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String fundamentals for the non-string-playing conductor

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String Fundamentals for the Non-String-Playing Conductor

Dianna M. Fiore

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JAMES MADISON UNIVERSITY

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FACULTY COMMITTEE:

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John Peterson
Dedication Page

This work is dedicated to members of my family, who have taught me to work hard for the things that I aspire to achieve.
Acknowledgements

I am grateful to those whom I have had the pleasure to work with during this project. Thank you to my advisor and mentor, Professor Foster Beyers, for your encouragement, thoughtful input, and motivation. Dr. John Peterson and Dr. Stephen Bolstad, thank you for your guidance and valuable feedback. I would like to express my sincere gratitude to Dr. Robert McCashin, who has taught me more than I could ever give him credit for here. Dr. McCashin, thank you for your patience, immense knowledge, and helping me become who I am today.

I thank my parents for providing me with continuous encouragement throughout my years of study. Last but not least, I thank my loving fiancé, Ian Passmore, who has supported me endlessly, kept me company during late nights of typing and proofreading, and continuously makes me laugh.
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Abstract

There are presently few resources on stringed-instrument fundamentals geared specifically toward the conductor who does not have string-playing experience. This paper is designed to fill this void through an explanation of string fundamentals, which the non-string-playing conductor should comprehend before addressing a string section on the podium. In addition to covering string fundamentals, this paper includes options for designing bowings and case studies of W. A. Mozart’s Divertimento in F major, K.138 and Edward Elgar’s Serenade for Strings in E minor, Op. 20.
Introduction

There are many non-string-playing conductors successfully leading orchestras around the world. For these individuals, resources regarding the basics of stringed instruments are limited and oftentimes require some sort of pre-existing string knowledge. Current resources are too technical to be used as a quick, practical resource for conductors, and their intended audience is too broad. I felt I could make a significant contribution to the orchestral conducting profession by developing a string instrument manual specifically geared toward non-string-playing conductors.

This manual, which covers essential string concepts and techniques, comes from my point of view, a fellow non-string-playing conductor. The document includes a literature review, showing the lack of resources available on string fundamentals to the non-string-playing conductor. Following the literature review is a chapter on the fundamentals of string instruments. In this document, string fundamentals refers to the rudimentary and important elements that conductors must understand to work productively with an orchestral string section. The final chapter provides options for designing bowings and includes case studies of W. A. Mozart’s Divertimento in F major, K.138 and Edward Elgar’s Serenade for Strings in E minor, Op. 20. Not only will this document be a reference for those conductors unfamiliar with string instruments, but its secondary goal is to provide examples of decision making through observing string notation in the case studies.
CHAPTER I: Literature Review

The following resources included in the literature review are helpful in fulfilling their individual purpose, however none exclusively aim to inform the non-string-playing conductor solely regarding string fundamentals. Rather, a large portion of the resources available focus on the types and rules of bowing, requiring pre-existing string knowledge from the reader. Frequently when a concept is defined in these resources, it lacks an explanation of why and how that concept works. The literature review is organized by the overall purpose each source serves. Example 1.1 is a table that indicates each manual’s intended audience and whether or not its primary topic is bowings.

<table>
<thead>
<tr>
<th>Main focus is on bowings</th>
<th>Primarily meant for the violinist or string pedagogue</th>
<th>Primarily meant for the conductor with pre-existing string knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norman Del Mar, <em>Anatomy of the Orchestra</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elizabeth A.H. Green, <em>Orchestral Bowings and Routines</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charles Gigante, <em>Manual of Orchestral Bowing</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marvin Rabin and Priscilla Smith, <em>Guide to Orchestral Bowings through Musical Styles</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>James Kjelland, <em>Orchestral Bowing: Style and Function</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robin Stowell, ed., <em>The Cambridge Companion to the Violin</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Martin Wulfhorst, <em>The Orchestral Violinists Companion</em></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Example 1.1** Table indicating the main focus and audience of each resource in the literature review.
Norman Del Mar’s *Anatomy of the Orchestra* is a reference for conductors seeking further information on the different sections of the orchestra. Its goal is to clarify “at least some of the confusions and contradictions which occur in almost every score.”

In the first section of the book, Del Mar addresses the strings. This section is organized into twenty-four segments, discussing topics such as score layout, seating formations, tremolo, vibrato, harmonics, and issues of bass tuning. Score excerpts are provided for reference.

The material in the string section is intended for a somewhat advanced audience. Oftentimes, Del Mar briefly introduces a basic idea and then follows it with more complex statements. For example, in the section “The Bow and its Standard Usage” he describes the sound achieved when playing in the lower and upper halves of the bow, respectively, but does not include any information about the mechanics of the bow, making some of these statements hard for a novice to understand. Furthermore, some basic bowing terms are not clearly defined. “Détaché” is, for example, referred to as “normal bowing.” Someone seeking information on string fundamentals would require further explanation.

*Orchestral Bowings and Routines* by Elizabeth Green, published in 1990, is an older resource designed for students and the orchestral teacher. Her manual serves two purposes. The first is to offer “a summary of the varied means used by the skilled

---

2 Ibid., 12.
3 Ibid., 72.
4 Ibid., 86.
5 It is unclear whether the “student” reader is a string player or a conductor; however, Green alludes to the book’s purpose for string students.
orchestral players to obtain a close correlation of bow-direction, without spending unnecessary hours of intensive rehearsal thereon, and to give some guidance in the choice of bowing styles for the various passages in compositions written in the several periods of orchestral literature.” The second purpose is to summarize “the customary routines which contribute to successful orchestral performance.”

Green presents “The Fourteen Basic Bowings,” which she claims are the fundamental bowing principles every player must know before they may be broken. These principles, along with their illustrations, serve as a good fundamental reference about bowings. While Green occasionally clarifies exceptions to a given principle, her explanation is often lacking. For example: Bowing No. 1 requires “the note written ON the first beat of the measure is played down-bow.” Green states, “This is the utter fundamental than [sic] which there is nothing more elementary nor basic,” in the sentence directly following the rule. This rule, however, may be misunderstood by someone who lacks basic string knowledge. There are many downbeats within a work that are better suited to begin with an up-bow: for example, if the note’s dynamic is pianissimo.

Following “The Fourteen Basic Bowings,” Green discusses “The Artistic Bowing,” which are more advanced principles and “much more dependent upon the musical qualities of the phrase.” Next, Green provides information on style and bowings. She briefly explains characteristics of string playing from the Early- and Late-Classical styles, the Romantic and Post-Romantic periods, and in Modern music. Within

6 Elizabeth A.H. Green, _Orchestral Bowings and Routines_ (Fairfax, VA: American String Teachers Association, 1990), 2.
7 Ibid., 6.
8 Ibid., 8.
9 Ibid., 42.
10 Ibid., 57.
each period of music, Green addresses general characteristics of the period and bowing styles.

The fifth and sixth chapters fulfill Greens secondary purpose. Chapter five mentions some “tricks of the trade,” including interchanging spiccato and legato, the roles of certain chairs when playing tremolos in forte passages, the rhythmic dangers of the quarter note followed by faster notes, and how to approach a run after a brief rest.\(^\text{11}\) The final chapter provides a variety of pedagogical tips related to sight-reading, rhythm, and general musicianship.\(^\text{12}\) The purpose of these final chapters is to provide possible solutions to the different problems that may arise when teaching young students (pre-college). This second portion is particularly useful to the non-string-playing conductor, however my resource would provide further information concerning why the solutions work. For example, the following is one of Green’s tips for pizzicato, “The plucking motion of the right-hand finger will produce the most resonant sound if the player will feel as if he rolled or twisted the string under the plucking finger.”\(^\text{13}\) A further explanation of why this is the best method to produce a resonant pizzicato would be more helpful to someone without string knowledge.

Green’s book assumes pre-existing knowledge of how string instruments and bows function. This book is a good source for conductors who already understand the fundamentals of string instruments and are learning to create their own bowings.

Intended for “the composer and conductor who do not play a stringed instrument,” Charles Gigante’s Manual of Orchestral Bowing offers the most information

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\(^{11}\) Ibid., 69, 73,74, 76, 79.
\(^{12}\) Ibid., 84, 86, 89.
\(^{13}\) Ibid.,76.
for the non-string-playing conductor.\textsuperscript{14} Part One, an “Introduction to Some Basic Principles of Bowing: Their Physical, Acoustical and Mechanical Aspects,” describes the bow, its divisions, and its physical qualities, along with bowing on and off the string, bow placement, pressure, and speed.\textsuperscript{15} Part Two, “Identification of Bowing Styles According to Tone Characterization: Gradation from Legato to Non-Legato,” contains the bulk of the material, which as the title suggests, focuses on bowings.\textsuperscript{16}

Part One of Gigante’s manual is the most helpful in understanding stringed instrument fundamentals because it explains why each instrument functions as it does. He omits some concepts such as bow distribution, double stops, and \textit{pizzicato}, because this resource focuses mainly on bowings. Part Two becomes quite complex, discussing techniques such as the \textit{sospiro} and the broad \textit{spiccato} (which Gigante also identifies as the “flaky” \textit{spiccato}).\textsuperscript{17} These specialized techniques are geared towards someone who already has a full understanding of the string fundamentals.

Marvin Rabin and Priscilla Smith’s \textit{Guide to Orchestral Bowings through Musical Styles} targets teachers and conductors with a general knowledge of strings, as well as expert string players. The book is supplemented with videotape, the primary purpose being “to discuss stylistic orchestra bowings and their underlying principles.”\textsuperscript{18} Rabin and Smith cite material from both Green and Gigante. The opening pages, which includes a section on bow usage, is helpful for the non-string-playing conductor. The

\textsuperscript{15} Ibid., 1–18.
\textsuperscript{16} Ibid., 19.
\textsuperscript{17} Ibid., 83–108.
\textsuperscript{18} Marvin Rabin and Priscilla Smith, \textit{Guide to Orchestral Bowings through Musical Styles: a manual to be used with video} (Madison, WI: University of Wisconsin, Division of University Outreach, 1990), iii.
section quickly proceeds from basics of the bow to proper editing practices. Similar to Elizabeth Green’s book, the primary focus is on bowing styles. Rabin and Smith, however, provide longer bowed score excerpts. The main draw of the manual is its accompanied video component, although it is outdated in the form of a VHS tape. This book is most helpful for the conductor who already knows the fundamentals, but is learning to bow parts.

James Kjelland cites Green, Gigante, and Rabin & Smith as sources in his book, *Orchestral Bowing: Style and Function*. His intended readers are conductors, teachers, professionals, string and non-string players, and composers who are interested in knowing the “‘what, how, when, and why’ of orchestral bowing.”\(^{19}\) Kjelland further addresses the non-string-playing conductor, emphasizing that the sections on “sound production, bow direction, and performance practice will be helpful in a variety of settings.”\(^ {20}\) The broad audience is reflected in the book’s organization. Kjelland oscillates between string instrument basics and tips for teaching string students. The bow strokes fall into three categories: on-the-string, off-the-string, and Kjelland’s term “onff,” or the combination of on- and off-the-string.\(^ {21}\) The bow strokes are also interspersed with teaching tips. Chapter Three covers bow direction and includes a brief summary of Green’s Fourteen Basic Bowing principles, followed by several newer down-bow rules excluded from Green’s book. The final chapter includes exercises for bow control, bowing etudes, and orchestral excerpts for study, and is intended to be used as the

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\(^ {20}\) Ibid., 5.
\(^ {21}\) Ibid., 23.
teacher’s manual for Kjelland’s corresponding workbook. The intended audience is widespread and the content is at times too in-depth, geared toward the string pedagogue or aimed at directing the string player to develop certain techniques.

Like Kjelland, The Cambridge Companion to the Violin, edited by Robin Stowell, also targets a broad audience, from amateurs interested in the violin to professionals. The opening articles discuss the violin’s history, the development of the instrument and bow, and its acoustical properties. Most of these essays are intended for the violin teacher, covering topics such as the fundamentals of violin playing and teaching, performance practice, contemporary techniques, famous violinists of the Baroque and Classical periods, repertoire of the instrument, and pedagogical literature.

The sections on the physics of the violin and fundamentals of violin playing are helpful to the non-string musician; however, the section addressing fundamentals portion excludes important topics such as pizzicato, playing on- and off-the-string, and characteristics of the bow. The chapter on “The fundamentals of violin playing and teaching” is geared toward the violin teacher, discussing proper posture, sight-reading skills, achieving pitch and rhythmic accuracy, and memorization skills.

The Orchestral Violinist’s Companion by Martin Wulfhorst is a two-volume “guide to the art and craft of orchestral playing.” Wulfhorst’s target audience is the orchestral violinist, but also includes others who may benefit such as audition candidates,

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22 Ibid., 76.
24 Ibid., 46, 92, 122, 143, 148, 168, 194, 224.
25 Ibid., 92.
college students, professional players, string teachers, composers, and conductors. He covers a wide variety of topics, ranging from the responsibilities of a section violinist to preparation for an orchestral audition. The text is well organized, blending both principles and practice.

While the book contains tips for musicians at every level, it is not meant as a basic method book. Wulfhorst often mentions a technique, then immediately describes how to execute it. Take the section on “Double Stops and Chords,” for example. Wulfhorst describes how to play a double stop with a resonant, good sound and emphasizes the importance of practicing double stops and chords. Because of his intended audience, he does not feel the need to define double stops.

There is an assortment of sources available on stringed instruments, from bowing manuals to listening guides, all aiming to appeal to a wide variety of audiences. As I have demonstrated, however, there is a shortage of resources that explain string fundamentals to the non-string-playing conductor, written by the non-string-playing conductor.

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27 Ibid., 75, 210.
CHAPTER II: Fundamentals of String Instruments

Physics of the Instrument

A conductor should begin with awareness of how sound is produced before exploring other facets of string instrument technique. Sound is the result of vibration, which is initiated when a bow is drawn across a string or a string is plucked in some fashion. This vibration travels through the bridge, or the thin piece of wood that serves to support the strings, causing the top of the instrument’s body to vibrate (see Example 2.1). The sound post, a small wooden dowel located vertically inside the instrument (underneath the foot of the bridge, or where the bridge is fixed to the instrument), transfers the vibrations from the top of the instrument to the back. The air within the hollow body of the instrument begins to vibrate at the same frequency. Sound emerges from the f-holes (also called the sound holes), which are the open areas located on either side of the strings on the top of the instrument.28

Example 2.1 Diagram illustrating the parts of the violin body.29

28 Stowell, Cambridge Companion, 31,41.
Many variables affect the quality and dynamic of the sound that a string instrument produces: the tension and length of the strings, the size and mass of the instrument, and the placement of the sound post. String players use their left hand fingers to depress the string onto the fingerboard (called “stopping the string”), causing the vibrating portion of the string to be shortened. The farther from the tuning pegs a player stops the string, the faster the vibration and the higher the pitch. Tightening and loosening the pegs located near the scroll of the instrument alters the tension of each string. Toward the end of the string in the opposite direction are small fine-tuners used to make minimal pitch adjustments. When the string is tightened, the increased tension also causes the pitch’s frequency to increase. Longer and thicker strings produce lower tones and vibrate at a slower rate than shorter and thinner strings, because they are under less tension. Strings that produce lower pitches must be longer and thicker to resonate properly.  

The thickness, length, and tension of each string also affects the quality of the sound, which is why a string bass sounds mellow in comparison to the sharper sound of the violin. The size of the instrument affects the agility with which a performer can play. Generally, a violinist can move around their strings faster than a string bass player since the string positions on a violin are closer together than on a double bass. Of course, the agility with which a player can perform is as closely tied to the physics of the instrument as it is to their own level of skill.


Ibid., 34–35.
The Strings

Open or unstopped strings refers to the pitches produced when the player bows or plucks the string without their left hand stopping the string along the fingerboard. The open strings differ depending on the instrument. Example 2.2 illustrates the open strings for the violin, viola, cello, and bass in their appropriate registers. Viola strings are tuned a perfect fifth below the violin strings, and as a result three of the four viola strings are identical to the violin in pitch except the lowest string, their C string. Cello strings are tuned one octave below the viola. A quick way to remember bass strings is recognizing they are the reverse order of the violin strings.

Example 2.2 Open strings of the violin, viola, cello, and bass. Note: Bass sounds an octave lower than written.

Violin, viola, and cello strings are tuned in fifths, while bass strings are tuned in fourths. A possible historical explanation for tuning in fourths is that the modern bass
descends from the viol da gamba family, which was mostly tuned in fourths. For practical considerations, due to the bass string length, a whole step in the lowest positions encompasses a fully stretched hand. Occasionally composers will request unconventional tunings, in which the pegs are used to re-tune the open strings by increasing or decreasing tension. This technique is called scordatura.

**Understanding Harmonics**

Composers can use harmonics in a composition to achieve a variety of effects, depending on the context: eerie, ethereal, glassy, hopeful, or simple background noise. They produced a different color than stopped tones. Maurice Ravel, Olivier Messiaen, and Igor Stravinsky frequently employ harmonics to achieve a specific musical effect.

When a vibration is initiated on a stringed instrument, we hear a single pitch. This pitch, however, comprises several frequencies. The frequency we hear is called the fundamental, or the first partial, and it is the lowest frequency the string produces. Harmonics, partials, and overtones all refer to the higher frequency, fractional components. A partial is one of the component frequencies that contributes to the sound produced by the vibrating string. Overtones refer to the partials occurring above the fundamental pitch and they are the same intervallic distance above any given fundamental pitch. Harmonics refer to all the notes in a harmonic series (including the

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32 Some bass players are exploring tuning in fifths.  
33 Sam Suggs, discussion with Dianna Fiore, Harrisonburg, VA, Spring 2018.  
fundamental), whereas overtones include all notes in a series except the fundamental. The first overtone is also called the second partial, the second overtone is also called the third partial, etc. Example 2.3 illustrates the harmonic series above the fundamental C2. The fundamental pitch C2 is the lowest bass note on the staff shown in the example (number 1). The overtones occur above the fundamental pitch (numbers 2 to 16). The intervallic relationship of the overtones would remain the same if the fundamental started on a different pitch. For example, the interval from the fundamental to the first overtone is one octave, the interval from the first overtone to the second is a perfect fifth, the interval from the second overtone to the third is a perfect fourth, etc.

![Harmonic Series](image)

**Example 2.3** The harmonic series (numbers 1 to 16) above the fundamental C2.

There are four fundamental pitches on a string instrument: the open strings. The overtones occur above each string as it vibrates. If the finger lightly touches\(^{37}\) the string at specific locations, called nodes, the vibrations along the length of the string become divided, creating harmonics.\(^{38}\) Isolating specific overtones over the fundamental pitch produces a harmonic.

There are two kinds of harmonics: natural and artificial. A natural harmonic occurs by touching the string at one of the nodes. If one touches the midway point on the string, dividing the string length into two equal parts, the harmonic that sounds is an

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\(^{37}\) Lightly touches the string as opposed to pressing the string to the fingerboard.

\(^{38}\) Del Mar, *Anatomy of the Orchestra*, 112.
octave higher. This upper octave is the second partial, which lies an octave above the fundamental pitch. If one stops the string in this location, the same pitch is produced but the color of the sound is different when it is touched to create a harmonic (see Example 2.4).

<table>
<thead>
<tr>
<th>Harmonic</th>
<th>Interval above fundamental</th>
<th>Touch points along length of open string</th>
<th>Resulting pitch using A string of violin as the fundamental</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>open string</td>
<td>none</td>
<td>A3</td>
</tr>
<tr>
<td>Second</td>
<td>octave</td>
<td>1/2</td>
<td>A4</td>
</tr>
<tr>
<td>Third</td>
<td>octave + perfect fifth</td>
<td>1/3, 2/3</td>
<td>E5</td>
</tr>
<tr>
<td>Fourth</td>
<td>two octaves</td>
<td>1/4, 3/4</td>
<td>A5</td>
</tr>
<tr>
<td>Fifth</td>
<td>two octaves + major third</td>
<td>1/5, 2/5, 3/5, 4/5</td>
<td>C#6</td>
</tr>
<tr>
<td>Sixth</td>
<td>two octaves + perfect fifth</td>
<td>1/6, 5/6</td>
<td>E6</td>
</tr>
</tbody>
</table>

**Example 2.4** Table illustrating the first six harmonics using the A string of the violin as the fundamental pitch.

Touching a perfect fifth above an open string will divide the vibration segments into thirds and the harmonic will sound an octave and a perfect fifth higher, thus creating the third partial. Touching the point on the string that is two-thirds of the way toward the bridge will also create the same harmonic. Touching at one-quarter or three-quarters on the string (the one-quarter point being essentially a perfect fourth above the fundamental open string) will divide the vibration segments into fourths, creating a harmonic pitch two octaves higher, also known as the fourth partial. Both a major third and major sixth above an open string produce an overtone two octaves and a major third higher than the fundamental, splitting the string into fifths and creating the fifth partial. Touching a minor third above an open string creates the sixth partial, which is two octaves and a perfect fifth higher than the fundamental. The further the string is divided into

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39 Ibid., 113.
segments, the more difficult it becomes to produce the harmonic pitch; so, creating the fifth partial and above will be more challenging.

The production of artificial harmonics allows the freedom to produce overtones on any pitch desired. An artificial harmonic is achieved by stopping the string with the first finger of the left hand to establish any new fundamental pitch. This is typically achieved using the fourth finger to touch the string, creating the second octave harmonic on the now shortened string. The most basic understanding of the difference between natural and artificial harmonics is that a natural harmonic is created with one finger, while an artificial harmonic requires a stopped note with one finger and a touch node with another finger (uses two fingers). Example 2.5 illustrates a chart for reading both natural and artificial harmonics.

<table>
<thead>
<tr>
<th>Interval above an open string or Interval from solid to diamond-shaped note</th>
<th>Partial</th>
<th>Resulting pitch above the fundamental</th>
</tr>
</thead>
<tbody>
<tr>
<td>minor 3\textsuperscript{rd}</td>
<td>6</td>
<td>two octaves + perfect 5\textsuperscript{th}</td>
</tr>
<tr>
<td>major 3\textsuperscript{rd}</td>
<td>5</td>
<td>two octaves + major 3\textsuperscript{rd}</td>
</tr>
<tr>
<td>perfect 4\textsuperscript{th}</td>
<td>4</td>
<td>two octaves</td>
</tr>
<tr>
<td>perfect 5\textsuperscript{th}</td>
<td>3</td>
<td>one octave + perfect 5\textsuperscript{th}</td>
</tr>
<tr>
<td>major 6\textsuperscript{th}</td>
<td>5</td>
<td>two octaves + major 3\textsuperscript{rd}</td>
</tr>
<tr>
<td>octave</td>
<td>2</td>
<td>one octave</td>
</tr>
</tbody>
</table>

**Example 2.5** Chart on reading both natural and artificial harmonics.\textsuperscript{40}

\textsuperscript{40} Ibid., 113.
Reading Harmonics

Composers may direct performers to play harmonics in various ways. A note that is marked with a small circle above it (°) indicates the sounding pitch (Example 2.6). Most commonly, notes that have a small open circle above them will occur on natural harmonics. Because harmonics can be touched at any of their divisions, the player can choose whichever node best produces the desired pitch.

Example 2.6 Natural harmonic indicated with a small circle above the note. The natural harmonic is an octave above the D string—2:1 ratio.

Occasionally, an open circle will appear on a single pitch that is to be produced using an artificial harmonic. When this occurs, the player has to work “in reverse” to figure out how to find the desired harmonic pitch (Example 2.7). In Example 2.7a, the notation indicates that the harmonic sounds as an E-flat. One possible solution is to find the E-flat two octaves lower, place the first finger to stop that pitch and lightly touch the string a perfect fourth above. This artificial harmonic will produce the desired sounding pitch (more on this process when discussing diamond-shaped notehead notation).

Example 2.7b provides an additional example.

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41 Ibid., 114.
Example 2.7 The small circle lies above a pitch that requires a player to work in reverse to produce an artificial harmonic.

The hollow, diamond-shaped notehead indicates where the finger touches the artificial node on the string. Some harmonic indications show a regular note and a diamond-shaped note above, appearing as a double stop. This indicates that the regular note is to be stopped by the first finger, while the diamond shaped note is touched (most frequently by the fourth finger).

To read a diamond-shaped note for natural harmonics, find the first available open string below that note; that is the string upon which the harmonic should be fingered. The interval from the solid note to the diamond note will indicate which partial is produced (for further clarification refer to the chart on reading harmonics in Example 2.5).

Examples 2.8a and 2.8b illustrate ways to read diamond-shaped noteheads that may appear in a score. Example 2.8a shows a diamond note on the fourth line D. Find the closest string on the violin below the diamond note, which is the A-string (the

\[ \text{2.7a} \]

\[ \text{2.7b} \]

Ibid.
fundamental pitch). The player will use the A-string to touch the node. The interval from A to D is a perfect fourth. Refer to the chart in Example 2.5, which shows touching the interval of a perfect fourth above the fundamental will sound the pitch two octaves above the fundamental string. Example 2.8b shows an alternative notation, this time on the cello. *Sul III* or *sul re* is an instruction to play on the third string or the D-string of the cello. The interval from the fundamental to the diamond note is a minor third. The chart in Example 2.5 shows that a minor third produces the pitch two octaves and a perfect fifth higher than the fundamental pitch, A4.

2.8a Natural harmonic for violin

![Diagram](image1)

written = closest open string: A = resulting pitch

2.8b Natural harmonic for cello

![Diagram](image2)

written = closest open string: D = resulting pitch

Example 2.8 Playing a natural harmonic notated with diamond-shaped note head on the violin and cello.

Example 2.9a illustrates a diamond-shaped note head above a regular note, written for the bass. The interval between the regular note and diamond note is a minor third, which sounds the pitch two octaves and a perfect fifth above the fundamental. Remember the bass string sounds an octave lower, so the sounding harmonic pitch is B3.

Example 2.9b illustrates artificial harmonics on the violin. The intervals between the
diamond note and regular note on the reference chart in Example 2.5 show the sounding pitch.

2.9a Example for bass

![Example 2.9 bass](image)

written = resulting pitch

2.9b Examples for violin

![Example 2.9 violin](image)

written = resulting pitches

**Example 2.9** Playing a diamond-shaped note head written above a regular note on the bass and violin.

Composers use a variety of ways to indicate harmonics, but it is helpful to have some basic knowledge of how to read the notation before a rehearsal, because someone will undoubtedly ask for clarification when it is least expected. Harmonics are occasionally written incorrectly by the composer, are either printed as an error, or are interpreted by the publisher/editor. Errors are common in Ravel’s music, for example.\(^{43}\) Therefore, it is important to compare the score and parts well before the first rehearsal to avoid wasting time.

**The Bow**

The bow has two main components: the wooden part, or the stick, and the hair, or ribbon (see Example 2.10). The bow hair is stretched to each end of the stick and is most

\(^{43}\) Ibid, 116—177.
commonly made from white or black horsehair, the second of which is more common on bass bows. The small screw at the frog end of the bow increases or decreases the tension of the hair through the use of a turn screw, fitted into a threaded eyelet inside the stick of the bow. Unless otherwise noted, the most conventional use for the bow is to draw the hair across the strings, referred to as *arco* in Italian, *archet* in French, and *Bogen* in German. Aside from being an instruction, these terms also refer to the bow as a noun. The players apply rosin (refined tree sap) to the hair to help provide friction. This creates resistance between the bow hair and the strings as the bow moves across them.\(^{44}\)

![Diagram of bow parts](image)

**Example 2.10** Diagram illustrating the parts of the bow.\(^{45}\)

The area of the bow segment underneath the hand is called the “frog” or “heel,” while the farther end of the bow is referred to as the “tip” or “point.” The bow moves in two directions: down-bow (the direction from frog to tip) or up-bow (the direction from tip to frog). The standard symbols associated with down and up strokes are \(\square\) (starting at the frog) and \(\bigvee\) (starting at the tip), respectively. The symbols are illustrative in their appearance, as the down-bow symbol looks like the frog end of the bow and the up-bow symbol comes to a tip.\(^{46}\) One can divide the bow into upper and lower halves, whose varying cantilevered weight (think of a beam that projects outward and is anchored at

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\(^{44}\) Ibid., 71.
\(^{46}\) Robert McCashin, discussion with Dianna Fiore, Harrisonburg, VA, Fall 2015–Spring 2018.
only one end) contributes to different sound qualities. Generally, when players perform in the upper half they can more easily achieve a soft, delicate, and light sound. This is because the majority of the bow weight is supported by the right hand, to the point where the bow is making contact with the string. By contrast, playing primarily in the lower half of the bow creates weighty and louder sounds. This is because a substantial portion of the bow is cantilevered beyond the instrument, and that portion is being pulled toward the ground as a result of gravity. The characteristics of the bow can be further explained when divided into three parts: the frog, the middle, and the tip. When playing at the frog, one can achieve an aggressive, biting sound. The middle area offers the most elasticity since the wooden part of the bow is easily flexed in this location. Techniques which require the bow bouncing off the string are best accomplished in the middle to the balance point, in the lower half of the bow. This is as a result of the flexing of the bow stick and because the gravitational weight of the bow is equally divided or balanced (a portion of the bow is supported by the bow hand and the other portion is cantilevered and unsupported). Lightness and finesse is achieved at the tip.

Many of the stylistic decisions made by musicians involve manipulation of these bow fundamentals: 1. Bow speed, or the rate at which the bow travels across the string(s); 2. The weight of the bow on the string, meaning the gravitational weight associated directly with where along the length of the bow the passage is played; and 3. The contact point. The contact point includes the following factors: 1. The point on the string at which the bow makes contact; 2. Where the strings make contact along the length of the

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47 Del Mar, Anatomy of the Orchestra, 72.
49 Term used by Robert McCashin.
bow; and 3. How much hair of the bow is used (for example, full hair versus tilting the bow to use half hair). These three variables—speed, weight, and contact point—function co-dependently. A combination of speed, weight, and contact point will alter any and all aspects of intensity, sound, timbre, dynamic, and color aspects. Increasing the weight on the string, while keeping the same or slightly slower bow speed, will also increase the amplitude or displacement of that string, thus affecting the timbre, intensity, and dynamic. String displacement refers to how far the string vibrates from its point of rest.

Too much pressure on the string, contrary to expectation, actually yields less sound, and can “choke” the string, eventually causing the sound to break into noise (harsh sounds). This only happens, however, if the bow speed remains the same; for example, if the bow speed is too slow to match the increased weight. Additionally, moving closer to the bridge, which increases resistance between the bow and the string, can also offset the weight. Generally, this requires slowing the bow speed to maintain a good tone quality.  

The contact point and bow location (where along the length of the bow) affects both the timbre and intensity of a tone, but only if correctly matched with a somewhat slower bow speed and some additional weight. The left hand is predominantly responsible for pitch, intonation, and vibrato, while the bow creates dynamic gradations, articulation, phrasing, color, and timbre.

**Terminology**

A chief responsibility of the conductor is to impart a unified interpretation of a given work, as there are many different ways musicians may interpret the notes on the

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50 McCashin, discussion.
page. For example: How short is the staccato note? How loud is the *forte*? How weighted is the accent? How brushed or brittle are the *spiccato* notes? To answer any of these questions, the conductor must first establish a vivid aural image of the score. It is also the conductor’s job to recognize problems and work with the ensemble to achieve a sound that best matches their interpretation. This does not mean the conductor needs to know every bowing term, as most string players have different ideas and understandings of a single term. Often the definitions for bow stroke terms are confusing and at worst, contradictory. Take the term *détaché* for example. This does not mean “a detached stroke,” despite what some definitions say; rather, it means normal, alternating (down-up) bow strokes of equal value and weight, with no affect at all.\(^5\) It is only detached in that it requires the changing of bow direction for each note. Often a conductor need only describe the desired effect, and string players will be able to communicate amongst themselves with technical terms where appropriate. That is not to say that all bowing terms are unimportant. There are some terms that are universally understood and more efficient to use in rehearsals, which is why it is helpful to have a working knowledge of “string speak.” The phrase, “*as it comes,*” meaning to alternate down and up-bows, for example, is universally understood amongst string players.\(^6\)

**Bowing Fundamentals**

One of the essential decisions a conductor needs to make is how the music should sound to best convey the musical message of the notation; then, the conductor must reconcile those notations with their own artistic perspective. One must consider the


\(^{6}\) Kjelland, *Orchestral Bowing: Style and Function*, 70.
dynamic, articulation, phrasing, timbre, and tempo they wish to achieve. A slow tempo requires different needs in terms of bowing than, for example, fast tempo. One must also consider the musicians and their technical capabilities; a professional string section will have different skills than junior high-school players. Different orchestras have different needs and no one set of bowings will fit the needs of every orchestra. In addition, other bowing considerations include bow distribution, contact point, and string crossings. It is also important to understand that different instruments have different needs. A bass, for example, would have different bowing considerations than a violin.55 Before creating bowings, the conductor should consider the following questions: What do the score notations mean? What is your personal vision for the music? What effect or musical character is one wishing to impart? And, what stylistic considerations will you include? The answers to each of these considerations will contribute to the conductor’s vivid aural image of the work.

As discussed in the previous chapter, abundant resources exist to provide general guidelines for bowings in achieving a certain color and quality of sound. Generally, players will use an alternating bow stroke (down and up) on notes that are not slurred. Slurred notes are to be played in a single bow direction, either down or up. This is a generalization, as slurring may be quite misleading depending on the era and the composer. In the 18th century, most slurs were recognized as both articulation and bowing indications.56 For example, Haydn, Mozart, and Beethoven frequently used slurs to designate bow markings. In the 19th century, however, slurs can denote both phrasing and

55 McCashin, discussion.
bowing.\textsuperscript{57} Often a conductor is faced with making an informed judgment as to whether slurs indicate phrasing, bowing, or both. Today the authenticity of these markings may have been subject to multiple editorial revisions. The only true way to know the composer’s original markings is to view the manuscript, if one is accessible. When a slur crosses multiple measures—making it impractical to play in one bow direction—it likely indicates a phrase marking rather than a bowing. The excerpt in Example 2.11, from Wagner’s Overture to \textit{Rienzi} (1840), is a phrasing indication. Very soft passages with limited color, like accompaniment figures, can also indicate phrase markings rather than bowing. Example 2.12 is from the first movement of Brahms’s Second Symphony in D Major, Op. 73. The excerpt is an example of a soft passage with slurring indicated over multiple measures, possibly representing a phrase marking.

![Example 2.11](image)

\textbf{Example 2.11} Slurs notated over multiple measures indicating a phrase marking in the violins, violas, and cellos in Wagner’s Overture to \textit{Rienzi}.\textsuperscript{58}

\textsuperscript{57} Ibid., 395.

Example 2.12 Slurs indicating phrase markings in first violins, violas, and cellos (not entirely shown in excerpt) in the first movement of Brahms’s Symphony No. 2 in D Major, Op. 73.59

When creating bowings, the conductor must plan ahead so the bow winds up in the correct location, allowing the players to execute the correct dynamic, style, intensity, and color at all times. It is important to observe the composer’s phrasing and articulation when bowing, and adjust bowings accordingly so as not to disturb the phrase. One may choose to break the slurs or switch bow direction mid-bar, mid-phrase, or at a melodic climax. In very long phrases or passages with extended tied notes, it can be useful to have the players stagger bow changes within the phrase.60 Staggered bows occur when the inside and outside players of each desk play alternate bow directions to support the phrase or sustained note. This is useful in masking bow changes or any inequality of sound that would occur in unison bowing.61

60 Rabin and Smith, Guide to Orchestral Bowings through Musical Styles, 5.
There are two basic types of bowings: those that are gravitational in nature and those that are levitational in nature. Gravitational bowings, as the name would imply, generally occur as down-bow strokes, where the bow arm is moving in tandem with gravity. Levitational bowings occur as up-bow strokes, where the bow arm is moving in opposition to gravity. For passages with a crescendo, phrases are best executed up-bow (tip of the bow to the frog); a down-bow is more effective for passages with a decrescendo. This preference follows the basic physics of the bow, where cantilevered weight increases as one moves toward the frog and decreases as the bow moves out toward the tip. When playing at the frog, all the gravitational weight is cantilevered over the far side of the instrument (see Example 2.13). Playing an equal tone and dynamic from frog to tip requires that the player counterbalance the weight with the little finger of the bow hand to control the cantilever effect. The opposite stands true that if he/she is playing a loud dynamic at the tip, weight needs to be added with the index finger of the bow hand to countermand the lack of cantilevered weight in that region of the bow (see Example 2.14). String players are constantly controlling the distribution of weight with various part of the bow hand—small finger to index finger and back—with each bow stroke. Violinists and violists use natural, gravitational weight, while cellists and bassists use their arm, shoulder, and back to adjust by pulling into the string. As a result of the vertical positioning of the strings, cellists and bassists have substantially less naturally occurring gravitational weight. As players become more advanced they become more comfortable manipulating the variables to perform the markings regardless of the direction of the bow.

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62 Terms gravitational and levitational are from Robert McCashin.
63 McCashin, discussion.
Example 2.13 The example illustrates playing at the frog, where gravitational weight is cantilevered over the far side of the instrument.\(^{64}\)

Example 2.14 The example illustrates playing at the tip, where there is a lack of cantilevered weight.\(^{65}\)

\(^{64}\) Photograph of James Madison University violinist.
On and Off the String

There are two “styles” of bow strokes. The first is “on the string,” where the bow maintains contact with the string over a series of notes. The second is “off the string,” where the bow disengages vertically from the string over a series of notes. These two fundamental styles may be adjusted to create a variety of articulations. Since many bow-stroke terms are not standardized, it may be more helpful to identify a player who can demonstrate the desired sound. This person is generally the principal player.

Spiccato is a common term used to describe a bow stroke in which the bow bounces completely off the string. To play off the string, musicians need to find the point of the bow where it bounces best and is easiest to control. This is somewhere between the bow’s balance point and the middle of the bow, and is unique to each bow. One can produce different articulation strains of spiccato, from elongated and resonant to short and dry. Tilting the bow can create further gradations of spiccato. The full hair contact with the string can allow the bow to bounce more actively. Tilting the bow to use less hair contact helps to reduce the vertical impact on the bow stick, and thus the percussive quality of the sound. It is important to recognize that the term spiccato describes a type of off the string bowing. Being a non-string player, it is difficult to know the correct term for particular passages, but most players will understand the term spiccato and apply the stroke that is most appropriate to the musical context.

65 Photograph of James Madison University violinist.
67 Refer to the sources cited in this document as a reference for bow strokes.
68 Green, Orchestral Bowings and Routines, 59.
69 McCashin, discussion.
70 Green, Orchestral Bowings and Routines, 59.
A brush-stroke is some form of halfway between on and off the string playing. I have often heard brush-strokes referred to as “off-ish,” “on-ish,” “brushy,” or, most commonly “brush stroke.” There are varying degrees of “brushiness” one can request from the ensemble. The brushier the sound, the closer to the balance point the players need to be.\footnote{Kjelland, \textit{Orchestral Bowing: Style and Function}, 17.}

**Bow Distribution**

Bow distribution, along with regulating bow speed, are skills that develop over many years of training, studying, and performing. Bow distribution involves being at the correct point in the bow-length to handle the immediate demands of the style, dynamic, and articulation. An example of good bow distribution is conserving the amount of bow being used to accomplish a complete phrase requiring a gradual crescendo, rather than running out of bow. Bow distribution also contributes to a clear tone. For example, if one is running out of bow, the tone wavers, weakens, or even stops early. Players must focus on the three fundamentals of the bow—speed, weight, and contact point—to maintain the musically necessary distribution.

**String Crossing**

String crossing occurs when a player moves from one string to another. If possible, players should eliminate successive string crossings. String crossings, if not well executed, can result in a heavy, sluggish, and sloppy sound. There are passages, however, that demand string crossings to accomplish a specific effect. When playing string crossings, arm movement and bow motion should be minimized for efficiency and
rhythmic clarity. Anything that increases the cantilevered weight (moving toward the frog, for example) or increases the arc of the arm (moving toward the tip, for example) will add weight or a greater physical demand, and is therefore more cumbersome and inefficient.\textsuperscript{72} At a quick tempo, string crossings are best executed at or near the middle of the bow. This reduces the arc necessary to get from one adjacent string to the next, which also lessens the physical effort of execution.\textsuperscript{73}

**Bridge versus Fingerboard, and other Special Features**

The area in which the strings are bowed lies between the bridge and the fingerboard.\textsuperscript{74} The closer the player is to the bridge, the more rich and powerful the sound.\textsuperscript{75} This is due to the greater amplitude or displacement of the string, caused by an increase in bow weight that is required by the greater resistance near the bridge. There is more resistance near the bridge, because it is the area that anchors the strings. If the piece requires a soloistic sound, instruct the players to play closer to the bridge. Playing near the bridge requires slower bow speed and more bow weight, so as to balance or counteract the increased string resistance.\textsuperscript{76} *Sul ponticello* is a technique in which a player bows as close as possible to the bridge to highlight the upper partials.\textsuperscript{77} If a fundamental pitch is produced, then the technique is being performed incorrectly; *sul ponticello* should only produce non-fundamental partials, or overtones. These partials are created with a

\textsuperscript{72} McCashin, discussion.
\textsuperscript{73} Kjelland, *Orchestral Bowing: Style and Function*, 19.
\textsuperscript{74} Rabin and Smith, *Guide to Orchestral Bowings through Musical Styles*, 4.
\textsuperscript{75} Kjelland, *Orchestral Bowing: Style and Function*, 18.
\textsuperscript{76} McCashin, discussion.
fast bow speed and decreasing bow weight, so the bow is just surfacing on the string.\textsuperscript{78} Therefore, the number of upper partials and the intensity of the sound increases as the bow moves toward the bridge. These partials decrease in number and density the closer the bow moves toward the fingerboard.\textsuperscript{79} At the bridge, the strings are positioned in an arch, making it easier to play a single string without touching another. The further the bow moves toward the fingerboard, the more the strings flatten out, making it more difficult to avoid the surrounding strings. \textit{Sul tastò} is an indication to bow a passage over the fingerboard. The resulting sound is delicate, warm, and ethereal, oftentimes described as “flute-like,” since the higher overtones are masked in that area. There is less tension and therefore less resistance because the string is further from the bridge. \textit{Col legno} is playing with the wood of the bow bouncing on the string, resulting in a percussive sound.\textsuperscript{80} In some contemporary works, composers will ask for \textit{col legno tratto}, where the wood of the bow is drawn across the strings. This can damage the finish on the bow wood over time.

\textit{Divisi}

\textit{Divisi} instructs a section to divide into two or more groups. There are three ways to consider dividing up a string section: by person, by stand, or by group (front or back half of a section). Most commonly, if divided by person, the outer player performs the top line, while the inner plays the bottom. A possibility for notating \textit{divisi} bowings is to write one bowing above the staff and another below the staff, to differentiate inside and outside. If the section plays \textit{divisi} by desk, the odd number desks play the top part and

\footnotesize
\textsuperscript{78} McCashin, discussion.  
even numbers play the bottom. Some music calls for violin I, II, and III, in which case, the sections would be divided into three groups. Dividing the sections into three groups may be done in a variety of ways. One possibility is having the front desks of the sections play violin I, the middle desks play violin II, and the back of the sections play violin III. Another possibility is to divide the sections so the front stands are more evenly dispersed; for example, splitting the front desks into different groups, so the stronger players are more evenly distributed on each part. There are advantages to all three methods depending on how divided the part becomes. Divisi by person allows for an evenly distributed blend of sound, while divisi by desk is helpful during page turns, as one person remains playing while the other is free to turn the page. In multiple-part divisi (like violin I, II, and III), it is more common to divide by person so the section can better hear the harmony. A three-part divisi would be divided as such: the concertmaster plays the first line, the inner first desk player plays the second line, the outer second desk player plays the third line, the inner second desk player plays the first line, and so on. Group divisi is typically indicated by the composer when they want the section to be further split; if the composer asks for cello I and cello II, for example. The advantage for group divisi is that it allows the string sections to be split beyond what is traditionally found in an ensemble.

Double, Triple, and Quadruple Stops

Stops require playing two or more notes simultaneously. Double stops are two stopped notes, occurring on two adjacent strings. Upon seeing a chord one must decide

81 Del Mar, Anatomy of the Orchestra, 36.
whether it should be as arpeggiated, broken, or blocked. The traditional way to play a broken chord is to sound the bottom pitches first, following the contour of the bridge. Take a four-note chord, for example, broken into two equal parts. The lower two notes would sound first and remain ringing, while the top two sound second. A blocked chord occurs when players are able to sound all notes simultaneously, which, due to the string-arching, can only be achieved with double stops and triple stops. For triple stops, the bow is placed primarily on the middle note to allow for sufficient bow weight to catch the other two strings on either side. It is not possible to do this with a quadruple stop and maintain any semblance of sound other than a crunch, but there is an alternative. The chord can be divided amongst the section as a divisi, producing the same effect as a blocked chord and helping intonation. Typically, the outside player plays the upper note(s), while the inside player takes the lower note(s). That way, the notes for each player will be on adjacent strings. If playing a divisi triple stop, a possible solution would be to have the outer stands play the upper notes while the inner stands play the lower note, or vice versa. A conductor may choose whether to divide a chord based on the sound they prefer.

**Vibrato**

*Vibrato* is employed as an expressive tool to change the character of a note or phrase. *Vibrato* refers to the undulating sound made by the stopped note of the left hand, moving forward and backward on the fingerboard, which alternates the pitch between

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82 McCashin, discussion.
83 Rabin and Smith, Guide to Orchestral Bowings through Musical Styles, 16.
84 Green, Orchestral Bowings and Routines, 79.
slightly sharp and slightly flat.\textsuperscript{85} The technique is adjusted based on the speed of the pulsations and the pitch distance of the vibrated note. There are two types of vibrato: 1. wrist vibrato, which usually produces a quick, faster vibrato, and 2. arm vibrato, which generally produces a slower, wider vibrato.\textsuperscript{86} In rehearsal, a conductor may ask the players for non-vibrato to check intonation.\textsuperscript{87}

\textit{Pizzicato}

\textit{Pizzicato} refers to a plucked string as opposed to a bowed string. A plucked string may produce slightly different sounds depending on if it is plucked with the tip of the finger, resulting in a dry and percussive sound; or the pad of the finger, which produces a more resonant and plump sound. Left-hand vibrato also influences the quality of the pizzicato, making the sound warmer and more colorful than an un-vibrated pizzicato. A plus sign (+) is used to indicate a left-hand pizzicato, which can occur on open or stopped strings. Usually, the player plucks the string with either the third or fourth finger of the left hand.

The distance from the bridge will also change the color of the plucked sound. If the string is plucked closer to the bridge, the sound is bright, short, and more percussive. The timbre becomes more resonant the farther one is from the bridge, because of the higher partials that sound.\textsuperscript{88} If one plucks too far from the bridge, both the tone and partials begin to diminish. Strumming the strings like a guitar, rather than playing individual strings, is another non-bowed method often indicated in scores. When

\textsuperscript{85} Del Mar, \textit{Anatomy of the Orchestra}, 135.
\textsuperscript{86} Wulfhorst, \textit{The Orchestral Violinists Companion}, 100.
\textsuperscript{87} Stowell, \textit{Cambridge Companion}, 131.
\textsuperscript{88} Kjelland, \textit{Orchestral Bowing: Style and Function}, 59.
strumming passages with triple-stop or quadruple-stop chords, the violins and violas typically use their index finger, or in rest position with their instruments in their lap. The cellos and basses typically use their thumb.\textsuperscript{89} All string players should strum in a diagonal motion, from the lowest note to the highest, unless otherwise indicated by the composer.

**Mutes**

A mute reduces the volume of an instrument and affects its tone. Mutes are clamps made of wood, rubber, or metal. These are applied to the bridge, restricting the transfer of vibration into the resonance chamber inside the instrument. The result is a less resonant sound and thinner tone, as the higher overtones have been muffled.\textsuperscript{90} Many terms may direct a player to apply a mute. Common terms meaning with/without mutes are *con/senza sordini* in Italian, *avec/sans sourdines* in French, and *mit/ohne Dämpfer* in German.\textsuperscript{91} The shorthand symbols to apply and remove mutes are \(\text{\textsuperscript{92}}\) and \(\text{\textsuperscript{92}}\), respectively.

\textsuperscript{89} Ibid., 60.
\textsuperscript{91} Del Mar, *Anatomy of the Orchestra*, 123.
\textsuperscript{92} Wulfhorst, *The Orchestral Violinists Companion*, 422.
CHAPTER III: Two Case Studies

Knowledge of a composer’s compositional style, combined with stylistic elements from various periods, enlightens the bowing process. Different composers, styles, and periods require different sounds and techniques. Block dynamics and balanced phrases are common features of the Classical Period, while long crescendos, lengthier fermatas, louder fortés, and softer pianos help capture the more dramatic elements of the Romantic Period.93

There are a variety of ways to become educated on matters of performance practices. Primary sources from composers, such as manuscripts, diaries, and letters may reveal information that is helpful toward establishing a clear aural vision of the music. One may listen to historically informed performances through recordings led by conductors who knew the composer personally, or even performances led by the composers themselves. Reviews from the time may also be available for reference.

Options for Designing Bowings

Bowings can dramatically influence how the phrasing, timbre, articulations, and dynamics of a work are realized.94 There are options for creating bowings, depending on the players’ abilities and the conductor’s knowledge of stringed instruments. The first possibility is to have the principal players meet to coordinate their own bowings. The conductor should be present at this meeting to clarify questions about articulations and provide input on phrasing, tempo, etc. This option should be considered when: (1) the

principal players are experienced enough to be trusted with this task, and (2) they have a thorough understanding of the technical capabilities of the players within their sections.

Another option is to seek accessible bowing libraries. In addition to reference books, there are other helpful sources for conductors learning to bow parts, or who are interested in viewing the bowings of other conductors. The College Orchestra Directors Association (CODA) offers an extensive bowing library to its members. Additionally, CODA members have access to the Listserv, where members have discussions with other conductors, ask questions, and even request bowed PDF files. 95 The New York Philharmonic also provides digital archives, which are open to the public. Through the digital archives, anyone can access thousands of marked scores and parts of many renowned conductors. 96 These resources are good starting points for the non-string-playing conductor, although one must remember that these parts are intended for professional musicians with a highly developed technique.

Additionally, one may seek out parts from other universities or nearby professional orchestra libraries. A neighboring professional orchestra will often allow a university to view or even borrow their parts. When renting parts from a publisher it is possible to request a bowed set of parts if one is available. A final option is learning to bow the parts on your own. In this case, the bowing manuals provided in the literature review are useful resources.

Case Study: W. A. Mozart’s Divertimento in F major, K.138

The following pages offer case studies of W. A. Mozart’s Divertimento in F major, K.138 and Edward Elgar’s Serenade for Strings in E minor, Op. 20. These works have been selected to demonstrate different bowing techniques and decisions that must be made to achieve a cohesive string sound. Each excerpt presents a distinctly different set of string issues and possibilities that must be addressed by the conductor. Unlike Elgar, Mozart wrote very few markings in his music, so conductors must often add or clarify markings to fulfill their aural vision for the music.

Example 3.1 Stylistic decisions in first movement of Mozart’s Divertimento in F major, K.138.97

The dramatically different characters in Mozart’s music speak to his operatic roots. Within the first few measures of the first movement, there is an immediate character shift from confident to meek. In the first measure of Example 3.1, all strings play a unison forte with an upward arpeggio. The second measure shifts immediately to piano and retracts through a downward gesture; mm. 3 and 4 are analogous to mm. 1 and 2. The ensemble can further influence the character changes by using lots of bow on the forte passages (mm.1 and 3), then playing at the tip in the piano passages (mm. 2 and 4). The instruction to use lots of bow on the forte quarter notes will require increased bow speed, which will make the quarter notes sound fuller. For punctuation, one might ask for a little space between each quarter note. Playing the piano measures at the tip will create more delicate sound.

Much of Mozart’s music has a buoyant character, which may have been a reflection of his personality. In the fifth measure, there are repeated eighth notes in the violas, cellos, and bass. At first glance these lower string parts might seem unimportant, since the first violins carry the melody and the second violins have the countermelody. However, the way in which the lower strings play these eighth notes will largely affect the overall musical character. As written, the dynamic is forte with full-length eighth notes. If a string orchestra were to play this excerpt exactly as written, the sound would be loud, dense, and unbalanced, as the melody would be obscured by the lower strings. Since there are many instruments carrying the eighth-note motor rhythm, it seems appropriate for the conductor to ask the lower strings to write in a mezzo forte or mezzo piano dynamic. This will fix the balance issue and add the playful character that is needed.
There are a few ways to approach the length of the eighth notes, and the decision as to how they are played will influence the musical character. Having the lower strings play a dry *spiccatto* will result in a very short eighth note, since the stroke requires the bow to bounce completely off the string. Full-length eighth notes played on the string will produce a muddy, heavy sound, because little space is left between each note. The compromise stroke between on and off the string is a brush stroke. Having the violas, cellos, and basses play the eighth notes with a brush stroke—requiring them to move closer to the balance point of their bows—will provide clarity to the eighth notes. And, since some space is now created between each note, the music will sound lighter than on the string and calmer than off the string. Additionally, a brush stroke will achieve a more buoyant character in the accompaniment.

Rather than playing with the full hair of the bow on the string, one may also request the players to tilt the bow at an angle and play with less hair. When players tilt the bow in this way, the hair rotates closer to the bridge and the stick tilts toward the scroll. There are varying degrees of bow tilt, from few hairs to full/flat hair. Asking the players to use half hair will result in a softer and lighter sound, because less hair is making contact with the string.

![Example 3.2](image)

*Example 3.2* Adding a *crescendo* in violins and violas at m. 80.
Example 3.2 also comes from the first movement. In m. 80, the violins and violas play sixteenth notes; a conductor might add a crescendo in this bar, which will help shape the phrase as the line ascends. Furthermore, the added crescendo increases the musical liveliness and energy, both of which are associated with Mozart’s music. To accomplish this added crescendo, the players must start with small bow strokes in the middle of the bow, then gradually broaden each stroke to use more bow.

![Example 3.3 Bowing decisions on last five measures of the first movement.](image)

The last five measures, shown in Example 3.3, focus on stress and release. The greatest emphasis should occur on the downbeats of mm. 87–89. The down-bow that occurs on the first eighth note of each measure will add stress. An increase in bow speed—the up-bow on the second eighth note—will release that stress. The last measure contains three quarter notes, which may be bowed either “as it comes” or as written in Example 3.3. I chose to bow all three quarter notes as down-bows for added punctuation at the end of the movement. This also creates space between each quarter, which maintains the light and playful character of the movement. If one did not want space between each quarter note, bowing “as it comes” would be an appropriate solution; however, the players must be mindful of the up-bow that would occur on the forte of the second quarter note, and be ready to make any necessary adjustments. Another possible option is to play the first two quarter notes as down-bows and the final note as an up-
bow. This would avoid emphasis at the end of the phrase, while still applying a down-bow to the *forte* on the second quarter note.

Case Study: Edward Elgar’s Serenade for Strings in E minor, Op. 20

Example 3.4 The excerpt shows the opening measures of Elgar’s Serenade for Strings in E minor, Op. 20.\(^{98}\)

Example 3.5a The last two staccatos in m. 1 are marked as up-bows (levitational). This is the preferred bowing.

Example 3.5b The last three eighth notes in m.1 are bowed as consecutive down-bows (gravitational), resulting in a heavy, weighted character, and therefore changing the phrasing of the motive.

From the Romantic Period, the first movement of Elgar’s Serenade demonstrates further options for achieving a cohesive string sound. In Example 3.4, the violas begin

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the movement with a one-measure rhythmic motive, which is repeated in m. 2. There are several ways to bow these first two measures; however, one way most closely captures the notation and lilting rhythmic feeling I feel is needed. Because there is a *sforzando* on the first note, most players would associate weight or an emphasized note with a down-bow. This is a good fundamental concept to understand—a heavy note is most easily accomplished with a down-bow. The three *spicatto* notes that appear later would sound lighter and have more equal rhythmic value if they were performed using double up-bows (Example 3.5a). These double up-bows prepare the accent on the downbeat of m.2, and provide buoyancy to the eighth notes to better phrase the motive. Sometimes it is helpful to imitate bowings by using your baton as a bow against your finger. Playing the last two *spicatto* notes as double up-bows feels natural and controlled, while playing the notes as down-bows feels unclear, uncontrolled, and mostly harsh (Example 3.5b). While this may be a good idea for some Stravinsky, it is not appropriate for Elgar. This is yet another fundamental concept: consecutive up-bows are levitational; while consecutive down-bows are gravitational, and therefore are to be used only under appropriate stylistic circumstances.

![Example 3.6 Bowed excerpt of Elgar’s Serenade for Strings in E minor, Op. 20.](image)
Hairpins, or successive crescendos and decrescendos, are indicated in mm. 3 and 4 of Example 3.6. A fundamental string rule, introduced in Chapter 2 under Bowing Fundamentals, is that a crescendo would be more effective if one begins with an up-bow, while a decrescendo is more effective on a down-bow. The peak of the line in the first violins occurs on the note D. This is where the down-bow is indicated and will carry the most emphasis, just like one wants in this phrase. Oftentimes conductors will ask players to use a generous amount of bow, utilizing the whole bow or as much as possible. Generous amounts of bow will positively influence and further exaggerate a crescendo, as opposed to playing with less bow.

When marking bowings, one typically follows the slur indications to show how many notes should fall under each bow. The slurring in this edition of Elgar’s Serenade indicates both a bowing and phrasing mark. One can deduce this because at the peak of the phrase in the first and second violins, a new slur starts, following a phrasing indication. If this were only a phrasing indication, m. 4 would be completely slurred to follow the decrescendo of the phrase. However, m. 4 is broken into two slurs, signaling that measure is to be played in two bows, thus indicating a bow marking. Later in this movement one can observe the same figure and dynamic indication of m. 4, slurred differently to fit into one bow (see first violins at m. 133 in Example 3.7). One may choose to follow the printed violin bowing in m. 4 (which means two bows); however, I have indicated a down-bow for the entire measure to achieve a more effective decrescendo. Additionally, the single down-bow will better position the tip for the upcoming pianissimo up-bow in the first violins and lower notes of the second violins in m. 5. Starting up-bow here will also emphasize the accented note, creating a more
nuanced phrase. By starting with a down-bow in m. 5, the upper notes of the second violin energize the accents, as they will have time to retake at the frog during the rests.

Example 3.7 Bowed excerpt of the end of Elgar’s first movement.
The next excerpt in Example 3.7 comes from the end of the first movement and shows the viola motive from the opening, which passed into the second violins, violas, and later, the cellos and basses. The bowing of the viola motive remains consistent throughout the movement, so the buoyant character and phrasing of the motive is consistent in each voice.

The cellos are instructed to play *divisi* at m. 115. I prefer this to be divided by player, outside and inside, rather than by alternating desks. In order for desk-by-desk alternation to work, there must be a sufficient number of desks available within the ensemble. If your cello section consists of three desks, for example, person-by-person *divisi* is more appropriate, whereas alternating desks will leave you one desk short on the cello II part. The decision of *divisi* by person or by desk should be made based on what will produce the most balanced sound.

A *fp* is indicated in the cello II and bass parts at m. 117. There is much discussion on the differences between *sf*, *sfz*, *fz*, ‡, ^, *rfz*, and *fp*, and how much each should be accented or emphasized. This largely depends on the composer and musical context.\(^99\) Gigante states, “such a scale of accents does not signify *absolute* dynamic values but only *relative* ones, for much depends on the general character of the particular phrase and upon the dynamic level within which the accent is seen.” He groups accents into three general categories: dramatic, lyric, and colorful.\(^100\) Dramatic accents are obtained by bow “bite,” lyric accents obtained by bow speed and the absence of bow “bite,” and colorful accents are obtained through *vibrato*.\(^101\) In this case, it is important to first decide how the

\(^101\) Ibid., 37.
fp should sound, so the players can apply the correct technique. Typically, accented or emphasized notes are executed with a down-bow and a fp should be performed in this manner. In this context, I would interpret this example as a lyric fp. It should carry some weight and drop immediately from forte to piano, with the absence of a “bite.” This stroke, therefore, involves greater bow speed at the onset of the forte, rather than gravitational weight.

At m. 128, the violins and violas have a long, slurred four-bar phrase. This excerpt illustrates a passage where it is appropriate to instruct players to “save” their bow. The passage requires appropriate bow distribution, as the players must both pace the rate of their bow to complete the phrase and prepare to be in the correct part of the bow for the upcoming phrase. In addition, they must save bow to prepare for the bow speed accent at the end of the phrase.

Example 3.8 The excerpt comes from the second movement of Elgar’s Serenade. The measure letter I indicates is where one may choose to manipulate the use of vibrato in the first violins.

102 Ibid., 38.
The next excerpt, from Elgar’s second movement, discusses the use of vibrato as a means for adjusting balance, color, dynamics, and characterization. In m. 16 of Example 3.8, the first violins hold the note G, while the rest of the strings join in the following measure. In m. 16 of the excerpt, one possible option is to have the first violins use full vibrato on the entire measure. Another option is to have the first violins play non-vibrato for the entire measure. Both options are reasonable, however they are static and lack any feeling of propulsion in the music. For me, the second movement is incredibly heartfelt and passionate, and therefore I prefer neither of the above options. A final option is to change the atmosphere of the music by manipulating the use of vibrato. One may instruct the first violins to initially exclude vibrato on the G, and then add vibrato toward the end of the tied note. The result will help support the phrasing of the bow as the first violins come into the tutti entrance.

To further improve the sound, the players should place their bow on the string and left hand fingers in position before they create a sound, rather than placing both as they begin to play. Imagine being in a room full of people, each holding a single marble at the same distance from the floor. Someone shouts, “drop,” instructing everyone to let go of their marble simultaneously. Each person would have a slightly different response time and, rather than a unison drop, one would hear a jumble of marbles as they all hit the floor. Now, if that person instructed the group by saying “and, drop” with those words spoken in a rhythmic fashion, it would allow for a unison drop because a temporal preparation has been added. This is the same concept: if the players have their fingers set and the bow placed on the string, a more accurate entrance will occur, as opposed to preparing at the same time the technique is to be executed. In m. 16, the second violin,
viola, and cello should prepare the next moment. Rather than resting, they should have their fingers set on the fundamental pitch and begin the *vibrato* simultaneously with the motion of the bow at m. 17. Frequently, conductors instruct players to vibrate before sounding the pitch; however, this may put intonation at risk. In some instances, it is appropriate to start with the bow above the string. In such cases, the conductor’s preparatory beat becomes even more important because of the added variable of difficulty.

![Image](image-url)

**Example 3.9** The example illustrates staggered bowing in the bass and first violins.

A good example of staggered bowing exists in the last several measures of the third movement (see Example 3.9). Measure 68 shows the basses holding a note tied over four plus measures. The first violins also have a tied note for the last five measures. In both of these instances, staggered bowing may be employed to mask bow changes. The alternative, unison bow changes, would disturb the phrase, as the synchronized change in bow direction would draw unwanted attention to itself. The appropriate way to notate staggered bowing is to put the down or up-bow inside parentheses, indicating that an individual player may switch bows at any time. The players should remain mindful,
however, that the whole section must not changing bows simultaneously.\textsuperscript{103} A fast way to accomplish this is by instructing the players to change bow direction only at times that are different from their stand partner’s.

\textbf{Conclusion}

The members of each section should watch their respective principals to unify the bow direction, placement, speed, length, and style.\textsuperscript{104} Furthermore, the principal players in the other string sections defer to the concertmaster to match style.\textsuperscript{105} Wulfhorst states, “one cannot stress enough that conscious awareness of uniform bow division is essential for a homogenous section sound, dynamic precision, and good phrasing.”\textsuperscript{106} It is immensely helpful to find a musician in the section who is playing in the right part of the bow and/or with the right sound, and have them demonstrate for the section. The quickest way to improve a string section is to get the players in the correct and same part of the bow. Dynamics, articulation, phrasing, and to some extent, tempo, will be drastically improved. In order for this to work, the conductor must have already established their aural vision, in order to recognize who will best demonstrate a specific passage to the section. Demonstration is one of the most effective ways to communicate an idea. A string term can have many interpretations, but a physical or vocal demonstration is often the most effective and efficient method to achieve the desired outcome. As long as the instrumentalists understand your intent, the section will unify the technique to accomplish the result. Having a knowledgeable and dynamic leader as concertmaster will help achieve the conductor’s vision by finding technical solutions for the strings. In addition to

\textsuperscript{103} Kjelland, \textit{Orchestral Bowing: Style and Function}, 62.
\textsuperscript{104} Green, \textit{Orchestral Bowings and Routines}, 79.
\textsuperscript{105} Ibid., 2.
\textsuperscript{106} Wulfhorst, \textit{The Orchestral Violinists Companion}, 87.
showing the section where to play along the bow length, concertmasters may also suggest fingerings, shifting positions, string crossings, and other helpful techniques.

If the section is not producing the right articulation or if the bowings simply do not work, the players should be prepared to change bowings “on the spot.” Remember, bowings will depend on the technical capabilities of the players, as not all players have the skillset to accomplish the more difficult bow strokes. Frequently, a publisher will print bowing markings into scores and parts, or you may receive bowed rental parts. Such markings are not set in stone, and the conductor or principal players may change the bowings to fit the musical requirements of the work being performed and the vision of the conductor.

It is critical that non-string-playing conductors learn the fundamentals of string instruments so precious rehearsal time isn’t wasted. There often is a quick solution to many of the issues that occur in string sections, but developing a clear aural vision of the music based on the score along with knowing how to effectively diagnose the problem can be determined with an understanding of these fundamentals.
Bibliography


