even when superimposed with the other patterns. This is explained later in this chapter.

³⁸ Personal e-mail correspondence with composer, March 10, 2010.

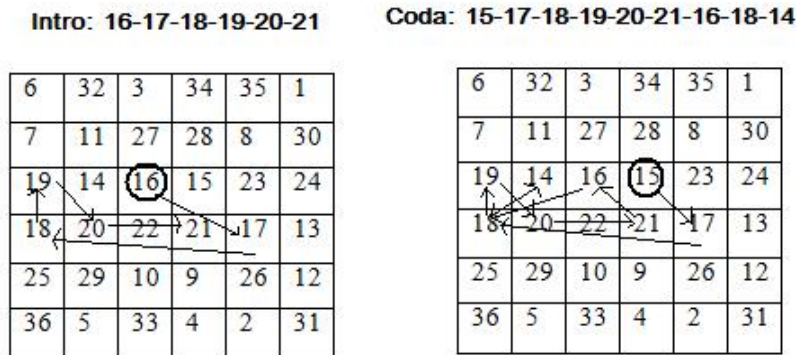
Table 23. *Sole Injection*, Overall structure of the main part, mm. 32-296

Route Subsection	Measures	Duration	Ideas	Route Subsection	Measures	Duration	Ideas
2.1	32-40	35	BF	6.4	165-169	22	DG
2.2	41-42	8	AC	6.5	170-172	10	CG
2.3	43-48	23	B	6.6	173-181	33	AD
2.4	49-52	17	AF	7.1	182-186	18	G
2.5	53-60	26	BC	7.2	187-191	20	CF
2.6	61	2	BDF	7.3	192-197	22	ADE
3.1	62-63	7	A	7.4	198-202	21	A
3.2	64-66	11	AG	7.5	203-206	17	ADG
3.3	67-72	27	BE	7.6	207-210	13	AE
3.4	73-79	28	D	8.1	211-218	32	B
3.5	80-81	8	ACE	8.2	219-221	11	AD
3.6	82-89	30	BG	8.3	222-225	14	B
4.1	90-98	34	B	8.4	226-230	20	DEG
4.2	99-105	28	EF	8.5	231-237	29	AB
4.3	106-109	15	B	8.6	238	5	AG
4.4	110-115	21	AEG	9.1	239-244	25	D
4.5	116-118	9	AE	9.2	245-251	29	CEG
4.6	119	4	BD	9.3	252-253	10	EG
5.1	120-124	19	A	9.4	254-256	9	A
5.2	125-128	14	BCG	9.5	257-263	26	BDG
5.3	129-133	16	BDE	9.6	264-266	12	FG
5.4	134-137	15	G	10.1	267-268	6	CE
5.5	138-143	23	CD	10.2	269-270	7	DF
5.6	144-149	24	AB	10.3	271-275	19	B
6.1	150	3	C	10.4	276-280	18	ACG
6.2	151-159	27	ABG	10.5	281-287	25	DE
6.3	160-164	16	E	10.6	288-296	36	BCF

The selection of the routes for the introduction and the coda of *Sole Injection* is a different process than for the main section. The first route for the introduction of *Sole Injection* is presented in the quarter notes and uses six consecutive numbers (Figure 13). The eleventh route is found in the coda and is in the eighth notes (rather than the quarter notes). It is the nine values derived from the cells of the magic square. The introduction and the coda have circular routes of consecutive numbers. The routes of the introduction are 16-17-18-19-20-21 and presented in the

quarter notes. The routes in the coda are 15-17-18-19-20-21-16-18-14 and presented in the eighth notes.

Figure 13. *Sole Injection*, Routes through the Magic Square of the Sun for the Introduction and the Coda (presented in the quarter notes and the eighth notes)



In the structure of *Sole Injection*, there seems to be a balance between the main part and the outside part (being the introduction and the coda) of the work whose durations are derived from the magic square. The introduction and the coda of *Sole Injection* serve to prepare for the beginning and the ending by using idea A. All of the ideas used in *Sole Injection* will be discussed in detail following an examination of the introduction and the coda.

In the introduction, the violin part presents only idea A but the computer part has two ideas, A and F. Through the introduction's the 111 quarter-note durations, idea A has 62 beats and idea F has 49 beats. The violin uses five versions of idea A (labeled A1, A2, A3, A4, and A5) that are distinguished by timbre (guitar-type arpeggiation for A1; *sul ponticello* for A2; *spiccato* for A3; *ordinario* for A4; and *pizzicato* for A5). There are 24 appearances of idea A in the introduction (Example 97). Ideas A1, A2, A3, A4 and A5, are played four times within the following scheme: 1st period [A1-A3-A4- A2-A5], 2nd period [A3-A5-A1-A4-A2], 3rd period

[A5-A2-A1-A4-A3], 4th period [A2-A1-A3-A5-A4] and 5th period [A5-A1-A2-A3]. The computer part has permutations of idea A. The time signatures are frequently changed (2/4, 3/4, 4/4, 5/4) but the dynamics stay at *ff*. (Table 24)

Example 97. *Sole Injection*, introduction (mm. 1-7); idea A and idea F

Table 24. *Sole Injection*, Overall structure of the introduction, mm. 1-31

Route Subsection	Measures	Duration J	Ideas in violin	Ideas in computer
1.1	1-4	16	[A1-A3-A4	A and F
1.2	5-9	17	A2- A5]-[A3	
1.3	10-14	18	A5-A1-A4-A2]	
1.4	15-19	19	[A5-A2-A1-A4	
1.5	20-24	20	A3]-[A2-A1-A3-A5	
1.6	25-31	21	A4]-[A5-A1-A2-A3]	

Similar to the introduction, the coda presents two ideas, ideas A and F but the coda is all based on eighth-notes (not the quarter-notes like the introduction). Time signatures are changed more often in the coda than in the introduction but the dynamics remain *ff* except for the big crescendo over the last two beats. (Example 98)

Example 98. *Sole Injection*, coda (mm. 325-330); ending

Table 25. *Sole Injection*, Overall structure of the coda, mm. 297-330

Route Subsection	Measures	Duration ♩	Ideas in violin	Ideas in computer
11.1	297-299	15	A1-A3-A4	A and F
11.2	300-302	17	A2-A5-A3	
11.3	303-305	18	A-A5-A1-A4-A2	
11.4	306-309	19	A5-A2-A1-A4	
11.5	310-312	20	A1-A3-A2-A1-A3	
11.6	313-316	21	A5-A1-A4-A1	
11.7	317-321	16	A1	
11.8	322-326	18	A1	
11.9	327-330	14	A1	

In *Sole Injection*, each route in the main part has the duration of 111 quarter-notes at the 120 quarter-notes which are 55.5 seconds per route. The duration of the introduction is 0.925 minutes or 55.5 seconds and the main part has ten routes which is 9.25 minutes or 555 seconds. The duration of the coda is the 158 eighth-notes or the 79 quarter-notes at the 120 a quarter-note. This gives a timing of 0.658 minutes or 39.39 seconds. Hence the total duration of *Sole Injection* is the 1189 quarter-notes which are 9.90 minutes or 9 minutes 54.4 seconds.

Since 1994, several of Browning's compositions have been written for live performers and computer-generated sounds. Many of these compositions use the original computer music software GACSS. The computer part for *Sole Injection* was realized using GACSS which is an original computer music software package written in C/C++³⁹. GACSS serves as a sound generation and compositional tool for music composition and was developed by Benjamin Grosser who is a composer, artist, and multi-media specialist. In addition to the computer aspect to this composition, inspiration for *Sole Injection* came from MC Hammer's 1991 tune "Adams Groove" which was featured in the film "The Adams Family".⁴⁰

³⁹ a statically typed, free-form, multi-paradigm, compiled, general-purpose programming language.

⁴⁰ Personal e-mail correspondence with composer, March 10, 2010.

4.3 Musical ideas, Patterns and Compositional Techniques in *Sole Injection*

Within the magic square structure in the main part of *Sole Injection*, Browning assigns seven musical ideas (A-G) that are varied within their individual presentations (see Table 26). In *Sole Injection*, density is defined as the number of layers present in the music at any given time and the number of ideas presented simultaneously (one, two, or three ideas). Trio is used to represent three layers of music; the violin plus two layers of the computer or three layers of the computer part. Duo represents two layers of music; the violin plus one layer of the computer or two layers of the computer. Solo is used for solo violin or solo computer. The number of layers in the music follows (with some variations) the basic pattern solo-duo-duo-solo-trio-duo which is assigned to each of the six cells in a given route through the magic square. The number of layers is also assigned a number of ideas performed following the pattern of 1-2-2-1-3-2 (again with some variations).

Table 26. *Sole Injection*, Overall structure

Introduction (mm. 1-31)

Route Subsection	1.1	1.2	1.3	1.4	1.5	1.6
Measures	1-4	5-9	10-14	15-19	20-24	25-31
Duration J	16	17	18	19	20	21
Grouping	Duo	Duo	Duo	Duo	Duo	Duo
Number of Ideas	1	1	1	1	1	1
Ideas	A[1-3-4]	A[2-5-3]	A[5-1-4-2]	A[5-2-1-4]	A[3-2-1-3-5]	A[4-5-1-2-3]

Main Part (mm. 32- 296) (*: violin or computer part is *tacet*⁴¹) (violin always listed first)

Section Number	2.1	2.2	2.3	2.4	2.5	2.6	3.1	3.2	3.3	3.4	3.5	3.6
Measures	32-40	41-42	43-48	49-52	53-60	61	62-63	64-66	67-72	73-79	80-81	82-89
Duration J	35	8	23	17	26	2	7	11	27	28	8	30

⁴¹ *Ibid.*

Table 26 (cont.)

Grouping	Duo	Duo	Solo	Duo	Duo	Trio	Solo	Duo	Duo	Solo	Trio	Duo
Number of ideas	2	2	1	2	2	3	1	2	2	1	3	2
Ideas (violin/computer)	*/ Ba Fb	Cb/ Ac Cb	B1a/ Ba	A4/ Fb	Ca/ Ba Ca	*/ Bb Dc Fb	A5/ Ac	A3/ G1	B1a/ Ea	Da/ Da	Ca/ Ab Ca Ea1	*/ Ba G2

Section Number	4.1	4.2	4.3	4.4	4.5	4.6	5.1	5.2	5.3	5.4	5.5	5.6
Measures	90-98	99-105	106-109	110-115	116-118	119	120-124	125-128	129-133	134-137	138-143	144-149
Duration J	34	28	15	21	9	4	19	14	16	15	23	24
Grouping	Solo	Duo	Solo	Trio	Duo	Duo	Solo	Trio	Trio	Solo	Duo	Duo
Number of Ideas	1	2	1	3	2	2	1	3	3	1	2	2
Ideas (violin/computer)	*/ Bb	E1/ Fb	B1a/ *	*/ Ac Ea1 G1	A2/ Ea	*/ Ba Dc1	A4/ Ac	Cb/ Bb Cb G2	E1/ Bb Dc1	G1a/ *	Cb/ Cb Dc	*/ Ac Bb

Section Number	6.1	6.2	6.3	6.4	6.5	6.6	7.1	7.2	7.3	7.4	7.5	7.6
Measures	150	151-159	160-164	165-169	170-172	173-181	182-187	187-191	192-197	198-202	203-206	207-210
Duration J	3	27	16	22	10	33	18	20	22	21	17	13
Grouping	Solo	Trio	Solo	Duo	Duo	Duo	Solo	Duo	Trio	Solo	Trio	Duo
Number of Ideas	1	3	1	2	2	2	1	2	3	1	3	2
Ideas (violin/computer)	Ca/ Ca	*/ Ad Ba G2	E1/ Ea	*/ Dc G1	Ca/ Ca G2	*/ Ad Dc	G1a/ G1	Ca/ Ca Fb	*/ Ab Dc1 Ea	A1/ *	Da/ Ac Da G1	*/ Ad Ea1

Section Number	8.1	8.2	8.3	8.4	8.5	8.6	9.1	9.2	9.3	9.4	9.5	9.6
Measures	211-218	219-221	222-225	226-230	231-237	238	239-244	245-251	252-253	254-256	257-263	264-266
Duration J	32	11	14	20	29	5	25	29	10	9	26	12
Grouping	Solo	Duo	Solo	Trio	Duo	Duo	Solo	Trio	Duo	Solo	Trio	Duo
Number of Ideas	1	2	1	3	2	2	1	3	2	1	3	2
Ideas (violin/computer)	*/ Ba	A5/ Dc1	B1b/ *	*/ Dc1 Ea G1	A1/ Bb	*/ Ab G1	Db/ Db	Ca/ Ca Ea1 G2	E1/ G1	A5/ Ad	G1a/ Bb Dc1	*/ Fb G2

Table 26 (cont.)

Section Number	10.1	10.2	10.3	10.4	10.5	10.6
Measures	267-268	269-270	271-275	276-280	281-287	288-296
Duration	6	7	19	18	25	36
Grouping	Duo	Duo	Solo	Trio	Duo	Trio
Number of Ideas	2	2	1	3	2	3
Ideas (violin/computer)	Cb/ CbEa	Da/ DaFb	B1b/ Bb	Cb/ AdCbG2	Da/ DaEa1	Ca/ BaCaFb

Coda (mm. 297-330)

Section Number	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.8	11.9
Measures	297-299	300-302	303-305	306-309	310-312	313-316	317-321	322-326	327-330
Duration	15	17	18	19	20	21	16	18	14
Grouping	Duo	Duo	Duo	Duo	Duo	Duo	Duo	Duo	Duo
Number of Ideas	1	1	1	1	1	1	1	1	1
Ideas	A[1-3-4]	A[2-5-3]	A[5-1-4-2]	A[5-2-1-4]	A[1-3-2-1-3]	A[5-1-4-1]	A[1]	A[1]	A[1]

4.4 Idea A

Idea A in the computer part of *Sole Injection* is originally presented as a six quarter-note pattern of three dyads that are doubled. Idea A in the computer has four versions; the original pattern (idea Aa), permuted patterns (ideas Ab and Ac), and a permuted/filtered pattern (idea Ad). The three dyads emphasize D minor by the pedal on the dominant A and the passing motion between the pitches D-E-F.

Example 99. *Sole Injection*, computer; idea Aa

The musical notation for Idea Aa consists of two staves. The upper staff is in the treble clef and contains six quarter notes, grouped into three pairs of dyads. The notes are A4, B4, A4, B4, A4, B4. The lower staff is in the bass clef and contains a steady eighth-note pedal point on A3. The notation includes a box labeled 'Idea Aa' and 'complete pattern'.

Both ideas Ab and Ac in the computer are composed using permutations of six ordered dyads and are used as a unifying basis for the pattern's progressions and variations (Examples 100). Idea Ab appears only in the treble clef and idea Ac only appears in the bass clef. Idea Ab appears three times in sections 3.5, 7.3 and 8.6 and idea Ac appears six times in sections 2.2, 3.1, 5.1, 5.6 and 7.5.

Example 100. *Sole Injection*, computer, sections 7.3 (mm. 192-197) and 5.6 (mm. 144-149); idea Ab only in treble clef and idea Ac only in the bass clef

Idea Ab permutated pattern

Idea Ac permutated pattern

Idea Ad is not only a permutated pattern of idea Aa but also a filtered version of idea Aa. It presents only the pitches D and E in their respective positions within the original pattern. In Example 101, the filtering process is marked by the circled notes and by parenthesis on the numbers of the quarter-notes which are silenced. Idea Ad appears five times in sections 6.2, 6.6, 7.6, 9.4 and 10.4.

Example 101. *Sole Injection*, computer, section 6.2 (mm. 151-159); idea Ad only on pitches D and E

on D on E Idea Ad filtered version

In the violin, idea A has five versions represented by the numbers, A1, A2, A3, A4 and A5. All of the ideas for A in the violin are composed with the sixteenth-notes and have the

Compared to the other variations of idea A in the violin, idea A4 has a different rhythmic character. Browning expanded the rhythmic and metric vocabulary of *Sole Injection* by incorporating elements of syncopation from jazz. The syncopation in idea A4 of the violin involves repeated off-beat patterns: the syncopation of these ostinato figures creates the metric vitality of the movement. The off-beats are emphasized by accents in the patterns. Idea A4 consists of the eighth-notes played on off-beats over static, repeated quarter-note dyads in the computer part. The violin pitch collection involves an oscillation between dyads that suggest a D minor seventh chord and a neighboring G major triad. Idea A4 in the violin appears twice in sections 2.4 and 5.1.

Example 105. *Sole Injection*, violin, section 5.1 (mm. 120-124); idea A4 with 4 J pattern



Instead of *arco*, Browning requires the violinist to perform *pizzicati* for idea A5. Each note and sound is clearly identified by the *pizzicato* attacks and this helps expand the sound of the violin with a subtle reference to jazz. All notes are played *staccatos* and are derived from the D Dorian mode (minus the pitch G which was important for idea A4). Idea A5 appears 2 times in the violin in sections 3.1 and 8.2.

Example 106. *Sole Injection*, violin, section 3.1 (mm. 62-63); idea A5 with 6 J pattern



Table 27. *Sole Injection*, Appearances of idea A in the main part

Section number	Measures	Ideas A/ Instrumentations		Duration J	Presentation of Pattern (filtering process indicated by parenthesis on the numbers)
		Violin	Computer		
2.2	41-42		Ac	8	[1-2-3-4][1-2-3]
2.4	49-52	A4		17	[1-2-3-4][1-2-3-4][1-2-3-4][1-2-3-4][1]
3.1	62-63	A5		7	[1-2-3-4-5-6-][1]
			Ac		[1-2-3-4][1-2-3]
3.2	64-66	A3		11	[1-2-3-4-5-6-7-8-9-10-11]
3.5	80-81		Ab	8	[1-2-3-4-5-6][1-2]
4.4	110-115		Ac	21	[1-2-3-4-5][1-2-3][1-2-3-4][1-2][1-2-3][1-2-3-4]
4.5	116-118	A2		9	[1-2-3-4][1-2-3-4][1]
5.1	120-124	A4		19	[2-3-4][1-2-3-4][1-2-3-4][1-2-3-4][1-2-3-4]
			Ac		[1-2-3][1-2-3-4-5-6][1-2-3-4][1-2][1-2-3-4]
5.6	144-149		Ac	24	[1-2-3-4-5][1-2][1-2-3-4][1-2-3][1-2-3-4-5-6][1-2-3-4]
6.2	151-159		Ad	27	[1-2-(3)-(4)-(5)-(6)][1-2-(3)][1-2-(3)-(4)][1-2][1-2-(3)-(4)-(5)][1-2-(3)][1-2-(3)-(4)]
6.6	173-181		Ad	33	[1-2-(3)-(4)-(5)][1-2]1-2-(3)-(4)][1-2-(3)][1-2-(3)-(4)-(5)-(6)][1-2-(3)-(4)][1-2-(3)-(4)-(5)][1-2-(3)-(4)]
7.3	192-197		Ab	22	[1-2-3][1-2-3-4][1-2][1-2-3-4-5][1-2-3-4-5-6][1-2]
7.4	198-202	A1		21	[1-2-3-4-5-6-7-8][1-2-3-4-5-6-7-8][1-2-3-4-5]
7.5	203-206		Ac	17	[1-2-3-4][1-2][1-2-3-4-5][1-2-3-4-5-6]
7.6	207-210		Ad	13	[1-2-(3)][1-2][1-2-(3)-(4)-(5)][1-2-(3)]
8.2	219-221	A5		11	[2-3-4-5-6][1-2-3-4-5-6]
8.5	231-237	A1		29	[6-7-8][1-2-3-4-5-6-7-8][1-2-3-4-5-6-7-8][1-2-3-4-5-6-7-8][1-2]
8.6	238		Ab	5	[1-2-3][1-2]
9.4	254-256	A5		9	[1-2-3-4-5-6][1-2-3]
			Ad		[1-2-(3)-(4)-(5)-(6)][1-2-(3)]
10.4	276-280		Ad	18	[1-2-(3)-(4)][1-2][1-2-(3)-(4)-(5)-(6)][1-2-(3)-(4)][1-2]

As shown in Table 27, idea Ab appears three times, idea Ac appears six times and idea Ad appears five times in computer part. For the violin, idea A1 appears two times, idea A2 and idea A3 appear once, idea A 4 appears twice and idea A5 appears three times. Therefore, each idea A for the violin appears throughout the main section of *Sole Injection* following this scheme: [Idea A1] $50_J \div 8_J = 6.25$ times through the pattern, [Idea A2] $9_J \div 4_J = 2.25$ times through the pattern, [Idea A3] $11_J \div 11_J = 1$ time through the pattern, [Idea A4] $36_J \div 4_J = 9$ times through the pattern, and [Idea A5] $27_J \div 6_J = 4.5$ times through the pattern.

4.5 Idea B

Idea B presents the eighth-note triplets within the quarter-note pulse and uses the pitch set derived from a major ninth chord on G [G-B-D-F-A# (Bb)]. The root G is related to the pitch D (important to idea A) as the subdominant. Idea B in the computer has two versions marked as Ba and Bb. Idea Ba in the computer passes the eighth-note triplets from the bass clef to the treble clef, which is reinforced by the pitches moving left to right in the stereo space. Idea Ba is a 29 quarter-note pattern. Idea Ba uses six melodic and rhythmic cells: A, B, C, D, and two retrograde cells (ret.A and ret.B). (Example 107)

Example 107. *Sole Injection*, computer; six cells for idea Ba

The image displays six musical cells for idea Ba, arranged in two rows of three. Each cell is shown in a grand staff (treble and bass clefs).
 - **Cell A:** Treble clef has an eighth-note triplet (G4, B4, D5) over a quarter note G4. Bass clef has a quarter note G4.
 - **Cell B:** Treble clef has a quarter rest. Bass clef has an eighth-note triplet (G4, B4, D5) over a quarter note G4.
 - **Cell C:** Treble clef has an eighth-note triplet (G4, B4, D5) over a quarter note G4. Bass clef has a quarter note G4.
 - **Cell retrograde A:** Treble clef has an eighth-note triplet (D5, B4, G4) over a quarter note G4. Bass clef has a quarter note G4.
 - **Cell retrograde B:** Treble clef has a quarter rest. Bass clef has an eighth-note triplet (D5, B4, G4) over a quarter note G4.
 - **Cell D:** Treble clef has an eighth-note triplet (G4, B4, D5) over a quarter note G4. Bass clef has a quarter note G4.

Example 108. *Sole Injection*, computer; ordering of six cells of idea Ba in the 29 ♩ pattern

The image shows a 29-measure musical pattern for idea Ba, divided into two segments. The notes are written in a grand staff.
 - **Segment 1 (Measures 1-16):** The sequence of cells is A, B, C, ret.A, ret.B, ret.A, A, D, B, C, ret.A, D, A, C, B, ret.A.
 - **Segment 2 (Measures 17-29):** The sequence of cells is B, C, A, D, ret.A, ret.B, A, D, ret.A, C, ret.A, A, D.

Idea Bb in the computer is a filtered version of Ba. Like idea Ba, it is a 29 quarter-note pattern that only appears in the treble clef. Idea Bb substitutes rests for attacks on four of the five

pitches of the original pattern Ba (F, B flat, B and D). Idea Bb then adds the pitch D to every attack on the pitch G from the original pattern, forming a perfect fourth (the interval D-G). The filtered notes in idea Bb are marked in Example 109 by the circled notes. Idea Ba in the computer appears a total of eight times in sections 2.1, 2.3, 2.5, 3.6, 4.6, 6.2, 8.1 and 10.6. The filtered version of idea Ba, idea Bb, appears in the computer a total of seven times in sections 4.1, 5.2, 5.3, 5.6, 8.5, 9.5 and 10.3.

Example 109. *Sole Injection*, computer, sections 3.6 (mm. 82-89) and 4.1 (mm. 90-97); ideas Ba (complete pattern) and Bb (filtered pattern)

The image displays musical notation for two ideas. The first, 'Idea Ba complete pattern', is shown in two systems. The first system contains measures 29 through 19, and the second system contains measures 20 through 29. The notation includes treble and bass staves with various notes, some of which are circled. The second system shows a circled note in measure 24. The second idea, 'Idea Bb filtered pattern', is shown in a single system covering measures 1 through 30. This system also features circled notes, indicating the filtered version of the pattern.

Idea B for the violin has two versions, B1a and B1b. Both of these ideas use the eighth-note triplet rhythms of idea B. Ideas Ba and Bb for the violin use a fourteen quarter-note pattern with the pitch structure built on a G minor seventh chord. Idea B1a appears three times in sections 2.3, 3.3 and 4.3.

Example 110. *Sole Injection*, violin, section 3.3 (mm. 67-72); idea B1a with 14 J pattern

The image shows musical notation for 'Idea B1a complete pattern'. It consists of a single system of music. The first part covers measures 10 to 14, the second part covers measures 1 to 14, and the final part covers measures 1 to 8. The notation includes a treble staff with eighth-note triplet rhythms and a bass staff with a 14-measure pattern.

Idea B1b in the violin is the filtered version of idea B1a. The filtered notes in idea B1b are marked in Example 111 by the circled notes in idea B1a. Only the attacks on the dyad of the interval G-D are sounded from the original pattern. Idea B1b in the violin appears twice in sections 8.3 and 10.3.

Example 111. *Sole Injection*, violin, sections 4.3 (mm. 106-109) and 8.3 (mm. 222-225); ideas B1a (complete pattern) and B1b (filtered pattern)

In the main part of *Sole Injection*, ideas Ba and Bb in the computer present the 29 quarter-note pattern and thirteen times for a total of 337 quarter notes. Idea B1 for the violin presents fourteen quarter-note pattern and seven times for a total of 98 quarter-notes.

Table 28. *Sole Injection*, Appearances of idea B in the main part

Section number	Measures	Ideas B /Instrumentations		Duration J	Presentation of Pattern
		Violin	Computer		
2.1	32-40		Ba	35	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29][1-2-3-4-5-6]
2.3	43-48	B1a		23	[1-2-3-4-5-6-7-8-9-10-11-12-13-14][1-2-3-4-5-6-7-8-9]
			Ba		[7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29]
2.5	53-60		Ba	26	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26]
3.3	67-72	B1a		27	[10-11-12-13-14][1-2-3-4-5-6-7-8-9-10-11-12-13-14][1-2-3-4-5-6-7-8]
3.6	82-89		Ba	30	[29] [1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29]
4.1	90-98		Bb	34	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29][1-2-3-4-5]
4.3	106-109	B1a		15	[9-10-11-12-13-14][1-2-3-4-5-6-7-8-9]
4.6	119		Ba	4	[6-7-8-9]

Table 28 (cont.)

Section number	Measures	Ideas B /Instrumentations		Duration J	Presentation of Pattern
		Violin	Computer		
5.2	125-128		Bb	14	[10-11-12-13-14-15-16-17-18-19-20-21-22-23]
5.3	129-133		Bb	16	[24-25-26-27-28-29][1-2-3-4-5-6-7-8-9-10]
5.6	144-149		Bb	24	[11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29][1-2-3-4-5]
6.2	151-159		Ba	27	[6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29][1-2-3]
8.1	211-218		Ba	32	[4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29][1-2-3-4-5-6]
8.3	222-225	B1b		14	[10-11-12-13-14][1-2-3-4-5-6-7-8-9]
8.5	231-237		Bb	29	[7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29][1-2-3-4-5-6]
9.5	257-263		Bb	26	[7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29][1-2-3]
10.3	271-275	B1b		19	[10-11-12-13-14][1-2-3-4-5-6-7-8-9-10-11-12-13-14]
			Bb		[4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22]
10.6	288-296		Ba	36	[23-24-25-26-27-28-29] [1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29]

As shown in Table 28 for the main part of *Sole Injection*, idea Ba in the computer part appears eight times, and idea Bb in the computer part appears seven times in the scheme: [Idea B(a+b)] 377_J ÷ 29_J = 13 times through pattern. Idea B1 in the violin appears three times and idea B1b in the violin appears twice. In the scheme: [Idea B1 (a+b)] 98_J ÷ 14_J = seven times through pattern.

4.6 Idea C

Different from the other musical ideas of *Sole Injection*, idea C is presented as a unison gesture. Parallel motion is a stylistic feature of Browning's music. Harmonically idea C is based on a ten-note set; the pitches G, Ab, Bb, B, C, Db, D, Eb, F, F# (the pitches E and A are missing). From the ten-note set, Browning creates a symmetrical prime set, P⁰ (the intervals of the set are

the same read forwards or backwards), and then puts the set through a series of permutations (involving the order of the five dyads) which are labeled below as P¹, P², P³, P⁴, P⁵ and P⁶.

Example 112. *Sole Injection*, Symmetrical pitch set P⁰ and permutations for idea C

Table 29. *Sole Injection*, 7 orders for the 5 dyads of the pitch set for idea C (ret. = retrograde)

Pitch	D – F	Bb – Db	G - Gb	C - Eb	Ab - B
P ⁰ Order	1	2	3	4	5
P ¹ Order	2	1	3	5	4
P ² Order	1	5	3	4	2
P ³ Order	4	5	3	1	2
P ⁴ Order	5	4	3	2	1
P ⁵ Order	4	1	3	5	2
P ⁶ Order		only Db	3(ret.)	2(ret.)	1(ret.)

In idea C, all notes are presented in parallel motion and consist of transpositions of a (025) trichord. Idea C is voiced in both parts and is scored for the violin and the computer. Idea C is a 30 quarter-note pattern. Consequently there are 67 notes produced by the permuted versions of the set, and when added to the sixteenth-notes within the eighth-note triplets in the pattern for idea C, there are 71 attacks. Rests are used to create syncopation and phrasing.

Example 113. *Sole Injection*, violin and computer; idea C with 30 J pattern and 7 pitch sets

Pitch sets **P0** D F Bb Db G Gb C Eb Ab B **P1** Bb Db D F G Gb Ab B C Eb **P2** D F Ab B G Gb C Eb Bb Db **P3** C Eb Ab B G Gb D

Attacks $\frac{J}{L_2}$

Durations 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

Pitch sets **P4** F Eb Db Ab B C Eb G Gb Db Bb D F **P5** Bb Db Ab B G Gb D F C Eb B **P6** Ab Eb C Gb G Db

Attacks $\frac{J}{L_3}$

Durations 18 19 20 21 22 23 24 25 26 27 28 29 30

Following the register, idea C has two versions marked as Ca and Cb. Idea Cb has the same harmonic and rhythmic character as idea Ca but is one octave higher in the treble clef and two octaves higher in the bass clef.

Example 114. *Sole Injection*, violin and computer, sections 7.2 (mm. 188-191) and 5.2 (mm. 125-128); ideas Ca and Cb

Idea Ca complete pattern

188

7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

Idea Cb treble up one octave, bass up two octaves

125

13 14 15 16 17 18 19 20 21 22 23 24 25 26

Table 30. *Sole Injection*, Appearances of idea C in the main part

Section number	Measures	Ideas C /Instrumentations		Duration J	Presentation of 30 J Pattern
		Violin	computer		
2.2	41-42	Cb	Cb	8	[1-2-3-4-5-6-7-8]
2.5	53-60	Ca	Ca	26	[9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30][1-2-3-4]
3.5	80-81	Ca	Ca	8	[5-6-7-8-9-10-11-12]
5.2	125-128	Cb	Cb	14	[13-14-15-16-17-18-19-20-21-22-23-24-25-26]
5.5	138-143	Cb	Cb	23	[27-28-29-30][1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19]
6.1	150	Ca	Ca	3	[20-21-22]
6.5	170-172	Ca	Ca	10	[23-24-25-26-27-28-29-30][1-2]
7.2	187-191	Ca	Ca	20	[3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22]
9.2	245-251	Ca	Ca	29	[23-24-25-26-27-28-29-30][1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21]
10.1	267-268	Cb	Cb	6	[22-23-24-25-26-27]
10.4	276-280	Cb	Cb	18	[28-29-30][1-2-3-4-5-6-7-8-9-10-11-12-13-14-15]
10.6	288-296	Ca	Ca	36	[16-17-18-19-20-21-22-23-24-25-26-27-28-29-30][1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21]

As shown in Table 30, idea Ca in the violin and the computer part appears seven times and idea Cb in the violin and the computer part appears five times through the main section of *Sole Injection*. Idea C appears for 201 J ÷ 30 J pattern which gives a total of 6.7 times through the entire pattern.

4.7 Idea D

Idea D has a distinctive playing technique for the violin. That is *glissando*, the execution of a sliding movement that produces a microtonal connection between two pitches. Browning places the *glissando* between two dyads to make a unique and quasi-electronic sound in the violin and similar to the sound of an electric guitar. Idea D has three versions marked as ideas Da, Db and Dc. Idea D has the 28 quarter-note pattern. Ideas Da and Db appear in the violin and the computer, but idea Dc only appears in the computer. Idea Da consists of continuous perfect fifth

dyads played *glissandi* and has the violin playing two octaves above the computer. Idea Da in the violin and the computer appears four times in sections 3.4, 7.5, 10.2 and 10.5.

Example 115. *Sole Injection*, violin and computer, section 3.4 (mm. 73-79); idea Da with 28 J pattern

Idea Da complete pattern

At section 9.1, idea Db appears in the violin and the computer together. The violin plays in canon to the computer at a distance of one quarter note.

Example 116. *Sole Injection*, violin and computer, section 9.1 (mm. 239-244); idea Db in canon

Idea Db violin part begins quarter note after computer part

Idea Dc is only for the computer and appears in the middle register. Idea Dc1 for the computer is a filtered version of idea Dc and appears in the high and middle register. The filtered notes in idea Dc1 are marked in Example 117 by the parenthesis on the number in idea Dc1 that is silenced from the complete pattern and by the circled notes in idea Dc.

Example 117. *Sole Injection*, computer, sections 6.6 (mm. 173-181) and 9.5 (mm. 257-263); ideas Dc (complete pattern) and Dc1 (filtered pattern)

Table 31. *Sole Injection*, Appearances of idea D in the main part

Section number	Measures	Ideas D /Instrumentations		Duration J	Presentation of 28 J Pattern
		Violin	Computer		
2.6	61		Dc	2	[27-28]
3.4	73-79	Da	Da	28	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28]
4.6	119		Dc1	4	[1-2-3-4]
5.3	129-133		Dc1	16	[5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20]
5.5	138-143		Dc	23	[21-22-23-24-25-26-27-28] [1-2-3-4-5-6-7-8-9-10-11-12-13-14-15]
6.4	165-169		Dc	22	[16-17-18-19-20-21-22-23-24-25-26-27-28] [1-2-3-4-5-6-7-8-9]
6.6	173-181		Dc	33	[10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28] [1-2-3-4-5-6-7-8-9-10-11-12-13-14]
7.3	192-197		Dc1	22	[15-16-17-18-19-20-21-22-23-24-25-26-27-28][1-2-3-4-5-6-7-8]
7.5	203-206	Da	Da	17	[9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25]
8.2	219-221		Dc1	11	[26-27-28][1-2-3-4-5-6-7-8]
8.4	226-230		Dc1	20	[9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28]
9.1	239-244	Db		25	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24]
			Db		[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25]
9.5	257-263		Dc1	26	[26-27-28][1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23]
10.2	269-270	Da	Da	7	[24-25-26-27-28][1-2]
10.5	281-287	Da	Da	25	[3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27]

As shown in Table 31, idea D appears 10.03 times in the main part of *Sole Injection*: [281] ÷ 28] pattern]. Idea Da in the violin and the computer appears four times, idea Db appears once in the violin and computer as a canon, idea Dc appears four times in the computer part, and idea Dc1 appears six times in the computer. The complete pattern for idea Da appears 2.75 times [77] ÷ 28], for idea Dc the complete pattern appears 2.5 times [80] ÷ 28], and for idea Dc1 the complete pattern appears 3.53 times [99] ÷ 28].

4.8 Idea E

Idea E in the computer is a harmonic progression in G minor [III6 - iv6 - III6/4 - i - III6 - iv6 - N6/4]. Idea Ea has three versions with ideas Ea and Ea1 for the computer and idea E1 for the violin. Idea E consists of a seventeen quarter-note pattern. Idea Ea in the computer appears six times in sections 3.3, 4.5, 6.3, 7.3, 8.4 and 10.1. Idea Ea1 is the filtered version of idea Ea and plays the C minor and G minor triads. The filtered notes in idea Ea1 are marked in Example 118 by the parenthesis on the number silenced in idea Ea1 and by the circled notes in idea Ea. Idea Ea1 in the computer appears 5 times in sections 3.5, 4.4, 7.6, 9.2 and 10.5.

Example 118. *Sole Injection*, computer, sections 3.3 (mm. 67-72) and 4.4 (mm. 110-115); ideas Ea (complete pattern) and Ea1 (filtered pattern)

The image displays two musical staves. The top staff, labeled 'Idea Ea complete pattern', shows a sequence of notes in a 4/4 time signature. The notes are numbered 1 through 17. The notes 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17 are circled. The bottom staff, labeled 'Idea Ea1 filtered pattern', shows the same sequence of notes. The notes 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, and 16 are circled. The notes 15, 16, and 17 are marked with a parenthesis '()' and are silenced. The notes 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, and 16 are circled. The notes 15, 16, and 17 are marked with a parenthesis '()' and are silenced.

Idea E1 in the violin uses parallel octaves with accents or *glissandi* to produce an almost blues style of performing the violin. Continuous octaves that emphasize the tritone Db-G are used in the presentation of idea E1 in the violin. Idea E1 appears four times in the violin in sections 3.5, 5.3, 6.3 and 9.3.

Example 119. *Sole Injection*, violin, section 5.3 (mm. 129-133); idea E1 with 17 J pattern



Table 32. *Sole Injection*, Appearances of idea E in the main part

Section number	Measures	Ideas E /Instrumentation		Duration J	Presentation of 17 J Pattern (Filtering process indicated by parenthesis on the numbers)
		Violin	Computer		
3.3	67-72		Ea	27	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17][1-2-3-4-5-6-7-8-9-10]
3.5	80-81		Ea1	8	[(11)-12-13-14-(15)-(16)-(17)][(1)]
4.2	99-105	E1		28	[2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17] [1-2-3-4-5-6-7-8-9-10-11-12]
4.4	110-115		Ea1	21	[13-14-(15)-(16)-(17)] [(1)-2-3-4-5-(6)-7-8-9-10-(11)-12-13-14-(15)-(16)]
4.5	116-118		Ea	9	[17 ✗] [1-2-3-4-5-6-7-8]
5.3	129-133	E1		16	[9-10-11-12-13-14-15-16-17][1-2-3-4-5-6-7]
6.3	160-164	E1	Ea	16	[8-9-10-11-12-13-14-15-16-17][1-2-3-4-5-6]
7.3	192-197		Ea	22	[7-8-9-10-11-12-13-14-15-16-17][1-2-3-4-5-6-7-8-9-10-11]
7.6	207-210		Ea1	13	[12-13-14-(15)-(16)-(17)][(1)-2-3-4-5-(6)-7]
8.4	226-230		Ea	20	[8-9-10-11-12-13-14-15-16-17][1-2-3-4-5-6-7-8-9-10]
9.2	245-251		Ea1	19	[(11)-12-13-14-(15)-(16)-(17)][(1)-2-3-4-5-(6)-7-8-9-10-(11)-12-13-14-(15)-(16)-(17)][(1)-2-3-4-5]
9.3	252-253	E1		10	[6-7-8-9-10-11-12-13-14-15]
10.1	267-268		Ea	6	[16-17][1-2-3-4]
10.5	281-287		Ea1	5	[5-(6)-7-8-9-10-(11)-12-13-14-(15)-(16)-(17)][(1)-2-3-4-5-(6)-7-8-9-10-(11)-12]

As shown in Table 32 for the main part of *Sole Injection*, the pattern for idea E is stated 11.52 times: [196 J ÷ 17 J pattern]. Idea Ea appears six times in the computer, idea Ea1 appears

five times in the computer, and idea E1 appears four times in the violin. The pattern for idea E1 appears 4.11 times $[70 \div 17]$, the pattern for idea Ea appears 4.58 times $[78 \div 17]$, and the pattern for idea Ea1 appears 3.64 times $[62 \div 17]$.

4.9 Idea F

Idea F appears only in the computer part and suggests the G Dorian mode. The two triads in second inversion used for idea F (the pitches B flat and C), function as an anacrusis to the pitch G of idea B. Idea F has two versions labeled as Fa and Fb. Idea Fa presents quarter-note triplets on the B flat and C chords and appears in the introduction and the coda. Idea Fb appears only in the main part. Idea Fa does not follow a set pattern and idea Fb is a 24 quarter-note pattern. Idea Fb appears eight times in the computer in sections 2.1, 2.4, 2.6, 4.2, 7.2, 9.6, 10.2 and 10.6.

Example 120. *Sole Injection*, computer; idea F



Example 121. *Sole Injection*, computer, sections 1.5 and 1.6 (mm.22-28); idea Fa in the introduction



Example 122. *Sole Injection*, computer, section 10.6 (mm. 288-293); idea Fb with 24 quarter-note pattern



Table 33. *Sole Injection*, Appearances of idea F in the main part

Section number	Measures	Ideas F/ Computer	Duration J	Presentation of 24 J pattern
2.1	32-40	Fb	35	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24][1-2-3-4-5-6-7-8-9-10-11]
2.4	49-51	Fb	17	[12-13-14-15-16-17-18-19-20-21-22-23-24][1-2-3-4]
2.6	61	Fb	2	[5-6]
4.2	99-105	Fb	28	[7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24][1-2-3-4-5-6-7-8-9-10]
7.2	187-191	Fb	20	[11-12-13-14-15-16-17-18-19-20-21-22-23-24][1-2-3-4-5-6]
9.6	264-262	Fb	12	[7-8-9-10-11-12-13-14-15-16-17-18]
10.2	269-270	Fb	7	[18-19-20-21-22-23-24]
10.6	288-296	Fb	36	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24][1-2-3-4-5-6-7-8-9-10-11-12]

As shown in Table 33, idea Fb appears 8 times in the computer in the main part of *Sole Injection*. Idea Fb has $157J \div 24J \text{ pattern} = 6.541 \text{ pattern}$ through the pattern.

4.10 Idea G

Idea G has three versions, ideas G1 (the complete pattern for the violin and the computer), Ga1 (filtered pattern for the violin only) and G2 (for the computer only). Idea G1 is made up four sixteenth-notes per the quarter duration and is a sixteen quarter-note pattern. For idea G1, Browning created a primary pitch set using four pitches [E, G, C, B flat] and reordered those four pitches 15 times to create an order for each of the sixteen quarter notes of the pattern. Idea G1 in the violin and the computer appears eight times in sections 3.2, 4.4, 6.4, 7.1, 7.5, 8.4, 8.6 and 9.3.

Example 123. *Sole Injection*, computer; pitch sets of idea G1 with 16 J pattern

The image shows two staves of musical notation for Idea G1. The first staff is labeled 'Idea G1 complete pattern' and contains 8 measures, numbered 1 through 8. Above each measure is a sequence of four numbers representing a pitch set. The second staff contains 8 more measures, numbered 9 through 16, also with pitch sets above them. A dashed line with the number '15' above it spans across the top of both staves, indicating a total of 15 pitch sets used across the 16 measures.

Figure 14. *Sole Injection*, Idea G1 (for Computer); 16 orders for 16 ♩ (4notes x ♩ per quarter-note)

1.	1 2 3 4 E G C Bb	2.	2 3 4 1 G C Bb E	3.	3 4 1 2 C Bb E G	4.	4 1 2 3 Bb E G C
5.	2 4 1 3 G Bb E C	6.	4 2 3 1 Bb G C E	7.	3 1 2 4 C E G Bb	8.	1 3 4 2 E C Bb G
9.	3 2 4 1 C G Bb E	10.	2 1 3 4 G E C Eb	11.	1 4 2 3 E Bb G C	12.	4 3 1 2 Bb C E G
13.	3 1 4 2 C E Bb G	14.	1 3 2 4 E C G Bb	15.	2 4 3 1 G Bb C E	16.	4 2 1 3 Bb G E C

Idea G1a only for the violin is a filtered version of idea G1. Sometimes it combines with idea G1 like at section 7.1 or appears by itself at sections 5.4 and 9.5.

Example 124. *Sole Injection*, violin and computer, section 7.1 (mm.182-187); ideas G1 (complete pattern) and G1a (filtered pattern)

The image shows a musical score for two parts: violin and computer. The violin part is labeled 'Idea G1a filtered pattern violin' and features a complex, fast-moving melodic line with many slurs and ties. The computer part is labeled 'Idea G1 complete pattern computer' and consists of a series of chords. The score includes dynamics such as 'mp sul ponticello' and 'mp'.

The chord version of idea G, idea G2 in the computer, is a twenty quarter-note pattern and only appears seven times in sections 3.6, 5.2, 6.2, 6.5, 9.2, 9.6 and 10.4.

Example 125. *Sole Injection*, computer, section 3.6 (mm. 82-89); idea G2 with 20 ♩ pattern

The image shows a musical score for the computer part of idea G2. The score is divided into two systems, each with 20 numbered measures. The first system is labeled 'Idea G2' and shows a series of chords. The second system continues the pattern. The score includes dynamics like 'f' and 'mp'.

Table 34. *Sole Injection*, Appearances of idea G in the main part

Section number	Measures	Ideas G /Instrumentations		Duration J	Presentation of Pattern
		Violin	Computer		
3.2	64-66		G1	11	[1-2-3-4-5-6-7-8-9-10-11]
3.6	82-89		G2	30	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20][1-2-3-4-5-6-7-8-9-10]
4.4	110-115		G1	21	[12-13-14-15-16][1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16]
5.2	125-128		G2	14	[11-12-13-14-15-16-17-18-19-20][1-2-3-4]
5.4	134-137	G1a		15	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15]
6.2	151-159		G2	27	[5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20][1-2-3-4-5-6-7-8-9-10-11]
6.4	165-169		G1	22	[1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16][1-2-3-4-5-6]
6.5	170-172		G2	10	[12-13-14-15-16-17-18-19-20][1]
7.1	182-186	G1a	G1	18	[7-8-9-10-11-12-13-14-15-16][1-2-3-4-5-6-7-8]
7.5	203-206		G1	17	[9-10-11-12-13-14-15-16][1-2-3-4-5-6-7-8-9]
8.4	226-230		G1	20	[10-11-12-13-14-15-16][1-2-3-4-5-6-7-8-9-10-11-12-13]
8.6	238		G1	5	[14-15-16][1-2]
9.2	245-251		G2	29	[2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20][1-2-3-4-5-6-7-8-9-10]
9.3	252-253		G1	10	[3-4-5-6-7-8-9-10-11-12]
9.5	257-263	G1a		26	[13-14-15-16][1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16][1-2-3-4-5-6]
9.6	264-266		G2	12	[11-12-13-14-15-16-17-18-19-20][1-2]
10.4	276-280		G2	18	[3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20]

As shown in Table 34 for the main part of *Sole Injection*, idea G1a appears three times in the violin, idea G1 appears eight times in the computer, and idea G2 appears seven times in the computer. The presentation for idea G1a is $59_J \div 16_J$ pattern = 3.625 times, the presentation for idea G1 is $124_J \div 16_J$ pattern = 7.75 times, and the presentation for idea G2 is $148_J \div 20_J = 7.4$ times.

4.11 Superimposition of Ideas in *Sole Injection*

Sole Injection uses the juxtaposition and superimposition of musical ideas as a means for the development of those ideas. Browning superimposes the ideas in *Sole Injection* into three

densities: (1) solo - the solo violin or one layer of computer sounds with or without violin; (2) duo - the solo violin and one layer of computer sounds or two layers of computer sounds without violin; and (3) trio - the solo violin and two layers of computer sounds or three layers of computer sounds without the violin. These density layers are presented differently in each route and subsection of the magic square structure. The ordering of the ideas in *Sole Injection* results in a dramatic presentation that involves the juxtaposition of the ideas. Browning composed *Sole Injection* using the musical ideas as the unifying basis for pattern variations which are superimposed. There are three different types of superimposing ideas in *Sole Injection*: (1) two complete ideas superimposed, (2) one complete idea superimposed on a filtered version of an idea, and (3) two filtered versions superimposed. For an example of the first type of superimposition in *Sole Injection*, two complete ideas Ba and Ca are superimposed in section 2.5.

Example 126. *Sole Injection*, violin and computer, section 2.5 (mm. 53-55); superimposition of two complete ideas Ca and Ba

The musical score for Example 126 is presented in three systems. The first system, labeled 'Idea Ca', contains measures 9 through 17. The second system, labeled 'Idea Ba', contains measures 1 through 9. The third system continues the superimposition of the two ideas. The score is written for violin and computer, with various musical notations including triplets, slurs, and dynamic markings such as 'f' and 'mf'.

An example of the second type of superimposition found in *Sole Injection* can be found at section 9.2. The complete idea Ca appears in the violin and the computer and the filtered idea Ec and the chord version idea G2 simultaneously appear in computer.

Example 127. *Sole Injection*, violin and computer, section 9.2 (mm. 245-251); superimposition of ideas Ca (complete pattern), Ea1 (filtered pattern) and G2 (chord pattern)

The musical score is divided into two systems, each containing three staves. The first system covers measures 245 to 251. The second system covers measures 249 to 251. Each system includes:

- Idea Ca (complete pattern):** The top staff of each system, showing a complex melodic line with triplets and slurs. Measure numbers 23-30 and 1-8 are indicated below the staff.
- Idea Ea1 (filtered pattern):** The middle staff of each system, showing a sparse, filtered version of the melodic idea. Measure numbers (11)-17 and (1)-9 are indicated below the staff.
- Idea G2 (chord pattern):** The bottom staff of each system, showing a rhythmic chordal accompaniment. Measure numbers 2-17 and 2-17 are indicated below the staff.

The third type of superimposition of ideas in *Sole Injection* can be found at sections 2.2 and 10.3. At section 10.3, two filtered versions of idea B, ideas Bb and B1b, are layered (Example 128). In section 2.2, two different filtered ideas, ideas Ac and Cb, are superimposed (Example 129).

Example 128. *Sole Injection*, violin and computer, section 10.3 (mm. 271-275);
 superimposition of two filtered versions of idea B, ideas B1b and Bb

The musical score for Example 128 consists of two staves. The top staff, labeled 'Idea B1b', shows measures 10-14 and 1-14. The bottom staff, labeled 'Idea Bb', shows measures 4-22. The notation includes complex rhythmic patterns with triplets and dynamic markings such as *f*.

Example 129. *Sole Injection*, violin and computer, section 2.2 (mm. 41-42);
 superimposition of two filtered versions of idea A and C, ideas Cb and Ac

The musical score for Example 129 consists of three staves. The top staff, labeled 'Idea Cb', shows measures 41-42 and includes the marking *ordinario*. The middle staff, labeled 'Idea Ac', shows measures 41-42. The bottom staff, labeled 'Idea Cb', shows measures 41-42. The notation includes complex rhythmic patterns with triplets and dynamic markings such as *mf*.

CHAPTER FIVE

CONCLUSION

The compositional process used by Zack Browning in *Blockhouse* (2006) for violin, cello and piano, *Double Shot* (2000) for violin and piano, and *Sole Injection* (1996) for violin and computer-generated sounds, is based on the use magic squares as the generator of musical structure. Other composers have used of magic squares as a structural determinant for composition.

In *Sixteen Dances* (1951), John Cage used magic squares “in which he put sounds and then he made moves on those squares, and he could change moves getting different kinds of continuities,”⁴² The method could be viewed as a semi-mystical technique that Cage utilized for chance operations.

The English composer, Sir Peter Maxwell Davies has derived pitch and durational material from magic squares in this works. Browning and Davies have a similarity in their use of magic square to generate musical material, nut their approach to composition is quite different. In particular, *Ave Maris Stella* is “projected” through the magic square of the moon.⁴³ This piece restructures the plainchant by variations derived from the magic square, as compared to Browning’s use of the magic square to create a global structure that encompasses musical events and patterns.

⁴² Diliberto, John. “Conversations with Cage”, *Electronic Musicians*, Magazine Article, January 17, 2005.
http://emusician.com/mag/Conversations_With_Cage/

Last Accessed Novermber 1, 2010.

⁴³Robert, David. *Techniques of composition in the Music of Peter Maxwell Davies* (Ph.D. Dissertation). University of Birmingham, 1985.

In a personal interview, Browning has compared his use of magic squares to that of John Cage and Peter Maxwell Davies.

While other composers such as John Cage and Peter Maxwell Davies have used magic squares in the compositional process to furnish musical materials such as pitch and rhythm, I have used magic squares to create musical structures. These magic square structures articulate the properties of the square by arranging my musical ideas in such a way that each route through the magic square can be heard by the listener. This can be seen in my careful structuring of the instrumentation of my compositions. While this is not true for every single route through the magic square, it can be observed that for most of the routes through the magic square structure of a given work, I begin that route with a solo or with something that creates an accent. The solos which may contain a single instrument or multiple instruments on the same idea provide an accent at the beginning of a route by a sudden change in density.⁴⁴

This emphasis on the aural recognition of a structure derived from magic squares sets Browning apart from Cage and Davies.

Browning's emphasis on creating a structure deeply rooted in the magic square can also be seen in his compositional process for his musical ideas. Browning's musical ideas are based on a combination of elements derived from popular music coupled with contemporary compositional techniques. Musical ideas are subjected to the magic square structure where each number within the square becomes a particular duration, idea, pattern, style and gesture in the score. These musical ideas are assigned to the subsections within each route. This assignment of ideas within the routes is based on a desire by Browning for the magic square structure to be audible.

Musical ideas are chosen to articulate the route by their contrasting values and by their density.

Individual values for the musical parameters for each musical idea are autonomous, allowing for

⁴⁴ Personal e-mail correspondence with composer, October 29, 2010.

the ideas to remain recognizable even when subjected to the juxtaposition and superimposition required by the magic square structure.⁴⁵

Browning assigns the musical ideas to each cell in the route, which creates quick changes and contrasting musical gestures but that are also varied. Each musical idea consists of patterns whose roots are in popular music, which are transformed and varied within their individual presentations by the use of permutations and filters that are combined both horizontally and vertically by the magic square structure. The presentation of patterns in Browning's compositions performs a crucial role since the function of the patterns is to enable the listener to comprehend, remember and identify the musical gestures within the magic square structure. The interpretation and performance of these three works must be based on a thorough understanding of the structure of these patterns.

Blockhouse, *Double Shot* and *Sole Injection* are part of a series of works by Browning that explore the application of magic squares to musical structure. The 4x4 magic square known as the Dürer Square is used as the structure for *Double Shot*, the 5x5 Magic Square of Mars is the basis for the structure for *Blockhouse*, and the 6x6 Magic Square of the Sun is the foundation for *Sole Injection*. Within these magic square structures, Browning assigns musical ideas that are varied within their individual presentations; five ideas (A-E) for *Double Shot*, six ideas (A-F) for *Blockhouse*, and seven ideas (A-G) for *Sole Injection*. Density schemes are defined as the number of instrumentations and ideas presented simultaneously; solo/duo with one or two ideas in *Double Shot*, solo/duo/trio with one or two ideas in *Blockhouse*, and solo/duo/trio with one, two or three ideas in *Sole Injection*. Each piece has a different basic pattern that provides a

⁴⁵ *Ibid.*

background structure for which musical ideas are assigned in the foreground. In *Double Shot*, the instrumentation pattern that is assigned to the four cells of any given route is [solo-duo-duo-duo] and the number of ideas assigned to that instrumentation pattern is [1-2-1-2]. In *Blockhouse*, the instrumentation pattern that is assigned to the five cells of a route is [solo-duo-trio-duo-trio] and the number of ideas assigned to that instrumentation pattern is [1-2-1-1-2]. In *Sole Injection* the instrumentation pattern that is assigned to the six cells of a route is [solo-duo-duo-solo-trio-duo] and the number of ideas assigned to that instrumentation pattern is [1-2-2-1-3-2]. Browning has commented on use of patterns for the design of density in his compositions.

I use the density patterns for instrumental combinations and number of musical ideas to create a structure that is fixed in the background yet mobile in the foreground. The mobile aspect comes from the changing musical ideas at the surface level. These constantly changing musical ideas are placed within a route according to the fixed background structure and articulate the structure for the listener.⁴⁶

As observed in the analysis of the compositions by Browning, each work displays a distinctive presentation of rhythmic vitality and melodic expression. Powerful musical ideas flow freely from the energy of the performance and from the sounds produced by the instruments. Architecturally each piece is logical and precise, producing compositions that are easily followed by the listener. The recalling of thematic ideas and patterns within his compositions creates a sense of unity, yet their variations produce variety.

Using the magic square as a source for structural inspiration in the background, and classical and/or new compositional techniques applied to musical ideas derived from popular music in the foreground, Browning has created his own individual voice. The three compositions

⁴⁶ *Ibid.*

examined in this study represent a successful model for the future creation of music that combines magic squares and musical techniques. Browning has innovatively challenged the serious classical music tradition but, at the same time, has drawn extensively from the compositional procedures of the past as a resource for his creative process. It is my hope that this research on the music of Zack Browning will help to bring attention to its valuable musical offerings and to contribute to a productive and continuing investigation into contemporary music.

APPENDIX A

LIST OF BROWNING'S COMPOSITIONS (TO DATE)

- 2010 *Flying Tones* for percussion quintet (10 minutes)
- 2010 *Soul United* for soprano and flute, oboe, harp, 2 pianos, 2 violins, 2 cellos (20 minutes)
- 2010 *Silk Dynasty* for violin, erhu, and guzheng (15 minutes)
- 2009 *Moon Thrust* for flute, violin, cello, and percussion (13 minutes)
- 2009 *Hakka Fusion* for flute, viola and piano (12 minutes)
- 2008 *String Quartet* for 2 violins, viola and cello (15 minutes)
- 2008 *Back Speed* for clarinet, guitar, piano, percussion, cello, and double bass (10 minutes)
(Version of Back Speed Double Circuit without computer sounds)
- 2007 *Profit Beater* for flute and percussion ensemble (12 minutes)
- 2007 *Execution 88* for solo piano (12 minutes)
- 2006 *Venus Notorious* for 2 pianos and 2 percussionists (15 minutes)
- 2006 *Flute Soldier* for flute and piano (8 minutes)
- 2006 *Blockhouse* for violin, cello and piano (12 minutes)
- 2005 *Flaming Walls* for trumpet, trombone and piano (8 minutes)
- 2004 *Secret Pulse* for flute, violin, cello and computer-generated sounds (8 minutes)
- 2004 *Howler Back* for saxophone quartet (2 minutes)
- 2004 *Crack Hammer* for clarinet and computer-generated sounds (8 minutes)
- 2003 *Back Speed Double Circuit* for clarinet, guitar, piano, drum set, cello, double bass and computer-generated sounds (10 minutes)
- 2002 *Blacktop Infusion* for piano and computer-generated sounds (8 minutes)
- 2000 *Double Shot* for violin and piano (7 minutes)
- 2000 *System Dominator* for alto saxophone and computer-generated sounds (8 minutes)
- 2000 *Banjaxed* for soprano, violin, piano, drum set and computer-generated sounds (14 minutes)
- 1999 *Funk Assault* for saxophone quartet (8 minutes)
- 1998 *Network Slammer* for amplified flute and computer-generated sounds (9 minutes)
- 1997 *Grid Rock* for 12 trombones and computer-generated sounds (8 minutes)
- 1996 *Sole Injection* for amplified violin and computer-generated sounds (10 minutes)
- 1996 *Broadside* for solo organ (10 minutes)
- 1995 *Pure Sweat* for amplified bass clarinet and computer-generated sounds (7 minutes)
- 1995 *Black Notes (tape version)* for alto saxophone and computer-generated sounds
[Brixton Publications] (5 minutes)

- 1995 *Impact Addiction* for violin, piano, drum set and computer-generated sounds (8 minutes)
- 1994 *Breakpoint Screamer* for five trumpets and computer-generated sounds (7 minutes)
- 1993 *Trilimital Adversary: Cold Cuts* for trumpet, piano, double bass, drum set and computer-generated sounds (10 minutes)
- 1993 *Tear Open The Heavens* for SATB Choir and organ (4 minutes)
- 1991 *Seascape* for clarinet and piano (11 minutes)
- 1991 *Blue Ride* for trumpet and piano (11 minutes)
- 1989 *Pattern Play* for trumpet, trombone and piano (11 minutes)
- 1988 *Second Sun* for soprano, flute, electric guitar and double bass (10 minutes)
- 1987 *Coming Up Sevens* for xylophone, vibraphone, marimba, piano and electric guitar (9 minutes)
- 1987 *Black Notes* for alto saxophone and piano (5 minutes) [Brixton Publications]
- 1986 *In Time* for violin, cello, DX-7 synthesizer and drum set (9 minutes)
- 1985 *For The Funk Of It* for tuba and piano (5 minutes) [Brixton Publications]
- 1985 *Melancholia* for piccolo trumpet and piano (6 minutes) [Manduca Publications]
- 1985 *Akhanda* for trumpet and percussion (14 minutes)
- 1984 *Sun Sets* for soprano, two trumpets and piano (8 minutes)
- 1983 *In The Garden Of Thedas* for trombone, double bass, harpsichord and percussion (7 minutes)
- 1981 *Dialogue* for trumpet and cello (7 minutes)
- 1981 *Crossings* for percussion, tape, slides and lights (10 minutes)
- 1980 *Zece* for solo piano (10 minutes)
- 1980 *Refrain* for solo amplified trumpet (7 minutes) [Manduca Publications]
- 1979 *Variables* for flute, oboe, viola, double bass, harp, and percussion (11 minutes)
- 1978 *Quintet for Winds* for flute, oboe, clarinet, horn, and bassoon (14 minutes)
- 1977 *Concerto for Brass and Percussion* for brass ensemble, piano and percussion (12 minutes)
- 1976 *String Quartet* for two violins, viola and cello (12 minutes)
- 1976 *Quartet* for soprano, flute, cello, and percussion (12 minutes)
- 1975 *Thunder Roll* for piano and three percussionists (10 minutes) [Brixton Publications]
- 1975 *Elegy* for cello and piano (8 minutes)
- 1975 *Movements* for Brass Quintet for two trumpets, horn, trombone, and tuba (10 minutes)
- 1974 *Music for Oboe and Piano* (6 minutes)
- 1974 *Suite Time* for flute, clarinet, and bassoon (12 minutes) [Brixton Publications]

APPENDIX B

MAGIC SQUARES ASSOCIATED WITH THE SEVEN PLANETS OF THE PTOLEMAIC UNIVERSE

Saturn (3x3) = 15		
4	9	2
3	5	7
8	1	6

Jupiter (4x4) = 34			
4	14	15	1
9	7	6	12
5	11	10	8
16	2	3	13

Mars (5x5) = 65				
11	24	7	20	3
4	12	25	8	16
17	5	13	21	9
10	18	1	14	22
23	6	19	2	15

Solar (6x6) = 111					
6	32	3	34	35	1
7	11	27	28	8	30
19	14	16	15	23	24
18	20	22	21	17	13
25	29	10	9	26	12
36	5	33	4	2	31

Venus (7x7) = 175						
22	47	16	41	10	35	4
5	23	48	17	43	11	29
30	6	24	49	18	36	12
13	31	7	25	43	19	37
38	14	32	1	26	44	20
21	39	8	33	2	27	45
46	15	40	9	34	3	28

Mercury (8X8) = 260							
8	58	59	5	4	62	63	1
49	15	14	52	53	11	10	56
41	23	22	44	45	19	18	48
32	34	35	29	28	38	39	25
40	26	27	37	36	30	31	33
17	47	46	20	21	43	42	24
9	55	54	12	13	51	50	16
64	2	3	61	60	6	7	57

Lunar (9x9) = 360								
37	78	29	70	21	62	13	54	5
6	38	79	30	71	22	63	14	46
47	7	39	80	31	72	23	55	15
16	48	8	40	81	32	64	24	56
57	17	49	9	41	73	33	65	25
26	58	18	50	1	43	74	34	66
67	27	59	10	51	2	43	75	35
36	68	19	60	11	52	3	44	76
77	28	69	20	61	12	53	4	45

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