

ABSTRACT

Title of Dissertation: *SCORDATURA IN THE ACCOMPANIED VIOLONCELLO REPERTOIRE OF JACOB KLEIN, PETER RITTER, AND ERIC MALMQUIST*

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Ever since a ‘standard’ tuning existed for the violoncello, certain composers have chosen to alter this tuning, a technique known as *scordatura*, in order to achieve various effects on the sound and technique of the instrument. Current scholarship on *scordatura* in the cello repertoire focuses primarily on its use in compositions prior to and including Johann Sebastian Bach’s Fifth Suite in C minor and in twentieth century compositions beginning with Zoltán Kodály’s Sonata for solo cello, Op. 8. Little attention has been given to *scordatura* compositions contemporary with Bach’s Fifth Suite and continuing through the nineteenth century. Moreover, discussions of *scordatura* across the entire string literature have skewed toward its use to facilitate technique. In doing so, scholars have underplayed the effect of *scordatura* on the resonance of the instrument. Of the scholarly writings that do address this subject, the discussion is frequently limited to broad references, such as increasing the projection

of an instrument or altering its tone. The research stops short of explaining the physics behind these results.

The following study aims to provide a more thorough understanding of how altered tuning of the violoncello strings affect the resonance of the instrument, and how this resonance affects the overall aural impression of the composition. It then examines the use of scordatura in two little-known compositions from the eighteenth and nineteenth centuries and one newly-commissioned work.

The dissertation project encompasses five components in total. The first component is a recital of Jacob Klein's complete Op. 1 sonatas and Eric Malmquist's Sonata for Cello and Piano, the video of which is accessible in the Digital Repository at the University of Maryland. The second component is the written document. The third and fourth components are modern editions of Jacob Klein's and Peter Ritter's compositions, created by the author to facilitate the performance and study of these works. The final component is the score for Eric Malmquist's work, included with permission from the composer. The scores and the program for the recital are located in the appendices.

SCORDATURA IN THE ACCOMPANIED VIOLONCELLO REPERTOIRE OF
JACOB KLEIN, PETER RITTER, AND ERIC MALMQUIST

by

Andrew Douglas Doran Hesse

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Preface

The impetus behind the following study was the author's previous research into Zoltán Kodály's Solo Sonata, Op. 8. In researching the work, the author uncovered several claims detailing the abandonment of scordatura in unaccompanied cello literature during the eighteenth and nineteenth centuries. These claims led to a search for any use of the technique in cello literature during that period. It was discovered that, while a few such compositions do exist, they are largely absent from the modern cello repertoire.

Nearly all of the scordatura compositions discovered during the course of research were out of print, a significant hurdle toward their performance. One aim of this study is to expand the 21st century cellist's repertoire to include previously inaccessible works. Consequently, this study only includes examples of the out-of-print compositions. This qualification eliminated the study Carlo Graziani's Sonata in D Major (1778), which, although it employs an altered tuning of *D–A–d–a*, was published in a 1997 edition edited by Mara E. Parker. Likewise eliminated was Klein's Sonata for Two Violoncellos in G Major, Op. 2, Sonata No. 6, which is currently published by Schott Music. Further considerations relating to availability and legibility of primary source material lead to the decision to include the present works by Jacob Klein and Peter Ritter.

In order to improve the study and ultimate performance of these pieces, the author created scores for Jacob Klein's and Peter Ritter's works, found in the appendices. The concerto by Peter Ritter posed particular challenges owing to the fact

that only the parts have survived, as maintained by the Library of Congress. In absence of a score, the author's judgement was used, for example, where dynamics were found in some instrumental parts but not in others, or where the indicated number of measures of rest in a part conflicted with the overall form of the movement. The author made an attempt to faithfully maintain the markings of the original facsimiles, except where he was sufficiently confident of such copy errors.

The system of pitch nomenclature used throughout this dissertation is that favored by *Grove Music Online*, which is adapted from the system devised by Hermann von Helmholtz. Specific pitches on the staff are denoted in italics using a combination of upper and lower-case letters in combination with the prime symbol (*C'*, *C*, *c*, *c'*). By contrast, non-italicized capital letters denote pitch classes. Individual string names are also identified by non-italicized capital letters (A string), while references to different tunings of the instrument identify the specific pitches from lowest to highest string (*C–G–d–a*).

There is an inherent challenge in notating scordatura compositions. Namely, if the notes appear on the staff at 'sounding' pitch, the performer may have difficulty locating the position of the fingers on the fingerboard. Most composers address this through the use of 'hand-grip' notation, in which the notes appear on the staff where they would be played in standard tuning. The altered tuning causes these written notes to sound at the pitches the composer intended. All musical examples in this dissertation pertaining to the solo cello part are provided in 'written' pitch, as opposed to 'sounding' pitch, unless noted otherwise. However, descriptions of pitch within the text refer to 'sounding' pitch exclusively.

Dedication

I would like to dedicate this dissertation to my wife, Molly, and our two sons, Isaac and Oliver, who inspire me to be my best self on a daily basis.

Acknowledgements

The completion of this project would not be possible without the support of the faculty and staff at the University of Maryland. I am particularly indebted to Dr. James Stern, who accepted the role of committee chair and advisor in the absence of a permanent cello professor at the time research began.

I would also like to acknowledge the support of cellist William Cernota, who has served tirelessly as an advocate, sounding board, colleague, mentor, teacher, and friend throughout this process and over the past 15 years.

Additional gratitude goes to my mother-in-law, Joy Doran, for commissioning a new scordatura composition, and to my dear friend, Eric Malmquist, for composing it. Mr. Malmquist also generously permitted the inclusion of the score for his sonata in this dissertation to facilitate its study by future readers.

Most importantly, I would like to extend never-ending thanks to my entire family, and in particular my parents and my wife's family, who have given me the gift of time by providing childcare and help around the house as I worked to achieve this long-time goal.

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Introduction

Imagine the following scenario: you eagerly await the start of a performance by a major symphony orchestra. The concertmaster arrives on stage and signals for the principal oboist to give the tuning note. Members of the cello section dutifully place their bows on the top string of their instrument. Violins, violas and double basses likewise locate the string corresponding with the universal tuning note. But, instead of some octave variant of the *a'* given by the oboist, the instruments generate a cacophony of different pitches: a *g* or *b \flat* in the cello section, perhaps a *c \sharp '* from an adventuresome violinist. The scenario might elicit memories of elementary school orchestra, but there is actually a historical basis for tuning the strings of an instrument differently, a technique known as scordatura.

For most string players, the pitches of the four strings (perhaps five for double basses) are foundational to playing the instrument. They form the basis of intonation; a cellist, for example becomes accustomed to the way a *d'*, when played on the A string, causes the first harmonic of the D string resonate sympathetically. Young musicians may even associate the lines and spaces on the staff with fingerings before they learn the note names. Much like the letters on a computer keyboard, string players rely on the notes being in a predictable and consistent geographical position based on their pitch. However, the pitches of the four open strings were not always so rigidly established and, even after their canonization, certain composers chose to alter the tuning of the instrument.

The purpose of this study is twofold: (1) to bring a greater awareness to the acoustical and physical effects of scordatura, thereby proving that the technique offers results which cannot be replicated by alternate methods of composition and (2) to bring attention to three heretofore little-known or unknown compositions for the violoncello written in scordatura. Some attention will be given to the technical implications of tuning the instrument differently for the performer, but the greater focus is on the effects of altered tuning on resonance of the instrument.

The written study is broadly divided into three parts. The first part defines scordatura as a technique born out of the history of the instrument. The second part addresses the physics of the violoncello, including the implications of scordatura on the sound of the instrument. The third part provides background and analysis of the three scordatura compositions in question.

In conjunction with the written document, the author performed a recital of Jacob Klein's complete Op. 1 sonatas and Eric Malmquist's Sonata for Cello and Piano, in collaboration with cellist William Cernota, harpsichordist Thomas Edward Zeman, and pianist Joy Doran. The program for this recital may be found in the appendices and the recording is accessible through the Digital Repository at the University of Maryland. Complete scores for the three works are also found in the appendices. The author created a modern edition of Klein's sonatas from the copper engraving facsimiles in order to facilitate performance by future cellists. Similarly a score for Ritter's concerto was created from the parts housed at the Library of Congress so that the work might be performed by orchestra at a future date. Malmquist's Sonata is included with the composer's permission.

Chapter 1 Defining Scordatura

Section 1. Origins of the Violoncello: Identifying a 'Standard'

Scordatura is taken from the Italian verb, *scordare*, meaning 'to mistune'. This begs the question, "Mistuned from what?" In order for scordatura to exist as a technique, there must first be a tuning accepted as 'standard'. In the case of the cello, and for the purpose of this study, the standard tuning of the instrument is accepted to be *C-G-d-a*.

When discussing a technique such as scordatura, which challenges the established tuning of the instrument, the history of the instrument from which the normal tuning was established must be addressed for a full understanding of the technique. The intent of this study is not to relay the full history of the cello, which has been thoroughly examined by qualified scholars. For the purposes of this study a broad knowledge of the instrument's history, with particular emphasis on tuning, will suffice.

The early history of the violoncello is difficult to trace. Stephen Bonta highlights the various names given to the bass member of the violin family in early treatises: *Bas de violon* (Jamba de Fer, C1556), *Basse de violon* (Mersenne, 1636), *Basso di viola da braccio* (Zacconi, 1592), and *Bass Viol de Braccio* (Praetorius, 1619).¹ Further complicating matters, at least two different tunings of the instrument were accepted to be normal. Of the treatises from the early sixteenth century to the

¹ Stephen Bonta, "From Violone to Violoncello: A Question of Strings?" *Journal of the American Musical Instrument Society* 3 (1997): 66.

mid-seventeenth century, most favor a tuning of $B\flat'-F-c-g$. However, $C-G-d-a$ also figures prominently. Moreover, there does not seem to be a strict timeline regarding which tuning was to be used. Bonta argues that the different tunings may have been geographic in nature, with Italian composers overwhelmingly showing preference for the higher tuning.² Mark Chambers makes the case for a third tuning to be considered standard by way of its common use by composers including Domenico Gabrielli, Benedetto Marcello and Della Bella: $C-G-d-g$.³

The terminology used in describing the violoncello is further confused recognizing that the size of the instrument was not standardized until the early eighteenth century. Bonta proposes that, from 1620 to 1680, use of the term *violone* was intended for a non-transposing, bass member of the violin family.⁴ The dimensions of this instrument were somewhat larger than the modern violoncello, largely by necessity of the material used for the strings: unwound sheep's gut. As Bonta argues, in order to achieve the desired thickness of strings it was necessary to make the vibrating length of the strings as long as possible, within the confines of the human body. This restriction was lifted with the invention of wire-wound strings in the 1660s. By winding the lower strings in silver wire, their density was increased. This allowed for a shorter vibrating string length while maintaining the same thickness as the longer unwound gut string. A shorter vibrating string length allowed

² Ibid., 3

³ Mark Chambers, "The 'Mistuned' Cello: Precursors to J.S. Bach's Suite V in C Minor for Unaccompanied Violoncello" (DMA diss., The Florida State University, 1996), 11.

⁴ Bonta, "Violone," 9.

for a smaller instrument in general, which fulfilled the same bass role as the larger violone. It was around this time that the term *violoncello* began to appear. Giulio Cesare Arresti is credited with the first printed use of the term in his *Sonate Op. 4* of 1665.⁵ By the late seventeenth century, the term had emerged as the predominant name for the bass member of the violin family, although other names continued to be used well into the eighteenth century, particularly in France and England.

Even after the invention of wire-wound strings, makers were reluctant to abandon the larger bass violin, which many felt was desirable for certain types of music. Antonio Stradivari, the famous Italian violin maker, was still using a larger model at the turn of the eighteenth century, as exemplified by his ‘Servais’ cello of 1701. As late as 1752, Johann Joachim Quantz describes the need for cellos of two sizes depending on the intended use: orchestral or solo.⁶ The increased popularity of the smaller model, which was easier for the performer to navigate, appears to directly coincide with the treatment of the cello as a more virtuoso instrument. Whether the availability of a smaller instrument pushed composers to compose more virtuosic repertoire for the instrument, or vice-versa, the two occurrences are undeniably intertwined. Stradivari developed his “forma B” around 1707 and the model would come to serve as the standard for luthiers for generations.⁷

⁵ Stephen Bonta, Suzanne Wijsman, Margaret Campbell, Barry Kernfeld, and Anthony Barnett, “Violoncello,” *Grove Music Online*, accessed February 26, 2018, <http://www.oxfordmusiconline.com>.

⁶ *Ibid.*

⁷ Charles Beare, Carlo Chiesa, and Duane Rosengard, “Stradivari, Antonio.” *Oxford Music Online*, accessed February 26, 2018, <http://www.oxfordmusiconline.com>.

By now it should be apparent that identifying and labeling the use of scordatura in a composition for the violoncello during the seventeenth century is not as straightforward as one might expect. The existence of multiple ‘standard’ tunings gives pause to overuse of the term. This problem appears to be more specific to the violoncello than to the violin, which developed a standard tuning at an earlier date.

Perhaps the most famous of all scordatura works is Franz Biber’s *Rosary (or Mystery) Sonatas*, a collection of fifteen sonatas and a passacaglia for violin and continuo completed 1676. Of these, fourteen sonatas employ the technique of scordatura, and each of these is preceded clearly by an incipit identifying the tuning of the instrument to be used (Figure 1.1).



Figure 1.1: Manuscript of Franz Biber's *Mystery Sonata No. 2*, containing incipit for the instruction of scordatura.⁸

The solo violin part is written in what has come to be known as ‘hand-grip’ notation, which instructs the proper positioning of the left hand as though the instrument was tuned normally.

By contrast, Domenico Gabrielli’s seven *Ricercari* for unaccompanied violoncello of 1689 contain no such instruction regarding altered tuning, despite

⁸ Heinrich Ignaz Franz, *Mystery (Rosary) Sonatas*, Manuscript, BSB Mus. ms.4123, n.d., ca.1678, accessed March 22, 2018. IMSLP Petrucci Library.

overwhelming evidence that the tuning of *C-G-d-g* should be used. Mark Chambers argues that the “Italian” tuning used in Gabrielli’s *Ricercari* would not have been considered scordatura. It was used frequently enough and in a certain geographic location that the performer was expected to recognize the intended tuning without any further instruction.

Just a decade after Gabrielli, Luigi Taglietti’s *Cappricio* of 1697, which uses the same tuning, bears the instruction *Discordatura* and contains an incipit instructing the altered tuning in the same manner of Biber. *Cappricio* thereby becomes the first known scordatura composition for violoncello.⁹ By the end of the seventeenth century, *C-G-d-a* had become sufficiently standardized that compositions using alternate systems of tuning could be considered truly scordatura.

Section 2. The Types and Effects of Scordatura

For the purpose of the present study, scordatura will be classified into two groups. If the four strings of the instrument are each altered proportionately, the result is referred as a ‘transposition scordatura’.¹⁰ All other altered tunings will be considered ‘unequal scordatura’. Theodore Russell, in his 1938 article on violin scordatura, identifies three situations in which scordatura might be employed:

- (1) To make certain types of passages easier to play, such as those involving large intervals, rapid passages in double-stops of various intervals, and even whole

⁹ Chambers, “The ‘Mistuned’ Cello,” 37.

¹⁰ Several authors, including Mark Chambers in his contribution to the *Grove* entry for “Scordatura,” refer to methods of tuning in which the four strings are each increased by either a half tone or whole tone as a ‘transcription scordatura’. The author believes that ‘transposition scordatura’ is a more suitable term due to the parallels with other transposing instruments, in which the music is written in one key and sounds in another.

compositions written in difficult keys; (2) to vary the tone color of the instrument by changing considerably the tension of one or more strings; (3) to extend the range of the instrument by lowering the G string, thus oftentimes providing a fair bass for chords.

The effect of scordatura on playability is well documented in existing research. For example, in his analysis of the following sonatas by Jacob Klein, Mark Chambers highlights the ways in which technical requirements are simplified through the use of scordatura.¹¹ While this method of analysis is valid and perhaps justified, it results in a largely performer-centric perception of such compositions. This is particularly true of transposition scordatura, where one could argue that the composer could have simply written in a different key and altered the accompaniment parts accordingly. The use of scordatura to expand the range of the instrument is undoubtedly important, but is limited, as Russell notes, to those compositions in which the lowest string is altered downward.

For these reasons, the present study is primarily interested in the use of scordatura to affect what Russell describes as the tone color of the instrument, or what is otherwise known as timbre. This is a property of psychoacoustics relating to the perceived sound quality of the instrument. While tone color is subjective, it is intrinsically related to physical properties of the instrument, including its resonance and the prevalence of partials. As the study will show, these properties are effected in different ways by both transposition scordatura and unequal scordatura. It seems to this author that affecting these and other physical properties of the instrument is the only result of scordatura that cannot otherwise be replicated either by changing the

¹¹ Chambers, "The 'Mistuned' Cello," 37.

key of a composition (in the case of a transposition scordatura) or altering passages so that they are better-suited to standard tuning (in the case of unequal scordatura).

Chapter 2 The Physics of the Violoncello

Section 1. Marin Mersenne's Laws and the Principles of Vibrating Strings

In order to understand the effect of scordatura on resonance, we must first explore a few basic principles of vibrating strings. Marin Mersenne, in his *Traité de l'harmonie universelle* of 1637, codified what was previously known of the frequency of a stretched string into three fundamental principles. For a stretched string of given material, its frequency is: (1) inversely proportional to its length, (2) directly proportional to the square root of the tension, and (3) inversely proportional to the square root of its linear mass density.

The first law, although intuitive for string players and paramount for the actual playing of the instrument, has little bearing on the present study. The vibrating string length on a given instrument is constant and cannot be changed significantly without making significant alterations to the instrument.

The third law has previously been mentioned with regards to the invention of the wire-wound string and will be discussed further as it pertains to the inherent differences between the four strings on the instrument. However, in the discussion of scordatura, we will assume that the linear mass of the string remains constant, noting that this property can only be altered by changing the string itself. Although there is theoretically an infinite range of string masses available, it is both impractical for the performer to change strings in order to perform scordatura compositions and, as will be discussed, potentially counterproductive to the composer's intention. Therefore, let us assume that adjusting tension is the sole intended means of changing the frequency

of a string for scordatura. A more thorough examination of Mersenne's second law is warranted. Given a string of frequency f and tension T , Mersenne's second law states that:

$$f \propto \sqrt{T}$$

or

$$f = c \cdot \sqrt{T} \text{ or } \frac{f}{\sqrt{T}} = c, \text{ where } c \text{ represents a constant}$$

Equation 1: Mersenne's second law relating the frequency of a string to its tension

In other words, the ratio of frequency to the square root of tension is constant. Let us take, as an example, a string tuned to frequency f_1 of 220 Hz at a tension T_1 of 100 N, where N is Newtons, the metric unit of force. What is the tension of the same string if the frequency is increased to 246.94 Hz, a whole tone higher?

$$\frac{f_1}{\sqrt{T_1}} = c = \frac{f_2}{\sqrt{T_2}}$$

$$f_1 \cdot \sqrt{T_2} = f_2 \cdot \sqrt{T_1}$$

$$\sqrt{T_2} = \frac{f_2 \cdot \sqrt{T_1}}{f_1} = \frac{246.94 \text{ Hz}}{220 \text{ Hz}} \cdot \sqrt{100 \text{ N}}$$

$$T_2 = \left(\frac{246.94 \text{ Hz}}{220 \text{ Hz}}\right)^2 \cdot 100 \text{ N} \cong 126 \text{ N}$$

Equation 2: Calculating the increased tension resulting from increasing the frequency of an open string by an amount equivalent to a whole tone

By increasing the frequency of the string by approximately 12.25%, its tension has increased by nearly 26%. Note that the change in frequency, and thereby the change in tension, between two notes is determined by the size of the interval and bears no relation to the frequency of the starting pitch. In other words, just as ascending by octave always doubles the frequency, ascending by a whole tone increases the

frequency by 12.25% whether the starting note is $C' = 65.4$ Hz or $a'' = 880$ Hz. This point, though perhaps intuitive, will become important as we discuss the effects of string tension on the body of the instrument. Figure 2.1 shows the relationship between frequency and tension of a string with a tension of 100 N at 220 Hz. The plotted points in the positive direction represent the frequency and tension as the string is raised by semitones. Likewise, the plotted points in the negative direction represent the frequency and tension as the string is lowered by semitones. We see that as the frequency doubles, the tension increases fourfold.

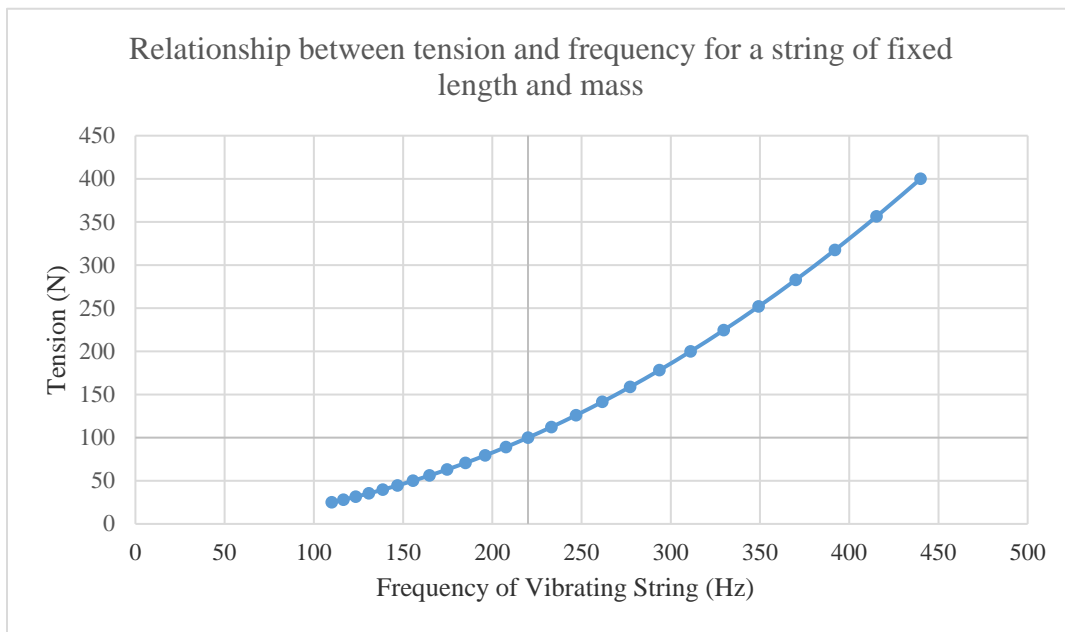


Figure 2.1: Relationship between tension and frequency for a string of fixed length and mass

Section 2. Influences of String Tension

The relationship between tension and frequency is important to examine from two perspectives: (1) that of the individual string and (2) that of the body of the instrument.

Influence of Tension on the Properties of the Individual String

A string has a limited range of what might be considered ‘practical tension’. The maximum tension is determined by the string’s tensile strength, the pulling force beyond which the string will break. All string players have likely unwittingly found a string’s tensile strength by carelessly tuning it above its intended pitch. Historically, Judy Tarling points to multiple sources indicating that this may have actually been the preferred method of establishing the tuning pitch of an instrument. Tarling cites, among others, Martin Agricola’s instructions of 1529:

The treble of the fiddle family is tuned as high as it can stand. Tune the highest string so high that it cannot stand one more turn.¹²

The minimum tension is a bit more complicated and is related specifically to the reaction of the string to the force of bowing. Hermann von Helmholtz (1821–1894) was a pioneer across many scientific fields, but his role in studying the vibrating motion of a string as the bow is drawn across formed the foundation for all who followed him. As summarized by Thomas Rossing, Helmholtz was the first to discover that, although the string appears to vibrate back and forth smoothly, in actuality it,

more nearly forms two straight lines with a sharp bend at the point of intersection. This bend races around the curved path that we see, making one round trip each period of the vibration.¹³

¹² Judy Tarling, *Baroque String Playing for Ingenious Learners* (St. Albans, Hertfordshire: Corda Music, 2001), 194.

¹³ Thomas D Rossing, *The Science of String Instruments* (New York: Springer, 2010), 197.

Rossing goes on to describe how this is related to what has come to be known as the *stick* and *slip* motion of the string relative to the moving bow. As the bow travels across the string, there are points at which the string is ‘captured’ by the bow and carried along at the same speed of the bow, and points at which the string detaches from the bow and “moves rapidly back until it is caught by the moving bow again.”¹⁴ There is a minimum and maximum bowing force needed to trigger this *stick* and *slip* motion. As Lothar Cremer proves, the minimum bowing force increases along with bowing speed, i.e. to move the bow quickly requires a higher minimum bowing force.¹⁵ Furthermore, as the bow moves closer to the bridge, both the minimum and maximum bowing force increase, and the margin between them decreases. What this all means in terms of string tension is that a string with very low tension would have to be played extremely close to the bridge with little margin of error. A simple experiment backs these findings: tune the highest string of the instrument to match the next lowest and one will find that the range of contact point and bowing force to produce a ‘good’ tone are greatly diminished.

To take things a step further, consider the frequencies of open strings on a cello tuned to $a' = 440$ Hz. The A string would be tuned to 220 Hz, while the C string would be tuned to 65.4 Hz. In order to use a single string of constant length and mass, it would need to cover this range. Let us examine this as it applies to a high-tensioned string commercially available at the time of writing. String manufacturers today

¹⁴ Ibid., 197

¹⁵ Lothar Cremer, *The Physics of the Violin* (Cambridge, Mass.: MIT Press, 1984), 72.

commonly provide tension in units of pound force rather than Newtons (1 lbf \approx 4.45 N). According to the figures provided by Aitchison & Mnatzaganian Cello Specialists, the highest-tensioned A strings commercially available today have a tension of approximately 40 lb.¹⁶ By using Mersenne's second law, we can see that the tension required to produce a frequency of 65.4 Hz would be,

$$T_2 = \left(\frac{65.4 \text{ Hz}}{220 \text{ Hz}}\right)^2 \cdot 40 \text{ lb} = 3.5 \text{ lb}$$

When viewed in these terms, it becomes clear that the frequency range of the cello far exceeds the practical tension range of a single string. In fact, for much of the seventeenth and eighteenth centuries, it was thought that an ideal set of strings should be equal in tension across its range.¹⁷ Mersenne's third law dictates that a string of greater mass will have a lower vibrating frequency than a string of lesser mass, provided that the strings are of the same length and tension. In order to maintain equal tension between the A string and the C string, we can calculate the relative mass of the C string using Mersenne's third law:

$$f \propto \frac{1}{\sqrt{\mu}}$$

$$f_1 \cdot \sqrt{\mu_1} = f \cdot \sqrt{\mu_2}$$

$$\mu_2 = \left(\frac{f_1}{f_2}\right)^2 \cdot \mu_1 = \left(\frac{220 \text{ Hz}}{65.4 \text{ Hz}}\right)^2 \cdot \mu_1 = 11.3\mu_1$$

Equation 3: Application of Mersenne's third law relating the frequency of a string to its linear mass density

¹⁶ Aitchison & Mnatzaganian Cello Specialists n.d., "Selected Cello String Tensions 1922 – 2016," accessed March 12, 2018, <http://www.aitchisoncellos.com/publications/cello-and-bow-articles/string-and-case-reviews/string-tension-charts/>

¹⁷ Tarling, *Baroque*, 245.

The linear mass density of the string must be increased eleven times over to maintain the same tension. The linear mass density of a string is a function of its mass divided by its length. For a given instrument, the length may be assumed to be constant. Therefore, the only variable we have control over is the string's mass, which is a product of volume and density. It follows that the linear mass density can be increased by either increasing a string's volume (by increasing its thickness), its density (by changing its material), or some combination of the two. Prior to the discovery of methods of winding strings with wire, the only way to increase a string's mass was by increasing its thickness. One can imagine the difficulty in playing on a C string of such thickness. It therefore becomes clear why altering the density of a gut string by means of metal winding was a groundbreaking achievement for string makers in the seventeenth century.

Influence of String Tension on the Body of the Instrument

From the perspective of the body of the instrument, four strings under tension exert considerable force on the bridge and, thereby, on the belly of the instrument. The amount of force is dependent on the tension of the individual strings as well as the angle of the strings passing over the bridge. Let us consider an instrument with four equal-tensioned strings of 100 N. We will define 'string break angle' as the total angle by which these strings pass over the bridge. For the following examples, we will use a string break angle of 154 degrees, a standard commonly identified by modern luthiers. We will also assume that the bridge perfectly bisects this angle.

Figure 2.2 diagrams the forces at work on the bridge under these conditions.

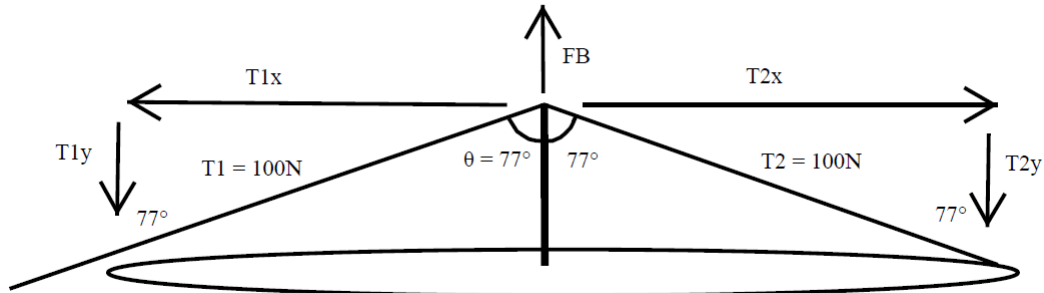


Figure 2.2: Force diagram of the violoncello in static state

The force of tension of the string is broken up into its ‘horizontal’ components (those perpendicular with the bridge and identified as T_{1x} and T_{2x}) and its ‘vertical’ components (those parallel with the bridge and identified as T_{1y} and T_{2y}). We can determine the tension of the string in the y-axis, representing the force exerted downward on the bridge, using basic principles of trigonometry.

$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}} = \frac{T_{1y}}{T_1}$$

$$T_{1y} = \cos 77 \cdot 100 \text{ N}$$

$$= 22.5 \text{ N}$$

Equation 4: Calculating the downward force exerted by a string under tension passing over the violoncello bridge at an angle of theta.

As seen in Figure 2.2, the total downward force of the string, T_y , is double this figure, assuming equal angles on both sides of the bridge.

Let us define ‘normal bridge force’ (F_B) as the force by which the bridge counters the downward force exerted by four strings under tension. It is simply the sum of the downward force produced by each string individually.

$$F_B = T_{yA} + T_{yD} + T_{yG} + T_{yC}$$

$$\begin{aligned}
&= 2 (\cos 77^\circ \cdot T_A + \cos 77^\circ \cdot T_D + \cos 77^\circ \cdot T_C + \cos 77^\circ \cdot T_C) \\
&= 2 \cdot \cos 77^\circ \cdot (T_A + T_B + T_C + T_D)
\end{aligned}$$

Equation 5: Calculating normal bridge force given the tension and angle of four strings

Given four strings of equal tension, the normal bridge force under the described conditions would be

$$\begin{aligned}
F_B &= 2 \cdot \cos 77^\circ \cdot (T_A + T_B + T_C + T_D) \\
&= 2 \cdot \cos 77^\circ (400 \text{ N}) \\
&\cong 180 \text{ N}
\end{aligned}$$

Equation 6: Calculating the normal bridge force of four strings at a total tension of 400N and a string break angle of 154 degrees

It becomes clear that normal bridge force is directly proportional to string tension given a constant string break angle. If the tension of each string is increased sufficiently to raise the pitch by a whole tone (previously calculated in Equation 2), the normal bridge force is increased proportionately by the same figure of 26%:

$$F_B = 2 \cdot \cos 77^\circ (126 \text{ N} + 126 \text{ N} + 126 \text{ N} + 126 \text{ N}) \cong 227 \text{ N}$$

Equation 7: Calculating the increase in normal bridge force of instrument tuned up by a whole tone

Up to this point, we have examined the effects of string tension on normal bridge force using examples of equal-tensioned strings for illustrative purposes. However, from the above equation, we see that normal bridge force can be calculated from the net force of tension between the four strings, as long as the string break angle of each string is assumed to be constant. Therefore, the same principles apply given four strings of different tensions. Consider the following example of one of the most popular sets of strings used by cellists at the time of this writing, Thomastik Infeld's *Versum*. The manufacturer again provides string tension for each string in

units of pound force: A = 38.8 lb, D = 31.5 lb, G = 31.5 lb, C = 30.2 lb.¹⁸ The normal bridge force resulting from the set is calculated as follows:

$$\begin{aligned}F_B &= 2 \cdot \cos 77 (38.8 \text{ lb} + 31.5 \text{ lb} + 31.5 \text{ lb} + 30.2 \text{ lb}) \\&= 2 \cdot \cos 77 (132 \text{ lb}) \\&= 59.4 \text{ lb}\end{aligned}$$

Equation 8: Calculating the force exerted on the bridge by a commercially available set of steel strings

If the tension were increased on each string sufficiently to raise its pitch by whole tone the normal bridge force would be increased proportionally.

Influence of String Break Angle on Normal Bridge Force

As previously mentioned, ‘string break angle’ is the second factor influencing normal bridge force. This angle is determined by the angle of the neck and the height of the bridge: a higher bridge will result in a more acute angle, as will a neck that is set further back. It is commonly accepted that most instruments of the baroque period had a neck angle closer to parallel with respect to the table of the instrument and a lower bridge height when compared to modern instruments. In the efforts of increased projection, the neck angle of many surviving instruments was reset and the bridge raised. Let us consider the example an instrument with a string break angle of 160 degrees, more indicative of the historical setup. Compared to the prior 154 degree setup, the normal bridge force is reduced by 23%, as calculated in Equation 9:

$$F_B = 2 \cdot \cos 80 (400 \text{ N}) = 139 \text{ N}$$

Equation 9: Calculating the effects of altering the string break angle on normal bridge force

¹⁸ Thomastik Infeld Vienna, accessed March 18, 2018, <http://versum.thomastik-infeld.com/versum>

While string break angle is of considerable interest historically, it can be largely disregarded for the present study. To the extent that the vibrating length of the string is not altered, string break angle as a variable is entirely independent of string tension and frequency. In other words, a string of equal length, tension, and linear mass will have the same frequency regardless of whether the string break angle is 91 degrees or 179 degrees. Similarly, altering the tension of a string as a means of achieving scordatura will have no impact on the string break angle. Therefore, in the case of scordatura, string tension is the sole variable for determining changes in normal bridge force.

Influence of Tension on Projection

We have not yet addressed the impact of greater or lesser force on the sound of the instrument. String tension tends to be a contentious topic among performers and scholars alike. Conventional wisdom is that instruments of the Baroque era were under considerably less force than their modern counterparts, owing both to a lower net string tension and to the greater string angle over the bridge. Paul Laird, in his book *The Baroque Cello Revival: An Oral History*, provides counterevidence to the first variable. Laird suggests that more recent research into the use of equal tension strings has determined that string tension during the Baroque period was likely much higher than previously credited. Lothar Cremer, a foremost authority on violin acoustics, offers the following definitive stance on the subject:

In the course of the evolution of the violin, the tension of the string increased considerably; the construction of the body was changed to accommodate the higher tension. As is well known, these developments led to an increase in loudness. [Mass per unit length], too, was increased with the introduction of

metal-wound strings. In both cases, these changes reached a limit which, as was discovered empirically, could not be safely exceeded.¹⁹

Regardless of one's stance on the merits of higher string tension, there is little dispute that it does have some impact on the projection of the instrument. If, as Cremer suggests, it was the increase in string tension that brought about other changes to the instrument, one must question which variable can be credited with affecting the loudness of the instrument. This topic will be addressed in greater detail as it relates to the body of the instrument.

Section 3. *Partials and the Harmonic Series*

Since at least the time of Pythagoras, it has been accepted that pure musical intervals follow strict arithmetical terms. The length of a vibrating open string is defined by the distance between the nut and the bridge. At its *fundamental* vibrating frequency, a string contains two nodes, one at either end of the string, where the string does not vibrate, and one antinode, in the middle of the string, where the displacement of the string is at its maximum. The wavelength, λ , of the string, the distance over which the wave repeats, is therefore twice the string length, $\lambda=2L$ (Figure 2.3).

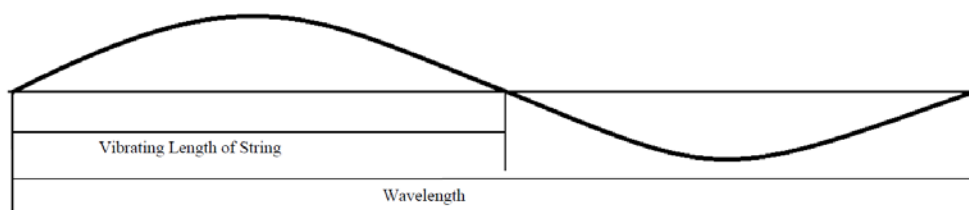


Figure 2.3: Illustration of wavelength of a string vibrating at its fundamental mode

¹⁹ Cremer, *The Physics of the Violin*, 47.

However, a string does not only vibrate at its fundamental frequency. It is also capable of vibrating at all harmonics, or overtones, of that frequency. The fundamental and its overtones are collectively referred to as partials, where the fundamental is the first partial, the first overtone is the second partial, and so forth. These partials follow a mathematical relationship whereby the wavelength for each successive partial is decreased by an ascending integer according to the formula $\lambda=2L/n$ (where λ is wavelength, L is the vibrating length of the string, and n is the integer corresponding to the partial). For example, the second partial will have a wavelength equal to the string length, or half that of the fundamental. Three nodes are present, one at either end of the string and one in the middle, and two antinodes, one $\frac{1}{4}L$ from the nut and $\frac{1}{4}L$ from the bridge. String players will recognize this intuitively from playing a harmonic at the octave from an open string, whereby the string does not vibrate at the harmonic but vibrates equally on either side. Helmholtz refers to these multitudinous ways in which a string may vibrate as the string's "vibrational forms."²⁰ The presence and intensity of upper partials is part of what gives a string instrument its characteristic sound and what allows us to detect the difference between the same pitch played as an open string or stopped by the finger on another string.

The frequency of each partial is inversely proportional to its wavelength. Therefore, the second partial has a frequency twice that of the fundamental, the third

²⁰ Hermann von Helmholtz, *On the Sensations of Tone As a Physiological Basis for the Theory of Music*, trans. Alexander John Ellis (New York: Dover Publications, 1954), 46.

partial a frequency three times greater, and so forth. Table 1 identifies the frequencies of the first eight partials of the strings of a standard-tuned cello in equal-tempered tuning at A440 Hz. The exact number of audible partials is dependent on a number of variables. However, Helmholtz shows that the intensity of these partials decreases exponentially as their pitch increases. The intensity of the second partial is one-fourth that of the fundamental, that of the third partial a ninth, that of the fourth partial a sixteenth, and so forth.²¹

Table 1: Partials of the open strings of a standard-tuned cello

String	Fundamental	2nd	3rd	4th	5th	6th	7th	8th
A	220.0 Hz	440.0	660.0	880.0	1100.0	1320.0	1540.0	3080.0
D	146.8 Hz	293.7	440.5	587.3	734.2	881.0	1027.8	2055.6
G	98.0 Hz	196.0	294.0	392.0	490.0	588.0	686.0	1372.0
C	65.4 Hz	130.8	196.2	261.6	327.0	392.4	457.8	915.7

While it may appear counterintuitive for a string to vibrate at multiple frequencies simultaneously, cellists can witness this phenomenon through a simple experiment. Begin by playing *D*, 73.4 Hz, on the C string. Upon releasing the note, dampen the C string from vibrating. One will hear and see quite clearly the continued sympathetic resonance of the other strings. If the *D* only vibrated at its fundamental, there would be no matching frequencies to resonate on the other strings. Instead, it is the upper partials of the fundamental pitch that force sympathetic vibration of the corresponding partials on the other strings. The open D string, 146.8 Hz, will resonate sympathetically with the second partial of the *D*. Likewise, the open A string, 220 Hz, will be forced into vibration by the third partial. The fourth partial of the fundamental, *d'*, 293.7 Hz, resonates the overtones of both the D string (second partial) and G string

²¹ Helmholtz, *Sensations*, 83–84.

(third partial). By dampening the other strings' vibration in succession, the disappearance of these overtones becomes all the more apparent. Once the overtones have been heard in such a manner, play the same *D* while stopping the other strings from vibrating. Upon releasing the note, the first few overtones become quite audible.

The same experiment can be conducted by starting with a fundamental above the pitches of the open strings. If the note matches any frequencies in the overtone series of open strings, these partials will resonate in kind. For example, *d'* played on the A string will cause the D string to vibrate at the second partial and the G string to vibrate at the third partial. An understanding of the principles of 'vibrational forms' helps explain what string players already understand intuitively, namely that certain pitches and certain keys produce strong resonance on the instrument while others decay much more rapidly. Moreover, we see that the pitches of strong resonance are directly tied to the tuning of the strings, which we will now examine in greater detail.

Section 4. Forced Vibration and the Violoncello

Until this point, we have only discussed the role of vibration as it relates to the strings. However, as Lothar Cremer succinctly states in his monumental book, *The Physics of the Violin*, the string is "ineffective as a radiator of sound."²² The vibration of a string is an example of a transverse wave, in which the displacement occurs perpendicular to the propagation of the wave. Sound waves, on the other hand, are longitudinal waves, in which displacement occurs in the form of compression and rarefaction in the direction parallel to the propagation of the wave. Owing to its

²² Cremer, *Physics*, 203.

thinness, the vibrating string simply does not move enough air to be an efficient radiator of sound, and it is this inefficiency that necessitates the need for the body of the instrument.

At its essence, a string instrument is a mostly hollow box designed for the sole purpose of radiating the vibrations of the string in order to create a sound wave of sufficient amplitude to be heard by the listener. The vibrations from bowed or plucked strings are transmitted to the bridge. This primarily transverse force (the string also exhibits a small amount of torsional motion) is transferred by the bridge into oscillations on the belly plate of the instrument. The soundpost couples the front plate of the instrument to the back plate, serving both to assist in supporting the downward force of the strings on the treble side of the bridge as well as to transmit the vibrations from the front plate to the back plate by means of coupling the two together. Its counterpart is the bass bar, which is glued to the underside of the belly near the bass side of the bridge, and helps to transmit the motion of the bridge to a larger surface area. All of this vibration from the body of the instrument excites vibration of the air within and surrounding the instrument and, eventually, radiates as sound waves.

Luthiers have long studied the vibrating properties of the plates in the effort to understand how the sound of a fine instrument is generated. Physicist and musician Ernst Chladni (1756–1827) is credited with first developing a method for determining the modes of vibration of such plates. Carleen Hutchins (1911–2009) took Chladni's principles and helped revolutionize the way in which luthiers approached their craft. Hutchins's research involved studying independently the response of top and back

plates of the violin to certain frequencies. By sprinkling the plates with small flakes of aluminum and subjecting them to various computer-generated tones, the flakes would become agitated, eventually settling along the nodal areas. Later studies were conducted using holographic photographs. Using these techniques, luthiers are able to tune the plates by carefully removing wood where the nodal areas are not well defined. Modern violin maker Joseph Curtin outlines yet another consideration for the modern luthier in his article, "Bridge Tuning: Methods and Equipment." Curtin describes how contemporary makers are able to measure with great accuracy the frequency of the bridge, which is controlled by the mass of its top and the stiffness of its waist.

The air inside the instrument too has its own resonant frequency. In contrast to Hutchins's highly analytic studies of the individual plates, Barry Parker speaks only in terms what he calls the 'main wood resonance' (MWR), the resonant frequency of the body of the instrument, and the 'main air resonance' (MAR), the resonant frequency of the air contained within.²³ As Parker explains, these frequencies on a violin serve to reinforce the pitches of the open strings. On a properly constructed violin, the MAR should approximate the frequency of the D string, while the MWR approximates the frequency of the A string. Cremer has another term for the MAR, which he calls the 'f-hole resonance.'²⁴ Cremer is quick to point out that the f-hole resonance, like all other forms of resonance, is not so much responsible for increasing

²³ Barry R Parker, *Good Vibrations: The Physics of Music* (Baltimore: Johns Hopkins University Press, 2009), 151

²⁴ Cremer, *Physics*, 253.

loudness of the fundamental, but rather for creating a particular tone color in which, “the fundamental is especially predominant.”²⁵

This last point brings us to a necessary conclusion: while the resonant frequencies of the wood and air of an instrument are important, the greatest importance of an instrument relies in its ability to vibrate according to the frequency of the string. Alexander Wood sums this up in his description of ‘forced vibration’ as it relates to an instrument:

The body of the violin and the contained air both have a tone of their own; but their vibrations are not free, they are controlled by the vibrating string. Musical instruments generally provide examples of this kind of vibration in so far as they consist of two vibrating systems, one of which imposes its vibrations on the other. It is second system which, as a rule, radiates the sound.²⁶

Let us return briefly to the previous question of tension and force as they relate to projection. Luthiers and acousticians alike have long been interested in ways to improve the efficiency of the instrument at radiating sound. In its static state, a string instrument does not output any power. It is completely reliant on the work put in by the performer. Lothar Cremer calculates the ratio of the “maximum radiated power” of the violin to the “mechanical-power input” at the bow and finds that the efficiency of the instrument at transferring this energy is just 4%.²⁷ Examining all of the parts involved in the production of sound from a string instrument, it comes as no

²⁵ *Ibid*, 253.

²⁶ Alexander Wood, *The Physics of Music*, rev. J. M Bowsher (7th ed. London: Chapman and Hall, 1975), 24.

²⁷ Cremer, *Physics*, 203.

surprise that a considerable amount of energy is lost along the way. Modern luthiers like Joseph Curtin lead the way in trying to eliminate some of this lost energy with lighter-weight instruments and alternate materials.

The question for the present study, however, is whether or not string tension factors into the equation to determine loudness. As Cremer notes, the sound pressure perceived as ‘loudness’ increases along with the transverse force on the bridge.²⁸ Cremer goes on to prove that the transverse force on the bridge is dependent on bowing speed and string impedance, or the characteristic resistance of the string. The latter, as he proves, can be expressed in terms of string tension and mass per unit length. Therefore, through multiple proofs that will not be duplicated in this text, Cremer arrives at the following equation for determining the peak value of the transverse force at the bridge:

$$\hat{F}(0) = \sqrt{F_x m'} \frac{1}{x_B} v_B$$

Equation 10: Peak value for the transverse force on the bridge as related to properties of bowing and string impedance

Where $\hat{F}(0)$ is the peak transverse force, F_x is string tension, m' is mass per unit length, x_B is the distance from the bow to the bridge as a fraction of the string’s total vibrating length, and v_B is bowing speed.²⁹

This equation is of such importance that it bears further examination. Let us work through the equation in reverse, beginning with the role of the performer. Two variables in the above equation are dependent on the performer, and string players

²⁸ Ibid., 45–46.

²⁹ Ibid., 46.

will find these to be rather intuitive. Beginning with the last variable we see that the input force at the bridge increases with bowing speed. In other words to produce more amplitude of sound, a performer should use a faster bow speed. Moving to the left, we find that the input force at the bridge decreases with distance from the bridge. Consequently, to produce more amplitude of sound, a performer should bow closer to the bridge. We now arrive at the variables which are of interest to the study of scordatura compositions. We have already seen how mass and tension are related to frequency. What Cremer ultimately proves is that, if the net string tension is increased as a means of altering the tuning of the instrument, then the transverse force at the bridge will be increased proportionally to the square root of this increase. This will result in greater perceived loudness to the listener.

One final point of clarification on this matter is warranted. At first glance, it may seem that the variable of bowing pressure is absent from the equation determining input force on the bridge. However, we must recall the minimum and maximum bowing force required to maintain the Helmholtz motion, as well as the relation between these forces and the variables in the equation. All of this goes to prove mathematically what the performer may already know intuitively, namely that the ability of a higher tension string to withstand more bowing force in comparison to a lower tension string allows for the potential of the performer to generate greater sound intensity. To the author's knowledge, there are no instances of transposition scordatura in which the four strings are lowered in pitch. Therefore, it is fair to conclude that any variety of scordatura which is achieved primarily through an increase in string tension would have the effect of increasing projection.

Section 5. Principles of Physics Applied to Three Examples of Scordatura

Now that we have a foundational knowledge of the physics of string instruments, let us consider the three examples of scordatura as appearing in the compositions of the present study: (1) Jacob Klein: *D–A–e–b*, (2) Peter Ritter: *D♭'–A♭–e♭–b♭*, (3) Eric Malmquist: *B–G–d–a*.

For the purpose of comparison, all tunings will be considered within the context of a performing pitch of $a' = 440$ Hz.³⁰ Table 2 outlines the frequencies of the first seven partials in each of the different tunings. Strings are labeled Roman numerically, I, II, III, IV, corresponding to the A, D, G, and C strings in standard tuning. The highlighted cells indicate common frequencies between partials. Note that the common partials between strings in both Klein’s and Ritter’s are identical and both match those of the standard tuning. The transposition scordatura has the effect of moving the entire resonance spectrum. Only the unequal scordatura used by Malmquist alters the relationship between the partials of the strings. By tuning the C string down a semitone, the resultant fundamental and its partials no longer resonate with the partials of the remaining strings in standard tuning, except in the very high partials, which may be considered inaudible for practical purposes.

Table 2: Open String Partial as appearing in the compositions of Jacob Klein, Peter Ritter, and Eric Malmquist

Klein	Fundamental	2nd Partial	3rd Partial	4th Partial	5th Partial	6th Partial
I	246.94	493.88	740.83	987.77	1234.71	1481.65
II	164.81	329.63	494.44	659.26	824.07	988.88
III	110.00	220.00	330.00	440.00	550.00	660.00
IV	73.42	146.83	220.25	293.66	367.08	440.50

³⁰ For further discussion on the topic, the reader may be referred to Haynes, Bruce, *History of Performing Pitch: The Story of “A.”*

Ritter	Fundamental	2nd Partial	3rd Partial	4th Partial	5th Partial	6th Partial
I	233.08	466.16	699.24	932.32	1165.40	1398.48
II	155.56	311.12	466.68	622.24	777.80	933.36
III	103.83	207.66	311.49	415.32	519.15	622.98
IV	69.30	138.60	207.90	277.20	346.50	415.80

Malmquist	Fundamental	2nd Partial	3rd Partial	4th Partial	5th Partial	6th Partial
I	220.00	440.00	660.00	880.00	1100.00	1320.00
II	146.83	293.66	440.50	587.33	734.16	880.99
III	98.00	196.00	294.00	392.00	490.00	587.99
IV	61.74	123.47	185.21	246.94	308.68	370.41

Table 3 demonstrates the changes in string tension of the three different tunings. As in prior examples, a set of equal-tensioned strings at 100 N will serve as the starting point and the string angle approaching the bridge from both the fingerboard and tailpiece direction will be assumed to be 77 degrees. It was previously established that the normal bridge force is directly proportional to the overall string tension.

A few conclusions may be drawn from this data. First, we see again that changes in tension are exponential with changes in frequency: the increase in overall tension caused by Jacob Klein's whole tone transposition scordatura is more than double the increase in overall tension caused by Peter Ritter's semitone scordatura. Second, we see that tuning a string down, as in Eric Malmquist's unequal scordatura, has a lesser effect on the tension than tuning a string up. This strengthens the idea that a composer has the freedom to alter the tuning downward by a greater interval than should be employed upward. Finally, and perhaps most intuitively, we see that alteration of a single string has relatively little effect on the overall force exerted on

the instrument. On the other hand, it does have the effect of upsetting the balance of tension amongst the strings. The scope of the present study does not allow for anything beyond speculation regarding the effects of decreasing the tension of the lowest string only on the oscillating motion of the bridge. Therefore, we will assume that that primary purpose of an unequal scordatura, such as Malmquist's, is to alter the timbre and resonance of the instrument by changing the ways in which the partials of the strings interact, thereby highlighting certain pitches and intervals other than those heard in standard tuning.

Additional analysis of these three pieces, and the history and context in which they were composed, will further illustrate the points addressed above and produce a more thorough understanding of pieces that have been overlooked in previous research.

Table 3: Changes in Frequency and String Tension Resulting from Three Examples of Scordatura

Klein	Frequency (in Hz)	% Change in Frequency	Tension (in N)	% Change in Tension
I	246.94	12.25%	125.99	Increase of 25.99%
II	164.81	12.25%	125.99	Increase of 25.99%
III	110	12.25%	125.99	Increase of 25.99%
IV	73.42	12.25%	125.99	Increase of 25.99%
Total String Tension			503.96	Increase of 25.99%

Ritter	Frequency	% Change in Frequency	Tension	% Change in Tension
I	233.08	5.95%	112.25	Increase of 12.25%
II	155.56	5.95%	112.25	Increase of 12.25%
III	103.83	5.95%	112.25	Increase of 12.25%
IV	69.3	5.95%	112.25	Increase of 12.25%
Total String Tension			449	Increase of 12.25%

Malmquist	Frequency	% Change in Frequency	Tension	% Change in Tension
I	220	No Change	100	No Change
II	146.83	No Change	100	No Change
III	98	No Change	100	No Change
IV	61.74	-5.61%	89.09	Decrease of 10.91%
Total String Tension			389.09	Decrease of 2.73%

Chapter 3 Jacob Klein's Six Sonatas for Violoncello and Basso Continuo, Op. 1

Section 1. The Composer

What little is known about the life and career of Jacob Klein de Jonge (in English, “the Younger,” in French, “le Jeune”) has been documented by musicologist Rudolf Rasch. Jacob Herman Klein was born in Amsterdam in 1688 and died there in 1748, making him a contemporary Johann Sebastian Bach almost to the year. He was son to Jacob Klein “the Elder,” a dancing master in the City Theatre of Amsterdam, who is presently known as the dedicatee of Estienne Roger’s 1702 reprint of the Op. 5 violin sonatas by Arcangelo Corelli. Through his father’s capacity as a dancer at the City Theater of Amsterdam, Jacob Klein the Younger would have had access to musicians and composers active in Amsterdam around the turn of the eighteenth century. His aunt, Lidwina Klein, was married to Philippus Hacquart, a dancer and musician (likely on viol), who may have introduced Jacob Klein the Younger to the violoncello.

Klein was an amateur cellist and composer, but did not pursue music as a career, instead taking up the merchant profession. According to Rasch, Klein married Susanna Spieringh in 1710, a union that gave him notable connections in both the merchant and artistic circles of Amsterdam. His father-in-law established a company for trading gum arabic, which has uses in both food and art. His mother-in-law was daughter to a well-known Dutch painter, Melchior de Hondecoeter.

As a musician, Klein left behind 36 sonatas, the vast majority of which featured the cello. His Opus 1 sonatas, published in 1717, consist of three books: six sonatas for oboe and continuo, six sonatas for violin and continuo, and six sonatas for cello and continuo. Unfortunately, the first two books have since been lost, leaving behind only the six cello sonatas. Klein's Opus 2 was published in 1719 and consists of six duets for two cellos. Opus 3 (1740) and Opus 4 (1746) are each comprised of six sonatas for cello and figured bass. The Opus 3 sonatas, like the first two books of Opus 1, were lost. The surviving oeuvre of Jacob Klein de Jonge consists of: Six Sonatas for Violoncello and Continuo, Opus 1, Book 3; Six Duets for two Violoncellos, Opus 2; and Six Sonatas for Violoncello and Continuo, Opus 4. Rasch credits Klein as the, "first Dutch composer to compose specifically for the violoncello."³¹

Section 2. The Work

Given such a concise body of work, Klein's fascination with scordatura is notable. Klein employs its use in all six of the Opus 1, Book 3 sonatas and in Duet No. 6 from Opus 2. The title page of the Opus 1 sonatas reads as follows:

³¹ Jacob Klein, Pavel Serbin, Alexander Gulin, and Hans Knut Sveen, *Scordatura Sonatas*. (Moscow, Russia: Caro Mitis, 2008).

VI Sonates à une Basse de Violon et Basse Continue
Dediées à Messieurs Nicolaas Nopen, Jacob Houtman & Jean de Wolf
Par
Jacob Klein le June, Amateur de Musique
Premier Ouvrage. Livre Troisième

A Amsterdam
Chez Jeanne Roger
No. 425

A few questions arise from this title page. First, there is a question of the instrument intended by “Basse de Violon,” a generic term for a bass member of the violin family. The instrument name should not be confused with the aforementioned *violone*, a name reserved for the larger-sized bass member of the violin family in the seventeenth century. Amsterdam, being the metropolitan city that it was in the early eighteenth century, would have exposed Klein to Stradivari’s revolutionary ‘Forma B’ model, smaller than the *violone* and more suited to solo performance. There is little dispute that this would have been the intended instrument for the performance of Klein’s sonatas. So why the archaic terminology for the instrument? This can be attributed to the publishing house. Jeanne Roger was the younger daughter of notable French Music printer, Estienne Roger, who was active in Amsterdam around the turn of the eighteenth century. French publishers in particular were slow to adopt *violoncello* as the accepted name of the instrument. Use of the name ‘basse de violon’ dated at least as far back as Mersenne, and the tradition was still being upheld by Roger.

That Jean Roger’s name appears as the publisher is of some interest, particularly in dating the sonatas. Jean was to inherit her father’s publishing business and her name was used on publications after 1716, although she was just 15 years old

at the time. Tragically, she died shortly after her father in 1722. While Jean is nominally identified as the publisher, her father was still in control of the business at the time of publication.

Finally, there is the curious description of Klein as an ‘Amateur’ musician. The word has certain connotations in contemporary usage and is often interpreted as someone who lacks a certain skill. In this context the word takes on a somewhat pejorative meaning and may perhaps temper the expectations of the would-be performer. However, we must also consider the Latin root of the word, *amator*, which translates broadly as ‘lover’. Therefore, while it is conceivable that the word is simply meant to reflect the fact that Klein’s chosen profession was outside the field of music, there is also strong reason to believe that the descriptor should be read more affectionately, labeling Klein as a ‘lover’ of music.

Tonality

The Op. 1 sonatas follow an interesting key structure: Sonatas XIII, XIV, and XV are in major keys while Sonatas XVI, XVII, and XVIII are in minor keys. In addition, the sonatas ascend by whole tone in key, with the exception of Sonata XVII. Table 4 shows the key structure of each sonata in both concert pitch as well as the notated key of the solo cello part.

Table 4: Key Structure of Jacob Klein's Six Sonatas Op. 1, No. XIII – XVIII

Sonata	Key	Written Key of Solo Violoncello
Sonata XIII	C major (no sharps/flats)	B \flat major (two flats)
Sonata XIV	D major (two sharps)	C major (no sharps/flats)
Sonata XV	E major (four sharps)	D major (two sharps)
Sonata XVI	F \sharp minor (three sharps)	E minor (one sharp)
Sonata XVII	A minor (no sharps/flats)	G minor (two flats)
Sonata XVIII	B minor (two sharps)	A minor (no sharps/flats)

The first question that comes to mind is: why did Klein choose this particular overarching key structure? There is a certain balance to a set containing three sonatas in major keys and three sonatas in minor keys, but he could have just as easily traversed the circle of fifths and chosen three major keys and their relative minor, or structured the tonality using any number of other methods. The answer seems to lie uniquely in the tuning of the strings.

As was previously discussed regarding sympathetic resonance, the pitches corresponding to open strings tend to offer the greatest resonance on the instrument. It should come as no surprise then that each pitch of the open strings of the scordatura cello is represented by a key in the set. We also notice the absence of any flat key signatures amongst the sonatas. The particular transposition scordatura used by Klein has the effect of either adding two flats to the key signature, taking away two sharps, or a combination of the two. On a standard-tuned cello, it is generally accepted that C major is the least challenging key technically, owing to the fact that all open strings can be used and no extensions are required in first position. Moreover, the partials of the tonic and dominant notes, *C* and *G*, are heavily favored, particularly on the bottom two strings, maximizing sympathetic resonance when playing on the upper strings. The advantageous use of all open strings remains possible with up to two sharps or flats, any more than which requires more frequent shifting in the lower positions. Given his particular tuning, if Klein were to have written a sonata in a flat key signature in terms of its sounding pitch, the solo part would lose the use of at least one or more open strings. Therefore, in choosing key structure, Klein stays within the confines of keys that maximize the use of open strings in the solo cello

part. This not only facilitates ease of technique but also, as previously described, generates the greatest resonance of the instrument.

Intonation and Temperament

If the choice of tonality was mostly skewed toward the advantage of the solo cello, one wonders whether there was any adverse effect on the continuo part, or if perhaps restrictions in the continuo part aided the choice of tonality. Bruce Haynes, in his 1991 article, “Beyond temperament: non-keyboard intonation in the 17th and 18th centuries,” wrote: “It is a troublesome physical fact that it is not possible, either in theory or practice, to combine both pure fifths and pure major thirds in the same tuning system.”³² Names are given to the discrepancies that result when one attempts to tune either by pure fifths or pure thirds. A series of 12 pure fifths results in a final note that is lower than a pure unison by the interval known as the ‘Pythagorean comma.’ A series of three pure major thirds falls short of a pure octave by the interval known as ‘lesser diesis.’ A series of four pure minor thirds exceed an octave by the interval known as the ‘greater diesis.’³³ Theorists have long attempted to reconcile these facts through the use of temperaments, which make some or all intervals impure in the efforts of making none excessively impure.

In the early Baroque period, mean-tone temperament, which favors the third over the fifth, was the desired method of tuning keyboard instruments. In its strictest form of ¼-comma mean-tone, the major thirds are tuned pure and divided into two

³² Haynes, “Beyond,” 357.

³³ Mark Lindley, “Temperaments,” *Grove Music Online*, accessed March 17, 2018, <http://www.oxfordmusiconline.com>.

equal whole tones. This results in tempered fifths and fourths, respectively smaller or larger than pure by a quarter of the syntonic comma. Various other 'shades' of mean-tone temperament also existed where thirds are very slightly larger or smaller than pure, thus reducing the degree to which the fourths and fifths are tempered. One result of mean-tone temperament is the difference between the diatonic and chromatic semitone, with flat notes being higher than their enharmonic sharp counterparts. As a result, one fifth in the twelve required to reach unison must be appreciably less pure than the others, i.e. C-G-D-A-E-B-F#-C#-G#-D#-A#-E#-B#/C. This is known as the 'wolf fifth.' In tuning a keyboard instrument using mean-tone temperament, one must choose not only the shade of mean-tone but also placement of the wolf fifth.³⁴

An alternative to regular mean-tone temperament was favored in eighteenth century keyboard tuning, whereby thirds were tempered unequally according to their distance around the circle of fifths. This irregular temperament eliminated the wolf fifth, but meant that the thirds in more distant keys, such as B major, were tempered by a noticeably larger amount than the thirds in keys more closely related to C major.³⁵

One must consider whether Klein would have been aware of such restrictions in key according to the temperament favored at the time. The curious omission in Klein's choice of tonalities is any sonata in the key of G/G# major/minor. Following the whole tone progression established by the first four sonatas, Sonata XVII would

³⁴ Mark Lindley, "Mean-tone," *Grove Music Online*, accessed March 17, 2018, <http://www.oxfordmusiconline.com>.

³⁵ Lindley, "Temperaments."

have been composed in G# minor. Perhaps Klein was simply aware of the increased technical demands on the continuo part of playing in a key with five sharps, but it is at least conceivable that he desired to avoid the more substantial impurities of such a distant key. Alternatively, he could have chosen to compose the Sonata XVII in G minor. This would have then become the only sonata written in a flat key, the disadvantages of which are outlined above. Lastly, he could have composed in G major, but that would upset the balance of three major and three minor sonatas. It would appear that in choosing keys, Klein sought a balance between the technical demands of the solo cello part, the purity of intervals in the keyboard part, and his overall concept of tonal architecture.

Why Scordatura?

Having examined the possible effects of Klein's transposition scordatura on the tonality, we must further determine why he chose to compose in scordatura at all. After all, if Klein simply wished for the solo cello to play in favorable keys, he could have just as easily composed in those keys, transposing the continuo part accordingly. We must assume, then, that the reasoning behind the use of scordatura lies somewhere beyond the obvious technical benefits.

It should be noted that Klein was not alone in his use of transposition scordatura. The technique came into favor for viola compositions in the late eighteenth century and is featured in works such as Mozart's Sinfonia Concertante for violin and viola K364/320d, Vanhal's Concerto in F, and Carl Stamitz's Sonata in

B \flat .³⁶ In all cases, just as in Klein’s Op. 1 Sonatas, the viola part is written a half or whole tone lower than sounding pitch and tuned up. Scholars often attribute this to the composers’ attempt to aid in the projection of the instrument, but fall short of explaining how exactly the increased projection is accomplished.

If the use of scordatura serves to increase the resonance of the solo cello part, so to it serves to decrease the resonance of the continuo cello part. At times, this can help the solo cello stand out of the texture. See Figure 3.1 from Sonata XVIII, in which the solo cello and continuo frequently overlap with unison B’s in concert pitch. The open string in the solo cello part is allowed to resonate freely throughout the first measure, lending a brightness to the sound of the solo part. In comparison, the fingered *b* in the continuo cello part sounds noticeably duller due to the quicker decay of vibrations.



Figure 3.1: Jacob Klein Op. 1, Sonata XVIII, mov. 4, Allegro, bars 1–2

At other times, Klein uses the different tunings of the two violoncellos to maximize the resonance of the entire ensemble. A prime example of this occurs in The *Adagio* movement of Sonata XVII (Figure 3.2).

³⁶ David Boyden, Robin Stowell, Mark Chambers, James Tyler, and Richard Partridge, “Scordatura,” *Grove Music Online*, accessed March, 17, 2018, <http://www.oxfordmusiconline.com>.



Figure 3.2: Jacob Klein Op. 1, Sonata XVII, mov. 3, Adagio, bars 18–21

Through the use of unconventional octave displacement in the solo cello part, Klein makes full use of both the open A (I) string in the continuo cello part and the open A (III) string in the solo cello part. The result for the listener is a pleasantly unusual texture that would not be possible if Klein had chosen a more conventional voicing with the continuo line playing the bottom octave (Figure 3.3).



Figure 3.3: Jacob Klein Op. 1, Sonata XVII, mov. 3, bars 18–21 re-voiced with continuo part on bottom octave

Another example of Klein’s keen awareness of how to best utilize the tuning of both cellos occurs in the *Adagio* movement of Sonata XIV in D Major (Figure 3.4). The movement opens with an unorthodox second inversion D major chord. Klein’s intent was clear. The inversion allows him to use both the open A string in the solo cello part and the open D string in the continuo cello part. The cadence in the second measure places the low *D* in the solo cello part, while the continuo cellist plays the *d* an octave higher, again maximizing use of open strings.



Figure 3.4: Jacob Klein Op. 1 Sonata XIV, mov. 3, bars 1–6

Section 3. Formal Analysis of Jacob Klein’s Six Sonatas for Violoncello and Basso Continuo, Op. 1

Jacob Klein’s Op. 1 sonatas are ostensibly of the *da chiesa* type in that they consist of four movements generally alternating slow–fast–slow–fast tempos and these movements not given dance names. However, by the turn of the eighteenth century, the distinction between the two types had all but vanished. Although Klein did not use dance movement titles, the influence of dance movements is unmistakable. Opening movements in four of the six sonatas contain multiple sections and/or tempo changes and with little regard for structure. This freedom of form draws comparisons to the prelude movement of the eighteenth century dance suite, about which theorist Johann Mattheson wrote the following in 1739:

Although all of these strive to appear as if they were played extempore, yet they are frequently written down in an orderly manner; but they have so few limitations and so little order that one can hardly give them another general name than good ideas. Hence also their characteristic is fancy.³⁷

In addition, unlike the *da chiesa* model of Corelli’s Op. 1, Op. 3 and Op. 5 Nos. I–VI, there is not a fugue to be found Klein’s Op. 1. While Klein does use some contrapuntal elements, simple binary forms are the norm in his Op. 1.

³⁷ Tarling, *Baroque*, 101.

Sonata XIII in C Major

Sonata XIII in C major is one of two sonatas from the set that, arguably, does not benefit from increased open string resonance as result of the altered tuning. The solo cello part is fingered in the key of B \flat major, sounding in C. If Klein had written the same pitches for a normally-tuned solo cello, it would have benefited more from open string resonance. Perhaps Klein intended to highlight the darker, more evocative tone quality that comes with lack of open string resonance in the first sonata of the set in order to draw attention to the greater open string resonance in subsequent sonatas. Speculation aside, the solo cello is still benefitting from the increased tension of the strings.

The first movement opens with a 12-bar Presto introduction, which clearly establishes the key and leads into the Adagio. Klein briefly visits to the key of F major in bars 17–20 before cadencing back in C major in bar 21. Klein does eventually cadence in A minor in bar 21 and stays there briefly before returning to the home key at the close of the movement. Klein exploits the open B string in bar 30 with parallel double stops that can be played in one position, which would require shifting in standard tuning.



Figure 3.5: Jacob Klein Op. 1, Sonata XIII, mov. 1, bar 30 in scordatura



Figure 3.6: Jacob Klein Op. 1, Sonata XIII, mov. 1, bar 30 in standard tuning

The second movement is in simple binary form. The first section opens in C major and modulates to the relative minor, ending on an E major chord, the would-be dominant of A minor. Strangely, the second section does not begin in A minor, as expected, but instead starts abruptly in G major. The preceding E major chord therefore serves somewhat clumsily as a major submediant in the new key. The modulation is made palatable by a quarter note rest immediately preceding the second section. Klein then briefly visits the key of A minor before returning again to C major to close the movement.

The third movement, *Largo*, is in a slow triple meter in the relative minor. The lamenting recitative-like melody in the solo cello sits atop a sparse accompaniment. Klein visits multiple keys, including E minor (bar 9), G major (bar 13), C major (bar 17). As the rhythm becomes more regular, Klein settles into F major for an extended period. A quick modulation to C major sets up the final movement, a jovial triple meter *Allegro* in ternary form.

The first section of the final movement sets the stage in C major. Following a repeat, the second section immediately begins in A minor. Klein again uses a quarter-note rest to clear the air rather than executing a more careful modulation. The second section modulates to G major, cadencing in bar 41. G major functions as the dominant to return to C major in the third section. After briefly playing with mode mixture in bar 55, Klein returns to C major to close the movement.

Sonata XIV in D Major

Sonata XIV opens with a cadenza-like flourish as the solo cello gracefully descends to the lowest register of the instrument (Figure 3.7). The rapid passagework atop a sustained D in the continuo part is somewhat reminiscent of the Corelli's Sonata in D Major, Op. 5, No. 1 (Figure 3.8).

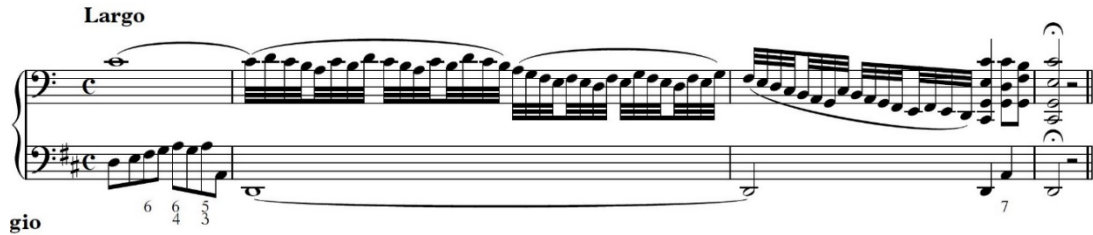


Figure 3.7: Jacob Klein Op. 1, Sonata XIV, mov. 1, bars 1–4



Figure 3.8: Arcangelo Corelli, Sonata in D major, Op. 5, No 1, mov. 1, mm 1–7³⁸

In fact, it is tempting to draw other comparisons between the two sonata movements. Aside from the matching keys, the overall form of the movements bear resemblance: a slow opening, followed by cadenza, which leads into an Adagio, followed by another rapid section, and ending in Adagio. Double-stops are featured prominently in the Poco Allegro section beginning in bar 11. The movement closes with a half cadence that anticipates the following Allegro.

³⁸ Arcangelo Corelli, *Sonate a violin e violone o cimbalò*, Opera Quinta, (Rome: Gasparo Pietra Santa, n.d.[1700]), accessed March 21, 2018. IMSLP Petrucci Library.

The second movement, *Allegro*, is among the most technically demanding of the Op. 1 Sonatas. Even with the aid of scordatura, the solo cellist is asked to make frequent and rapid string crossings (Figure 3.9). As with second movements in the set, the form is a simple binary



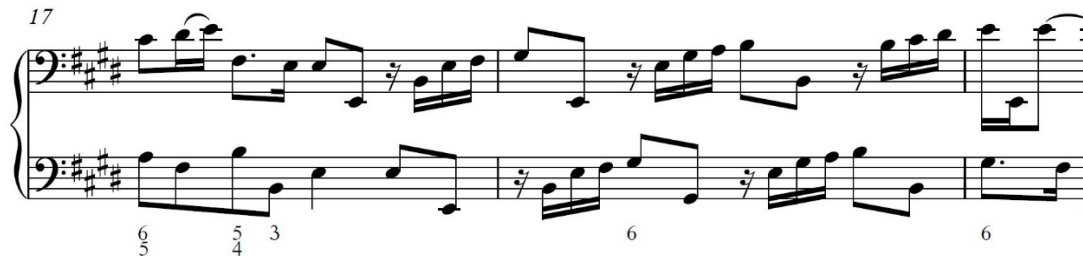
Figure 3.9: Jacob Klein Op. 1, Sonata XIV, mov. 2, bars 5–7

The third movement, *Adagio*, is in a stately triple meter. Harmonically, Klein shows a propensity for evading modulation where it is expected. Secondary dominant chords in bars 14–15 imply a modulation to A major, but the opening theme returns in bar 17 and the key of D major is reestablished. Klein again mixes modes between the major and minor. Beginning in bar 22, B \flat and F \sharp appear and a modulation to D minor is expected. A cadence in D major in bar 25 delays the arrival momentarily; but the movement ultimately does end in D minor.

The final movement, *Allegro*, is in a lively compound triple meter, again in binary form. The first section begins in D major and modulates to the dominant. Once again, the second section does not start in A major as expected, but rather reestablishes the dominant function of the chord in D major. Through the use of sequence, we arrive briefly in the key of F \sharp minor in bar 20 and then eventually progress to A major in bar 26. The movement, and with it the sonata, ends firmly back in D major.

Sonata XV in E Major

Sonata XV in E major displays the full advantages of scordatura tuning. For the first time, we have a key that is otherwise challenging for the cellist made noticeably easier by the altered tuning. The first movement, Adagio, is through-composed, modulating briefly to the relative minor in bar 13 before returning to the home key. The movement also contains one of the few exhibits of imitation in bars 17-18 as the continuo part follows the solo cello part in quick succession (Figure 3.10, shown in sounding pitch).



The image shows a musical score for two staves, likely a cello and a continuo. The top staff is the solo cello part, and the bottom staff is the continuo part. The music is in E major, indicated by three sharps (F#, C#, G#) in the key signature. The score covers bars 17 and 18. The continuo part includes figured bass notation: 6, 5/4, 3, 6, 6. The first staff has a fermata over the first measure of bar 17. The second staff has a fermata over the first measure of bar 18. The music is in a 3/4 time signature.

Figure 3.10: Jacob Klein Op. 1, Sonata VI, mov. 1, bars 17–18 (sounding pitch)

At this time, it seems prudent to address what might be described as questionable figures in the continuo part. The edition in the appendix attempts to be faithful to the copper engraving of the first edition. However, the author questions the accuracy of the harmonies suggested by the figured bass in, for example, bars 7–9. Figure 3.11 presents the part as figured in the copper engraving with the solo line written in sounding pitch. Non-chord tones have been circled to highlight the inconsistencies of the figured bass. The use of first inversion harmonies results in a series of seventh chords, which are inconsistent with the typical harmonies of the period.



Figure 3.11: Jacob Klein Op. 1, Sonata XV, mov. 1, bars 7–9 (sounding pitch)

While it is conceivable that Klein intended for this clash, the author proposes two alternate figurations, which fit with the implied harmonies of the solo line and make for a more consistent harmonic progression. The first alternative continues the progression of root position chords Klein begins in bar 7. In this instance, the solo cello alternates between playing the third of the chord and doubling the root. The chords have been filled in closed position, not as a suggestion for realization, but simply to highlight the harmonic function of the solo part (Figure 3.12). Care would be necessary to avoid parallel fifths.



Figure 3.12: Jacob Klein Op.1, Sonata XV, mov. 1, bars 7–9. Alternative figured bass progression.

The second alternative, which the author believes is closer to what Klein may have intended, more or less alternates root position and first inversion chords. As in the prior example, the chords are filled in closed position to highlight the function of the solo line, and harmonic analysis has been provided (Figure 3.13).

Figure 3.13: Jacob Klein Op 1, Sonata XV, mov. 1, bars 7–9. Second alternative figured bass progression

Finally, a voicing of the second progression is provided, which draws attention to the rising line of the root note (Figure 3.14).

Figure 3.14: Jacob Klein Op. 1, Sonata XV, mov. 1, bars 7–9. Second alternative figured bass progression with voice leading

The second movement, *Allegro*, is a lively dance-like movement in triple meter. The simple binary form, triple meter, and pick-up notes in the solo cello line draw similarities to the *courante* movement common to the eighteenth century dance suite. The first section modulates to the dominant as expected and the second section returns to the tonic. The dotted rhythm in the solo cello line presents a common problem in Baroque music. The performer must first decide whether the rhythm should be played as notated or allowed to fall into a triplet subdivision. The problem is heightened when the rhythm in the solo line appears to conflict with rhythm of the bass line, as in bar 45 and similar instances (Figure 3.15). Here the performer must

decide whether to adhere strictly to differences or to allow the rhythms of both parts to coincide.



Figure 3.15: Jacob Klein Op. 1, Sonata XV, mov. 2, bars 45–50

The third movement, Adagio, might be considered as operatic in nature, especially given Klein’s association with the City Theater of Amsterdam. The Adagio contains elements of both recitative and aria and seems to move the action forward amidst the more static movements surrounding it. The repetition of the opening note in the solo line has a certain speech-like quality. Soaring melodic figures are continuously interrupted by ascending triplet passages, which build tension only to be released again. The movement could end with the cadence leading into bar 18. Instead, Klein uses the opportunity to highlight the tuning of the solo cello with four measures of triple-stop chords serving as a codetta.

The final movement is an Allegro in 12/8 time that again bears striking resemblance to the gigue. The uneven phrases show influence of the French gigue in particular, although the lines between the French and Italian types were considerably less clear after the eighteenth century.

Sonata XVI in F# Minor

The change to minor keys occurs with Sonata XVI in F# minor. Perhaps more than any other, Sonata XVI has the feel of a cohesive unit, with each movement

seeming to lead directly into the subsequent movement. The opening Adagio movement features the characteristic dotted rhythms found in the French overture. Leopold Mozart describes the use of dotted figures to lend animation to slow movements:

There are certain passages in slow pieces where the dot must be held rather longer . . . if the performance is not to sound too sleepy.³⁹

The Adagio ends on a dominant chord, and is followed by a short triple-meter Allegro, which has a certain ferocity that has not yet been heard in Klein's sonatas. The ensuing third movement, Largo, is notable for the way in which Klein treats the solo cello part as both melody and accompaniment. Rather than giving continuous quarter notes to the continuo part, Klein fills the second beat with dramatic leaps downward in the solo line (Figure 3.16).



Figure 3.16: Jacob Klein Op. 1, Sonata XVI, mov. 3, bars 1–4

As with the opening two movements, the Largo leads directly into the final movement. With the closing Allegro, Klein pushes the limits of his contrapuntal writing. The first section begins in canon, with the bass line chasing after the solo cello at the interval of one measure (Figure 3.17). The interval of imitation decreases

³⁹ Tarling, *Baroque*, 177.

at points of cadence in order to build excitement, with the bass line chasing the solo line by just half a measure (Figure 3.18).



Figure 3.17: Jacob Klein Op. 1, Sonata XVI, mov. 4, bars 1–2



Figure 3.18: Jacob Klein Op. 1, Sonata XVI, mov. 4, bars 24–26

Sonata XVII in A Minor

Klein breaks the traditional order of movements in slow–fast–slow–fast pattern with Sonata XVII, which opens with an Allegro movement. Here too he begins experimenting with more advanced techniques in the solo cello line. The first movement, Allegro, requires sophisticated string crossings as the solo cello fills two notes of the triad. The movement closes with a brief, written-out cadenza over a sustained pedal E.

The second movement is the only movement of the set bearing the marking of Andante. Dotted rhythms again serve to give the impression of motion and energy. The second half opens in the dominant, E minor, and Klein uses the open B string to build tension against an ascending line (Figure 3.19).



Figure 3.19: Jacob Klein Op. 1, Sonata XVII, mov. 2, bars 17–18

A third movement, *Adagio*, reestablishes the common order of movements. The movement opens in canon at the octave but quickly veers off into homophonic texture. The unusual display of octave open A strings in bar 18 was previously mentioned.

The final movement, *Vivace*, is written in duple meter, but the inclusion of triplet quavers leads one to assume that the dotted figures should be ‘tripletised’ in the manner of a duple meter *gigue*.⁴⁰ Klein uses a similar technique in bar 77 as was deployed in the second movement, starting with a *g#* and ascending the scale to *a'*, while returning to the open E string between notes.

Sonata XVIII in B Minor

The final sonata of the opus, Sonata XVIII in B minor, most directly follows the *da camera* type. Although the movements are not given dance titles, each corresponds quite well to a movement of the traditional dance suite. In the first movement, sequential cadenza-like passages of bars 4–12 give way to unabashed virtuosity in the *Vivace* section beginning in bar 13. Klein displays his full knowledge of cello technique with rapid triple-stop passage work and string crossings, all while visiting the key of E minor en route to A major, in which key we arrive at the *Presto* (m. 28). Klein uses a common baroque shorthand in bar 32, marked *Arpeggio*. The

⁴⁰ See Tarling, Judy pg. 171 for a discussion of conventions regarding the performance of dotted rhythms in this context.

chords are shown, leaving the performer to divide the notes into a rhythmic pattern. The performer should make use of the open B string throughout the passage, and the effect is particularly pleasant in bar 44, when a stopped *b* on the E string can be alternated with open string in a textbook example of bariolage. One possible method of dividing the chords is provided in Figure 3.20, using a technique Jean-Jacques Rousseau termed *Batterie*.⁴¹



Figure 3.20: Jacob Klein Op. 1, Sonata XVI, mov. 1, bars 32-39. Solo cello Arpeggio section using Batterie technique

The second movement, *Allegro*, is a gavotte in all respects but its name and meter. Although written in 4/8 meter rather than the traditional common time, the effect is that of double up-beats before the bar. The phrase structure of two short phrases followed by a longer phrase also fits in the gavotte tradition. An extensive bariolage section beginning in bar 9 should be performed with alternating strings so that the open B string is used to full effect.

The third movement, *Largo*, also appears to owe its style to a dance movement, the *sarabande*. In particular, the style is reminiscent of the later French *sarabande grave*, described by James Talbot as,

⁴¹ Jean-Jacque Rousseau, *Dictionnaire de musique* (Paris: Chez la veuve Duchesne, 1768), 50, accessed March 24, 2018. IMSLP Petrucci Libray.

. . . a soft passionate Movement, always set in slow triple . . . apt to move the Passions and to disturb the tranquility of the Mind.⁴²

The use of dotted rhythms in a slow triple meter is a strong characteristic of the *sarabande*. Klein's placement of the dotted figure approaching cadences draws attention to the second beat, a stress which is also associated with the *sarabande* (Figure 3.21).



Figure 3.21: Jacob Klein Op. 1, Sonata XVII, mov. 3, bar 1-8. Rhythms characteristic of sarabande.

The finale of the sonata, Allegro, is in the style of a *gigue*. The rhythm, and the uneven bow distribution associated with it, (refer to Figure 3.1) lends a certain ‘pesante’ character to the movement. Phrase lengths are unpredictable, sometimes appearing to start on the first beat of the measure, other times on the third beat. The liberal application of written dynamics, in contrast the overall sparseness of dynamics throughout the remaining sonatas, shows that Klein intended repeated phrases to be played *piano*. Sequential modulation is featured prominently, though Klein never strays far from the home key.

Section 4. Summary of Jacob Klein's Six Sonatas for Violoncello and Basso Continuo, Op. 1

Jacob Klein is not a name one encounters frequently in the modern cellist's repertoire. His compositional output was limited and, arguably, lacks some of the

⁴² Tarling, *Baroque*, 119.

refined quality found in works his contemporaries, Antonio Vivaldi and J.S. Bach. However, the Op. 1 sonatas should not be overlooked. The violoncello was still in its youth as a solo instrument at the time Klein composed these sonatas. Similar sets of sonatas by composers including Vivaldi, Barrière, and Geminiani would not appear for another 20 to 30 years. Moreover, the use of transposition scordatura, which had its peak use with the viola in the late eighteenth century, was quite novel for the time. Klein's use of scordatura was an innovative approach toward resonance and sound production, especially considering what we now know about the subsequent changes to the instrument. Altering the tuning was a means of increasing string tension, with its attendant benefits. This increase in tension foreshadowed later developments in the history of string instruments.

Chapter 4 Peter Ritter's Concerto in E-flat Major, R5

Section 1. The Composer

Johann Peter Ritter was born July 2, 1763 in Mannheim. Like Klein, he was born into a musical family. Peter's father and eldest brother were violinists, and his uncle and cousin bassoonists, all attaining positions in Mannheim. Parallels may also be drawn between Ritter and his Viennese contemporary, Wolfgang Amadeus Mozart. Josephine Elsen, in her 1968 dissertation entitled "The Instrumental Works of Peter Ritter (1763–1846)," relays multiple accounts of concerts given by the Ritter family in Frankfurt, Berlin and various other German cities.⁴³

The Palatinate court left Mannheim for Munich in 1778, and many Mannheim musicians went with it. The National Theater orchestra became the center of music in Mannheim. Ritter began playing with the orchestra in 1778 and took over as principal cellist in 1784.⁴⁴ Around this time, he began composing for the theater. His first Singspiel was produced in 1788 and he would go on to compose dozens more operas and Singspiele.

Around 1800, Ritter began to take on a greater role in the orchestra. An account from December 25 of that year describes Ritter's conducting of Haydn's *The Creation*:

⁴³ Josephine Caryce Elsen, "The Instrumental Works of Peter Ritter (1763–1846)" (PhD diss., Northwestern University, 1979), 3–4.

⁴⁴ *Ibid.*, 6.

He stood in the middle of the chorus with the baton in the right hand, as was fitting a Kapellmeister, conducting the whole with energy in a masterful fashion.⁴⁵

Building off of this successful performance, Ritter was appointed Konzertmeister in 1801 under the aging music director Ignaz Fränzl. In 1803, he was appointed Kapellmeister. The instructions of the new post included:

1. To the Kapellmeister Peter Ritter along is transferred the direction and supervision of all operas, oratorios, church music, in addition to the public concerts.
2. The selection of the operas should be done with care and accuracy, with the same respect for the taste and mood of the public as for aesthetic excellence
3. Everything in musical respect that is to be altered for the good of the operas, to be added or taken away, is left to his judgment; therefore the singing personnel is instructed to give up or exchange no role without his approval.
4. With the opera itself the same [Ritter] shall represent the place of the composer; the entire orchestra personnel as well as the singers are held to be guided scrupulously by those instructions and regulations whereby, however, it goes without saying that the same [Ritter] will demand nothing for the increase of the effect but what the ability of the singers allows. The wish of the individual singer must always be secondary to the general advantage of the whole
5. The Kapellmeister will make it his task to preserve most carefully the good agreement of the singing and orchestral personnel.
6. No less he is to have a vigilant eye on the discharge of duty of all members, to punish the smaller mistakes immediately, to report all greater ones and to propose penalty.
7. With regard to the play, he is to provide symphonies and entr'actes suitable to the spirit of the play.⁴⁶

In summary, Ritter's duties were many and his influence significant. He conducted from his raised cello desk in the center of the orchestra. All the while, Ritter continued to compose and frequently appeared as a cello soloist for the

⁴⁵ Ibid., 16.

⁴⁶ Ibid., 23.

subscription concerts, often performing his own compositions. By firsthand accounts, Ritter was an excellent cellist of the highest technical order and particularly adept at changing the timbre of the instrument. Elsen translates the following review of an 1803 performance for the King of Sweden's visit to Mannheim in 1803:

Konzertmeister Ritter played a cello concerto of his own composition: the ease with which he handles his instrument even in difficult passages, his tasteful and polished Allegro, his sureness in double stops and his powerful bass received the loudest applause. I noticed that in the Adagio he modified his instrument by putting on a strong mute which, I have been assured, is customary for him to do. I heard a few experts in the audience make the remark during the applause: when Herr Ritter plays Adagio he has a completely different tone than in the Allegro.⁴⁷

Ritter stayed on in his capacity as Kapellmeister until 1823, at which time he retired to composing and eventually took a post as chairman of the Mannheim Society of Arts.⁴⁸

Ritter came at a time of a Renaissance of sorts for the cellist-composers. Fellow cellist-composers, including Luigi Boccherini (1743–1805), Bernhard Romberg (1767–1841), and Jean Louis Duport (1749–1819), were pushing the technical boundaries of the cello as a solo instrument through their own compositions. Of course, the same could be said for the violin and its chief virtuoso of the early eighteenth century, Nicolò Paganini (1782–1840). However, while the violin was featured prominently as a solo instrument by the likes of Mozart and Beethoven, the surviving cello concertos of the late eighteenth and early nineteenth centuries were,

⁴⁷ Ibid., 27.

⁴⁸ Roland Würtz, et al, "Ritter," Grove Music Online. Oxford Music Online. Oxford University Press, accessed September 10, 2017, <http://www.oxfordmusiconline.com>.

with the exception of those by Joseph Haydn, largely composed by cellists. Thus, the role of these virtuoso cellist-composers was integral in laying the foundation for the instrument as the soloist in the later concertos of Robert Schumann (1850), Camille Saint-Saens (1872) and Antonín Dvořák (1894–95).

Ritter wrote twelve cello concertos for solo cello and one concertante for cello and horn, all around the turn of the nineteenth century. The solo part in four of these concertos is written in scordatura: D14/19 (D14 is an incomplete score, which can be completed by the parts of D19), D15 (the concertante for cello and horn), D18, and R5.⁴⁹ In each case, Ritter employs use of transposition scordatura with the solo cello sounding a semitone higher than written.

The exact date of composition of Ritter's Concerto in E♭ major, R5 is unknown. On the basis of stylistic comparison to other compositions of known date, Elsen dates it ca. 1800. This date puts the concerto in rarified air as a specimen of the late-Classical/early-Romantic concertos for the instrument. Joseph Haydn's Concerto in D Major, Hob. VIIb/2, Op. 101 was composed roughly 20 years prior and is well-rooted in the classical tradition. Likewise, Schumann's concerto of 1850 marked the beginning of series of prominent Romantic concertos for the instrument. The approximate date of composition places the R5 concerto as a rough contemporary with Beethoven's Op. 5 sonatas.

⁴⁹ Ibid., 83. Note that Grove Music identifies five scordatura concertos by considering D14 and D19 separately, but these scores belong to the same composition.

Section 2. On the Existence of Key Characteristics

One of the questions that arises when approaching works written in transposition scordatura is: could this piece be transposed to standard tuning and have the same effect? In the case of Ritter's Concerto in E \flat major R5, could the concerto be transposed to D major, preserving the technical advantages of the solo part while using standard tuning? In other words, is there anything inherent to E \flat major that would be lost by transposing to the key of D major? This question requires examination of a highly contested subject amongst musicians and theorists: the existence of color, characteristics or affect particular to individual keys. Books, dissertations, and articles, some of which adopt an antagonistic tone, have been devoted to the subject.

During the Baroque era, there was a consensus amongst composers that key-color was a distinct and important phenomenon. The use of unequal temperaments created varying degrees of impurity amongst intervals and, as result, there was a scientific basis behind the belief that different keys possess different characters. As Judy Tarling highlights in her table of key characteristics in Baroque music, composers/theorists generally agreed on the characteristic of a key in some cases, and strongly disagreed in others. Rather than repeating the entirety Tarling's findings, the table below highlights two keys, C major and D major, for which the characteristics were more or less agreed upon and a two keys, E \flat major and E major, for which the writers' opinions varied greatly.⁵⁰

⁵⁰ Tarling, *Baroque*, 7.

Table 5: Key Characteristics as described in writings of the Baroque period

Key	1691 J. Rousseau	1692 Charpentier	1713–19 Mattheson	1722 Rameau
C major	gay grandeur	gay, militant	rejoicing	mirth, rejoicing
D major	gay grandeur	joyful, militant	noisy, joyful	mirth, rejoicing
E \flat major		cruel, harsh	Pathetic, serious	
E major		quarrelsome, clamorous	fatal sadness	grand, tender

Even as the effects of unequal temperament appeared to offer a basis for the belief in key characteristics, some composers and theorists did not adhere to the idea. Johann David Heinichen, in his *Der General-Bass in der Composition*, of 1728, writes:

...in today's good temperaments (I am not referring to old organs) the keys with two or three flats or sharps in their signatures emerge, especially in the theatrical style, as the most beautiful and expressive...But that the affect of Love, Melancholy, Joy, etc, belongs to specific keys, I cannot accept.⁵¹

Even Mattheson, who wrote of the characteristics of keys, is quick to offer the qualification that “No key can be so sad or happy in and of itself that one might not compose the opposite.”⁵²

As equal temperament began to take hold in the eighteenth century, the validity of key characteristics came into question. Without the differences in intervals between keys, it was more difficult to offer a physical basis for their inherent characteristics. Rameau, one of the early proponents of equal-temperament, offered the following argument in its favor:

He who believes that the different impressions which he receives from the differences caused in each transposed mode by the temperament [now] in use

⁵¹ Bruce Haynes, “Beyond Temperament: Non-Keyboard Intonation in the 17th and 18th Centuries,” *Early Music* XIX, no. 3 (1991): 368.

⁵² Tarling, *Baroque*, 7.

heighten its character and draw greater variety from it, will permit me to tell him that he is mistaken. The sense of variety arises from the intertwining of the keys [*l'entrelacement des Modes*] and not at all from the alteration of the intervals, which can only displease the ear and consequently distract it from its functions⁵³

In this statement, Rameau seems to contradict what he previously wrote about key characteristics, arguing that it is only the relationship between keys that create variety in music. Yet many composers of the eighteenth and nineteenth centuries continued to believe in key affect long after equal temperament was adopted. Beethoven was one of its strongest proponents, and has left multiple writings in support.⁵⁴ Schubert, by contrast freely transposed his own song cycles, believing that the music was not tied to a particular key. Physicist Alexander Wood is quite definitive on the topic in *The Physics of Music*, writing:

It therefore seems wiser to assume, without being too dogmatic, that the association of particular keys with music of a particular type, and especially with familiar examples, has given rise to a belief in distinctive emotional characters for which there is in fact no rational foundation⁵⁵

From a purely theoretical standpoint, it is difficult to argue with Wood's claim. Notwithstanding those individuals with absolute pitch, there might appear no reason to believe that F major should possess any different qualities from A major in equal temperament. The rise and fall in frequency of tuning pitch would seem to support this claim. After all, even the strongest proponents of key characters would be hard-

⁵³ Lindley, "Temperaments."

⁵⁴ Maho Ishiguro, "The affective properties of keys in instrumental music from the late nineteenth and early twentieth centuries" (MM Thesis: University of Massachusetts Amherst, 2010), 37.

⁵⁵ Wood, *The Physics Of Music*, 179.

pressed to argue that, for example, Beethoven's symphony in C major has a different effect when tuned at A440 Hz or A446 Hz, or that the character of Bach's cello suites are significantly altered by performing at A415 Hz as opposed to A440 Hz.

However, this way of thinking fails to take into account the influence of the instrument. Hermann Helmholtz, from whose work Wood based his assertion, offers a qualification to the statement that key characteristics do not exist in equal temperament:

If an instrument of fixed tones is completely and uniformly tuned according to the equal temperament, so that all Semitones throughout the scale have precisely the same magnitude, and if also the musical quality of the tones is precisely the same, there seems to be no ground for understanding how each different key should have a different character...
On the other hand, there is a decidedly different character in different keys on pianofortes and bowed instruments.⁵⁶

As was previously discussed, musical instruments do not produce notes in a vacuum. For example, the notes corresponding to the open strings on the cello produce a more complex sound with greater resonance than notes not corresponding to the open strings, owing to the sympathetic resonance of partials. In the case of keyboard instruments, Helmholtz takes into account the physical differences between the mechanism of white and black keys, noting,

The *D \flat* of one instrument may be as high as the *C* of the other, and yet on both the *C* major retains its brighter and stronger character, and the *D \flat* its soft and veiled harmonious effect.⁵⁷

Therefore, while we may safely eliminate absolute pitch as a decisive factor in establishing the character of a piece, by factoring in the effects of timbre and

⁵⁶ Helmholtz, *Sensations*, 310–311.

⁵⁷ *Ibid.*, 311.

resonance of certain instruments, there is a compelling argument that key characteristics do have an objective physical basis.

All of this goes by way of showing that, in the case of Ritter's concerto, the transposition scordatura has a real effect on the character of the solo instrument. For all practical purposes, the solo cello is performing a concerto in D major. The effect of the transposition scordatura in terms of absolute pitch is very much akin to what might be attributed to changes in historical tuning pitch and, following the logic behind Helmholtz's analogy of two pianos tuned to different pitches, could not be replicated by playing in E♭ major. However, the fact that the orchestra *is* performing a concerto in E♭ major is no less important to the overall impression of the concerto and could not be replicated by transposing the orchestra to D major. It is not the absolute pitch that is important; the effects would be no less different if all instruments played in D major and tuned to A465 Hz. Rather it is the contrast of resonance offered by having the solo cello part in a different key than the rest of the orchestra, especially in comparison to the orchestral string sections, that offers a distinctly different aural experience.

Section 3. Formal Analysis of Ritter's Concerto in E-flat Major, R5

The Concerto in E♭ major, R5 is a three movement work following the standard conventions for the period: a first movement in concerto-sonata form, which is rooted in ritornello form, a slow second movement in binary form and a final movement in rondo form. Prior to proceeding with an analysis of the concerto, it should be noted that the manuscript edition located in the Library of Congress uses what is commonly referred to as 'false' treble clef. According to this historical

convention, composers switched between bass clef and treble clef, avoiding tenor clef altogether. However, all instances of treble clef in the solo part are written one octave above sounding pitch. Due to the difficulty in reading such notation for the modern cellist, all of the following musical examples, as well as the complete edition in the appendix, use either standard treble clef or tenor clef at fingered pitch, which is one semitone below sounding pitch due to the scordatura.

Movement I. Grave – Allegro

The first movement begins with a Grave introduction 27 measures in length. An orchestral tutti opens in E \flat major. A rising sixteenth note figure is passed between the string sections and becomes a sort of unifying motif throughout the movement. A brief transition beginning in bar 8 leads to the subdominant key of A \flat major. The soloist enters with the first true theme of the concerto in bar 13. Interestingly, this theme does not reoccur at any other time in the concerto. As such, we will simply call it the ‘Grave theme.’ The orchestral tutti resumes with the rising sixteenth note motif in bar 18, transitioning back to the tonic. Secondary diminished seventh chords in measures 22 and 24 over a pedal B \flat in the cello and bass sections signal the return to E \flat major and the Grave closes with a robust B \flat dominant seventh chord leading directly into the Allegro.

The ensuing Allegro is in a modified sonata form. An opening ritornello serves as the orchestral exposition. This tutti, lasting from bar 28 through bar 83, lacks strong thematic material, but does allude to later themes in the movement. The first theme in E \flat major, consists of a rising triadic figure in the violins in the manner allusive of the ‘Mannheim Rocket’ (Figure 4.1).



Figure 4.1: Peter Ritter Concerto in E-flat major, mov. 1, bars 28-30.

The second theme arrives in bar 48 as a lyrical eight bar period in antecedent/consequent phrases in the dominant (Figure 4.2).



Figure 4.2: Peter Ritter Concerto in E-flat major, mov. 1, bars 48-55

The closing material returns to the tonic in preparation for the start of the solo exposition.

The solo exposition begins in bar 84. The first theme group is relatively concise at twelve measures and consists of two uneven phrases. A brief two measure extension in the orchestra links to the start of the transition in bar 88. The extreme range of the solo cello part is displayed (Figure 4.3).



Figure 4.3: Peter Ritter Concerto in E-flat major, mov. 1, bars 98-101

The material is repeated at the dominant in bar 102 and extended further, ending with a half cadence in B♭ major in bar 109.

Measure 110 marks the start of the second theme group in B♭ major. The second theme consist of two subjects. The first subject, Theme IIA, is presented in an intimate texture, accompanied only by the first and second violins. The subject ends with a half-cadence and is marked by a fermata. Theme IIB is a simple melody in

antecedent/consequent phrases, heard first in the solo cello (Figure 4.4) and repeated eight bars later by the orchestral tutti.



Figure 4.4: Peter Ritter Concerto in E-flat major, mov. 1, bars 129–136. Theme IIB

Ritter uses extended virtuosic solo episodes to serve as transitional material in between thematic material throughout the movement. The next such episode occurs in bars 144–172. The soloist first navigates the upper registers of the instrument in broken octave arpeggios in bars 144 – 148. Then Ritter exploits the open B \flat string in a bariolage passage in bars 160–165 (Figure 4.5).



Figure 4.5: Peter Ritter Concerto in E-flat major, mov. 1, bars 160–167

A new subject begins in bar 173 in G minor, the relative minor of B \flat major (Figure 4.5). Labeling this theme gives some pause. In terms of rhythm and contour, the material bears strong similarities to Theme IIB. Moreover, it is unusual to introduce a new tonal center at this point in the exposition. Ritter quickly repeats the melody down a whole tone in F major, which he then establishes as the dominant in B \flat major. Nonetheless, this section is noteworthy both for its distinctive melodic content as well as for its use in the recapitulation, as we will see. We will refer to this theme group as the ‘Closing Theme’.



Figure 4.6: Peter Ritter Concerto in E-flat major, mov. 1, bars 173–180, 'Closing Theme'

The final virtuosic solo episode, beginning in bar 190, reinforces B \flat major. This is another example of Ritter's use of extreme range in the solo cello part. In a textbook example of the 'Mannheim Rocket,' the solo cello spans 5 octaves in just two measures (Figure 4.7).



Figure 4.7: Peter Ritter Concerto in E-flat major, mov. 1, bar 196

An orchestral codetta rounds out the exposition.

The development begins in bar 218 with new thematic material in B \flat major, a descending triadic figure very loosely based of the 'Grave Theme.' Upon an abrupt modulation to G minor, Klein introduces a new theme in bar 234, which we will refer to as the 'Development Theme' (Figure 4.8).



Figure 4.8: Peter Ritter Concerto in E-flat major, mov. 1, bars 234–238, 'Development Theme'

The *bb'* in the violins in bars 257–260 serves as the common tone for a mediant modulation back to E \flat major in bar 261. A solo episode in E \flat major parallels the exposition, although the material is different. The 'Closing Theme' returns in bar 276, this time beginning in C minor, the relative minor of E \flat major. The Closing Theme

follows the exposition directly, cadencing on a dominant seventh at the fermata and ending with final solo episode in the home key of E♭ major.

In the traditional concerto-sonata form, we would expect a solo cadenza on the dominant at this point. Instead, Ritter enters into a fragmented recitativo section in bar 303, which seems to be searching for a tonal center. He works his way to an augmented sixth chord in bar 315. This precedes the final Allegretto, which is based on the ascending sixteenth note motif from the opening Grave. The movement ends definitively on a perfect authentic cadence.

Movement II. Adagio

The middle movement is an Adagio in 3/4 time and expanded binary form. The orchestration is substantially reduced from the first movement with the absence of trumpets, timpani, and ripieno strings. The texture is also thinned. The succinct opening phrase of the A section establishes the tonic key of E♭ major with the solo cello riding in a vocal melody atop a pizzicato accompaniment. The winds strengthen the harmonies with sustained chords.

The transition begins immediately in bar 7, moving to the dominant. As we have now come to expect, the solo part exhibits vast leaps of register, jumping first down nearly three octaves before ascending a major 10th, all within the span of four notes (Figure 4.9).



Figure 4.9: Peter Ritter Concerto in E-flat major, mov. 2, bars 11–17

A cadence in B \flat major in bar 17 is followed by a brief four-bar tutti, which leads to the start of the second group in bar 21. This section will be used in the return to tonic in the second part. A *forte* B \flat dominant seventh chord serves a secondary dominant of IV in B \flat major. Chromaticism in the solo part and more secondary dominants eventually lead to a strong cadence in bar 34 (Figure 4.10).



Figure 4.10: Peter Ritter Concerto in E-flat major, mov. 2, bars 21–26

A brief cadencial extension rounds out the first part.

The ‘Development’ section of the movement begins with bar 38. Ritter promptly changes modes in to B \flat minor and briefly cadences in F minor in bar 41. With the addition of an A \flat in bar 43, the chord serves as borrowed diminished second chord to modulate back to E \flat major. A four bar retransition in m. 48 returns to the second group material in bar 52 (Figure 4.11).



Figure 4.11: Peter Ritter Concerto in E-flat major, mov. 2, bars 52–57

This time, the leap in the solo line is even greater. The remainder of the movement parallels the first part, this time in the tonic.

Movement III. Rondeau – Allegro

The third movement is the most conventional of the concerto in terms of its form. The refrain is 20 bars in length, consisting of two phrases. The first phrase is played by the soloist accompanied by strings. A four-bar tutti cadential extension

ends with a half cadence and a fermata. The melody is picked up in the oboes for the second phrase.

The first episode is substantially longer than the refrain, consisting of bars 21–96. The episode begins again with solo cello and strings, modulating to B \flat major, where we cadence in bar 36. The second half of the period repeats up the octave in bar 37, this time accompanied by the full orchestra. A second subject is introduced in bar 48. A chromatic section beginning in bar 83 leads to a repeated diminished vii/V–V cadence, which sets up the second refrain in bar 97.

The second episode begins in C minor in bar 117 but does not stay there long. The transition back to E \flat major begins in bar 133. This episode is primarily a vehicle for virtuosic passagework in the solo cello part. The third refrain comes in bar 175.

In lieu of a third episode and refrain, Ritter moves directly to the coda in bar 195. After one more display of technique in bars 206–220, a false return of the refrain serves as the closing material in bar 221. The movement ends definitively with a nine bar cadential extension.

Section 4. Summary of Peter Ritter's Concerto in E-flat Major, R5

Ritter was clearly forward-thinking in his desire to explore new possibilities of tone color in the cello. While the R5 concerto may lack the formal balance of Joseph Haydn's concerti, Ritter's technical demands on the solo cellist rival or surpass those of his contemporaries. Even aside from its curiosity as a rare specimen of early nineteenth century transposition scordatura for the cello, the concerto would be worthy of study. It is a shame that this concerto and the others by Peter Ritter have been neglected for so long.

Chapter 5 Eric Malmquist's Sonata for Cello and Piano

Section 1. Origins of the Sonata

Eric Malmquist (b. 1985) is a contemporary composer based out of Chicago, Illinois. The idea for using scordatura in his Sonata for Cello and Piano was born out of the present study. By his own admission, Eric “draws on a deep love of early music and modern influences to produce works that are focused and emotional.”⁵⁸

Therefore, when Malmquist was commissioned to compose a piece for the author in 2014, the author quickly approached Malmquist with the idea of featuring this early music technique in a modern application. Malmquist was enthusiastic about the idea and, after several meetings between the author and composer, the Sonata for Cello and Piano was completed in 2015.

With no instructions on how scordatura was to be employed, Malmquist made the decision to alter only one string of the instrument. The C string is lowered by semitone to a *B'*. In doing so, Malmquist alters the resonance of the instrument in a completely different manner than the transposition scordatura employed by Klein and Ritter.

One of the benefits in working with a living composer is the opportunity to understand the compositional thought process. Whereas we can only speculate the reasoning behind Klein's key structure, Malmquist clearly lays out his reasoning in the score's performance notes:

⁵⁸ Personal website of Eric Malmquist, accessed April 4, 2018, <https://ericmalmquist.wordpress.com/about/>

I wanted to employ the “B” string as much as possible, but also allow for variety, so I decided to structure my key areas by using that B in different tonal functions as we progress through the piece. The first movement is in G (B as the third scale degree); the second is in E minor (B as the fifth) and so forth.⁵⁹

As did Klein, Malmquist provides an incipit instructing the tuning of the strings and the sonata uses ‘hand-grip’ notation.

In the case of an unequal scordatura, such as Malmquist’s, ease of technique can effectively be eliminated as a motivating factor for the altered tuning. Such methods of scordatura do allow for certain double-stops and chords that would not otherwise be possible and, as is the case with Malmquist’s, may increase the range of the instrument. However, there is nothing inherently ‘easier’ about performing on an instrument that is not tuned in fifths. Moreover, as was demonstrated in Chapter 2, the net change in string tension is relatively minor in comparison with the other works in the present study. Although there may be some hitherto undiscussed effects of lowering the tension over the bass bar, projection may also be disregarded as a motivating factor for the tuning. Therefore, the primary reason for such tuning must be either in terms of harmony or resonance.

One of the necessary consequences of using ‘hand-grip’ notation in an unequal scordatura composition is that certain notes must include further instruction as to which string they are to be played on. An example of this occurs in bar 50 of the first movement (Figure 5.1).

⁵⁹ Eric Malmquist, *Sonata for Cello and Piano*, Varangian Publishing, 2014, 2.



Figure 5.1: Eric Malmquist Sonata, I. Prologue, bars 45–52

Without further instruction, the performer might assume that this note was to be played as an open G string, rather than an $F\sharp$ on the B string, as was specified.

Section 2. Analysis of the Sonata for Cello and Piano

Malmquist’s Sonata is in five movements, with titles as follows:

- I. Prologue
- II. Dance
- III. Nocturne
- IV. Rhapsody
- V. Epilogue

Instructions are given to the performer to perform the movements *attacca* to the extent possible, lending to the overall narrative of the work.

Movement I. Prologue

The first movement begins with the piano outlining a G major chord in first inversion and open position. By highlighting B' as the lowest pitch in the chord, Malmquist alludes to the tuning of the cello even before its first entrance. Although the key area of the movement is G, Malmquist does not use a key signature, leaving the modality of the movement somewhat open-ended. When the cello enters on the fourth beat of the second bar, it does so on a $c\sharp''$ in thumb position on the A string. $C\sharp$ figures throughout the movement, a reference to the Lydian mode and indicative of Malmquist’s fascination with early music. This opening cello motive figures

prominently throughout the sonata, and will be referred to subsequently as the ‘Prologue Motive.’ The melody first ascends stepwise by a minor third, then descends a perfect fifth and rises again by third (Figure 5.2).



Figure 5.2: Eric Malmquist Sonata, I. Prologue, bars 3–7. "Prologue Motive"

The first section builds to an early climax with a *fortissimo* chord in bar 27 as the C in the cello clashes with the pedal B' in the piano (Figure 5.3).



Figure 5.3: Eric Malmquist Sonata, I. Prologue, bars 26–27

A cadenza two bars later releases this tension with the first use of the open B string. Malmquist fully exploits the minor sixth relationship between the two lowest strings in an extended *accelerando* string crossing passage. The cellist ascends ever higher on the A and D strings, eventually climbing to the c#" for a return of the opening theme in bar 43 (Figure 5.4). Malmquist writes in the performance notes that the piece is “based almost entirely on thirds.”⁶⁰ The importance of the interval is

⁶⁰ Malmquist, *Sonata*, 2.

highlighted in a passage beginning in bar 49, which ascends by both major and minor thirds over a span of more than three octaves from the open B string up to a $c\sharp^1$.

Figure 5.4: Eric Malmquist Sonata, I. Prologue, Cadenza

Movement II. Dance

The second movement is titled *Dance* and bears the instructions “Quickly, aggressively.” Rhythmically, the movement is built on a syncopated motif, which brings out the pickup to the first and third beats of each measure. It is composed in a pseudo-rondo form, with the slow sections marked “Half-time” dividing the dance

refrain. In the case of the “Half-time” sections, there is no actual change in pulse; rather, the illusion of half-tempo is achieved through changing of note values.

Movement III. Nocturne

The third movement, *Nocturne*, is the only movement to feature *B* as the tonal center. It also reinforces the cyclic nature of the sonata and Malmquist’s assertion that the movements should be performed *attacca*. Beginning with five sharps, Malmquist again adds a raised fourth scale degree to give the movement a Lydian mode character. The movement is built around the ‘Prologue Motive’. In the beginning of the movement, this motive is played against the open B string, taking advantage of the altered tuning.



Figure 5.5: Eric Malmquist Sonata, III. Nocturne, bars 3–7

In bar 22, the motive begins at the same pitch as in the first movement, but is heard in a completely different harmonic context. The tonality shifts to B minor, taking on a character of darkness.

From bar 48 to the end of the movement, the instruments switch roles from the opening as the piano picks up the rising motive while the cello pulsates on an extended pedal *B*'.

Movement IV. Rhapsody

The pedal *B*' at the end of the third movement transforms into a leading tone at the start of the fourth movement, which is mostly in the key of C major. Malmquist

again plays with tertian harmonies as rising and falling thirds make up the bulk of the melodic material in the movement. The opening material returns in bar 46, this time rhythmically compressed, as the cello part launches into a brief written-out cadenza. The tertian construction somewhat clouds the tonal center of the movement, but this harmonic instability subsides with entrance of the piano in bar 68 as C major returns as the dominant harmony.

Movement V. Epilogue

The final movement, *Epilogue*, begins with rapid string crossings across the first harmonic of each string. Because of the altered tuning, the strings form a ninth chord.

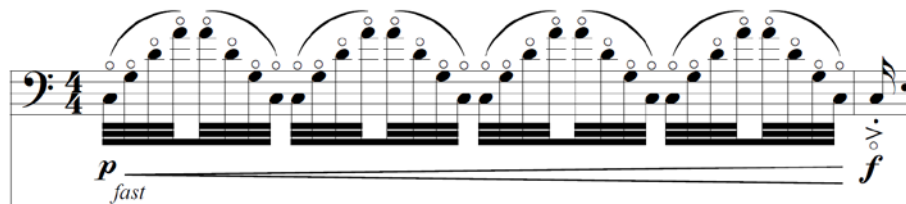


Figure 5.6: Eric Malmquist Sonata, V. Epilogue, bar 1

The piano enters with the start of the ‘Prologue Motive’ but descends after just one note. The cello reasserts the string crossings in bar 4. The piano enters again, this time continuing up the scale to an *F* in the manner of bars 9–13 from the *Prologue*. The cello enters with a third flourish of string crossings, now at the second harmonic across the four strings. The piano enters one final time on a *C#* but this time ascends up a tritone before continuing up the scale. Malmquist admits in the opening performance notes that the piece incorporates some “subtle or not-so-subtle

references to...works of profound influence on me.”⁶¹ In this case, we encounter reference to Leonard Bernstein’s “Maria” in terms of both melody and rhythm.



Figure 5.7: Eric Malmquist Sonata, V. Epilogue, bar 9

Rehearsal letter A (bar 17) begins a long climax, which extends all the way until rehearsal letter F (bar 87). The build-up begins with quarter-note chords in the piano. The cello then joins with the ‘Prologue Motive’ at rehearsal letter B (bar 32), which follows the first movement faithfully until rehearsal letter C (bar 47), with the exception of slight alteration to rhythm, accidentals, and octave displacement. At rehearsal letter D (bar 62), polyrhythms enter into the piano part, with the right hand playing dotted eighth notes against quarter notes in the left hand, creating a 4:3 ratio between the hands. At rehearsal letter E (bar 79) the piano launches into the arpeggiated figure from *Prelude* as the cello begins one final ascent to a *forte fortissimo* climax.

At rehearsal letter F (bar 87), the meter becomes unhinged. The piano dogmatically insists on accenting the downbeats of each measure while the cello enters on the second beat with a pattern that repeats every ten beats. The accumulated energy slowly deflates as we approach rehearsal letter G (bar 105). Here we encounter two more of Malmquist’s references to works that will be immediately

⁶¹ Malmquist, *Sonata*, 2.

recognizable to the modern cellist: Bach's Suite in G major, BWV 1007 and Britten's Suite No. 1, Op. 72.



Figure 5.8: Eric Malmquist Sonata, V. Epilogue, References to Bach and Britten

Section 3. Summary of Eric Malmquist's Sonata for Cello and Piano

Eric Malmquist uses the altered tuning of the cello's lowest string as a compositional premise that generates the fabric of his sonata. First, Malmquist consciously chooses key areas so that the B string takes on a different, yet equally important, tonal function in each movement. Second, by lowering the tuning the bottom string by a semitone, Malmquist imposes the interval of a minor sixth on the lowest two strings. He then takes this interval, its inversion, and their respective modal counterparts, and uses them as the building blocks for the entire composition. Malmquist's treatment of the scordatura is such that the tuning subtly affects the timbre of the instrument by altering its overtone series, yet it never presumes to be the focal point of the sonata. Malmquist has succeeded in bringing modernity to this historic technique and his sonata stands as a true gift to the scordatura cello repertoire.

Conclusion

Scordatura has played an important role in the history of the violoncello and its repertoire. From the beginnings of the instrument, multiple tunings were considered standard. As a single tuning emerged dominant, composers in the late seventeenth and early eighteenth centuries challenged the norm to create new possibilities in terms of both technique and sound.

In the twentieth century, there was some resistance to scordatura, particularly the so-called ‘transposition scordatura,’ amongst both scholars and performers. Perhaps there was a tendency to downplay this technique as a gimmick aimed at alleviating the technical challenges of playing in certain less-than-ideal keys on the instrument. This perception was reinforced by scholarly writings, which have emphasized the technical advantages of scordatura for making certain passages playable. From a performer’s perspective, there may have even been an element of pride in performing a scordatura composition in standard tuning in order to prove one’s technical prowess. As result, transposition scordatura compositions, such as Mozart’s *Sinfonia Concertante* in E \flat major, K. 364, were often altered to be played in standard tuning.

Given this downplay of the scordatura technique, it is understandable that scordatura compositions by lesser-known composers would have been forgotten over time. No modern editions of the works by Jacob Klein and Peter Ritter exist at the time of writing. Moreover, in this author’s opinion, there has not been sufficient consideration of the effect of scordatura on non-technical aspects of performance. By examining the physical effects of scordatura on the instrument, as well as its effects

on resonance, it becomes clear that there are aspects of scordatura outside the realm of technique that cannot be recreated by transposing or arranging a piece into standard tuning.

There are certainly disadvantages to performing in scordatura which may be considered, not the least of which is the constant retuning of the instrument if the performer expects to rehearse or perform any other pieces in conjunction with the scordatura composition. This can be alleviated with the use of separate instruments, but not every performer has multiple instruments at their disposal. Moreover, the idiosyncrasies of each instrument can have adverse effects on aspects of intonation and tone production if the performer is to switch instruments within a single performance.

Another consideration, particularly with compositions that call for tuning to higher pitches, is the potentially harmful effects of increased string tension on the instrument. This is a particularly valid concern on older instruments that have since been modified to modern standards. Such instruments are already under more force than the makers had originally intended, and one might question the wisdom behind adding extra tension to the strings. Fortunately, there is a remedy to this in the form of lower tension strings. With the string choices available to today's cellist, it is possible to obtain a set of strings in whichever material one prefers, be it gut, steel, or synthetic, that is of suitable linear density to be tuned to the required frequencies without exceeding the tension of another set at standard pitch. The performer will lose the potential benefits of higher tension in terms of sound intensity, but will still enjoy the intended effects of the altered tuning on resonance.

To disregard effects of scordatura on aspects not related to technique is an injustice on the composers who consciously chose this method of composition. While we cannot say for certain that Jacob Klein considered the effects of temperament on key choice or that Peter Ritter calculated the units of force exerted on the instrument, it would be equally naïve to assume that these cellist-composers were unaware of the effects of their choices. If technique were the only concern, these compositions and others like them could have just as easily been written to sound at the notated key of the solo part and avoided the use of scordatura altogether. It is logical to assume that these composers were searching for a means of altering the sound of the solo instrument compared to what was expected and relative to the other instruments in the composition. The scientific and mathematical analysis in this study outlining the impact that scordatura has on resonance bolsters this conclusion.

The author hopes that, with greater awareness of the extra-technical effects of scordatura, performers will realize that something is lost by altering these compositions from their intended tuning. The modern editions provided in the appendix should further aid in understanding the purpose of scordatura, as well as provide the opportunity to perform the pieces. Finally, the author hopes that modern composers such as Eric Malmquist will continue to create works in which the tuning is not simply altered for the sake of alteration, but rather forms an integral part of the piece's construction.

JACOB KLEIN

VI SONATAS

OPUS 1, BOOK III

FOR VIOLONCELLO AND BASSO CONTINUO

MODERN EDITION BY

ANDREW HESSE

Sonata XIII

Solo Violoncello in Scordatura

Jacob Klein (1688-1748)

Edited by Andrew Hesse (2018)

Presto

Measures 1-6 of the Presto section. The music is in 3/4 time with a key signature of one flat. The right hand plays a continuous eighth-note pattern, while the left hand provides a rhythmic accompaniment. Fingering numbers (6, 6, 6, 6, 6, 6) are indicated below the left-hand notes.

7

Measures 7-12 of the Presto section. The right hand continues with eighth notes, and the left hand has a more active role. Fingering numbers (6, 7, 6, 4, 3, 6, 6, 6) are indicated below the left-hand notes.

13 **Adagio**

Measures 13-16 of the Adagio section. The tempo slows down, and the music features longer note values and slurs. Fingering numbers (6, 6, 6, 5, 4, 6, 4, 6, 7, 6, 5, 4, 3, 7, 6) are indicated below the left-hand notes.

17

Measures 17-20 of the Adagio section. The music continues with a focus on melodic lines and harmonic support. Fingering numbers (6, 6, 6, 6, 5, 6, 6, 7, 6) are indicated below the left-hand notes.

21

Measures 21-24 of the Adagio section. The music features complex rhythmic patterns and slurs. Fingering numbers (4, 3, 6, 7, 5, 6, 6, 7, 4, 7, 5, 6, 6, 7, 4, #, #, 6, 6) are indicated below the left-hand notes.

25

Measures 25-27 of the Adagio section. The music continues with a focus on melodic lines and harmonic support. Fingering numbers (6, 7, 6, 6, 7, #, 6, 6, 5, 7, 7, 6, 7) are indicated below the left-hand notes.

28

Measures 28-31 of the Adagio section. The music concludes with a focus on melodic lines and harmonic support. Fingering numbers (6, 6, 6, 6) are indicated below the left-hand notes.

30

6 6 6 6 4 6 6 5 4

Allegro

6 6 6 6 7 6

4

6 4 3 6 6 6 6 6 # 6

7

5 6

10

6 6 6

13

6 6 # 6 7 6 7 6

16

6 5 # 6 7 6 # 4 2

19

6 6 7 6 5# 6 5 6 5

22

7b 7b 6

25

5 6 6 # 4/2 6 6 5 6

28

6 6 6 6

30

6 3 6 6 6

Largo

Musical notation for measures 4-5. The system consists of two staves. The upper staff contains a melodic line with eighth and quarter notes, some beamed together. The lower staff contains a bass line with quarter notes. Fingering numbers are placed below the notes in the lower staff: 6, 4, 3, 6, 6, 5, #.

Musical notation for measures 6-7. The system consists of two staves. The upper staff contains a melodic line with eighth and quarter notes. The lower staff contains a bass line with quarter notes. Fingering numbers are placed below the notes in the lower staff: 6, 5, 4, 3, 6, #, 6.

Musical notation for measures 8-9. The system consists of two staves. The upper staff contains a melodic line with quarter and eighth notes. The lower staff contains a bass line with quarter notes. Fingering numbers are placed below the notes in the lower staff: 6, 5, 5, 4, 3, 6, #, #, #.

Musical notation for measures 10-11. The system consists of two staves. The upper staff contains a melodic line with quarter and eighth notes. The lower staff contains a bass line with quarter notes. Fingering numbers are placed below the notes in the lower staff: 6, 7, 6, 6, 6, 6, 5, 4, 3, 6, b7.

Musical notation for measures 12-13. The system consists of two staves. The upper staff contains a melodic line with quarter and eighth notes. The lower staff contains a bass line with quarter notes. Fingering numbers are placed below the notes in the lower staff: 4b, 3, 6, 5, 7, 6, b, 6, 6.

Musical notation for measures 14-15. The system consists of two staves. The upper staff contains a melodic line with quarter and eighth notes. The lower staff contains a bass line with quarter notes. Fingering numbers are placed below the notes in the lower staff: 6, 5, 4, 3, b7, b, 6, 4, 3.

Musical notation for measures 16-17. The system consists of two staves. The upper staff contains a melodic line with quarter and eighth notes. The lower staff contains a bass line with quarter notes. Fingering numbers are placed below the notes in the lower staff: 6, 6, 7, 6, 4, 5.

Allegro

Musical notation for measures 1-6. The piece is in 3/4 time with a key signature of two flats (B-flat and E-flat). The right hand features a continuous eighth-note melody, while the left hand provides a simple accompaniment of quarter notes and rests.

Musical notation for measures 7-13. Measure 7 begins with a repeat sign. Measure 8 contains a double bar line and a key signature change to one flat (B-flat). Fingering numbers are provided below the notes: 6, 4, 5, #, 6, 6, 7, 6, 7, 7, #, 6, 4, 7, 6.

Musical notation for measures 14-19. The right hand continues with eighth-note patterns, and the left hand has a steady accompaniment. Fingering numbers are provided below the notes: 6, 6, 7, 6, 7, 7, #, #, #.

Musical notation for measures 20-25. The right hand melody continues with eighth notes, and the left hand accompaniment remains consistent. Fingering numbers are provided below the notes: #, #.

Musical notation for measures 26-31. The right hand features eighth-note patterns with some slurs. The left hand accompaniment includes some chromatic movement. Fingering numbers are provided below the notes: 5, 5, 6, 7, 4, 3, 6_b, 5_b, 5_b.

Musical notation for measures 32-37. The right hand continues with eighth-note patterns. The left hand accompaniment includes some chromatic movement. Fingering numbers are provided below the notes: 5_b, 6_b, 7_#.

Musical notation for measures 38-43. The right hand continues with eighth-note patterns. The left hand accompaniment includes some chromatic movement. Fingering numbers are provided below the notes: #, #, 6, 93, 6_b, 5_b, 3, 6, 6, 5.

45

52

58

64

70

p

p

Sonata XIV

Largo

7

Musical notation for measures 1-2. The right hand has a whole rest. The left hand has a whole note chord (F#4, A4, C5) followed by a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Fingering: 6, 6, 4, 3.

Adagio

Musical notation for measures 3-6. Measure 3: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Measure 4: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Measure 5: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Measure 6: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Fingering: 7, 6, 6, 6, 4, 5, 6.

Musical notation for measures 7-10. Measure 7: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Measure 8: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Measure 9: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Measure 10: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Fingering: 9, 8, 4+, 6, 7, #, 6, 6, 6, 4, 3, 6, 7, 6.

Poco Allegro

Musical notation for measures 11-14. Measure 11: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Measure 12: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Measure 13: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Measure 14: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Fingering: #, p, 6, 4, 7, #, 4, 3, 4+, 6, 7, 6.

Musical notation for measures 15-18. Measure 15: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Measure 16: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Measure 17: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Measure 18: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Fingering: 7, 6, 6, 7, 6, 7, 6, 7, 5, 4, 3, 4+, 6.

Musical notation for measures 19-22. Measure 19: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Measure 20: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Measure 21: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Measure 22: Right hand has a sixteenth-note triplet (F#4, A4, C5) and a sixteenth-note triplet (F#4, A4, C5). Left hand has a whole note chord (F#4, A4, C5). Fingering: 7, 6, 7, 6, 6, 7, 6, 7, 6, 6, 6, 5, 5, 4, #.

Adagio

8

Allegro

6 6 6 7

4

6 4 # 6 4 # 6 6 # 6 5 5 6 5

7

6 6 9 8 6 # 6 5

10

6 7 # 6 5 # 6 #

13

6 6 4 5 6 5 6

16

5 6 5 4 3 # # #

19

6 5 4 3 7 6 7 6 # #

22

5 4 # 4+ 6 7 6 7 6 7 6 #

25

6 6 5 4 # 6 6 6 5 7 6 7

28

p 6 6 6 *p* 6 6 4 3

Adagio

Musical score for Adagio, measures 10-25. The score is written in bass clef with a key signature of two sharps (F# and C#) and a 3/4 time signature. It consists of two staves: a treble staff and a bass staff. The music features a variety of rhythmic patterns, including eighth and sixteenth notes, and rests. Fingerings are indicated by numbers 1-5 below the notes. Measure numbers 10, 14, 20, and 25 are marked at the beginning of their respective systems. The score concludes with a double bar line at measure 25.

Allegro

Musical score for piano, measures 1-25. The score is in 9/8 time and D major. It features a complex bass line with many sixths and dynamic markings such as *f* and *p*. Measure numbers 5, 9, 13, 17, 21, and 25 are indicated at the start of their respective systems.

12

29

Musical notation for measures 29-33. The right hand features a melodic line with slurs and ties. The left hand provides a bass line with some rests. Fingering numbers are present below the left hand notes.

Fingering: 6 4 5 3, 6 6, 7 6 6 6

34

Musical notation for measures 34-36. The right hand has a rhythmic pattern of eighth notes. The left hand has a bass line with rests. Fingering numbers are present below the left hand notes.

Fingering: 6 4, 6 4, 7, 7

37

Musical notation for measures 37-41. The right hand has a melodic line with slurs and ties. The left hand has a bass line with rests. Fingering numbers are present below the left hand notes.

Fingering: 6 5, 5, 4 2, 6, 5 4 3

Sonata XV

Adagio

13

Measures 1-3 of the piece. The right hand has a whole chord in the first measure. The left hand has a melodic line with slurs and ties. Fingering numbers 4/2, 6, and 6/4 are shown below the left hand.

Measures 4-6. The left hand features a complex rhythmic pattern with slurs and ties. Fingering numbers 5, 6, 7, 3, 6, 6/5, 56, 6, 56, and 6 are shown below the left hand.

Measures 7-9. The left hand has a melodic line with slurs and ties. Fingering numbers 56, 6, 6/5, 6, 6, 6, 6, 6, 6, 4/2, 6, 4, and 3 are shown below the left hand.

Measures 10-12. The left hand has a melodic line with slurs and ties. Fingering numbers 6, 65, #, 6, 6, 5/4, and # are shown below the left hand.

Measures 13-14. The left hand has a melodic line with slurs and ties. Fingering numbers 6, #, 4/2, 6, and 6/5 are shown below the left hand.

Measures 15-17. The left hand has a melodic line with slurs and ties. Fingering numbers 6, 6, 6, 5, 4/2, and 6 are shown below the left hand.

14

17

6 5 5 4 3 6 6 # #

20

6 # 4+ 6 6 5 4 # 6 4 3

Allegro

6 6 7 6 5 6

6

5 6 6 6 6 6 5 6 6

12

6 6 5 6 5

18

6 5 #

24

6 6 6 6 5 # 7 5 4

30

37

43

49

55

16

Adagio

6 6 9 8 6 7 6 5 5

7

9 8 6 # # 6 5

11

9 8

16

4 3 5 3 4 3 5 3 4 3

Allegro

6 6 7 5 4 3

4

6 7 3 6 5 6

7

6 6 6 4 6 6

10

5

13

6 7/4/2 6 6

16

6

19

6 6 7 6 6 4 5 6

22

6

25

3 #

28

6 6

18

31

34

37

40

43

f

p

6 # 6 6 6 4

5 6 4 6 # 6 6 5 4 3

5 6 4 2 6 6 6

43 6 7 4 2

Detailed description: This is a musical score for bass guitar, consisting of four systems of two staves each. The key signature is three sharps (F#, C#, G#). The first system (measures 31-33) features a melodic line in the upper staff with slurs and a bass line in the lower staff with fingerings 6, #, 6, 6, 6, 4. The second system (measures 34-36) continues the melodic line with slurs and a bass line with fingerings 5, 6, 4, 6, #, 6, 6, 5, 4, 3. The third system (measures 37-39) shows a melodic line with slurs and a bass line with fingerings 5, 6, 4, 2, 6, 6, 6. The fourth system (measures 40-43) begins with a forte (*f*) dynamic, followed by a piano (*p*) dynamic. The melodic line has slurs and the bass line has fingerings 43, 6, 7, 4, 2. The piece concludes with a double bar line and repeat dots.

Sonata XVI

19

Adagio

Measures 1-3 of the piece. The right hand (RH) plays a melodic line with slurs and accents, while the left hand (LH) provides a steady accompaniment. Fingering numbers are indicated below the LH staff: 5, 6, 6, 6, 6, 4, 5, 6, 6, 6, 4, 5.

Measures 4-6. The RH continues with a complex melodic pattern. Fingering numbers for the LH are: 6, #, 6, #, 5, 4, #, 6, #, 6, 7, 4, 3.

Measures 7-9. The RH features a series of slurred notes. Fingering numbers for the LH are: 6, 4, 5, 6, #, 7, 5, 4, #.

Measures 10-12. The RH has a more active melodic line. Fingering numbers for the LH are: 4, 2, 6, #, #, 6, 5, 4, #, #.

Measures 13-15. The RH continues with a melodic line. Fingering numbers for the LH are: 6, 6, 6, 5, #, 6, 6, 4, #, 6, 5, 4, #.

Measures 16-18. The RH concludes with a melodic phrase. Fingering numbers for the LH are: 6, 6, 6, 6, 6, 5, 7, 6, #.

Allegro

6 5 3 # # # 6 5

6 5 # 6 5 6 7 6 # # 4+ 4+

6 6 6 6 6 6 6 6

6 6 6 5 6 5

6 # # # # 4+ #

6 7 6 6 7 7 6 6 7 5 4 #

Largo

Musical score for piano, measures 1-28, in G major, Largo tempo. The score is written in bass clef with a key signature of one sharp (F#). It consists of five systems of two staves each. Measure numbers 8, 15, 22, and 26 are indicated at the start of their respective systems. Fingerings are indicated by numbers 1-5 below notes. The piece concludes with a double bar line and repeat dots at the end of measure 28.

46

6 6 6 6

51

6 6 5 7 5 4 3 4 6 5 6

57

4/2 6 6 6 6/5 6

61

5/5 # # #

Sonata XVII

24

Allegro

5 4 3

4

4+ 6

8

p

4+ 6 # 7 # 4+

12

6 6 4 6 4

16

6 5 # 4+ 6 #

20

6

24

#

28

7 5 4 3

32

5 4 #

36

f *p* *f*

Adagio 6

40

5 6 4 5 4 3

Andante

4

5
4#

6
4+

6

6

4

5

6

6

6

7

98

5

6

98

6

5

4

3

4

2

#

4+

6

9

6

7

3

6

6

11

6

6

6

6

6

13

6

6

6

5

#

#

6

7

5+

4

16

6

#

4+

6

6

6

4

6

19

6 5 # 6 7 5 5 2+ 5+ # 6 7 7 6 7

22

5 # 6 7 # # 4+ 6 7 6

25

6 # 6 98 6 6 #

27

6 # 6 98 6 7 5

Adagio

6 6 4 6 5 # 6 6 6 # 4+

8

5+ # 4+ 6 6 6 5 # # 6 6 #

14

6 6 6 # 65

20

7 7 # 6 6 4+ # 6 5 98 56

25

76 6 76 6 6 6

29

4+ 2 6 6 5 6 4 5 4 #

Vivace

9

17

25

33

42

49

6 5 4 3

56

65

74

81

Fingerings and markings: #, 6, #, 5, 7, #, 5, 7, 5, 7, 6, 6, 5, 4, 3, 6, 6, 6, 4, 6, 5, 4, 3, 5, 6, 4, 3, 7, 7, #, 6, 6, #, 4+, 3, 3, 3, 3, 3, 3, 3, 6, 5, 6, #, 4+, 6, 6, 4, #

Sonata XVIII

Adagio

31

Measures 1-4 of the Adagio section. The right hand features a complex melodic line with many accidentals and slurs. The left hand provides a simple harmonic accompaniment. Fingering numbers are indicated below the notes: 5, 4+, 2, #, #, 6, 6, 5, 4, #, 6.

Measures 5-8 of the Adagio section. The right hand continues with intricate melodic patterns. The left hand accompaniment remains steady. Fingering numbers are: 7, 5, 5, 6, 6.

Measures 9-12 of the Adagio section. The right hand has a more active melodic line. The left hand accompaniment includes some grace notes. Fingering numbers are: 5, 7, #, 6, 6, 6, 4.

Measures 13-16 of the Vivace section. The right hand has a dense, rhythmic texture with many sixteenth notes. The left hand accompaniment is simpler. Fingering numbers are: #, 6, #, 6, 4.

Measures 17-20 of the Vivace section. The right hand continues with a fast, rhythmic pattern. The left hand accompaniment is consistent. Fingering numbers are: #, #, #, #.

Measures 21-23 of the Vivace section. The right hand has a fast, rhythmic pattern. The left hand accompaniment is consistent. Fingering numbers are: 7, 4, 2, #, 6, #, #, 6.

Measures 24-27 of the Vivace section. The right hand continues with a fast, rhythmic pattern. The left hand accompaniment is consistent. Fingering numbers are: 5, 5, 6, #.

32

28 **Presto**

Musical notation for measures 28-31 of the Presto section. The right hand features a rapid sixteenth-note pattern, while the left hand plays a simple bass line with rests and notes.

32 **Arpeggio**

Musical notation for measures 32-37 of the Arpeggio section. The right hand plays sustained chords, and the left hand plays a rhythmic eighth-note pattern.

38

Musical notation for measures 38-43 of the Arpeggio section. The right hand continues with sustained chords, and the left hand continues with eighth-note patterns.

44

Musical notation for measures 44-49 of the Arpeggio section. The right hand continues with sustained chords, and the left hand continues with eighth-note patterns.

50 **Adagio**

Musical notation for measures 50-54 of the Adagio section. The right hand plays a melodic line with slurs, and the left hand plays a simple bass line.

Allegro

7

13

19

25

31

37

121

34

43

6 6 5

49

6 # # 6 6 5 4 # 6

55

6 6 5 6 6 5

61

6 # 6 # # # # 5 6 6 #

67

6 6 6 6 6 6

72

6 6 6 #

Largo

Musical score for the Largo section, measures 1-14. The score is written in bass clef with a key signature of one sharp (F#) and a 3/4 time signature. It features a melodic line in the upper voice and a bass line in the lower voice. Fingerings are indicated by numbers 1-5. Measure numbers 6, 9, and 14 are marked. The piece concludes with a double bar line and repeat dots.

Allegro

Musical score for the Allegro section, measures 1-13. The score is written in bass clef with a key signature of one sharp (F#) and a 12/8 time signature. It features a melodic line in the upper voice and a bass line in the lower voice. Fingerings are indicated by numbers 1-7. Dynamic markings include *f* (forte) and *p* (piano). Measure numbers 4, 7, and 10 are marked. The piece concludes with a double bar line and repeat dots.

36

13

Musical notation for measures 13-15. The right hand features a melodic line with slurs and accents, marked with *p* and *f*. The left hand provides a bass line with fingerings: 5, 6/4, #, 5, 6, 7, 6, #, 5.

16

Musical notation for measures 16-18. The right hand continues the melodic line with slurs and accents, marked with *f*. The left hand provides a bass line with fingerings: #, #, 6/4, #, 6, 6, 6.

19

Musical notation for measures 19-21. The right hand features a melodic line with slurs and accents, marked with *p* and *f*. The left hand provides a bass line with fingerings: 6, 6, 7, 6, 7.

22

Musical notation for measures 22-24. The right hand continues the melodic line with slurs and accents. The left hand provides a bass line with fingerings: 6, 6, #, 6, 6.

25

Musical notation for measures 25-26. The right hand continues the melodic line with slurs and accents. The left hand provides a bass line with a fingering of 6.

27

Musical notation for measures 27-28. The right hand continues the melodic line with slurs and accents. The left hand provides a bass line with fingerings: 5, 6, 12, 6.

29

32

35

38

f *p* *f*

7 7 7 7 7 7 6

6 5 $\frac{4}{2}$ 6 5 5 6 $\frac{4}{2+}$ # #

6 # $\frac{4}{2+}$ 6 6 7 $\frac{6}{5}$ 7 6 # $\frac{4}{2+}$ 6 6 7 6 #

6 $\frac{6}{4}$ 6 6 $\frac{6}{4}$

Detailed description: This is a musical score for bass guitar, spanning measures 29 to 38. The music is written in a key with two sharps (F# and C#) and a common time signature. The score is divided into four systems. The first system (measures 29-31) features a melodic line in the right hand with slurs and a bass line in the left hand with fret numbers 7 and 6. The second system (measures 32-34) continues the melodic and bass lines with fret numbers 6, 5, 4/2, 6, 5, 5, 6, 4/2+, and two sharps. The third system (measures 35-37) includes dynamic markings *f* and *p* and fret numbers 6, #, 4/2+, 6, 6, 7, 6/5, 7, 6, #, 4/2+, 6, 6, 7, 6, #. The fourth system (measures 38) concludes with dynamic markings *f*, *p*, and *f*, and fret numbers #, 6, 6/4, 6, 6, 6/4, #.

Sonata XIII

Solo Violoncello in Concert Pitch

Jacob Klein (1688-1748)

Edited by Andrew Hesse (2018)

*Solo Violoncello
to be tuned

Presto

Measures 1-5 of the Presto section. The music is in 3/4 time. The right hand has a treble clef and the left hand has a bass clef. The key signature has one flat (B-flat). The notation includes a G-clef on the right hand and a C-clef on the left hand. The first measure shows a G-clef on the right hand and a C-clef on the left hand. The music consists of eighth and sixteenth notes. Fingering numbers 6 are indicated below the notes in measures 1, 2, 3, 4, and 5.

Measures 6-11 of the Presto section. The notation continues with eighth and sixteenth notes. Fingering numbers 6, 7, 6, 4, 3, and 6 are indicated below the notes in measures 6 through 11.

Adagio

Measures 12-15 of the Adagio section. The music is in 3/4 time. The right hand has a treble clef and the left hand has a bass clef. The key signature has one flat (B-flat). The notation includes a G-clef on the right hand and a C-clef on the left hand. The first measure shows a G-clef on the right hand and a C-clef on the left hand. The music consists of eighth and sixteenth notes. Fingering numbers 6, 6, 6, 6, 5, 4, 6, 4, 6, 5, 7 are indicated below the notes in measures 12 through 15.

Measures 16-19 of the Adagio section. The notation continues with eighth and sixteenth notes. Fingering numbers 6, 4, 3, 7, 6, 6, 6, 6, 6, 6, 5, 6 are indicated below the notes in measures 16 through 19.

Measures 20-23 of the Adagio section. The notation continues with eighth and sixteenth notes. Fingering numbers 6, 7, 6, 4, 3, 6, 7, 5, 6, 6, 7, 4, 7, 5, 6, 4, 2 are indicated below the notes in measures 20 through 23.

Measures 24-26 of the Adagio section. The notation continues with eighth and sixteenth notes. Fingering numbers #, 6, 6, 6, 7, 6, 6, 7, #, 6, 6, 5, 7 are indicated below the notes in measures 24 through 26.

Measures 27-30 of the Adagio section. The notation continues with eighth and sixteenth notes. Fingering numbers 7, 6, 7, 6, 6, 6, 6 are indicated below the notes in measures 27 through 30.

30

6 6/4/2 6/4/2 6/4/2 4/2 6 6 5/4

Allegro

6 6 6 6 7 6

4

6 4 3 6 6 6 6 6 6 # 6

7

5 6

10

6 6 6

13

6 6 # 6 7 6 7 6

16

6 5 # 6 7 6 # 4/2

19

22

25

28

30

Largo

Musical notation for measures 4-5. The system consists of two staves. The upper staff has a treble clef and a 3/2 time signature. The lower staff has a bass clef. Fingerings are indicated by numbers 1-5 below the notes. Measure 4: Treble clef has a half note G4 with a slur over it, followed by a half note F4 with a slur over it. Bass clef has a whole note G3. Measure 5: Treble clef has a half note E4 with a slur over it, followed by a half note D4 with a slur over it. Bass clef has a whole note F3.

Musical notation for measures 6-7. The system consists of two staves. Measure 6: Treble clef has a half note C5 with a slur over it, followed by a half note B4 with a slur over it. Bass clef has a whole note G3. Measure 7: Treble clef has a half note A4 with a slur over it, followed by a half note G4 with a slur over it. Bass clef has a whole note F3.

Musical notation for measures 8-9. The system consists of two staves. Measure 8: Treble clef has a half note F4 with a slur over it, followed by a half note E4 with a slur over it. Bass clef has a whole note G3. Measure 9: Treble clef has a half note D4 with a slur over it, followed by a half note C4 with a slur over it. Bass clef has a whole note F3.

Musical notation for measures 10-11. The system consists of two staves. Measure 10: Treble clef has a half note B4 with a slur over it, followed by a half note A4 with a slur over it. Bass clef has a whole note G3. Measure 11: Treble clef has a half note G4 with a slur over it, followed by a half note F4 with a slur over it. Bass clef has a whole note F3.

Musical notation for measures 12-13. The system consists of two staves. Measure 12: Treble clef has a half note E4 with a slur over it, followed by a half note D4 with a slur over it. Bass clef has a whole note G3. Measure 13: Treble clef has a half note C4 with a slur over it, followed by a half note B3 with a slur over it. Bass clef has a whole note F3.

Musical notation for measures 14-15. The system consists of two staves. Measure 14: Treble clef has a half note A3 with a slur over it, followed by a half note G3 with a slur over it. Bass clef has a whole note G3. Measure 15: Treble clef has a half note F3 with a slur over it, followed by a half note E3 with a slur over it. Bass clef has a whole note F3.

Musical notation for measures 16-17. The system consists of two staves. Measure 16: Treble clef has a half note D4 with a slur over it, followed by a half note C4 with a slur over it. Bass clef has a whole note G3. Measure 17: Treble clef has a half note B3 with a slur over it, followed by a half note A3 with a slur over it. Bass clef has a whole note F3.

Allegro

7

14

20

26

32

38

6 5 3 # 6 6 7 6 7 7 # 6 4 7 6

6 6 7 6 7 7 # # #

#

6 5 6 7 4 3 5_b 5_b

5_b 6 5_b 7 #

#

6 6_b 5 4_b 3 6 6 6

45

52

58

64

70

p

p

Sonata XIV

Largo

7

Musical notation for measures 1-2. The piece is in G major (one sharp) and common time (C). The right hand features a complex, flowing melodic line with many slurs and ties. The left hand has a simpler accompaniment. Fingering numbers 6, 6, 4, and 5, 3 are indicated below the left hand notes.

Adagio

Musical notation for measures 3-6. The tempo is Adagio. The right hand continues with a melodic line, and the left hand has a steady accompaniment. Fingering numbers 7, 6, 6, 6, and 4, 5, 6 are indicated below the left hand notes.

Musical notation for measures 7-10. The right hand has a more active melodic line with slurs. The left hand accompaniment is consistent. Fingering numbers 9, 8, 4+, 6, 7, #, 6, 6, 6, 4, 3, 6, 7, 6 are indicated below the left hand notes.

Poco Allegro

Musical notation for measures 11-14. The tempo is Poco Allegro. The right hand has a more rhythmic, chordal texture. The left hand accompaniment is steady. Dynamics *p* (piano) are marked. Fingering numbers #, 6, 4, 7, #, 4, 3, 4+, 6, 7, 6 are indicated below the left hand notes.

Musical notation for measures 15-18. The right hand continues with a rhythmic texture. The left hand accompaniment is steady. Fingering numbers 7, 6, 6, 7, 6, 7, 6, 7, 5, 4, 3, 4+, 6 are indicated below the left hand notes.

Musical notation for measures 19-22. The tempo returns to Adagio. The right hand has a melodic line. The left hand accompaniment is steady. Fingering numbers 7, 6, 7, 6, 6, 7, 6, 7, 6, 6, 6, 5, 4, # are indicated below the left hand notes.

8

Allegro

6 6 6 7 5

4

6 4 # 6 4 # 6 6 # 6 5 5 6 5

7

6 6 9 8 6 # 6 5

10

6 5 7 # 6 5 # 6 #

13

6 6 4 5 6 5 6

16

5 6 5 4 3 # # #

19

6 5 4 3 7 6 7 6 # #

22

25

28

5 4 # 4+ 6 7 6 7 6 7 6 #

6 6 5 4 # 6 6 6 5 7 6 7

p *p* 6 6 4 3

Adagio

6 7 6 7 6 6 6 4 3 98

5 5 # # 6 6 5 7 5 7 5

7 # 4+ 6 # 6 7 6 98 6

98 65 6 6 5 6 4 2

6 6 6 98 6 4 3 4

Allegro

Musical score for piano, measures 1-25. The score is in 9/8 time and D major. It consists of two staves: a treble staff and a bass staff. The music is marked *f* (forte) in measures 1-4, *p* (piano) in measure 5, and *f* in measures 6-8. The piece features a complex bass line with many sixths and other intervals, and a treble staff with eighth-note patterns and slurs. Measure numbers 1, 5, 9, 13, 17, 21, and 25 are indicated at the start of their respective systems. The score ends with a double bar line and repeat dots in measure 25.

12

29

Musical notation for measures 29-33. The system consists of two staves. The upper staff contains a melodic line with eighth and sixteenth notes, including slurs and ties. The lower staff contains a bass line with quarter and eighth notes, including rests. Fingering numbers are placed below the notes: 6, 4, 3, 6, 6, 7, 6, 6, 6.

34

Musical notation for measures 34-36. The system consists of two staves. The upper staff contains a melodic line with eighth notes and slurs. The lower staff contains a bass line with quarter notes and rests. Fingering numbers are placed below the notes: 6, 4, 7, 6, 7.

37

Musical notation for measures 37-41. The system consists of two staves. The upper staff contains a melodic line with eighth notes and slurs. The lower staff contains a bass line with quarter notes and rests. Fingering numbers are placed below the notes: 6, 5, 4, 2, 6, 5, 4, 3.

Sonata XV

Adagio

13

Musical score for Sonata XV, Adagio, measures 1-18. The score is written in bass clef with a key signature of three sharps (F#, C#, G#) and a common time signature (C). The music is divided into six systems, each with a measure number at the beginning. Fingerings are indicated by numbers 1-5 below the notes. Some measures include specific fingering instructions like 4/2, 6, 6/4, 5, 6, 7, 5/3, 6, 6/5, 56, 6, 56, 6, 56, 6, 6/5, 6, 6, 6, 6, 6, 6, 4/2, 6, 4, 3, 6, 65, #, 6, 6, 5/4, #, 6, #, 4/2, 6, 6, #, 4/2, 6, 3, 3, 3, 3, 6, 6, 6, 5, 4/2, 6.

14

17

6 5 4 3 6 6 # #

20

6 # 4+ 6 6 5 4 # 6 4 3

Allegro

6 6 7 6 5 6

6

5 6 6 6 6 6 5 6 6

12

6 6 5 6 5

18

6 5 #

24

6 6 6 6 5 # p 3 3 3 3 3 7 5 4

30

37

43

49

55

16

Adagio

6 6 9 8 6 7 6 5 6 5

98 6 # # 6 5

98

4 3 5 3 4 3 5 3 4 3

Allegro

6 6 7 5 4 3

6 7 6 5 6

6 6 6 6 6

10

5

13

6 7/4 2 6 6

16

6

19

6 6 7 6 6 4 5 6

22

6

25

7 #

28

6 6

18

31

34

37

40

43

p

f

Sonata XVI

19

Adagio

5 6 6 6 4 6 6 6 4 3

4

6 # 6 # 5 4 # 6 # 6 7 4 3

7

4 6 5 6 # 7 5 4 #

9

4 2 6 # # 6 5 4 # #

11

6 6 6 # 6 4 # 6 5 4 #

13

6 6 6 6 5 7 6 #

144

Allegro

6 5 4 3 # # # 6 5

6 5 # 6 5 6 7 6 # # 4+ 2 4+ 2

6 6 5 6 5 6 6 6 6 6 6

6 6 6 5 6 5 6 5

6 # # # # 4+ #

6 7 6 6 7 7 6 6 7 5 4 #

Largo

Musical score for piano, measures 1-26. The score is in bass clef with a key signature of two sharps (F# and C#). It consists of five systems of two staves each. Measure numbers 8, 15, 22, and 26 are indicated at the start of their respective systems. Fingerings are indicated by numbers 1-5 below notes. Some notes have accidentals (sharps and naturals). The piece concludes with a double bar line and repeat dots at the end of measure 26.

Allegro

6 6 # 4+ 6 6 6 6 5 #

7 6 5 # 4+ 6 6 6 5 4 # # 6

14 6 6 4/2 6 5 6 7 4/2 6 4/2 # 4+ 6 6

21 6 6 6 # # # # #

28 6 6 6 # 4+ 6 6 6 6 6 6

34 6 6 6 6 #

40 # 6 6 6

46

6 6 6 6

51

6 6 5 7 5 4 3 4 6 5 6

57

4+ 6 6 6 6 5 6

61

6 # 6 # 6 #

Sonata XVII

24

Allegro

Musical score for Sonata XVII, measures 24-25. The score is written for piano in 3/4 time. It consists of two staves: a treble staff and a bass staff. The right hand (treble staff) plays a continuous eighth-note pattern. The left hand (bass staff) plays a simple harmonic accompaniment. The key signature is one sharp (F#). The tempo is marked 'Allegro'. The score is divided into systems of four measures each. Measure numbers 24, 25, 9, 13, 17, 21, and 25 are indicated at the beginning of their respective systems. Fingerings are indicated by numbers 1-5 below the notes. A dynamic marking 'p' (piano) is present in measure 25. The page number 149 is at the bottom.

29

33

37

p *f*

Adagio

40

5 4 3

5 4 3

6 4 5 4 3

Andante

Musical score for 'Andante' in bass clef, consisting of seven systems of two staves each. The right hand plays a complex, flowing melodic line with many slurs and ties. The left hand provides a steady accompaniment with various rhythmic patterns and rests. Fingering numbers (1-5) are indicated below the notes in the left hand. Some numbers are accompanied by a '+' sign, indicating a specific fingering technique. Measure numbers 4, 7, 9, 11, 13, and 16 are placed at the beginning of their respective systems.

System 1: 5₄#, 6₄₊/₂, 6, 6₄, 5₃, 5, 6, 6

System 2: 4, 98, 5, 6, 98, 6, 5, 3, 4, #, 4+, 6

System 3: 7, #, #

System 4: 9, 6, 7, 3, 6, 6

System 5: 11, 6, 6, 6, 6, 6

System 6: 13, 6, 6, 6, 6, #, #, #, 6, 7, 5+₄

System 7: 16, #, 4+, 6, 6, 6, 4, 6

19

22

25

27

p 3 3 3 3

6 5 # 6 5 7 5 5 4+ 5+ # 6 7 7 6 7

6 5 # 6 7 # # 4+ 6 7 6 5

6 # 6 98 6 6 #

6 # 6 98 6 7 6 5

28

Adagio

6 6 4 6 5 # 6 6 6 # 4+

8

5+ # 4+ 6 6 6 5 # 6 6 #

14

6 6 6 # 65

20

7 7 # 6 5 98 56

25

76 6 76 6 6 6

29

4+ 2 6 6 6 5 #

Vivace

This page contains a piano score for a piece titled "Vivace". The score is written in 2/4 time and consists of seven systems of music, each with a treble and bass clef staff. The piece is characterized by frequent triplet patterns in the right hand and a steady bass line in the left hand. The key signature changes from one sharp (F#) to two sharps (F# and C#) and finally to one flat (Bb).

The score includes the following measures and fingering:

- Measures 1-8: Right hand triplets; left hand notes: #, #, 5.
- Measures 9-16: Right hand triplets; left hand notes: 7, 7, 5, 7, 6, #, 4+, 6, 6, 6, 6.
- Measures 17-24: Right hand triplets; left hand notes: 4, 3, 6, 7, 5.
- Measures 25-32: Right hand triplets; left hand notes: 6, 5, 3, x, 4+, 6, #, x, 4+, 6, 6, 6, 3, 3, 6, #, 6.
- Measures 33-41: Right hand triplets; left hand notes: x, 5+, #, #, 5+, #, #, 5, #, #, 5, #, 5, 4.
- Measures 42-48: Right hand triplets; left hand notes: 5, 4, 4, b.
- Measures 49-56: Right hand triplets; left hand notes: 6, 5, 4, 3.

56

65

74

81

Fingerings: #, #, #, 6, #, 5, 7, #, 5, 7, 5, 7, 6, 6, 5, 4, 3, 6, 6, 6, 6, 4, 5, 4, 3, 5, 6, 4, 3, 7, 7, 6, 6, #, 4+, 3, 3, 3, 3, 3, 3, 3, 6, 5, 6, #, 4+, 6, 6, 4, #

Sonata XVIII

Adagio

31

Musical score for Sonata XVIII, Adagio section, measures 5-25. The score is written for piano in G major and 3/4 time. It consists of two staves: a treble clef staff and a bass clef staff. The key signature has one sharp (F#) and the time signature is 3/4. The tempo is marked Adagio. The score is divided into measures 5, 9, 13, 17, 21, and 25. The first system (measures 5-8) shows a complex melodic line in the treble staff with many slurs and a steady bass accompaniment. The second system (measures 9-12) continues the melodic development. The third system (measures 13-16) is marked **Vivace** and features a more rhythmic, chordal texture in the treble staff. The fourth system (measures 17-20) returns to a more melodic style. The fifth system (measures 21-24) continues the melodic line. The sixth system (measures 25-28) concludes the section. Fingerings and articulation marks are indicated throughout the score.

32

28 **Presto**

Musical notation for measures 28-31 of the Presto section. The right hand features a rapid sixteenth-note pattern, while the left hand plays a simple bass line with occasional accidentals.

32 **Arpeggio**

Musical notation for measures 32-37 of the Arpeggio section. The right hand plays chords with a wavy motion, and the left hand plays a steady eighth-note pattern.

38

Musical notation for measures 38-43 of the Arpeggio section. Similar to the previous system, with wavy chords in the right hand and eighth notes in the left hand.

44

Musical notation for measures 44-49 of the Arpeggio section. Continues the wavy chord pattern in the right hand and eighth-note pattern in the left hand.

50 **Adagio**

Musical notation for measures 50-54 of the Adagio section. The right hand has a slower, more melodic line with slurs, and the left hand plays a simple bass line.

Allegro

Measures 1-6 of the piece. The right hand features a complex rhythmic pattern with eighth and sixteenth notes. The left hand provides a steady accompaniment. Fingering numbers are indicated below the notes: #, 6, 6, 6, 6, 6, #, 4+, 6, 6.

Measures 7-12. Measure 7 begins with a double bar line. The right hand continues with sixteenth-note patterns. The left hand has a more melodic line. Fingering numbers: 6, 4, #, #, 6, 4, #, #, #, #, 6, 6, 4.

Measures 13-18. The right hand has a dense texture of sixteenth notes. The left hand has a simpler accompaniment. Fingering numbers: 4, 7, 6, #, 6, 6.

Measures 19-24. Measure 19 begins with a double bar line. The right hand has a rhythmic pattern of eighth notes. The left hand has a melodic line. Fingering numbers: 6, 6, #, 6, 6, 6, #, 6.

Measures 25-30. The right hand features a complex sixteenth-note pattern. The left hand has a steady accompaniment. Fingering numbers: 6, #, 6, 6, #, 5b, #, 6, 5b.

Measures 31-36. The right hand has a rhythmic pattern of eighth notes. The left hand has a melodic line. Fingering numbers: 5, 7, 6, 6.

Measures 37-42. Measure 37 begins with a double bar line. The right hand has a complex sixteenth-note pattern. The left hand has a steady accompaniment. Fingering numbers: 6, 6, #, 6, 6, #, #, #, 6, 4, #, 6, 5.

34

43

6 6 5

49

6 # # 6 6 6 5 4 # 6

55

6 6 5 6 6

61

6 # 6 # # # # 5 6 6 #

67

6 6 6 6 6 6

72

6 6 6 #

Largo

6 6 # 6 6 5

7 9 6 # # 6 4 4 # 6

14 5+ # 4 # 6+ # 7 # 7 6 7 6 #

Allegro

6 6 # 6 6

4 # 6 6 # #

7 p f # 6 6 6 6 7 #

10 6 4 # # 6 # 6 4

36

13

p *f*

5 6 4 # 5 6 7 6 # 5

16

f

6 4 # 6 6

19

p *f*

6 6 7 6 7

22

6 6 # 6 6

25

6

27

5 6 16 6

29

7 7 7 7 7 7 6

32

6 5 $\frac{4}{2}$ 6 5 5 6 $\frac{4+}{2}$ # #

35

f *p*

6 # $\frac{4+}{2}$ 6 6 7 $\frac{6}{5}$ 7 6 # $\frac{4+}{2}$ 6 6 7 6 #

38

f *p* *f*

6 $\frac{6}{4}$ 6 6 $\frac{6}{4}$

Detailed description: This is a page of musical notation for bass guitar, spanning measures 29 to 37. The music is written in a key with two sharps (F# and C#) and a common time signature. The notation consists of two staves per system, with the upper staff containing the melodic line and the lower staff containing the bass line. Measure numbers 29, 32, 35, and 38 are placed at the beginning of their respective systems. Fingerings are indicated by numbers 1-4 below notes, and specific techniques like '7' (natural harmonics) and '6' (artificial harmonics) are noted. Dynamic markings include *f* (forte) and *p* (piano). The piece concludes with a double bar line and repeat dots at the end of measure 37.

PETER RITTER

CONCERTO

IN E-FLAT MAJOR

R5

FOR VIOLONCELLO AND
ORCHESTRA

MODERN EDITION

BY

ANDREW HESSE

Concerto in E-Flat Major, R5

I.

Peter Ritter (1763-1846)
Edited by Andrew Hesse (2018)

Grave

Flauto I, II
Oboe I, II
Fagotto I, II
Corno I, II Tono Dis
Clarino I, II Tono Dis
Timpano Tono Dis
Violoncello Principale in Scordatura
Violino I
Violino II
Viola I, II
Violoncello e Basso

f *p* *f*

f *p* *f*

f *p* *f*

f *p* *f*

f *p* *f*

f *p* *f*

f *p* *f*

f *p* *f*

f *p* *f*

5

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Tpt. 1, 2

Timp.

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

p

p

tr

Solo

p

Detailed description: This page of a musical score covers measures 4 through 7. The score is for a full orchestra with a solo cello. The key signature is three flats (B-flat major or D-flat minor), and the time signature is 3/4. The woodwinds (Flute, Oboe, Bassoon) play sustained notes, with the Flute and Bassoon marked *p* in measure 7. The Horns play sustained notes. The Trumpets play a rhythmic pattern of eighth notes. The Timpani play a rhythmic pattern of eighth notes, with a trill (*tr*) in measure 7. The Solo Violoncello plays a melodic line with slurs. The Violins and Viola play sustained notes, with the Violins marked *p* in measure 7. The Violoncello/Double Bass plays a melodic line with slurs. The page number 166 is centered at the bottom.

9

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Timp.

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

p

p

p

p

tr

tr

tr

p

Solo



14

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

Musical score for measures 18-21. The score is in 3/4 time and features the following instruments and parts:

- Fl. 1, 2:** Flutes, starting with a whole rest in measure 18 and playing a half note in measure 21.
- Ob. 1, 2:** Oboes, playing a whole note chord in measure 18 and a half note in measure 21.
- Bsn. 1, 2:** Bassoons, playing a rhythmic eighth-note pattern in measures 18-20 and a half note in measure 21.
- Hn. 1, 2:** Horns, playing a whole note chord in measure 18 and a half note in measure 21.
- Tpt. 1, 2:** Trumpets, playing a rhythmic eighth-note pattern in measures 18-20 and a half note in measure 21.
- Timp.:** Timpani, playing a rhythmic eighth-note pattern in measures 18-20 and a half note in measure 21.
- Solo Vc.:** Solo Violoncello, playing a rhythmic eighth-note pattern in measures 18-20 and a half note in measure 21.
- Vln. 1:** Violin 1, playing a rhythmic eighth-note pattern in measures 18-20 and a half note in measure 21.
- Vln. 2:** Violin 2, playing a rhythmic eighth-note pattern in measures 18-20 and a half note in measure 21.
- Vla. 1, 2:** Violas, playing a rhythmic eighth-note pattern in measures 18-20 and a half note in measure 21.
- Vc., Cb.:** Violoncello and Contrabass, playing a rhythmic eighth-note pattern in measures 18-20 and a half note in measure 21.

Measures 18-21 are marked with a dynamic of *f* (forte). Measure 21 also features a *p* (piano) dynamic marking for the Horns and Timpani.

23 Allegro 7

Fl. 1, 2 *p* *f* *p* *f*

Ob. 1, 2 *p* *f* *p* *f*

Bsn. 1, 2 *p* *f* *p* *f*

Hn. 1, 2 *p* *f* *p* *f*

Tpt. 1, 2 *p* *p* *f*

Timp. *p* *f* *p* *f*

Solo Vc. *p* *f* *p* *f*

Vln. 1 *p* *f* *p* *f*

Vln. 2 *p* *f* *p* *f*

Vla. 1, 2 *p* *f* *p* *f*

Vc., Cb. *p* *f* *p* *f*

30

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Tpt. 1, 2

Timp.

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

f

Detailed description: This page of a musical score covers measures 30 through 34. The score is for a full orchestra and includes parts for Flutes 1 and 2, Oboes 1 and 2, Bassoons 1 and 2, Horns 1 and 2, Trumpets 1 and 2, Timpani, Solo Violoncello, Violins 1 and 2, Violas 1 and 2, and Contrabass. The music is in a key with two flats (B-flat major or D minor) and a 2/4 time signature. The Flute and Oboe parts play sustained chords. The Bassoon part has a rhythmic eighth-note pattern. The Horn and Trumpet parts play chords and rhythmic patterns. The Timpani part has a steady eighth-note pattern. The Solo Violoncello part plays sustained chords. The Violin and Viola parts play rhythmic eighth-note patterns. The Contrabass part plays sustained chords. A dynamic marking of *f* (forte) is present in the Horn part at measure 32.

35

Fl. 1, 2
Ob. 1, 2
Bsn. 1, 2
Hn. 1, 2
Tpt. 1, 2
Timp.
Solo Vc.
Vln. 1
Vln. 2
Vla. 1, 2
Vc., Cb.

Detailed description: This page of a musical score covers measures 35 through 39. The score is for a full orchestra and a solo violin. The woodwind section (Flutes, Oboes, Bassoons) plays sustained chords. The brass section (Horns, Trumpets, Timpani) features rhythmic patterns, with the timpani playing a steady eighth-note accompaniment. The string section (Solo Violin, Violins, Violas, Violoncello/Double Bass) provides harmonic support with various rhythmic figures. The key signature has two flats, and the time signature is 4/4. Measure numbers 35, 36, 37, 38, and 39 are indicated at the top of the staves.

40

Fl. 1, 2
Ob. 1, 2
Bsn. 1, 2
Hn. 1, 2
Tpt. 1, 2
Timp.
Solo Vc.
Vln. 1
Vln. 2
Vla. 1, 2
Vc., Cb.

Detailed description: This page of a musical score covers measures 40 through 44. The woodwind section (Flutes, Oboes, Bassoons, Horns, Trumpets) and strings (Solo Violoncello, Violins, Violas, Violas/Celli) play sustained chords and rhythmic patterns. The percussion section (Timpani) features a complex rhythmic pattern with accents and slurs. The score is written in a key signature of two flats and a common time signature. The woodwinds and strings have a melodic line, while the percussion provides a rhythmic accompaniment.

45

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Tpt. 1, 2

Timp.

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

p

p

p

p

p

58

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Tpt. 1, 2

Timp.

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

Detailed description: This page of a musical score covers measures 58 through 63. The score is for a symphony orchestra and a solo violin. The key signature is B-flat major (two flats) and the time signature is 4/4. The woodwind section includes Flutes 1 and 2, Oboes 1 and 2, Bassoons 1 and 2, and Trumpets 1 and 2. The percussion section includes Timpani. The string section includes Solo Violin, Violins 1 and 2, Violas 1 and 2, and Violoncello/Double Bass. The woodwinds and strings play a rhythmic pattern of eighth and sixteenth notes, while the solo violin has a more melodic line. The score is written in a standard musical notation with a grand staff for each instrument group.

65

Fl. 1, 2
Ob. 1, 2
Bsn. 1, 2
Tpt. 1, 2
Timp.
Solo Vc.
Vln. 1
Vln. 2
Vla. 1, 2
Vc., Cb.

fp *fp* *fp*
p *fp* *fp* *fp*
fp *fp* *fp*
fp *fp* *fp*
fp *fp* *fp*
fp *fp* *fp*

tr

Detailed description: This page of a musical score covers measures 65 through 71. The score is for a full orchestra and solo violin. The woodwind section (Flutes 1 & 2, Oboes 1 & 2, Bassoons 1 & 2, Trumpets 1 & 2, and Timpani) has a melodic line in measures 65-67, followed by a rest in measure 68, and then a series of chords in measures 69-71. The brass section (Bassoons, Trumpets, and Timpani) plays a rhythmic pattern of eighth notes in measures 65-67, followed by a rest in measure 68, and then a series of chords in measures 69-71. The string section (Solo Violin, Violins 1 & 2, Violas 1 & 2, and Violoncello/Double Bass) plays a rhythmic pattern of eighth notes in measures 65-67, followed by a rest in measure 68, and then a series of chords in measures 69-71. The Solo Violin part includes a trill in measure 68. The dynamic markings are *fp* (fortissimo piano) for most parts, and *p* (piano) for the Trumpets in measures 69-71.

72

Fl. 1, 2
Ob. 1, 2
Bsn. 1, 2
Tpt. 1, 2
Timp.
Solo Vc.
Vln. 1
Vln. 2
Vla. 1, 2
Vc., Cb.

79 Solo

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

p *pp* *f*

87

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

p *f* *p*

93

Fl. 1, 2
Ob. 1, 2
Bsn. 1, 2
Tpt. 1, 2
Timp.
Solo Vc.
Vln. 1
Vln. 2
Vla. 1, 2
Vc., Cb.

f

Detailed description: This block contains the musical score for measures 93 through 97. It features six staves: Flutes 1 and 2, Oboes 1 and 2, Bassoons 1 and 2, Trumpets 1 and 2, Timpani, and Solo Violoncello. The woodwinds and strings play sustained chords and rhythmic patterns. The Solo Violoncello part is more active, with a melodic line. A dynamic marking of *f* (forte) is present in the lower strings.

98

Tpt. 1, 2
Solo Vc.
Vln. 1
Vln. 2
Vla. 1, 2
Vc., Cb.

p

Detailed description: This block contains the musical score for measures 98 through 102. It features five staves: Trumpets 1 and 2, Solo Violoncello, Violins 1 and 2, Violas 1 and 2, and Violoncello/Double Bass. The woodwinds are silent. The strings play a sustained chord with a dynamic marking of *p* (piano). The Solo Violoncello part has a complex, rhythmic figure. Dynamic markings of *p* are present in the Solo Vc., Vln. 1, Vln. 2, and Vc., Cb. staves.

103

Solo Vc.

Vln. 1

Vln. 2

Vc., Cb.

108

Solo Vc.

Vln. 1

Vln. 2

114

Solo Vc.

Vln. 1

Vln. 2

121

Solo Vc.

Vln. 1

Vln. 2

126

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

pizzicato

132 19

Ob. 1, 2

Bsn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

f

f

f

f

f

f

139

Ob. 1, 2

Bsn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

p

p

145

Solo Vc.

Vln. 1

Vln. 2

20

149

Solo Vc.

Vln. 1

Vln. 2

Vc., Cb.

Arco



153

Solo Vc.

Vln. 1

Vln. 2

Vc., Cb.



160

Solo Vc.

Vln. 1

Vln. 2

Vc., Cb.



164

Solo Vc.

Vln. 1

Vln. 2

Vc., Cb.

168

Solo Vc. *tr*

Vln. 1

Vln. 2

Vc., Cb.

174

Solo Vc.

Vln. 1

Vln. 2

Vc., Cb.

181

Solo Vc.

Vln. 1

Vln. 2

Vc., Cb.

188

Ob. 1, 2

Bsn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

193

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.



198

Tutti

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Tpt. 1, 2

Timp.

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

203 23

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Tpt. 1, 2

Timp.

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

209

Fl. 1, 2
Ob. 1, 2
Bsn. 1, 2
Tpt. 1, 2
Timp.
Solo Vc.
Vln. 1
Vln. 2
Vla. 1, 2
Vc., Cb.

p *f* *p* *f* *p* *f* *p* *f* *p* *f*

216

Fl. 1, 2
Ob. 1, 2
Bsn. 1, 2
Solo Vc.
Vln. 1
Vln. 2
Vla. 1, 2
Vc., Cb.

p
p
p
p
p
p
p
f
Solo



223

Solo Vc.
Vln. 1
Vln. 2
Vc., Cb.

f
p
p
f



227

Solo Vc.
Vln. 1
Vln. 2
Vc., Cb.

f
p
p
f

231

Solo Vc. 

Vln. 1 

Vln. 2 

Vc., Cb. 

237

Solo Vc. 

Vln. 1 

Vln. 2 

243


Solo Vc. 


Vln. 1 


Vln. 2 

Vc., Cb. 

249

Solo Vc. 

Vln. 1 

Vln. 2 

253

Solo Vc. 

Vln. 1 

Vln. 2 

Vc., Cb. 

p

258

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

p

f



264

Ob. 1, 2

Bsn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

f

28

268

Ob. 1, 2

Bsn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.



272

Solo Vc.

Vln. 1

Vln. 2

Vc., Cb.



279

Solo Vc.

Vln. 1

Vln. 2

Vc., Cb.

287

Fl. 1, 2
Ob. 1, 2
Bsn. 1, 2
Solo Vc.
Vln. 1
Vln. 2
Vc., Cb.



293

Solo Vc.
Vln. 1
Vln. 2
Vla. 1, 2
Vc., Cb.



297

Solo Vc.
Vln. 1
Vln. 2
Vla. 1, 2
Vc., Cb.

30

302 Andante

Fl. 1, 2 *f*

Ob. 1, 2 *f*

Bsn. 1, 2 *f*

Solo Vc. *tr*

Vln. 1 *f* *p*

Vln. 2 *f* *p*

Vla. 1, 2 *f* *p*

Vc., Cb. *f*



309

Solo Vc.

Vln. 1 *f*

Vln. 2 *f*

Vla. 1, 2 *f*

Vc., Cb. *f*

Allegretto

316

Musical score for measures 316-318. The score is for Solo Vc., Vln. 2, Vla. 1, 2, and Vc., Cb. The key signature is two flats (B-flat and E-flat), and the time signature is 2/4. The music begins with a rest for two measures, followed by a series of sixteenth-note patterns starting in measure 317. A dynamic marking of *f* (forte) is present in measure 317. The Solo Vc. part has a treble clef and a key signature of one sharp (F#), which is a transposition from the main key signature.



319

Musical score for measures 319-322. The score is for Fl. 1, 2; Ob. 1, 2; Bsn. 1, 2; Tpt. 1, 2; Timp.; Solo Vc.; Vln. 1; Vln. 2; Vla. 1, 2; and Vc., Cb. The key signature is two flats (B-flat and E-flat), and the time signature is 2/4. The woodwinds and Solo Vc. have rests for the first three measures, followed by a series of notes starting in measure 320. A dynamic marking of *f* (forte) is present in measure 320. The Solo Vc. part has a bass clef and a key signature of one sharp (F#), which is a transposition from the main key signature.

II.

1 **Adagio**

Ob. 1, 2 *p*

Bsn. 1, 2 *p*

Hn. 1, 2 *p*

Adagio

Solo Vc. *p*

Vln. 1 *p* Pizzicato

Vln. 2 *p* Pizzicato

Vla. 1, 2 *p* Pizzicato

Vc., Cb. *p*



7

Solo Vc. *tr*

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

13

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

p

Arco

tr

33

Detailed description: This page of a musical score covers measures 13 to 33. The score is for a symphony orchestra and a solo violin. The woodwind section (Flutes 1 & 2, Oboes 1 & 2, Bassoons 1 & 2, Horns 1 & 2) is mostly silent until measure 28, where they enter with a soft (*p*) accompaniment. The strings (Violins 1 & 2, Violas 1 & 2, Violoncello and Double Bass) play a rhythmic pattern of eighth notes. The solo violin has a melodic line with a trill in measure 28. The Viola part has an 'Arco' marking in measure 28. The score ends at measure 33 with a final chord in the woodwinds.

19

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

f *p*

24

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

29

Solo Vc. *tr*

Vln. 1

Vln. 2

Vla. 1, 2 *Pizzicato*

Vc., Cb.

33

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

39

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

45

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

tr

3 3

Arco

51

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Tpt. 1, 2

Timp.

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

f

f

f

f

f

f

f

f

f

f

38

56

Ob. 1, 2
Bsn. 1, 2
Hn. 1, 2
Solo Vc.
Vln. 1
Vln. 2
Vla. 1, 2
Vc., Cb.



61

Solo Vc.
Vln. 1
Vln. 2
Vla. 1, 2
Vc., Cb.

pizz.
tr.

64

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

arco

Detailed description: This page of a musical score contains measures 64 through 68. The score is for a symphony or concerto, featuring woodwinds, strings, and a solo violin. The key signature is B-flat major (two flats), and the time signature is 4/4. The woodwind section includes two oboes (Ob. 1, 2), two bassoons (Bsn. 1, 2), and two horns (Hn. 1, 2). The string section includes two violins (Vln. 1, 2), two violas (Vla. 1, 2), and a violin/cello part (Vc., Cb.). A solo violin part (Solo Vc.) is also present. The woodwinds play a melodic line with some rests, while the strings provide a rhythmic accompaniment. The solo violin part is mostly silent, with a few notes in measure 64. The word 'arco' is written above the viola part in measure 64, indicating that the violas should play with the bow.

III.

Rondeau - Allegro

1

Solo Vc. 

Vln. 1 *Arco* 

Vln. 2 *Arco* 



7

Fl. 1, 2 

Ob. 1, 2 

Bsn. 1, 2 

Hn. 1, 2 

Tpt. 1, 2 

Timp. 

Solo Vc. 

Vln. 1 

Vln. 2 

Vla. 1, 2 

Vc., Cb. 

16

Ob. 1, 2
Bsn. 1, 2
Hn. 1, 2
Timp.
Solo Vc.
Vln. 1
Vln. 2
Vla. 1, 2
Vc., Cb.



25

Solo Vc.
Vln. 1
Vln. 2
Vla. 1, 2
Vc., Cb.

32

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.



39

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

47

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vc., Cb.

56

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vc., Cb.

65

Solo Vc.

Vln. 1

Vln. 2

Vc., Cb.

73

Solo Vc.

Vln. 1

Vln. 2

Vc., Cb.



82

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Timp.

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

92

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Timp.

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

Arco

100

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Tpt. 1, 2

Timp.

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

f

f

f

f

f

f

f

f

f

f

f

Minor

116

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Timp.

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

125

Ob. 1, 2

Bsn. 1, 2

Tpt. 1, 2

Timp.

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

134

Ob. 1, 2

Bsn. 1, 2

Tpt. 1, 2

Timp.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

50

144

Ob. 1, 2

Bsn. 1, 2

Tpt. 1, 2

Timp.

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.



151

Ob. 1, 2

Bsn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

158

Ob. 1, 2

Bsn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.



165

Ob. 1, 2

Bsn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

187

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Tpt. 1, 2

Timp.

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

f

p

tr

p

p

p

p

p

13

197

Fl. 1, 2
Ob. 1, 2
Bsn. 1, 2
Hn. 1, 2
Tpt. 1, 2
Timp.
Solo Vc.
Vln. 1
Vln. 2
Vla. 1, 2
Vc., Cb.



206

Fl. 1, 2
Solo Vc.
Vln. 1
Vln. 2
Vc., Cb.

213

Fl. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Vc., Cb.

tr



220

Solo Vc.

Vln. 1

Vln. 2

Vc., Cb.



229

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Solo Vc.

Vln. 1

Vln. 2

Solo

239

Fl. 1, 2

Ob. 1, 2

Bsn. 1, 2

Hn. 1, 2

Tpt. 1, 2

Timp.

Solo Vc.

Vln. 1

Vln. 2

Vla. 1, 2

Vc., Cb.

f

f

f

f

f

f

f

f

f

f

f

246 57

Fl. 1, 2
Ob. 1, 2
Bsn. 1, 2
Hn. 1, 2
Tpt. 1, 2
Timp.
Solo Vc.
Vln. 1
Vln. 2
Vla. 1, 2
Vc., Cb.

Detailed description: This page of a musical score, numbered 246 and 57, features ten staves of music. The top five staves are for woodwinds: Flutes 1 and 2 (treble clef), Oboes 1 and 2 (treble clef), Bassoons 1 and 2 (bass clef), Horns 1 and 2 (treble clef), and Trumpets 1 and 2 (treble clef). The sixth staff is for Timpani (bass clef). The bottom five staves are for strings: Solo Violoncello (bass clef), Violin 1 (treble clef), Violin 2 (treble clef), Viola 1 and 2 (alto clef), and Violoncello/Double Bass (bass clef). The score is in a key signature of two flats (B-flat and E-flat) and a 2/4 time signature. The woodwinds and strings play rhythmic patterns, while the Solo Vc. has a more melodic line.

Violoncello Principale

Concerto in E-Flat Major, R5

I.

Peter Ritter (1763-1846)
Edited by Andrew Hesse (2018)

Grave

6

10

Solo

16

20

26

Allegro

35

41

47

55

Violoncello Principale

2

61



68



74



81



87



93



98



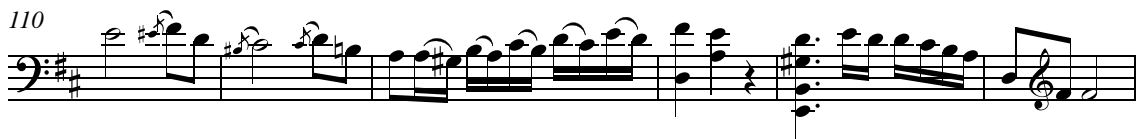
102



106



110



116



Violoncello Principale

3

122

126

131

144

147

150

153

159

162

165

168

Violoncello Principale

4

173



180



187



192



195



Tutti
Tutti

200



206



213



219



224



227



Violoncello Principale

5

230

234

240

246

251

254

261

264

267

270

274

Violoncello Principale

6

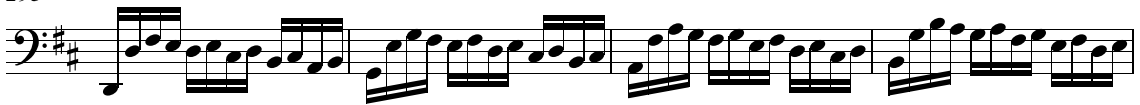
281



287



293



297



301



307

Andante



312



317 Allegretto



320



II.

Adagio

Musical staff 1: Treble clef, 3/4 time signature, key signature of one sharp (F#). Measures 1-6.

Musical staff 2: Bass clef, measures 7-13. Includes a trill (tr) in measure 10.

Musical staff 3: Treble clef, measures 14-22. Includes a trill (tr) in measure 18 and a triplet (3) in measure 21.

Musical staff 4: Bass clef, measures 23-26. Includes a fermata in measure 26.

Musical staff 5: Treble clef, measures 27-29.

Musical staff 6: Treble clef, measures 30-33. Includes a trill (tr) in measure 32.

Musical staff 7: Treble clef, measures 34-41. Includes a four-measure rest (4) at the beginning.

Musical staff 8: Bass clef, measures 42-44.

Musical staff 9: Bass clef, measures 45-52. Includes a trill (tr) in measure 48 and a four-measure rest (4) at the end.

Violoncello Principale

8

52

f

57

61

63

tr 4

III.

Rondeau - Allegro

6

f

13

p

21

28

33

tr

Violoncello Principale

39

44

53

65

72

79

90

99

103

110

117 Minor

Violoncello Principale

10

127 12



Musical staff 127-144: Bass clef, key signature of one sharp (F#), 3/4 time signature. The staff contains a sequence of eighth and sixteenth notes, ending with a double bar line and a fermata.

145



Musical staff 145-149: Bass clef, key signature of one sharp (F#), 3/4 time signature. The staff contains a sequence of eighth and sixteenth notes.

150



Musical staff 150-154: Bass clef, key signature of one sharp (F#), 3/4 time signature. The staff contains a sequence of eighth and sixteenth notes.

155



Musical staff 155-159: Bass clef, key signature of one sharp (F#), 3/4 time signature. The staff contains a sequence of eighth and sixteenth notes.

160




Musical staff 160-164: Bass clef, key signature of one sharp (F#), 3/4 time signature. The staff contains a sequence of eighth and sixteenth notes.

165



Musical staff 165-168: Bass clef, key signature of one sharp (F#), 3/4 time signature. The staff contains a sequence of eighth and sixteenth notes.

169



Musical staff 169-174: Bass clef, key signature of one sharp (F#), 3/4 time signature. The staff contains a sequence of eighth and sixteenth notes, ending with a fermata.

175



Musical staff 175-178: Treble clef, key signature of one sharp (F#), 3/4 time signature. The staff contains a sequence of eighth and sixteenth notes.

179



Musical staff 179-184: Treble clef, key signature of one sharp (F#), 3/4 time signature. The staff contains a sequence of eighth and sixteenth notes, ending with a fermata and a forte (*f*) dynamic marking.

185



Musical staff 185-193: Bass clef, key signature of one sharp (F#), 3/4 time signature. The staff contains a sequence of eighth and sixteenth notes, starting with a piano (*p*) dynamic marking.

194



Musical staff 194-200: Bass clef, key signature of one sharp (F#), 3/4 time signature. The staff contains a sequence of eighth and sixteenth notes.

Violoncello Principale

11

203

209

214

220

228

245

tr

tr

11

f

Detailed description: This block contains six staves of musical notation for the Violoncello Principale part. The first staff (measures 203-213) is in bass clef with a key signature of one sharp (F#) and a 3/4 time signature. It features a trill (tr) in measure 206. The second staff (measures 209-213) continues the bass clef notation. The third staff (measures 214-219) includes a change to a treble clef in measure 214 and another trill (tr) in measure 219. The fourth staff (measures 220-227) is in treble clef. The fifth staff (measures 228-244) is in treble clef and contains a double bar line in measure 232, followed by a fermata with the number '11' above it, and a forte (f) dynamic marking in measure 244. The sixth staff (measures 245-249) is in bass clef.

ERIC MALMQUIST

SONATA

FOR CELLO AND PIANO

Commissioned in 2015 by pianist Joy Doran for her cellist son-in-law, Andrew Hesse.

COMPOSER'S NOTE:

At time of writing I am not particularly wise or old, but as my life continues I find that both sorrows and joys of life multiply in ways that I never could have imagined even a few short years ago. Loved ones go through misfortunes, stress mounts in careers, and what's more life never seems to let one catch up. At the same time, one can find solace and love in partners and in the wisdom of friends.

There can be so much love and so much bitterness, all flowing in an endless stream that might quicken or slow, but never, ever stops for even a breath. In some small way, this music is meant to be a reflection of this.

PERFORMANCE NOTES:

The cello is retuned (*scordatura*) with the C string tuned down a half-step:



Pitches on the fourth string are notated as played, but sound a half-step lower.

All movements are to be performed *attacca*, with only the slightest pause for page turns and preparation.

Piano pedal indications are including for coloristic effect, but shouldn't be excluded elsewhere. The pianist should pedal as he or she feels necessary and proper.

For those who would find it interesting or helpful, the piece is based almost entirely on thirds (and the inverse, sixths). Much material is taken from a "scale" of alternating major and minor thirds. I wanted to employ the "B" string as much as possible, but also allow for variety, so I decided to structure my key areas by using that B in different tonal functions as we progress through the piece. The first movement is in G (B as the third scale degree); the second is in E minor (B as the fifth) and so forth.

This piece is also part of a personal musical lineage, incorporating some subtle or not-so-subtle references to previous pieces of mine and to works of profound influence on me. Most of the rough drafts were written while commuting on Chicago's Red Line.

OUTLINE: Approximate Duration – 17 minutes

Movement:	Page Number:
I. Prologue	2
II. Dance	6
III. Nocturne	10
IV. Rhapsody	14
V. Epilogue	18

SONATA FOR VIOLONCELLO AND PIANO

commissioned by Joy Doran for Andrew Hesse

I. PROLOGUE

Moderately, mysteriously ♩ = 80

ERIC MALMQUIST (2015)

The musical score is written for Cello and Piano in 4/4 time. The Cello part begins with a whole rest in the first measure, followed by a half note G2 in the second measure, and a half note G2 with an accent in the third measure. The Piano part features a continuous eighth-note accompaniment. The right hand (RH) plays a melodic line with slurs and accents, while the left hand (LH) plays a steady eighth-note pattern. Dynamics range from piano (p) to forte (f). A 'simile' instruction is given for measures 2 through 28. A performance instruction at the bottom of the first system reads: 'sempre (murmuring sound, but do not obscure the beat)'. Measure numbers 4, 7, 10, and 13 are indicated at the start of their respective systems.

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16

Musical notation for measures 16-18. The upper staff features a melodic line with slurs and a fermata. The lower staff provides a rhythmic accompaniment of eighth notes.

19

Musical notation for measures 19-21. The upper staff has a melodic line with dynamics *p*, *f*, and *p*. The lower staff has a rhythmic accompaniment.

22

Musical notation for measures 22-24. The upper staff has a melodic line with a dynamic *p*. The lower staff has a rhythmic accompaniment.

25

IV-----

Musical notation for measures 25-27. The upper staff has a melodic line with a dynamic *ff*. The lower staff has a rhythmic accompaniment.

28

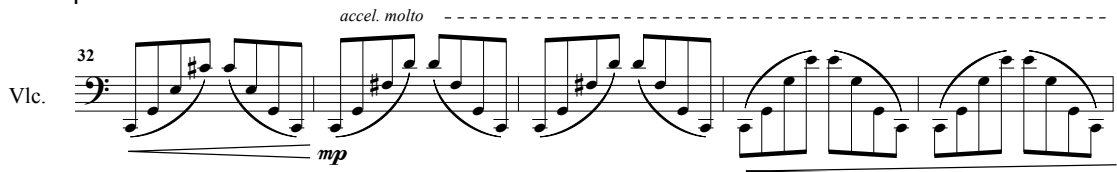
Cadenza

Musical notation for measures 28-30. The upper staff has a melodic line with a dynamic *p*. The lower staff has a rhythmic accompaniment.

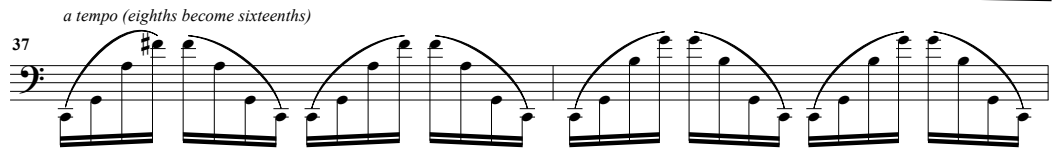
(Ped.) hold until sound decays

4

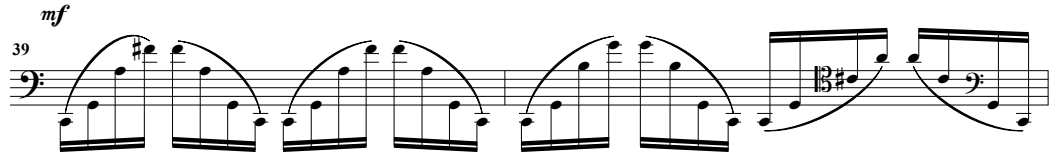
Vlc. *mp* *accel. molto*



a tempo (eighths become sixteenths)



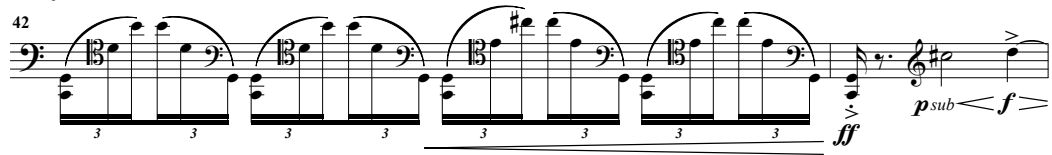
mf



f



ff *p sub* *f*

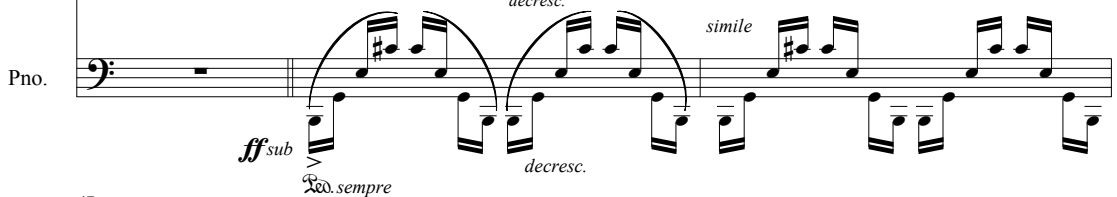


Vlc. *p* *ff sub* *decresc.* *simile*

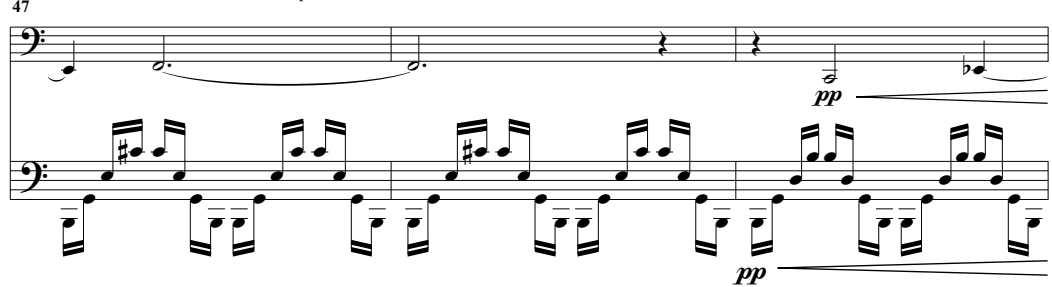
Tempo I (in time)



Pno. *ff sub* *decresc.* *And. sempre*



pp *pp*



50 (IV) loco *ff*

53 *p*

56 *p* *ff*

* senza Ped.!

attacca.

II. DANCE

Quickly, aggressively $\text{♩} = 120$

Cello

Piano

4

8

12

ff

ff

p sub.

p sub.

[D]

A "Half-time" ($\text{♩} = \text{♩}$) (II) (III)

ff

p

B

18

Measures 18-20: Bass clef, treble clef, and bass clef. Time signatures: 3/4, 3/4, 4/4, 7/4. Dynamics: *p*, *f*, *p*.

21

Measures 21-23: Bass clef, treble clef, and bass clef. Time signatures: 7/4, 4/4, 7/4. Dynamics: *f*, *f*.

C "Half-time"

24

Measures 24-28: Bass clef, treble clef, and bass clef. Time signatures: 4/4, 4/4, 4/4, 4/4, 4/4. Dynamics: *p*, *ff*, *ff*. Includes *pizz.* and *arco* markings.

29

Measures 29-33: Bass clef, treble clef, and bass clef. Time signatures: 4/4, 4/4, 4/4, 4/4, 4/4. Dynamics: *f*, *mf*, *p*. Includes *arco* marking.

D III
IV...

35

pp *f* *pp*

40

f *pp*

46

E

pp

52

III
IV

pp *espress. molto*

56

II
III

cresc. poco a poco (*mp*)

cresc. poco a poco (*mp*)

59

I
II

(*mf*) *ff*

(*mf*) *ff*

62

pp *cresc.*

pp *cresc.*

66

f *ff*

f *ff*

attacca.

III. NOCTURNE

Moderately slow ♩ = 80

Cello

Piano

7

13

19

p dolce *mf* *p*

ff *p*

mf *p* *mf* *p* *mf*

p *f* *p*

pp *ff* *pp*

mf *pp sempre*

IV

Λ

passionata

8^{ub}

24

mf pp ff pp <

30

B

ff p

ff p

(8va)

36

IV loco sfz

fff

fff

(8va)

41

p pp

p pp

(8va)

48 C sul tasto

(pp) $\delta^{(1)}$

hands doubled
in octaves *(pp)*
misterioso

53

(8va), *loco*

58

63

attacca.

IV. RHAPSODY

Very quickly, energetically ♩ = 140

Cello

Piano

6

11

16

p *mf* *p* *mf* *p cresc.*

(mf) *ff*

f *f*

A

21

26 *pizz.*

p sub. *f* *p* *f* *p* *f* *p* *f* *p sub.*

32

B

f

38

Pno.

44

Vlc. *arco* **C**

solo (in time) *p*

Pno. *p sub.*

49

Vlc.

f

53

fp *ff* *ffp* *ffp*

59

ffp *ffp* *mf* *f*

66

Vlc.

(III) **D** *fff* *p*

Pno.

p

72

(III) *mp* *mp*

78 (III)

mf

84

f *ff*

89

p *p* *attacca.*

V. EPILOGUE

Slowly, freely ♩ = 72

The musical score is arranged in systems. The first system (measures 1-4) features the Cello part with a *p* dynamic and a *fast* tempo marking. The second system (measures 5-8) includes the Violin and Piano parts. The Violin part has dynamics of *f*, *p*, and *f*, with an *8^{va}* marking. The Piano part has a *pp* dynamic and the instruction *otherworldly*. The third system (measures 9-12) features the Violin and Piano parts. The Violin part has a *p* dynamic and an *8^{va}* marking. The Piano part has a *pp* dynamic. The fourth system (measures 13-16) features the Violin and Piano parts. The Violin part has dynamics of *p*, *f*, and *p*, with an *8^{va}* marking. The Piano part has a *pp* dynamic. The fifth system (measures 17-20) features the Piano part with triplets and a quintuplet, with an *8^{va}* marking.

13

Vlc. *p* *f*

Pno. *pp*

17 **A** In time (♩ = 72)

Pno.

23

29 **B**

Vlc. *pp* *mf* *p*
espress.

Pno.

35 *pp* *mf* *pp* *ff*

41

pp *pp*

47

C

mf *mf* IV III

53

58

D

f *f* *f*

63

67

71

75

ff

ff

IV

Detailed description: This page of a musical score contains measures 63 through 80. It is written for voice and piano. The score is organized into four systems. Each system includes a vocal line (treble or bass clef) and a piano accompaniment (grand staff). The piano accompaniment features a consistent rhythmic pattern of eighth-note chords in the right hand and a steady eighth-note bass line in the left hand. Measure 75 includes a dynamic marking of *ff* (fortissimo) and a Roman numeral IV above the vocal line. The key signature has one sharp (F#) and the time signature is 4/4.

79 E

Vlc. *mf sub.* IV / III IV III IV

Pno. *mf sub.* *sempre, lift every measure*

82

f

f

84

Vlc. *ff* *fff*

Pno. *simile*

87 F

fff *ff*

fff *ff*

repeat through m. 103

Musical score for piano, measures 90-99. The score is written for a single instrument, with a treble clef and a bass clef. The key signature is one sharp (F#). The time signature is 4/4. The score is divided into four systems, each with a single staff. The first system (measures 90-92) features a melody in the treble clef and a piano accompaniment in the bass clef. The melody starts with a half note G4, followed by quarter notes A4, B4, and C5. The piano accompaniment consists of a steady eighth-note pattern. The second system (measures 93-95) continues the melody and accompaniment. The third system (measures 96-98) shows a change in dynamics and a more complex melodic line. The fourth system (measures 99) concludes the passage with a final melodic phrase and a piano accompaniment. Dynamics include *f*, *mf*, *mp*, and *p*. The score is marked with a rehearsal sign (III) above measure 99.

90 *f*

93 *mf*

96 *mp* *p*

99 (III)

102 III G

105 freely mp pp simile 5 3

110 3 3 3 5 3

Detailed description: This musical score consists of three systems of piano music. The first system, starting at measure 102, features a bass clef with a melodic line marked *pp* and a treble clef with a rhythmic accompaniment marked *pp* and *(pp)*. A section marker 'III' and a chord symbol 'G' are present. The second system, starting at measure 105, is marked 'freely' and includes dynamic markings *mp*, *pp*, and *simile*, along with fingering numbers 5 and 3. The third system, starting at measure 110, continues the melodic and accompaniment lines with various fingering numbers (3, 5, 3) and dynamic markings.

114

Musical score for measures 114-117. The top staff is a bass clef with a 4/4 time signature. It features a melodic line with a five-fingered scale (marked '5') and a triplet (marked '3'). The middle and bottom staves are grand staff notation with treble and bass clefs, showing chordal accompaniment with slurs and dynamic markings.

118

Vlc.

Musical score for measures 118-124. The top staff is a bass clef with a 4/4 time signature, showing a descending melodic line. The bottom staff is a grand staff with treble and bass clefs, showing a steady accompaniment of chords. A dynamic marking '(pp)' is present below the piano staff.

Pno.

(pp)

125

Musical score for measures 125-128. The top staff is a bass clef with a 4/4 time signature, showing a melodic line that ends with a fermata. The bottom staff is a grand staff with treble and bass clefs, showing a steady accompaniment of chords. A dynamic marking 'f' is present below the piano staff.

f



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For your own safety, look for your nearest exit. In case of emergency, walk, do not run, to that exit.



PRESENTS

Andrew Hesse

Cello

William Cernota, Cello

Joy Doran, Piano

Thomas Edward Zeman, Harpsichord

JANUARY 28, 2018. 4:00 p.m.

SKOWRONSKI MUSIC HALL
MUNDELEIN CENTER FOR THE FINE AND PERFORMING ARTS
LOYOLA UNIVERSITY CHICAGO

PROGRAM

This recital is being presented in partial fulfillment of the requirements for the degree of Doctor of Musical Arts

Special thanks, in no particular order, to:

Loyola University of Chicago, particularly Jeffrey Hart and Jennifer Martin, as well as the concert support staff who have made this performance possible
William Cernota, dear friend, mentor, and constant voice of support
Joy Doran, for twenty-five plus years of musical memories, and for being the best mother-in-law one could hope for
Thomas Zeman for tireless efforts in bringing Klein's music to "realization"

Eric Malmquist for taking a seedling of an idea and turning it into something wonderful

Mark Shuldiner of Brass and Quill Harpsichord Workshop for generously providing and maintaining the instrument heard this afternoon

Dr. James Stern and the other members of my dissertation committee, for their support and creativity to make this possible

Molly Hesse, for whose selflessness, devotion, and partnership I am forever grateful, and to Isaac and Oliver, who bring us both such joy

My parents for always encouraging the pursuit of passion

I would like to dedicate this performance to my grandmother, Marjorie Dannenbring, who performed on the very instrument heard in the second half of this program into her final years.

VI Sonates à une Basse de Violon & Basse Continue

Jacob Klein
1688-1748

Sonata in C major, Op. 1, No. XIII

Presto – Adagio
Allegro
Largo
Allegro

Sonata in D major, Op. 1, No. XIV

Largo – Adagio – Poco Allegro – Adagio
Allegro
Adagio
Allegro

Sonata in E major, Op. 1, No. XV

Adagio
Allegro
Adagio
Allegro

Sonata in F sharp minor, Op. 1, No. XVI

Adagio
Allegro
Largo
Allegro

Sonata in A minor, Op. 1, No. XVII

Allegro – Adagio
Andante
Adagio
Vivace

Sonata in B minor, Op. 1, No. XVIII

Adagio – Vivace – Presto
Allegro
Largo
Allegro

~Intermission~

Sonata for Cello and Piano

I. Prologue
II. Dance
III. Nocturne
IV. Rhapsody
V. Epilogue

Eric Malmquist (2015)

Annotated Bibliography

Books, Articles, and Dissertations

Abbott, Djilda and Ephraim Segerman. "Gut Strings." *Early Music* 4, no. 4 (1976): 430–37.

This article is directed toward individuals considering a switch from nylon or steel strings to gut strings. The article provides some historical background on gut strings. More importantly, it addresses some of the idiosyncrasies and/or shortcomings of gut strings and how to cope with them. Among the useful information is a table containing the usable pitch ranges of different types of gut strings.

Bonta, Stephen. "From Violone to Violoncello: A Question of Strings?" *Journal of the American Musical Instrument Society* 3 (Jan., 1977): 64–99.

A strong starting point into the history of the violoncello, Bonta provides a history of the early tuning and sizes of the instrument. He makes a convincing argument that the development of the instrument into the form that we know it today was directly related to advancements in string technology. In particular, he argues that the invention of silver-wound bottom strings allowed for the development of a smaller model. He bases this on the fact that the violoncello first appeared in Bologna, a city known for its string manufacture and not for its instrument makers.

Bonta, Stephen. "The Making of Gut Strings in 18th-Century Paris." *The Galpin Society Journal* 52 (Apr., 1999): 376–386.

Building on his prior article, Bonta states that this article was written to address how the string materials available at any given time may have had an effect the size and tuning of an instrument. He references prior articles on the subject, including the above article by Abbott and Segerman, but implies that the research has fallen short. As the title implies, Bonta's article gives special attention to the processes by which gut strings were made.

Bonta, Stephen, Suzanne Wijsman, Margaret Campbell, Barry Kernfeld, and Anthony Barnett, "Violoncello." *Grove Music Online*, 2001.
<http://www.oxfordmusiconline.com>.

The author consulted this article on multiple occasions in strengthening knowledge of the cello's history. It led to multiple other sources, in particular Bonta's own articles relating to the history of gut strings.

Chambers, Mark. "The 'Mistuned' Cello: Precursors to J.S. Bach's Suite V in C Minor for Unaccompanied Violoncello." DMA diss., The Florida State University, 1996.

Chambers' is one of the few studies available focused exclusively on the use of scordatura in the violoncello repertoire. It was from this dissertation that the author first learned about Jacob Klein's sonatas. It was also this dissertation that led to the recognition that aspects relating to the physics of scordatura needed to be further explored. Chambers analyzes the use of scordatura from a performer's perspective, emphasizing its role in facilitating technique. Nonetheless, Chambers provides a strong historical background on scordatura.

Chiang, I. Chun. "A Historical Technique from a Modern Perspective: The Transposition scordatura in Mozart's Sinfonia Concertante for Violin, Viola and Orchestra in E-Flat Major, K. 364." DMA diss., University of Cincinnati, 2011.

This dissertation was helpful for the present study owing to the fact that Mozart's Sinfonia Concertante uses the same transposition scordatura as Peter Ritter's Concerto. Like Chambers, Chiang emphasizes the performer in her analysis of the scordatura. As part of her research, Chiang interviews a number of violists, some of whom are playing the Sinfonia Concertante in scordatura for the first time, to obtain their reactions. The dissertation addresses several commonly-cited negative aspects of transposition scordatura in an attempt to answer whether the altered tuning is worthwhile.

Cook, Nathan. "Scordatura Literature for Unaccompanied Violoncello in the 20th Century: Historical Background, Analysis of Works, and Practical Considerations for Composers and Performers." Rice University, 2005.

Along with Chambers, one of two studies devoted entirely to use of scordatura in cello repertoire. Cook's focus on scordatura literature for *unaccompanied* cello led the author to question whether any yet unstudied scordatura literature existed for *accompanied* violoncello.

Cremer, Lothar. *The Physics of the Violin*. Cambridge, Mass: MIT Press, 1984.

The Physics of the Violin is a sort of compendium of all that has been discovered about the acoustics of the violin and other string instruments. Cremer's intended audience include specialists in the field of musical acoustics. Accordingly, from a performer's perspective, his research is almost too technical. Cremer assumes a prior knowledge of basic principles of a vibrating string from his reader. From this author's perspective, had this book been encountered earlier in the course of study, it may not have been used at

all. As it stands, it took several readings of parts that seemed applicable to the study of scordatura in order to begin to grasp its full usefulness. Ultimately, however, the depth of knowledge at the reader's fingertips is considerable. The present study only breaks the surface of Cremer's discussion of the force transferred on the bridge. This particular author looks forward to revisiting Cremer's research many times in the future.

Curtin, Joseph. "Bridge Tuning: Methods and Equipment." *VSA Papers* 1, no. 1 (2005): 137–144.

A contemporary luthier's perspective on many of the principles discussed in Lothar Cremer's book. Joseph Curtin is on the forefront of what luthiers are trying to accomplish in terms of improving the efficiency of the instrument.

Elsen, Josephine Caryce. "The Instrumental Works of Peter Ritter (1763–1846)." PhD diss., Northwestern University, 1979.

The foundation laid by Elsen's dissertation made the present study of Peter Ritter's concerto possible in multiple ways. Elsen conducted considerable research into Peter Ritter's life, consulting several sources only available in German. She also provided the information necessary to identify and obtain scores from the Library of Congress. The only downside, if it can be considered as such, of Elsen's dissertation is that the scope of her study was broad enough that it precludes a more thorough examination of the cello concertos. In particular, discussion of the R5 concerto is restricted to only a few passing mentions. Elsen's dissertation is comprised of two volumes. The second volume contains the appendices, which include a complete cello concerto and various chamber works. Unfortunately, these appendices were not published electronically. The author travelled to Northwestern University, where the appendices were to be housed. Unfortunately, the staff was unable to locate them.

Haynes, Bruce. "Beyond Temperament: Non-Keyboard Intonation in the 17th and 18th Centuries." *Early Music* 19, no. 3 (1991): 357–82.

Haynes provides a high-level overview of historical temperaments in this brief article. As the title implies, most of the subject matter pertains to how non-keyboard instruments reconcile the subject of temperament. Haynes makes the point that use of temperament is restricted to keyboard instruments only and is, in fact, not even possible on non-keyboard instruments. Haynes's writing takes up only the first seven pages of the article. However, this author found particularly useful his appendix of sources, which cites many historic sources on the subject.

Helmholtz, Hermann von. *On the Sensations of Tone as a Physiological Basis for the Theory of Music*. Second English edition, translated thoroughly revised and

corrected, rendered conformal to the 4th (and last) German ed. of 1877, with numerous additional notes and a new additional appendix bringing down information to 1885, and especially adapted to the use of music students by Alexander J. Ellis. ed. Dover Books on History of Science and Classics of Science; Dover Books on History of Science and Classics of Science. New York: Dover Publications, 1954.

Helmholtz's seminal work needs little introduction. Nearly every subsequent venture into the physics of music is rooted in Helmholtz's research. The author was pleased to find the book quite approachable and well-organized. While advancements have been made in several aspects of Helmholtz's research, the author found it important consult the primary source and determine where it all began. On certain subjects, such as the influence of the instrument on key color, the author found Helmholtz's explanation to be unsurpassed.

Hutchins, Carleen. "The Acoustics of Violin Plates." *Scientific American* 245, no. 4 (Oct 1981): 170–182

Hutchins was a pioneer in her field as one of the first violinmakers to put a strong emphasis on free-plate tuning. This article summarizes the methods tuning violin plates in a clear and concise manner. Although the scope of the dissertation did not allow for much discussion of the topic, the author wishes to pursue it further.

Ishiguro, Maho A. "The affective properties of keys in instrumental music from the late nineteenth and early twentieth centuries." Master's Thesis, University of Massachusetts Amherst, 2010.

Ishiguro's was a launching point into the research of key characteristics. The thesis is organized as a sort of survey of various writings on the topic. As such, it provides several avenues for further research.

Keller, Hans. "Key Characteristics." *Tempo*, no. 40 (1956): 5–16.

Keller's article was written as a response to a prior article on the subject of key characteristics. Keller takes an antagonistic tone from the start, which may be off-putting. However, it seems to this author that many of his arguments are valid. In particular, his discussion of contrast of key colors is particularly applicable to the use of transposition scordatura.

Lindley, Mark, "Temperaments," *Grove Music Online*. Accessed March 17, 2018. <http://www.oxfordmusiconline.com>.

Parker, Barry R. *Good Vibrations: The Physics of Music*. Baltimore: Johns Hopkins University Press, 2009.

Very much the antithesis of Lothar Cremer's book, Parker's audience is the lover of music with little background in physics. While the author certainly appreciated the colloquial tone as a starting point, its usefulness was ultimately limited.

Rossing, Thomas D. *The Science of String Instruments*. New York: Springer, 2010.

Rossing's book falls somewhere between Parker's and Cremer's in terms of balancing accessibility with thoroughness. Rossing's great gift as the book's editor is compiling the research of many other scholars to present a balanced overview of the subject.

Russell, Theodore. "The Violin 'Scordatura'." *The Musical Quarterly* 24, no. 1 (1938): 84–96.

This was one of the first sources the author located on scordatura. Although focused exclusively on scordatura in the violin repertoire, many of the thesis questions of the dissertation came out of Russell's article.

Tarling, Judy. *Baroque String Playing for Ingenious Learners*. St. Albans, Hertfordshire: Corda Music, 2001.

The author previously studied Tarling's book and found it invaluable as a resource on Baroque style and performance practice. On some level, Tarling addresses all aspects of Baroque string playing, from equipment to ornamentation and everything in between.

Wood, Alexander, and J. M Bowsher. *The Physics of Music*, 7th ed. London: Chapman and Hall, 1975.

Another pillar source in the study of the physics of music. Wood does a very fine job of summarizing the existing research on the topic. Some of the research begins to feel a bit dated in comparison the Cremer's or Rossing's.

Würtz, Roland et al, "Ritter," *Grove Music Online*. Accessed September 10, 2017, <http://www.oxfordmusiconline.com>.

Musical Scores and Recordings

Biber, Heinrich Ignaz Franz. *Mystery (Rosary) Sonatas*. Manuscript, BSB Mus. ms.4123, n.d., ca. 1678. Accessed March 22, 2018. IMSLP Petrucci Library.

Corelli, Arcangelo, *Sonate a violin e violone o cimbalò*, Opera Quinta, Rome: Gasparo Pietra Santa, n.d.[1700]. Accessed March 21, 2018. IMSLP Petrucci Library.

Klein, Jacob. *VI Sonates à une Basse de Violon et Basse Continue*, Premier Ouvrage. Livre Troisième. Amsterdam, ca. 1717. Accessed October 22, 2015. IMSLP Petrucci Library.

Klein, Jacob and Gerhart Darmstadt. *6 Sonaten Für Zwei Violoncelli = for Two Violoncellos, Opus 2*. Cello-Bibliothek; Cb 156. Mainz: Schott, 1998.

The final sonata in the Op. 2 set uses scordatura in both cello parts (C–G–d–g). Ultimately, the author decided not to include this work in the study since it was previously published.

Klein, Jacob, Aleksandr Gulin, Pavel Serbin, H. K. Sveen, and Anna Andrushkevich. *Scordatura Sonatas*. Moscow, Russia: Caro Mitis, 2008.

The only known recording of Klein's Op. 1 Sonatas. The disc contains four of the six sonatas in their entirety and single movements from the remaining two. Sound quality is excellent and the level of playing is quite high. Several of Serbin's embellishments found their way into the author's own performance of the sonatas.

Parker, Mara E. "Carlo Graziani Sonatas for Violoncello and Basso," *Recent Researches in the Music of the Classical Era* 49 (1997).

Ritter, Peter. *Concerto [in Es] Violoncello principale*. M1016.R5. Washington, D.C.: Library of Congress, 1900.

While facsimiles were ordered from the Library of Congress for all of the scordatura concertos of Peter Ritter, unfortunately, only the R5 arrived in suitable condition to facilitate further study. The parts have been photographed in high-resolution. Unfortunately, a manuscript score does not exist for this concerto. Curiously, the instruments appearing in part form do not match the orchestration listed on the title page. The title page omits the flutes and oboes that are included in part form, but references two clarinets for which there are no parts. It is not clear whether this was a copyist error or a later arrangement. The individual parts contain several errors, including inconsistencies in multi-measure rests. This matter is complicated by the absence of a score to serve as reference.