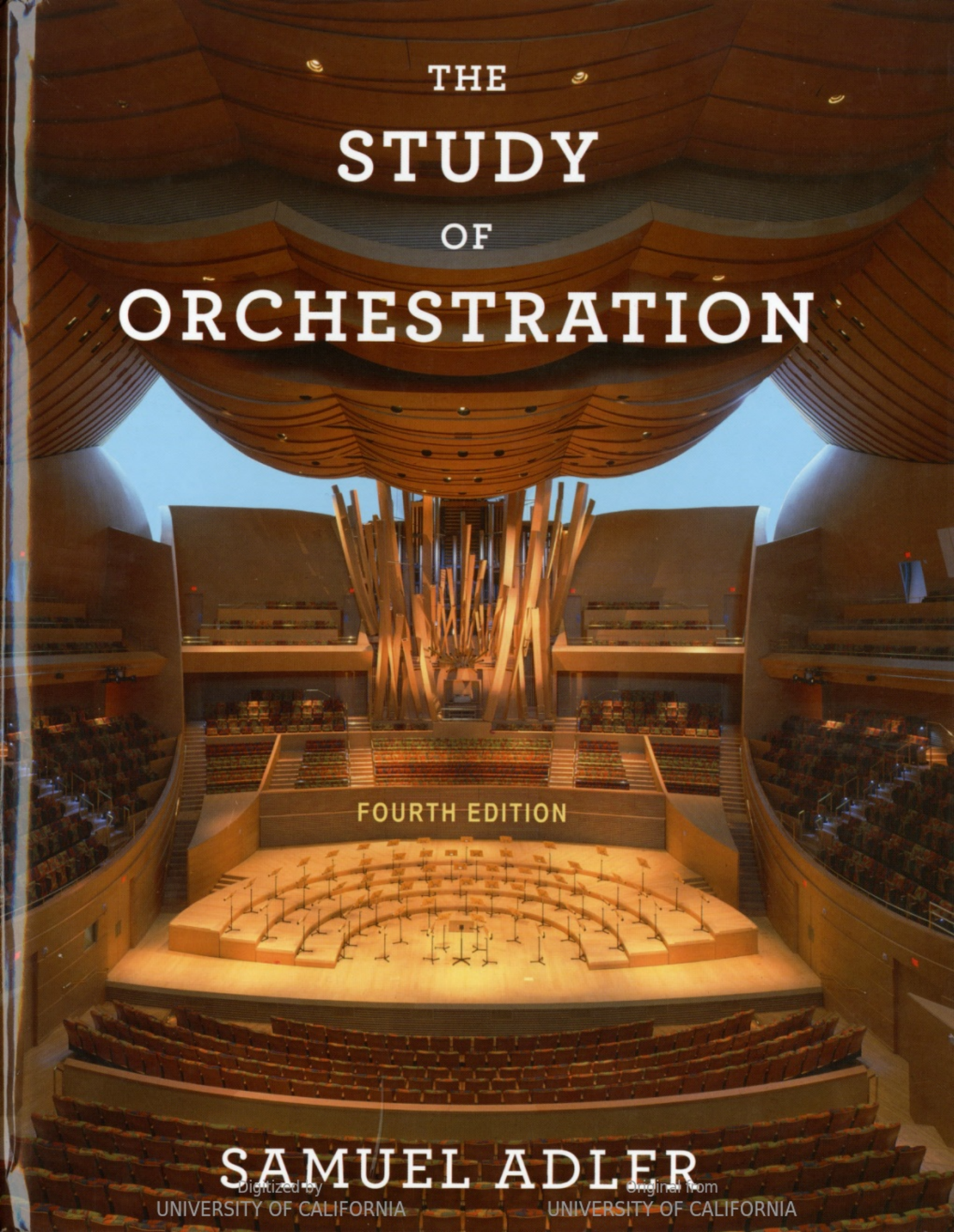
THE STUDY OF ORCHESTRATION



FOURTH EDITION

SAMUEL ADLER

THE STUDY OF ORCHESTRATION

FOURTH EDITION

SAMUEL ADLER

The Juilliard School

W. W. NORTON AND COMPANY

NEW YORK • LONDON

CONTENTS IN BRIEF

PART TWO
ORCHESTRATION

CONTENTS

PART TWO
ORCHESTRATION

PREFACE

"Instrumentation is, in music, the exact equivalent of color in painting."
—Hector Berlioz
"In the orchestra you must have air; let the air into your score."
—Georges Bizet

Many composers have learned to orchestrate simply by studying scores. My own study of orchestration has been inspired by master composers like Berlioz and Bizet. I hope that this new fourth edition will bring the same inspiration to another generation of students, and that they will continue to use it as a guide throughout their lives as musicians. In this volume the student will find hundreds of examples from the past three hundred years. Indeed, at the end of each chapter, I've included even more examples for study, and I encourage aspiring composers to listen to and study all of them.

The text is divided into two parts: Instrumentation and Orchestration. After a general introduction on the orchestra of the past and present, Part 1 introduces the instruments by choir: strings, winds, brass, and percussion. The discussion of each choir starts with an overview chapter, with general descriptions of the instruments and their uses in ensembles. In this new edition, a short excerpt featuring all the instruments of the choir is presented to give an idea as to how this collection of instruments sounds as a section of the orchestra, and demonstrates the richness garnered by using all the instruments of the choir together.

The introductions to the string, wind, and brass families are each followed by a detailed chapter on individual instruments, with descriptions of their playing techniques and specific uses in orchestras and other ensembles. Discussion of newer and extended playing techniques has been greatly expanded in this edition. The aspiring orchestrator is reminded that these techniques should be used sparingly, since they are often more effective–and more practical–in the chamber ensemble than in the orchestra. Chapter 12, on percussion, has been expanded in this edition to cover some more-recent additions to the orchestra, and a discussion of the beaters used for percussion instruments.

While the section on strings focuses on members of the violin family, there is a separate chapter (Chapter 4) on harp, guitar, and other plucked string instruments that make their appearance in the orchestra. Similarly, the percussion portion of the book includes a chapter on keyboard instruments (Chapter 13), since the main keyboard instrument, the piano, is itself a percussion instrument. This chapter now also includes material on the accordion, which has become an increasingly important ensemble instrument.

Finally, the discussion of each choir closes with a chapter devoted to scoring, with extended examples from the repertoire. The book is structured progressively, building the orchestra by section; thus Chapter 5 deals with scoring for strings, Chapter 8 with scoring for woodwinds as a choir and in combination with strings, and Chapter 11 with scoring brass as a choir and in combination with winds and strings.

The focus in Part 2 is on musical and practical issues of writing for full orchestra and for wind ensemble. Chapter 15 takes the student through techniques that exploit the full palette in orchestral works, and Chapter 16 deals with the special issues of orchestra as accompanist. In Chapter 17, students study transcription between different mediums. Since band music has become increasingly important in orchestration classes, in this edition I have greatly expanded discussion of orchestrating for wind ensemble. Thus Chapter 17 includes important examples of works that exist in two versions, for orchestra and for band. Listening to the Milhaud and Schoenberg examples in this chapter will provide insight into how masters of orchestration deal with these different mediums. Chapter 18 covers important practical issues of preparing scores and parts. Finally, Chapter 19 continues the exploration of scoring for wind ensembles with a wide range of examples from the literature. Although playing techniques are the same whether an instrument appears in an orchestra or a band, the sound of a band or wind ensemble is certainly unique and requires demonstration.

An ideal complement to this text, the comprehensively revised accompanying workbook features Test Yourself activities, which test factual information in the text; Worksheets, which offer opportunities to practice orchestrating short passages; and Listen and Score activities, which challenge students to identify and notate instrumentation aurally. In this new edition, I have substantially expanded the number of Listen and Score activities both to accommodate students with a wide range of skill levels and to include examples written for wind ensemble.

Listening has always been essential to studying orchestration, and previous editions of *The Study of Orchestration* were pathbreaking in offering recordings—made at the Eastman School of Music—for every example in the text. With this new edition, we've made the recordings available online; every new copy of this text includes access to the recordings.

Even though in class we may preach caution about over-orchestrating, young composers and arrangers often succumb to the temptation to clutter their scores so that the main ideas are obscured. A careful study of each of the orchestration chapters in the book and the examples quoted and discussed within them should help aspiring orchestrators heed Bizet's admonition to let air into their orchestral scores.

I am deeply indebted to the many people who have been extremely helpful with this book. Even though one tries valiantly to publish a volume without any errors, little details get overlooked, and I am most grateful to David Schober (Queens College, City University of New York) for his tireless reading and for catching a great many small mistakes that are now corrected in this new edition. Further, I want to thank the reviewers Dorothy Chang Bortolussi (University of British Columbia), Paul Chihara (University of California, Los Angeles), Gregory Fritze (Berklee College of Music), Stephen M. Gryc (The Hartt School, University of Hartford), Shafer Mahoney (Hunter College, City University of New York), François Rose (University of the Pacific), Andrew Staniland (Memorial University of Newfoundland), and Aaron Travers (Jacobs

School of Music, Indiana University), who were most helpful with their suggestions to make this an even more effective volume. In addition, Samuel Solomon provided invaluable advice on beaters for the percussion chapter, and Robert MacMahan helped shape the section on the accordion.

A very special thanks to the Ann and Gordon Getty Foundation for their generous support once more to record all the musical examples and have them streamed for the new edition. Special thanks also to Thomas Frost, who oversaw the entire recording process. Additional gratitude to the faculty, staff, and students of the Eastman School of Music, who have done the greater part of the recordings under the able direction of Mark Scatterday and Neil Varon with the encouragement of the late director of the school Douglas Lowry as well as the present director Jamal Rossi and Michele Gibson, associate dean for administration and finance.

The entire project could not have been accomplished without the tremendous help and devotion of the very skillful staff at W. W. Norton. Maribeth Payne launched this edition, and my editor, Justin Hoffman, brought it to completion with the help of editorial assistant Grant Phelps. Media editor Steve Hoge developed the website with help from editorial assistant Stephanie Eads. Rachel Mayer project edited the text, Jodi Beder copyedited, Debra Nichols proofread, Andy Ensor and Ashley Horna were production managers, Lissi Sigillo created the design, and Trevor Penland devised marketing strategies. It has been a great pleasure and privilege to work with these wonderful people, and I will always be most grateful to them for their support of my books.

THE STUDY OF ORCHESTRATION

FOURTH EDITION

PART ONE

Instrumentation

CHAPTER 1

The Orchestra—Yesterday and Today

Aristotle, in his famous discourse "On Music," said: "It is difficult, if not impossible, for those who do not perform to be good judges of the performance of others." He was referring to solo performance on instruments or singing; but the same may be said of those who must judge the worth, competence, and effectiveness of a piece of orchestral music. Hands-on experience in a specific area of the musical arts makes a composer, conductor, teacher, performer, or student a better practitioner in that particular aspect of music. Since so many musicians deal with the great instrument we call the orchestra, it is most important that the study of orchestration and instrumentation become a basic part of every musician's education.

The orchestra is certainly one of the noblest creations of Western civilization. The study of its intricacies will illumine many important areas of music. After all, timbre and texture clarify the form as well as the content of a host of compositions. Further, specific orchestral colors and even the spacing of chords in the orchestral fabric give special "personality" to the music of composers from the Classical period to our own time. In an informative book called *The History of Orchestration*, Adam Carse concludes with this judgment:

> Orchestration has been many things to many composers. It has been a servant of the great, a support to the mediocre, and a cloak for the feeble. Its past lives enshrined in the works of the great dead, its present pants after the exertion of recent progress, and its future lies as completely hidden as it lay at the end of the sixteenth century.*

Mastering the technique of orchestration leads one to a deeper understanding of the sensitivity with which the great masters of composition have handled the symphony orchestra and how each made this remarkable instrument serve his or her musical ideas in the clearest and most vivid ways.

The art of orchestration is of necessity a highly personal one. The orchestral sound of Wagner, for instance, is vastly different from that of Brahms, even though these two composers lived at the same time. In this regard, orchestration is similar to harmony, melody, or any other parameter of music. It is, therefore, imperative that one acquire the basic skills of the art in order to make it personal at a later time. The ear will be the deciding factor in the choice of instruments as well as in combinations of instruments.

*Adam Carse, *History of Orchestration* (New York: Dover, 1964), p. 337.

For that reason we shall immediately concentrate on developing the ear and trying to make it capable of listening and distinguishing colors.

The goal of this book is to acquaint the reader with the distinctive, particular sound each instrument makes alone and in combination with other instruments, as well as with the techniques used to produce these sounds. Acquiring this knowledge will enable a composer to notate a particular tone color so that the music sounds in performance as it is heard in the inner ear (or mind). Walter Piston put it succinctly: "You've got to hear what you put on that page." Let us call this "hearing mentally."

Compared with the development of other areas in the discipline of music, orchestration as we know it is a latecomer. It is very true that instruments have been used since the dawn of history, but they were employed for the most part to accompany voices or improvise during festive occasions. During the Middle Ages and the Renaissance, the composer never specified the exact instruments that were to perform the various parts, but rather designated a "soprano, alto, tenor, or bass" instrument. Monteverdi was one of the first composers to specify the exact instrument to be used to perform a specific part. In his madrigal book "Concerto published in 1619" he calls for three choirs of specific instruments, and in the preface to his opera *Il Combattimento di Tancredi e Clorinda* (1624) Monteverdi wrote: "A uniform basic mood throughout a piece postulates an unchanging combination of instruments all the way through." Even as late as 1740, Leopold Mozart wrote in the preface to one of his *Serenatas* that "if the alto trombone player is inadequate, a violinist should be asked to perform the trombone part on the viola." But by the middle of the eighteenth century this was an anomaly rather than the norm.

From as early as 1600, the orchestra as we know it began its rather slow development. We learn from such writers as Francis Bacon that in the middle of the seventeenth century in England, there were still two kinds of consorts: the broken or heterogeneous consort and the whole or homogeneous consort. However, orchestras were springing up in many of the courts of Italy, France, and Germany. We may divide the history of the orchestra into two broad periods: from the beginnings of the orchestra to the death of Bach and Handel around 1750; and from the Mannheim School, Haydn, and Mozart to the present.

The first period saw the adoption of a stable core ensemble, based on instruments of the violin family. The string choir was the first to be exploited because the construction of the four constituent instruments—violin, viola, cello, and double bass—was perfected by the end of the seventeenth century. The institution of public concerts in the eighteenth century was the catalyst for the gradual creation of an orchestra with multiple strings. The media of opera and ballet also considerably aided the advancement of orchestral technique as well as the concern for very specific colors. Lully, as early as 1686, used a string orchestra plus flutes (or recorders), oboes, bassoons, horns, trumpets, and timpani. This orchestra was as yet not universally accepted. Throughout his lifetime, Bach experimented with all kinds of orchestral combinations, especially as accompaniment for his cantatas. In his case, as was so often true for composers of that period, availability of performers largely dictated the constitution of the orchestra. By the time of Haydn and Mozart, stabilization had almost been achieved, and it was accepted that an orchestra, as distinct from a large chamber group, was made up of three different choirs: the strings (first violins, second violins, violas, cellos, and double basses), the woodwinds (two flutes, two oboes, two clarinets, and two bassoons), and

the brass (two horns, two trumpets, and timpani). As yet the standard symphony orchestra had no separate percussion section, but it did exist in the opera orchestra. Such instruments as snare drum, bass drum, triangle, and cymbals were commonly found in opera scores. The timpani, however, were classified with the brass in the Classical orchestra. The reason for this was utilitarian, since the timpani invariably played together with the trumpets. It is often asked why in so many orchestral scores the trumpets are placed below the horns, even though they normally play in a higher range. The reason is historical: the trumpets were placed in the score near the timpani, since their music was usually coupled.

From the Classical period on, the orchestra expanded rapidly. First, auxiliary instruments such as piccolo, English horn, bass clarinet, and contrabassoon were added to increase the range of the wind choir, and other instruments were brought into the symphony orchestra from the opera orchestra (trombones, harps, and the larger percussion battery). Berlioz assembled huge orchestras for specific performances in which the wind, brass, and percussion sections were more than doubled and the string choir was greatly enlarged. By the time of Mahler and Stravinsky, the large orchestra as we know it today was an accepted norm. The strings in the Classical and early Romantic orchestra were often 6, 6, 4, 4, 2 and grew to 18, 16, 14, 12, 10 toward the end of the nineteenth century. Nor was it uncommon to employ six flutes, five oboes, six clarinets, four bassoons, eight horns, four trumpets, four trombones, two tubas, two harps, piano, and a host of percussion instruments requiring four to five players.

Not only has the size of the orchestra increased, but its use has grown more sophisticated. When it does not matter what instrument plays a certain part, the composer relinquishes responsibility for the orchestration; and, at least from today's perspective, he or she is not much concerned with timbral problems. However, as the orchestra became a huge apparatus and every note, chord, timbre, and nuance became an integral part of the composition, it was necessary to codify the art of orchestration so that it could be taught. Some of the great orchestrators of the nineteenth century felt compelled to set down their ideas and insights. Two of the outstanding orchestration texts of the nineteenth century are those by Berlioz (revised by Richard Strauss) and Rimsky-Korsakov. Both treatises are concerned with the techniques of each instrument separately and the various combinations that proved successful in the authors' own works. Rimsky-Korsakov used only his own works to illustrate each point; he was, after all, a great orchestrator and a daring experimenter who provided us with insights and explanations that would not have been possible had he used works by other composers.

It has been said that Maurice Ravel was asked by his publisher to write a book on orchestration. He respectfully declined but was reported to have told his friends that if he were to write such a volume it would include everything in his own orchestral music that, in his view, was an orchestral miscalculation. Since we have come to consider Ravel one of the true giants of orchestration, how very interesting it would have been to have such a book. In this connection, it is important to note that tastes in orchestration change; some of the problems attendant on these changes will be discussed in Chapters 15, 16, and 17. Such great musicians of the past as Wagner, Mahler, Weingartner, Mengelberg, Toscanini, and Beecham took it on themselves to "improve" the orchestrations of Beethoven and Schumann symphonies to suit the larger orchestras and the fashion in orchestral sonorities of the late nineteenth and

early twentieth centuries. Mozart reorchestrated Handel's *Messiah*, adding clarinet and trombones to the original in order to satisfy the ears of late-eighteenth-century audiences.

The art of orchestration today is a sophisticated and intricate one. It is also highly individual, depending greatly on the taste and even the prejudice of the composer or orchestrator. Realizing this, you should master the techniques of writing for each instrument and listen carefully to the various combinations. You can learn much from reducing a full score to its bare essentials so that it may be performed on the piano; "blowing up" conversely, a piano part to create a full orchestral score will challenge your knowledge and imagination. This kind of activity has been common practice for well over one hundred years and offers invaluable lessons about clarity and coloration in the orchestra. Ravel, Debussy, and Stravinsky, all fabulous orchestrators, composed many of their most advanced orchestral scores at the piano and then orchestrated them, whereas Webern and Berg zealously made piano arrangements of huge orchestral scores by Schoenberg and Mahler in order to make them easier to study. In our time, the composer or orchestrator is often called on to reorchestrate certain works for our large music-education establishment. During the course of this book, all these and other practical possibilities will be addressed.

Throughout this book, the instruments most commonly used in the modern symphony orchestra receive the broadest exposure. On the other hand, with the advent of so many Baroque ensembles and heterogeneous large chamber groups, it was deemed important to include a few instruments peculiar to such ensembles and to describe basic techniques and concepts associated with them. Appendix B gives some bibliographic references for further information about the instruments that are discussed less thoroughly.

CHAPTER 2

Bowed String Instruments

The modern symphony orchestra is usually divided into four sections or choirs: strings, woodwinds, brass, and percussion. The bowed string choir—violins, violas, cellos, and double basses, technically called chordophones*—*was the first to be developed fully and exploited by composers. This preferential treatment may be explained on two counts: the strings, of all the choirs used in the orchestra, reached their present state of technical perfection in construction by 1700; and the "violin family," as it is sometimes called, has the greatest number of properties in common.*

Some other reasons composers have given the violin family priority are:

1. its enormous range, encompassing seven octaves between the double basses and the violins;
2. the homogeneous tone color throughout its entire range, with only slight variations in the different registers;
3. its wide dynamic range, from an almost inaudible *pianissimo* to a most sonorous *fortissimo*;
4. the richness of tone quality, which produces a particular warmth that lends itself to the performance of *espressivo* passages;
5. its versatility in producing different kinds of sound (bowed, plucked, struck, and so on) and performing rapid passages, slow sustained melodies, skips, trills, double stops, and chordal configurations, as well as special (even extramusical) effects;
6. its ability to sound continuously, unhampered by the player's need to breathe (as distinct from wind instruments).

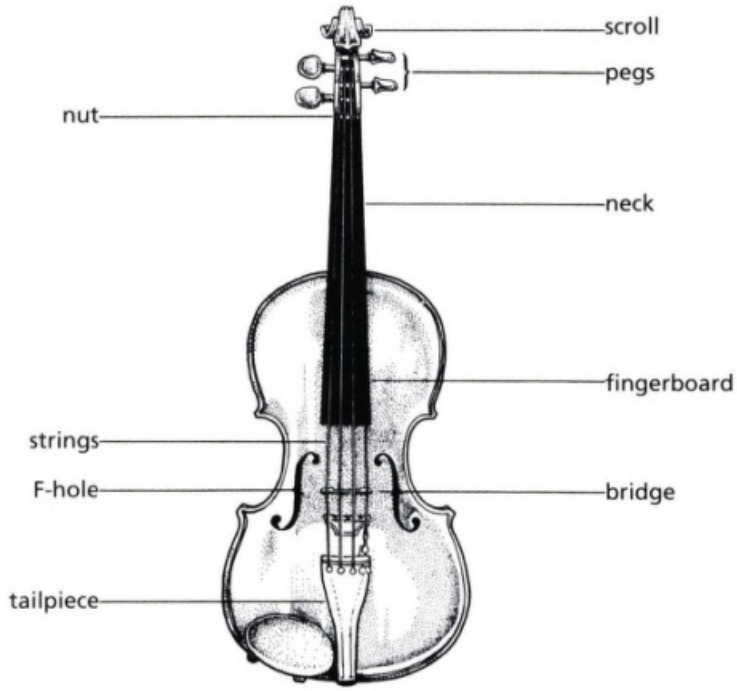
The string section of a full symphony orchestra consists of the following number of players, with two players sharing each stand:

first violins	16 to 18 players	8 or 9 stands
second violins	14 to 16 players	7 or 8 stands
violas	10 to 12 players	5 or 6 stands
cellos	10 to 12 players	5 or 6 stands
double basses	8 to 10 players	4 or 5 stands

*The term for musical instruments that produce sound by means of strings attached between fixed points. (See also pp. 489–490.)

CONSTRUCTION

Like a true family, all bowed string instruments have many things in common: the same construction and acoustical properties, similar playing techniques, and even special problems and peculiarities. Discussing these shared characteristics before considering each instrument separately will help clarify the familial status of each instrument, and help illuminate the slight variations and modifications that we will see each member exhibit when the individual instruments are discussed in turn. Since we shall use certain terms to describe the structure of string instruments throughout this book, this chapter introduces the appropriate nomenclature.



Violin

Except for the proportions, which will be given as each instrument is considered separately, the construction of all the instruments, as well as the names of the different parts, are identical to those in the violin diagram shown.

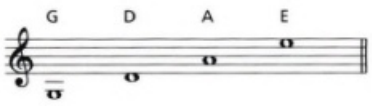
Each instrument consists of two main parts: the body and the neck. Both are made of wood. The top surface of the body, called the *belly*, the *table*, or the *soundboard*, and the bottom, called the *back*, are both convex. Together with the sides, called the *ribs*, they form a hollow box that acts as a resonator and amplifies the vibrations of the strings. The overall shape of the body somewhat resembles the human form; it also appears to have a waist. Inside the body is a *sound post*, which transmits the vibrations of the strings from the belly to the back. The neck consists of a long, thin, piece of wood, onto which is glued a layer of ebony or other hard wood called the *fingerboard*. At its upper end is a *pegbox*, which holds the tuning pegs, and ends in a small curved ornamental *scroll*. Over the fingerboard and belly are stretched four strings, or in the case of the double bass, sometimes five. The strings, each wound around a tuning peg, pass thence over a small piece of wood called the *nut*, along the fingerboard, then over another piece of wood, called the *bridge*; they are attached to a third piece of wood or plastic, called the *tailpiece*. The strings are sounded by means of a *bow* (the construction of which is discussed on p. 18). A bow rubbed across the string between the place where the fingerboard ends and the bridge is positioned makes the string vibrate, producing a sound. The bridge, which supports the strings, also vibrates, and its vibrations pass to the belly and, to a lesser extent, the back. Cutting through the belly are two sound holes, called F-holes because they resemble that letter in the alphabet. They permit the belly of the instrument to vibrate freely, and also provide sound exits from the body of the instrument.

TUNING

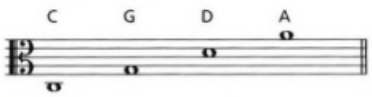
Three of the instruments of the violin family, the violin, viola, and cello, are tuned in 5ths, while the fourth, the double bass, is tuned in 4ths.

Here are the pitches of the open strings of the instruments. The term *open strings* refers to the strings as they sound when they are not touched, or stopped, by the fingers of the left hand.

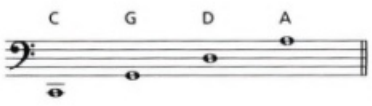
EXAMPLE 2-1. Tuning of the Four Violin Strings



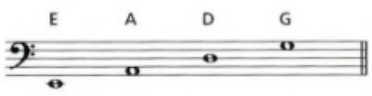
EXAMPLE 2-2. Tuning of the Four Viola Strings



EXAMPLE 2-3. Tuning of the Four Cello Strings

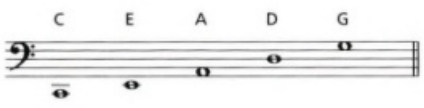


EXAMPLE 2-4. Tuning of the Four Double Bass Strings



The standard tuning of a five-string bass is:

EXAMPLE 2-5. Tuning of the Five-String Double Bass



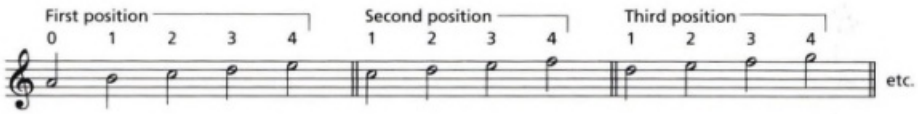
The double bass is the only transposing instrument of the violin family: it sounds one octave lower than written.

FINGERING

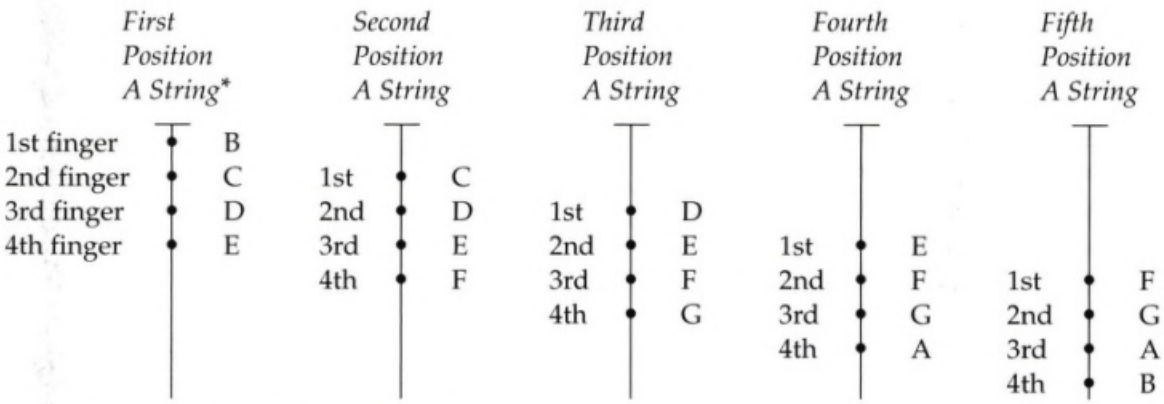
The string itself vibrates only between the bridge and the nut. In order to produce pitches higher than that of an open string, the player presses the left-hand fingers firmly against the fingerboard, thus shortening the vibrating length of the string and

consequently raising the pitch. The left hand therefore moves from a position closest to the nut (*first position*) up the fingerboard toward the place where the bow is drawn across the string (which is between the end of the fingerboard and the bridge). As the hand moves up the fingerboard it shifts from one position to another. The shifting is executed in the manner shown in Example 2-6. Fingering is indicated above the staff: the number 0 denotes an open string, 1 the first finger (the index finger of the left hand), 2 the second finger (the middle finger of the left hand), and so forth.

EXAMPLE 2-6. First, Second, and Third Positions for the Violin and Viola



Here is the fingering for the five basic positions of the violin and the viola, as shown on the A string:



The Five Basic Positions of the Violin and Viola

The principle of fingering is the same on all the bowed string instruments, but certain details are quite different, particularly for the cello and the double bass; therefore, we will discuss fingering at greater length in the special sections devoted to each instrument in Chapter 3.

DOUBLE, TRIPLE, AND QUADRUPLE STOPS

Two or more notes on adjacent strings played simultaneously are called *multiple stops.* When only two notes are played together, a *double stop* results. There are two kinds of double stops:

1. one or both of the pitches are played on an open string;
2. both pitches are played on stopped strings.

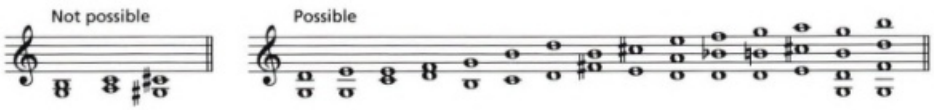
On all string instruments it is possible to play two notes on adjacent strings at the same time by fingering the two pitches and then drawing the bow across both strings.

*For the complete range of possible pitches produced in the first position on the violin, refer to the chart on p. 58; for the viola, the chart on p. 72; for the cello, p. 83; and for the double bass, p. 91.

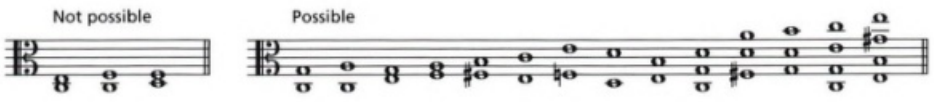
Chords of three or four pitches, if they occur on adjacent strings, are also possible; these are called *triple stops* and *quadruple stops*. For triple stops, greater bow pressure has to be exerted on the middle string of the three that are played, so that all pitches can sound at the same time. For this reason, the simultaneous attack of three notes can only be accomplished at a relatively loud dynamic level (***f*** or ***mf***). When *piano* or *pianissimo* triple stops are desired, the performer usually has to arpeggiate them slightly. For quadruple stops, the bow is only able to sustain two pitches at a time. Therefore, all quadruple stops must be arpeggiated. The most successful triple and quadruple stops contain one or two notes played on open strings, since these have a greater sustaining power.

Here are some examples of simple double, triple, and quadruple stops for each of the four instruments, along with a few examples that are impossible to perform, since both pitches would have to be played on the same string. More-complete charts for the violin, viola, and cello will be found in Chapter 3.

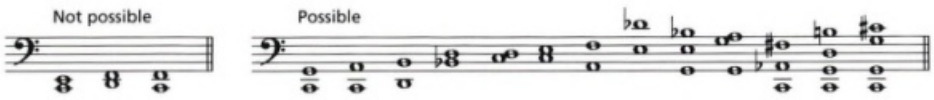
EXAMPLE 2-7. Violin



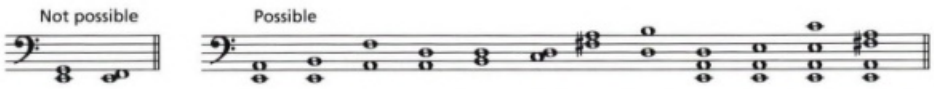
EXAMPLE 2-8. Viola



EXAMPLE 2-9. Cello



EXAMPLE 2-10. Double Bass: Only double stops that include an open string are practical.

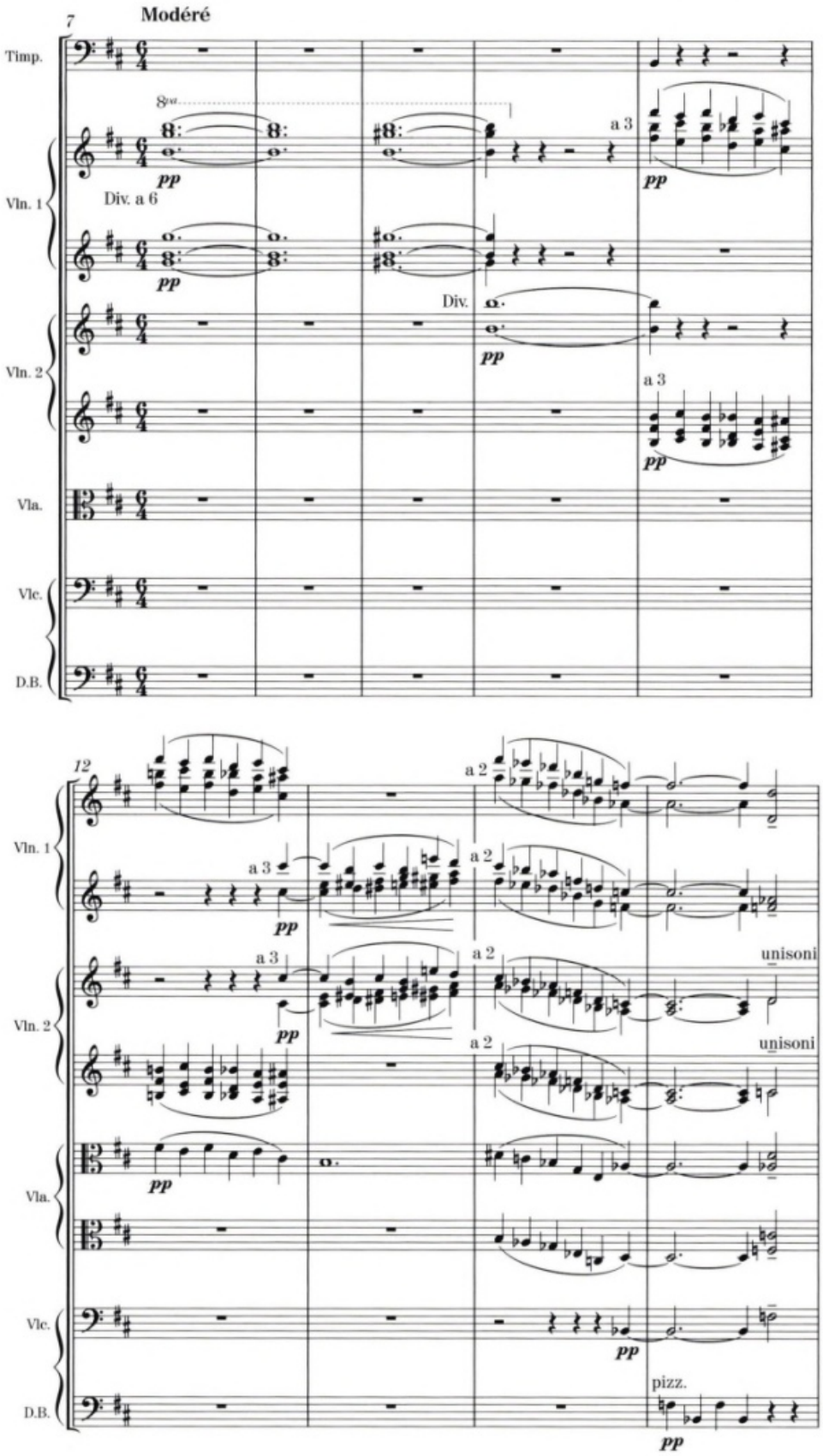


DIVIDED STRINGS

Divisi (It.); Divisés (Fr.); Geteilt (Ger.)

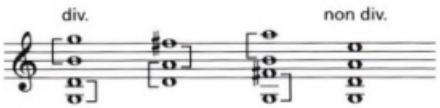
Since there is more than one player for each string part in a symphony orchestra, double stops are usually divided between the two players on the same stand. The player sitting on the "outside" (usually, the side nearest the audience) performs the upper notes, while the one sitting on the "inside" plays the lower notes. To signal this division, the part is marked *divisi*, or its abbreviation, *div*. If the word *divisi* does not appear in the parts, the player would be correct in performing the chord as a double stop. Sometimes the indication *non div*. appears to ensure that each player will perform double stops. When *divisi* is no longer called for, the word *unisoni* appears in the part.

EXAMPLE 2-11. Debussy, *Nocturnes*, "Nuages," mm. 7–15 (strings only)



When triple or quadruple stops are to be divided, it is helpful to specify how this is to be done.

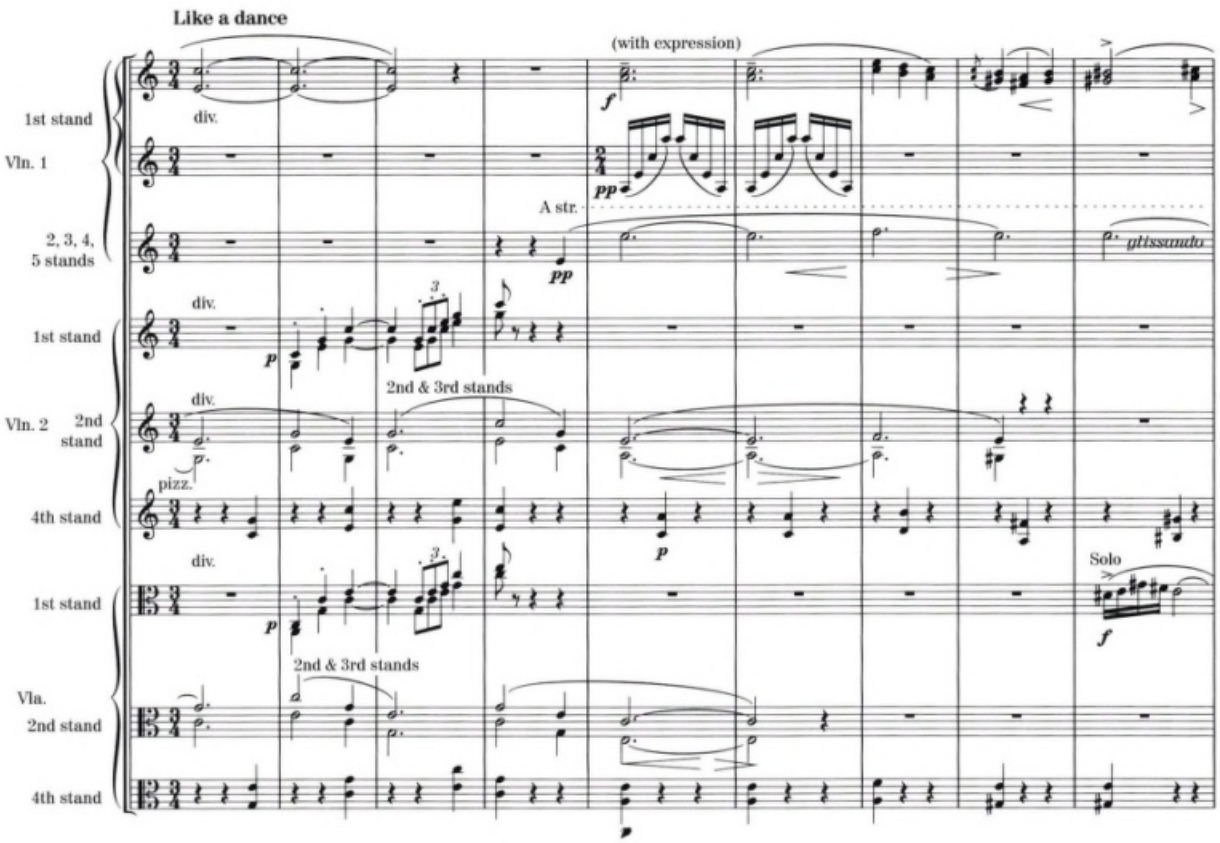
EXAMPLE 2-12. Dividing Triple and Quadruple Stops



If the composer wants the triple stops to be performed by three different players, the parts should be marked *div. a 3*; quadruple stops, *div. a 4*. If the division is to occur by stand—that is, first stand plays the top note, second stand the next lower note, and so on—it is best to write out three or four different lines in the part and give the direction "Divide by stand." The Italian for "by stand" is *da leggii*; French, *par pupitres*; German, *Pultweise* (*Pult.*).

In the following example, the composer not only has indicated the division by stand to the left of the score, but also has specified *divisi* instructions for each stand within the body of the score.

EXAMPLE 2-13. R. Strauss, *Also sprach Zarathustra*, at 27



In a passage where a composer wants only half the section to play, the part should be marked "half" (in Italian, *la metà*; French, *la moitié*; German, *die Hälfte*). The inside players (or sometimes, the back half of the section) will then remain silent during such a passage. When all are to play again, the word "all" (or *tutti* [It.], *tous* [Fr.], *alle* [Ger.]) must appear in the score.

✦ **ADDITIONAL PASSAGE FOR STUDY**

Debussy, *Images*, "Rondes de printemps." 4 mm. after 20 to the end

VIBRATO

Most string performers will use *vibrato* to enhance the beauty of a tone that is sustained for any length of time. Vibrato is accomplished by pressing the finger firmly on the string at the desired pitch while quickly rocking it back and forth on the string. Vibrato also increases the intensity of the pitch without distorting the essential frequency. A composer or orchestrator may ask for *non vibrato*, or *senza* (without) *vibrato*, if a white, pale sound is desired. For obvious reasons an open string cannot have a fingered vibrato, although it can be made to sound as if it were vibrating in either of two ways: by fingering (oscillating) the note one octave higher on the next higher string to set up sympathetic vibrations (which is obviously not possible when the note in question is played on the highest string); or by vibrating the same pitch on the next lower string.

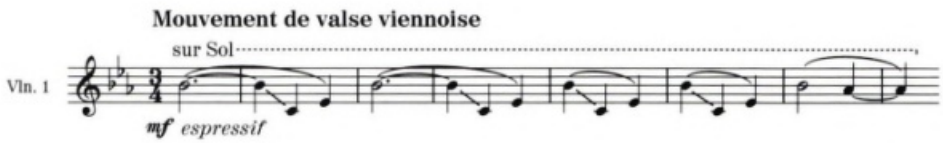
GLISSANDO AND PORTAMENTO

Glissando

This is another technique common to all string instruments. It is accomplished by sliding one finger on one string from one pitch to another. It is usually indicated by a line connecting two noteheads with or without the word *glissando* (*gliss.*) above the line. The glissando is executed in one long (legato) bow stroke, and all the pitches will sound, or at least be touched, between the first and last notes. It is possible to slide upward as well as downward on a string.

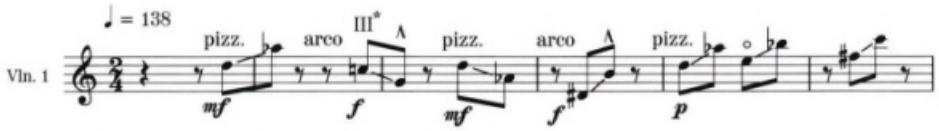
Here is a famous example of the use of glissando in an orchestral passage:

EXAMPLE 2-14. Ravel, *La Valse*, at 30



In the following example, glissando is also performed on pizzicato (plucked) notes; in this passage, only the starting note of the glissando is plucked.

EXAMPLE 2-15. Bartók, *Music for Strings, Percussion and Celesta*, second movement, 1 m. before 170



*To be played on the third, the D, string.

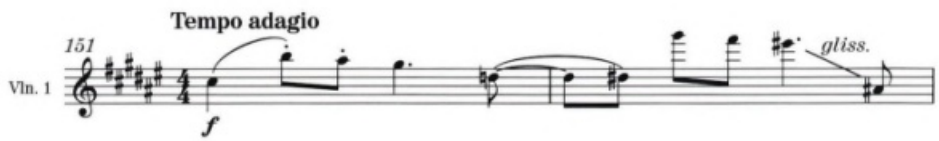
Portamento

In many scores the indication *port.* (for *portamento*) occurs where *gliss.* would normally be used to indicate a conscious slide from one pitch to another. *Portamento*, indicates a more natural, expressive method of connecting melody notes that are a great distance apart. This effect is rarely indicated in the score but is added by players as a part of melodic playing. When *port.* is found in the score it signifies to the performer to create a minimal slide between the two pitches, whereas *gliss.* usually directs the player to execute the slide with a full volume of sound.

Glissando on More Than One String

If a glissando is to be performed over more than one string, it cannot be a "true" glissando, for the sliding motion must be broken as soon as the open string is reached and then continued on the next string until the desired pitch is attained.

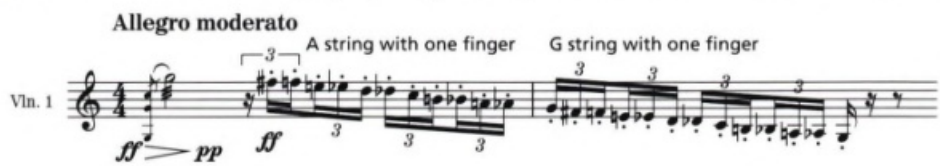
EXAMPLE 2-16. Mahler, Symphony No. 10, first movement, mm. 151–152



Fingered Glissando

One other kind of glissando, called "fingered glissando," is found most often in solo literature or in string solos within an orchestral work. It is sometimes called the "written-out glissando," because every pitch is notated and is meant to be performed as written, as in Example 2-17. When played by the full string section, passages such as this will sound much more like a blurred glissando.

EXAMPLE 2-17. Mahler, Symphony No. 7, second movement, 2 mm. before 92



✦ ADDITIONAL PASSAGES FOR STUDY

Bartók, *The Miraculous Mandarin*, first part
Debussy, *Ibéria*, part 2, at 38
Mahler, Symphony No. 4, third movement, mm. 72–76 (glissando on more than one string)
Ravel, *La Valse*, 3 mm. before 27 (glissando on more than one string)
J. Schwantner, *Aftertones of Infinity*, mm. 18–24
R. Strauss, *Till Eulenspiegel*, mm. 205–209 (fingered glissando)

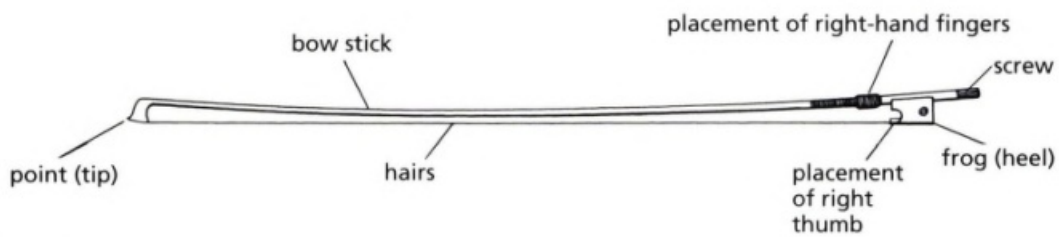
THE BOW

The bow, with which violin-family instruments are played, derives its name from its initial resemblance to the bow used in archery. Both the violin and its bow derive from earlier Arab instruments, and its older curved form of the bow, in use in Europe until the sixteenth century, is still evident in fiddles used for many kinds of Arabic and Far Eastern music. For the next three hundred years or so, various experiments in Europe brought the shape of the bow closer to what we know today. Corelli, Vivaldi, and Tartini still used bows that were slightly curved outward, away from the hair. The bow's final form—curved inward—was achieved in the bows of François Tourte (1747–1835), and has the following parts:

1. A long, tapering wooden *bow stick*, which is curved slightly inward toward the hair.
2. A plate made of metal or other material, protecting the tip.
3. Horse-tail hair.
4. A handle or *frog* containing a *ferrule*, a metal band that encircles the hairs and keeps them evenly spread.
5. A metal screw with which the hair is tightened or loosened.

The tension of the hair is of the utmost importance. When the hair is tightened, the elastic quality of the wood gives the entire bow a resilience that makes it possible to execute any kind of stroke desired.

The specific measurements are proportional so that the bow is balanced toward its middle, allowing for agility and control, as well as a rich tone quality. The bow is held firmly but flexibly between the four fingers and thumb of the right hand. There are other bow hand positions, especially for the double bass, and we shall say more on this when we discuss these the bass in Chapter 3.



The Bow

BOWING

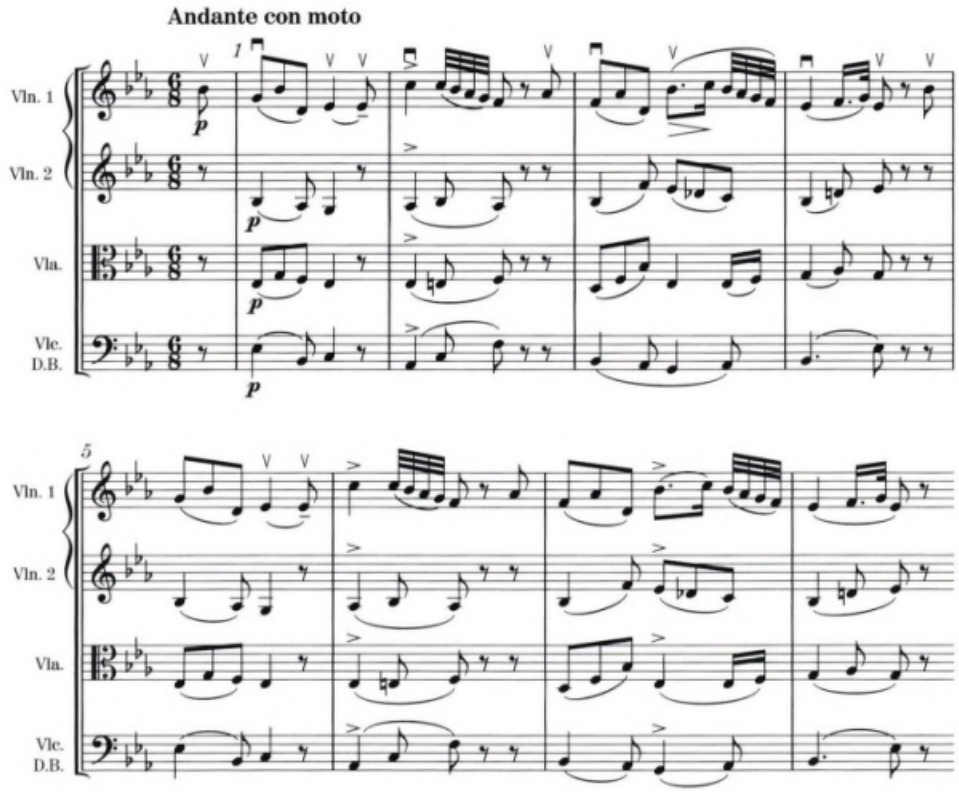
Bowing refers to the act of drawing the bow across the string. The bow is normally drawn across the string midway between the end of the fingerboard and the ridge. But to alter the sound of the instrument, the player may draw the bow across the string at different places.

Two symbols are used to indicate the direction in which the bow is drawn: ⊓ for down-bow, drawing the bow from the frog toward the tip, and ∨ for up-bow, drawing the bow from the tip toward the frog.*

Slurred Bowing

Whenever a passage is slurred, all notes within that slur are performed on one bow, meaning that all are played in one bow direction. Normally, this produces smooth or *legato* playing (*legato* means "bound together").

Example 2-18 Schubert, Symphony No. 5, second movement, mm. 1–8

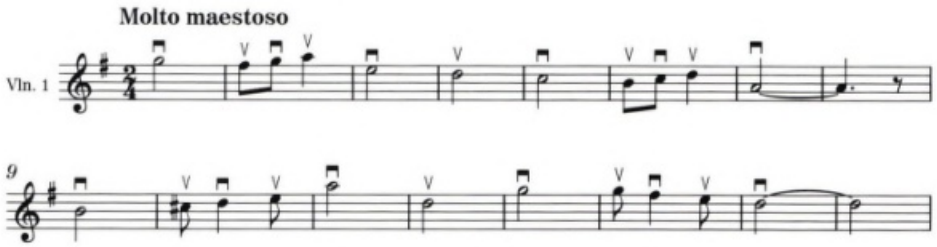


Non-Slurred Bowing

In a passage with no notated slurs, each pitch is normally performed by changing the direction of the bow, detaching each note from the next, whether the passage is slow or fast.

*The performer does not always use the whole bow (all the way from the frog to the tip and vice versa).

Example 2-19 Elgar, *Pomp and Circumstance* No. 1, Trio, mm. 1–15



Even though changes of bow direction occur for each of the notes in Example 2-19, a listener does not necessarily perceive these changes, since skilled performers can play the successive notes without an audible break between up- and down-bows. The technique of *detaché* bowing is discussed in more depth later.

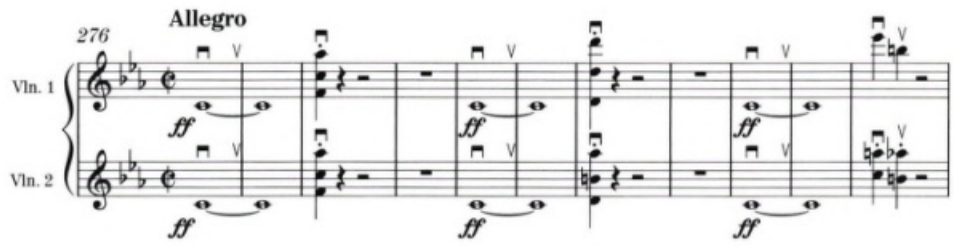
General Principles of Bowing

A passage for any of the string instruments may be bowed effectively in a variety of ways, and experienced players often disagree on bowings. Even today, concertmasters and conductors introduce new bowings for well-established works. Bowing decisions are greatly influenced by the style of the music, its character, and the tempo and dynamics at which a particular work or passage is to be performed.

The composer or orchestrator should keep the following principles in mind:

1. Performers can play louder and heavier toward the frog of the bow than toward the tip, because the pressure from the right hand holding the bow is much greater at the frog.
2. Because of this weight difference, players naturally begin an anacrusis, or upbeat, with an up-bow (∨), and play downbeats with a down-bow (⊓), unless the composer marks otherwise.
3. A very common type of bowing instruction, two adjacent up-bows, occurs on the second beat of the first measure of Example 2-18; these are necessary to have a down-bow on the accented first beat of the next measure. The violinist will play the quarter-note E♭, then stop the bow movement ever so briefly (the dash under the note indicates separation) before playing the eighth-note E♭, while still in an up-bow motion. (For another application of this idea, "hooked" bowing, see Example 2-35.
4. When two vigorous articulations follow one another, two successive down-bows are called for, as in Example 2-20. Here, a down-bow and an up-bow are marked over the long note so that the following attack will be solid. The bow is changed almost immediately to up-bow and is then ready to give a *fortissimo* attack on the triple stop.

EXAMPLE 2-20. Beethoven, Coriolanus Overture, mm. 276–286



When this passage is executed well, the bow change will hardly be noticed.

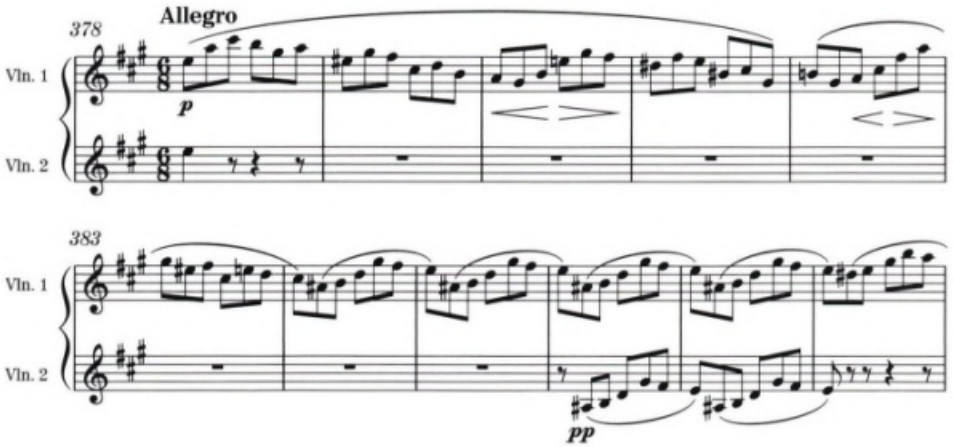
5. The most effective way to produce a crescendo is with an up-bow, due to the right hand's ability to increase the pressure on the bow toward the frog. Conversely, diminuendos are often performed with a down-bow.

   When bowing a passage, the composer should be aware of these tendencies and, rather than overmarking the parts, should indicate bow direction only where he or she wishes to counteract the normal habit of the players.

6. One should never mark long phrase slurs in string parts. Such slurs only confuse the performer. The only slurs that should be used are those that designate the notes to be performed on one bow (legato).

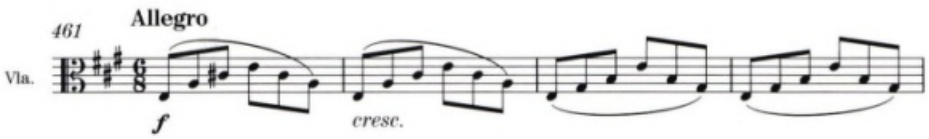
   There is a limit to how many notes can be played slurred on a single bow stroke. This is largely determined by the tempo and the dynamics governing a particular passage. In a fast but soft passage, a great many notes may be slurred together.

EXAMPLE 2-21. Mendelssohn, Symphony No. 4, first movement, mm. 378–338



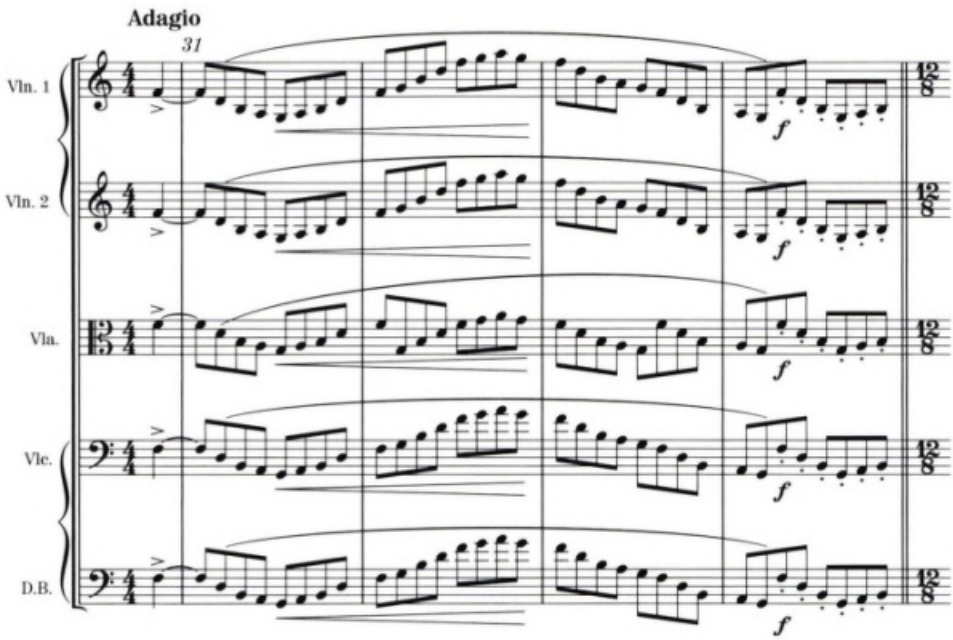
A similar passage in the violas some measures later shows only six notes on a bow, since the dynamic is *forte*.

EXAMPLE 2-22. Mendelssohn, Symphony No. 4, first movement, mm. 461–464



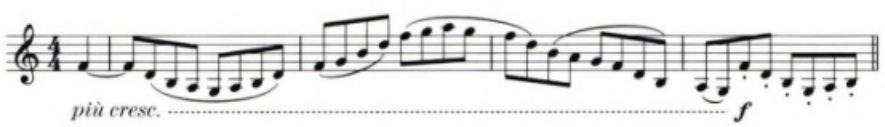
In slow passages, even if the dynamic is soft, special caution must be taken not to overload the bow and thereby make the music physically impossible to perform. This is especially crucial for cellos and basses, whose bows are a bit shorter than those of the violin and viola. For instance, the following passage is impossible to perform as the composer has marked, adhering to both the crescendo marks *and* the slurs, unless, starting at the end of measure 30, it is broken up into several bows. Both conductor and preformer will understand the long slurs to be phrasing indications and make bowing decisions at their discretion.

EXAMPLE 2-23. Liszt, *Les Preludes*, mm. 30–34

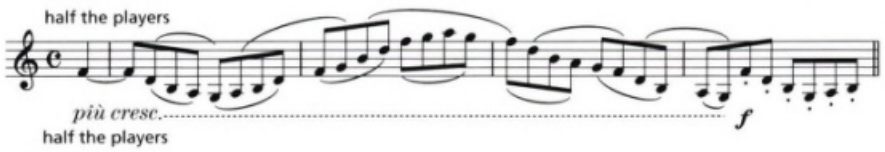


Examples 2-24 and 2-25 give two possible solutions. By dividing the section and staggering the bowing among the players, one can produce a very long and effective legato line, as Example 2-25 demonstrates.

EXAMPLE 2-24. Liszt, *Les Preludes*, mm. 30–34, possible bowing



EXAMPLE 2-25. Liszt, *Les Preludes*, mm. 30–34, possible bowing



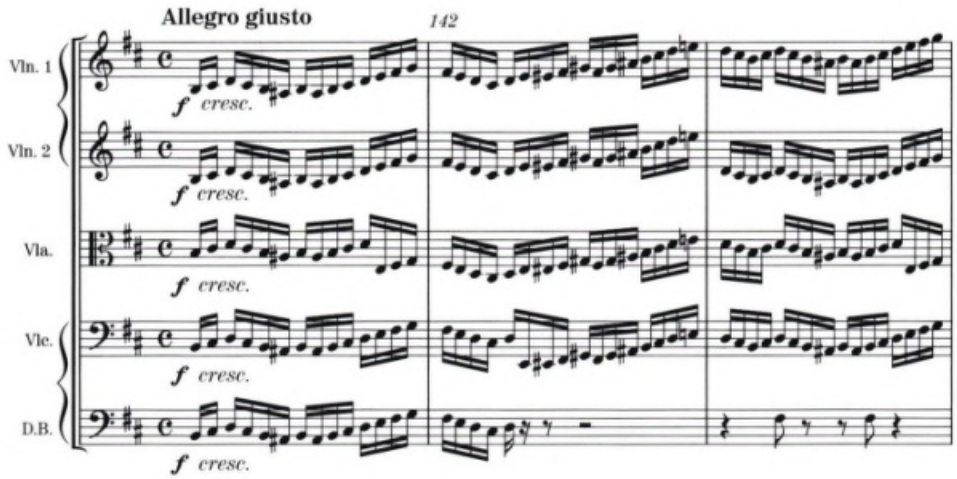
Besides the single bow stroke (*non legato*) and the slur (*legato*), there are various other types of bowings. Their execution depends greatly on the speed and dynamics of the passage, as well as on the style and character of the music. For many of these bowings, there is a great diversity of views about the meaning of each term used to describe the bowing and the manner in which the bowing is executed. Concerning the former, the terminology itself is not universally accepted, and quite often there are several names for a particular bowing in a given language. We have chosen what we consider to be the safest way to classify these bowings, by dividing them into:

1. bowings in which the bow remains on the string;
2. bowings in which the bow is made to bounce off the string.

Détaché (Fr.)

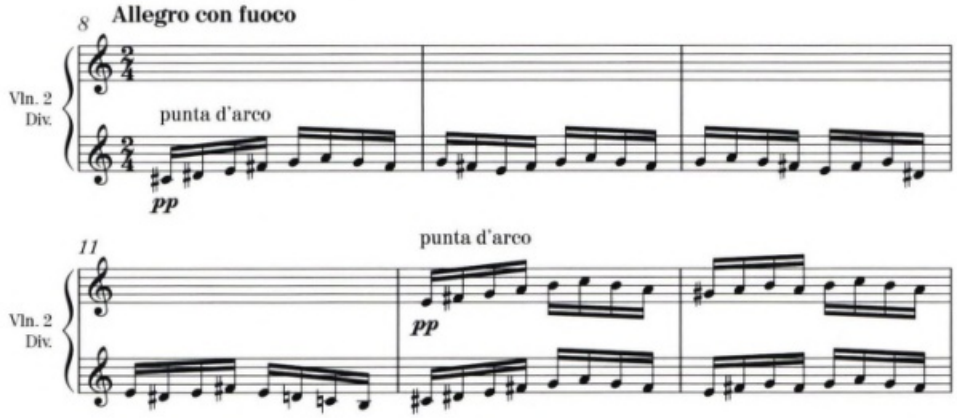
This basic *non legato* bowing is performed on all bowed string instruments by changing the direction of the bow for each note (see also p. 19). Sometimes referred to as "separate bows," this stroke clearly articulates each pitch without necessarily accenting any one, unless the passage is marked specifically to do so. At a rapid tempo, the middle to upper third of the bow is usually used when performing this stroke ***f*** or ***mf***; to produce an even louder sound, the bowing is often executed at or near the frog.

EXAMPLE 2-26. Tchaikovsky, *Romeo and Juliet*, mm. 141–143



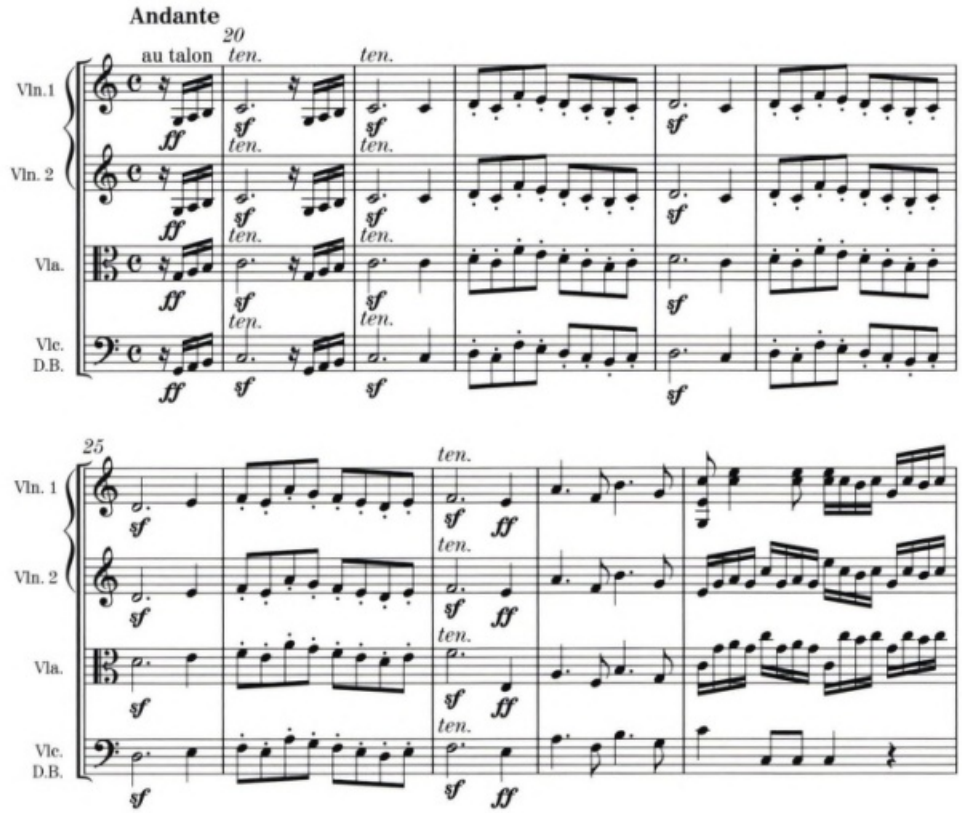
Sometimes the composer asks that a passage be played at the tip, which produces a much lighter, more delicate sound. The marking for this effect is: at the point; *a punta d'arco* (It.); *à la pointe* (Fr.); *an der Spitze* (Ger.).

EXAMPLE 2-27. Bartók, *Concerto for Orchestra,* fifth movement, mm. 8–13



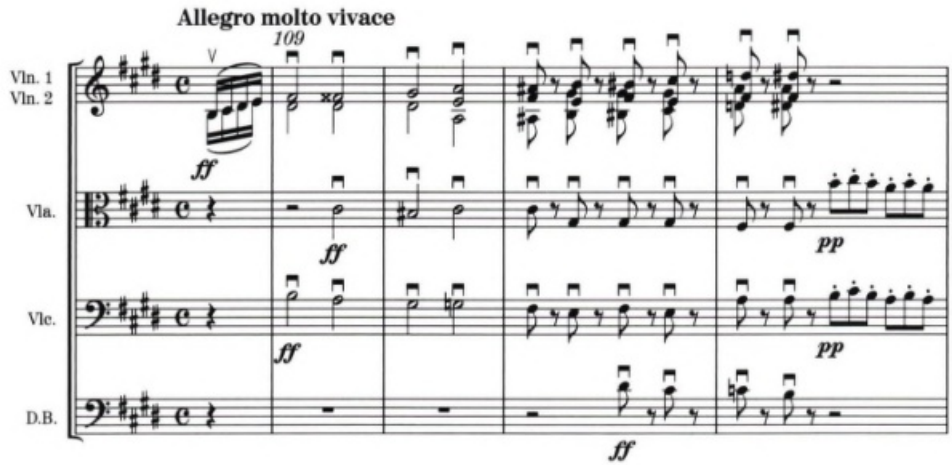
Conversely, composers ask for a passage to be played at the frog to take advantage of the heavy stroke that can be produced there. The marking for this effect is: at the frog; *al tallone* (It.); *au talon* (Fr.); *am Frosch* (Ger.).

EXAMPLE 2-28. Gluck, *Iphigenia in Aulis*, Overture, mm. 19–29



A very heavy and vigorous effect is commonly achieved using a series of down-bows. These can be played quite fast, with the bow raised between down-bows, and will most often be performed at the frog.

EXAMPLE 2-29. Tchaikovsky, Symphony No. 6, third movement, mm. 108–112

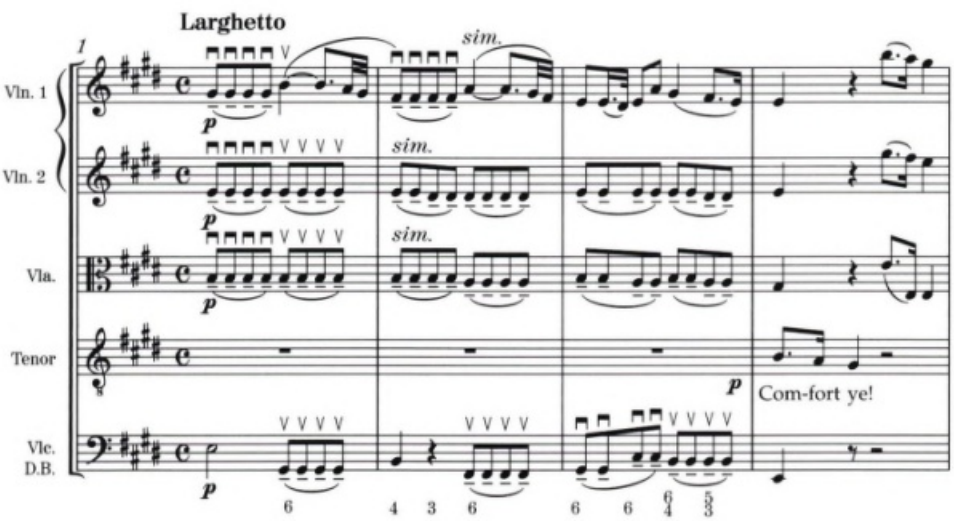


OTHER ON-THE-STRING BOWINGS

Louré (Fr.); Portato (It.)

This essentially legato bowing is accomplished by slightly separating the notes while the bow is being drawn across the string. It can produce a very expressive effect and is used often in accompaniments. This bowing is indicated by dashes under or over each of the noteheads, with slurs to designate the bow changes. We have added bowings in Example 2-30 to show how the passage is to be played. *Louré* is easily played with both up- and down-bows.

EXAMPLE 2-30. Handel, *Messiah*, "Comfort Ye," mm. 1–4 (tenor part not recorded)



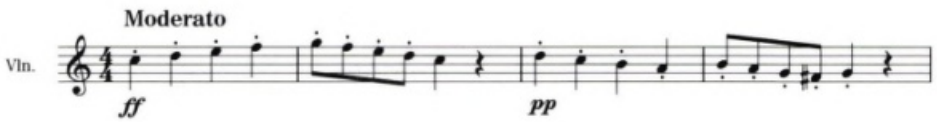
Staccato

The word *staccato* is derived from the Italian word *staccare*, meaning to detach or separate. For bowed string instruments, it is best to use the term staccato to describe an on-the-string effect only. Staccato is indicated by placing a dot over or under the notehead and is most effectively performed at moderate to slow tempos for reasons that will be clarified next. Staccato passages can be played loud or soft, and may be performed in one of two ways. Notice the difference in the notation of these two modes of performance.

SEPARATE-BOW STACCATO

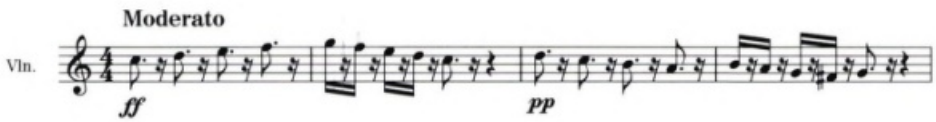
This technique is effected by playing short, separate bow strokes (Examples 2-31 and 2-36).

EXAMPLE 2-31. Separate-Bow Staccato*



Because staccato bowing separates or leaves a space between the notes, this passage could sound approximately like this:

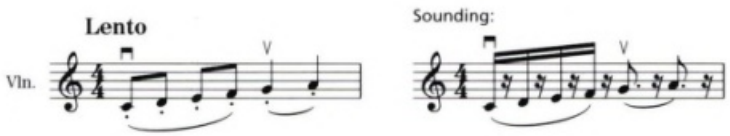
EXAMPLE 2-32. Separate-Bow Staccato as Played



SLURRED STACCATO

This technique consists of the separation of a series of short notes on one bow (Examples 2-33, 2-34, and 2-35).

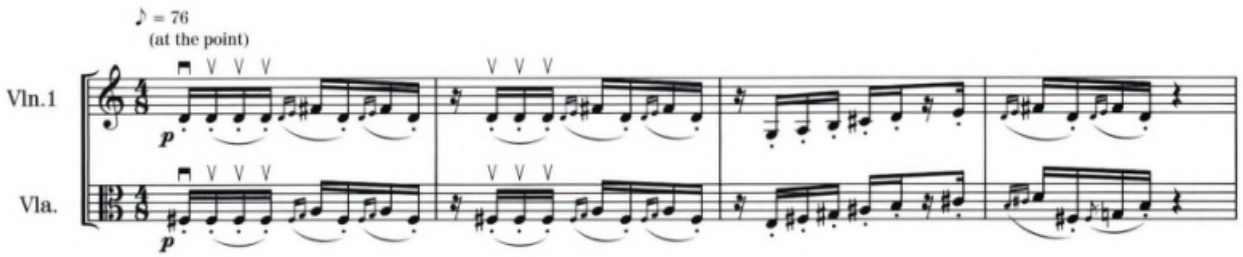
EXAMPLE 2-33. Slurred Staccato



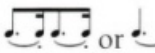
A *staccato* passage like the following is executed very much like *louré*—on one bow—except that the notes are shorter (staccato) and, therefore, the space between them is longer. Beats 3 and 4 in measures 1 and 2 and beats 1 and 2 in measure 4 have a dot only on the second sixteenth note. This indicates that the first sixteenth should be held its full length while the second should be clipped short.

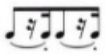
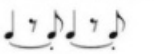
*Where no other attribution is given, the example is written by the author.

EXAMPLE 2-34. Stravinsky, *Symphony in Three Movements*, second movement, at 135



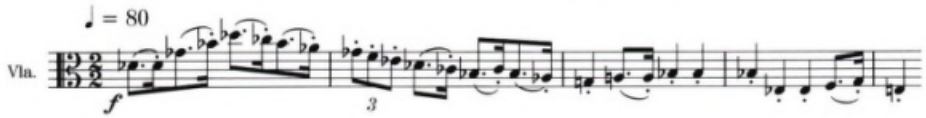
Two other variations of the staccato on one bow are very common.

1. The notation  or  is usually performed:

    or 

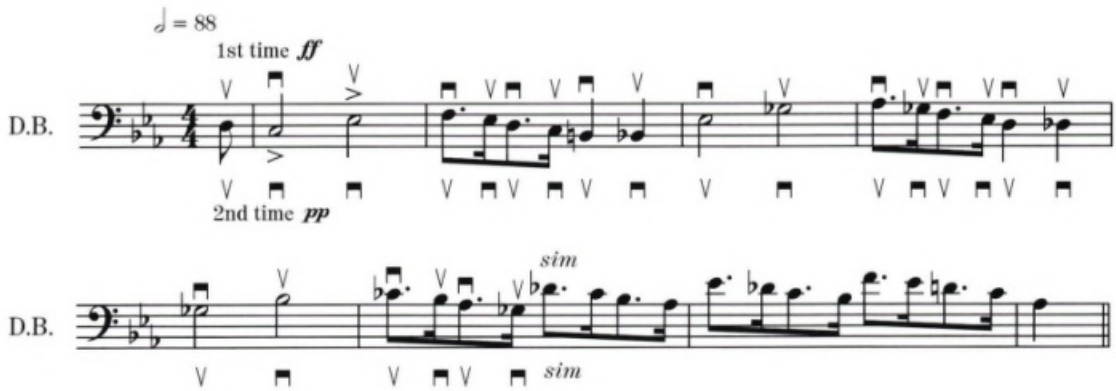
   Notice that in the actual notation the staccato dot is placed under the short note. If both notes were dotted, the long note would be measurably shortened in performance. This is sometimes referred to as "hooked bowing."

EXAMPLE 2-35. Hindemith, *Symphonic Metamorphoses*, fourth movement, at A



2. In order to make  sound crisp, light, and soft, the composer often does not use slurs but rather indicates that the passage be played with separate bows. To make this playing technique absolutely clear to the performer, the composer may add dots above the sixteenth notes. In the following example, we have added up- and down-bowing indications to show how the passage would be played.

EXAMPLE 2-36. Weber, *Euryanthe*, Overture, 27 mm. after Tempo I: *Assai moderato*



The first time the passage is performed, *fortissimo,* it would be executed from the middle of the frog of the bow; the second time, *pianissimo*, it would be performed from the middle of the bow, with bowings reversed.

Notice that all the tempos for the staccato passages have been moderate, for a fast tempo will invariably be played off the string, with a bouncing bow. Such passages are not called staccato, but rather *spiccato* or *saltando*—both terms that will be discussed in the off-the-string section.

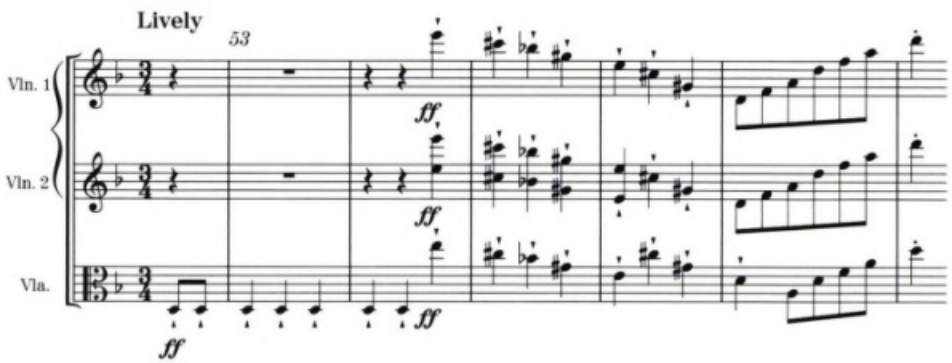
✦ ADDITIONAL PASSAGE FOR STUDY

Stravinsky, *Orpheus*, "Pas de deux," at 109

Martelé (Fr.); Martellato or Marcato (It.)

The derivation of this term is from the verb "to hammer." In bowing, it indicates a fast, well-articulated, heavy, separate stroke, resembling a *sforzando. Martelé* can be performed with any part of the bow: at the tip, in the middle, or toward the frog. The bow does not leave the string, even though there is a stop between the notes and each new stroke is initiated with a heavy accent. Sometimes, instead of a simple dot, the composer places one of the following signs over a note: 𝅗𝅥 or 𝅗𝅥 or 𝅗𝅥.

EXAMPLE 2-37. Bruckner, Symphony No. 9, second movement, mm. 52–58



OFF-THE-STRING BOWINGS

Spiccato (It.)

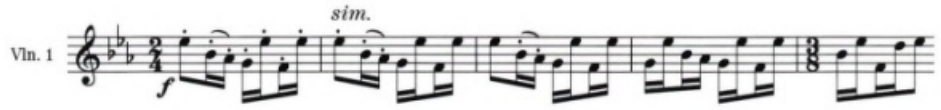
There are three distinct ways of performing spiccato bowings. All depend on the speed and the dynamic of a particular passage.

CONSCIOUS *SPICCATO*

In a slow or moderate tempo the player makes a conscious effort to make the bow bounce. The pressure of the right hand is reduced, and the wrist drops the middle of the bow on the string in a semicircular motion. The notation is like that for staccato: dots are placed above or beneath the noteheads. Composers often signal their intention

by marking the passage *spiccato* or *off the string*. The lightness and speed required in the passage determine whether the player uses a conscious spiccato, as shown in Example 2-38, or a spontaneous spiccato, described next.

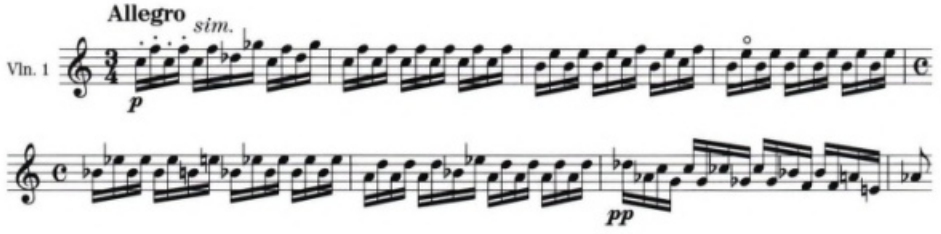
EXAMPLE 2-38. Stravinsky, *Dumbarton Oaks* Concerto, first movement, at 22



SPONTANEOUS *SPICCATO* (*SALTANDO*)

At a fast tempo the player does not have to make a conscious effort to lift the bow; rather, the short, quick up-down motion controlled by the wrist alone makes the bow bounce spontaneously off the string with every stroke.

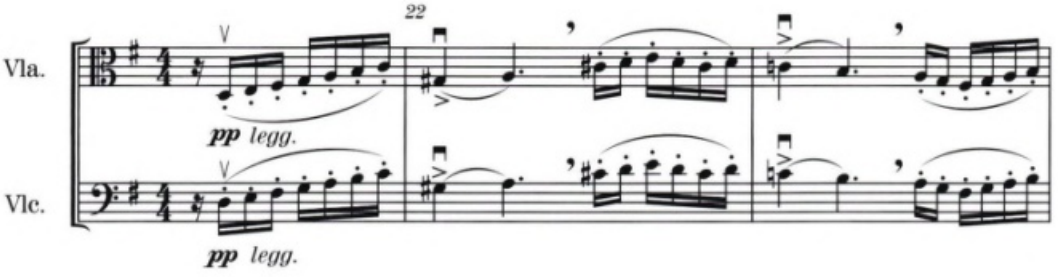
EXAMPLE 2-39. Rachmaninoff, *Symphonic Dances*, first movement, at 18



SLURRED *SPICCATO*

The following example shows a short series of spiccato notes grouped together in a single bow.

EXAMPLE 2-40. Mahler, Symphony No. 4, first movement, mm. 21–23



✦ ADDITIONAL PASSAGES FOR STUDY

Beethoven, Symphony No. 1, second movement, mm. 154–156 (conscious spiccato)

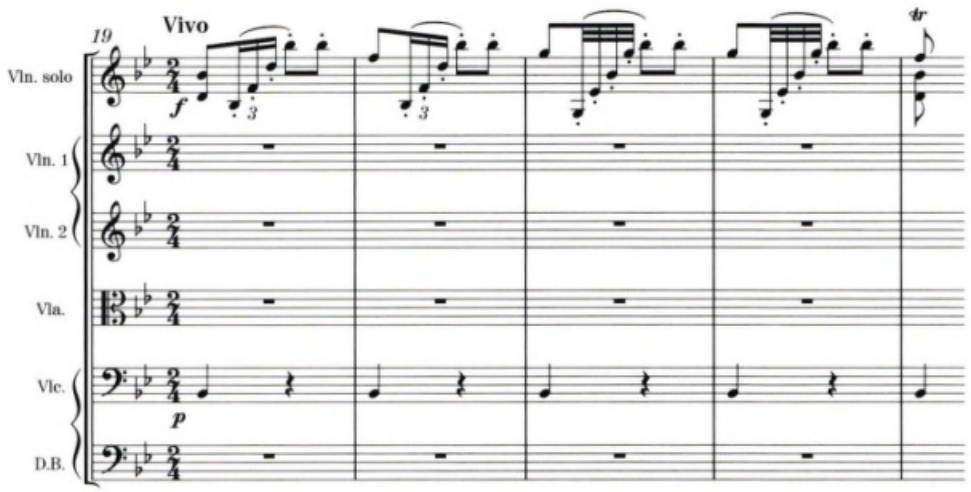
Rossini, *William Tell*, Overture, mm. 336–343 (spontaneous spiccato)

Jeté (Fr.); Ricochet (Eng.)

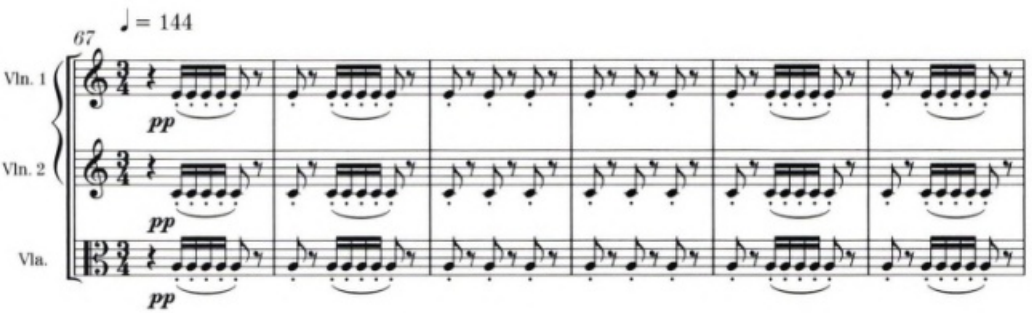
For this technique, the upper third of the bow is thrown on the string so that it will bounce, producing from two to six or more rapid pitches. *Jeté* is usually executed by a downward motion of the bow. However, it can be played up-bow as well.

A word of caution: the more notes desired on one bow stroke, the more impractical *jeté* bowing is. In an orchestral setting, we suggest that no more than three bouncing notes at a time be used in this bowing, even though solo players are perhaps capable of including many more well-articulated notes on a single bow. Since the bows of the cello and double bass are slightly shorter, three, or at most four, notes to a single *jeté* stroke are the limit of what can be played.

EXAMPLE 2-41. Rimsky-Korsakov, *Capriccio espagnol*, third movement, mm. 19–22 (violin solo only recorded)



EXAMPLE 2-42. Shostakovich, Symphony No. 8, second movement, mm. 67–72



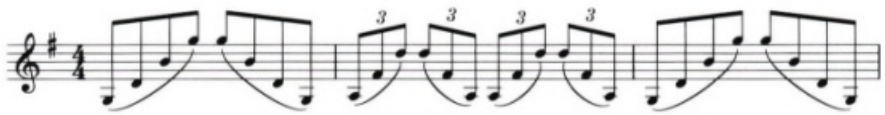
✦ ADDITIONAL PASSAGES FOR STUDY

Rimsky-Korsakov, *Capriccio espagnol*, fifth movement, mm. 89–96
Stravinsky, *The Firebird* ballet, from m. 30 on

Arpeggiando

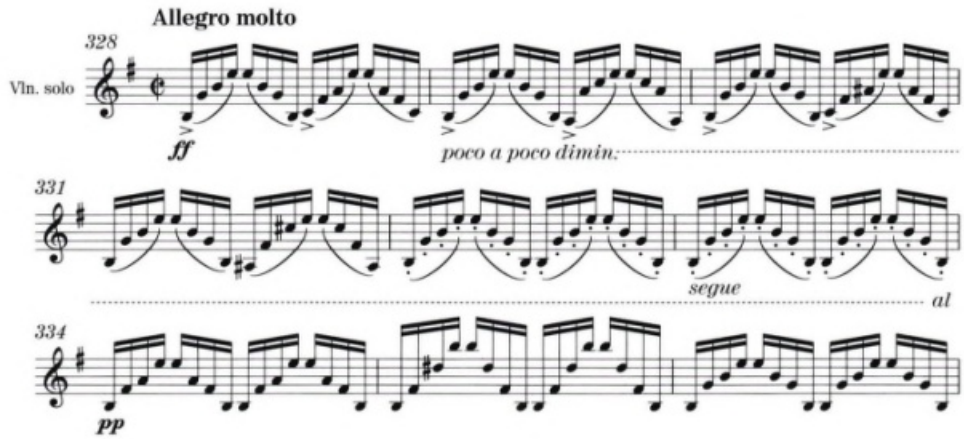
A slightly different kind of spiccato is related to *jeté*. This bowing may begin with a simple on-the-string slurring of an arpeggio played over three or four strings at a moderate tempo:

EXAMPLE 2-43. *Arpeggiando*



But at a fast tempo, the bow will spontaneously bounce off the string because of the motion of the right wrist, and an *arpeggiando* will occur naturally. This technique is used most often in solo string and chamber music literature, such as the solo violin passage in Example 2-44, but it is also an effective orchestral device (as in the cadenza in the final movement of Rimsky-Korsakov's *Scheherazade*). The *segue* marking is used to indicate that a bowing continues.

EXAMPLE 2-44. Mendelssohn, Violin Concerto, first movement, mm. 328–336

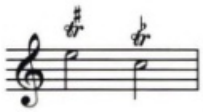


TRILLS AND OTHER COLORISTIC EFFECTS USING THE BOW

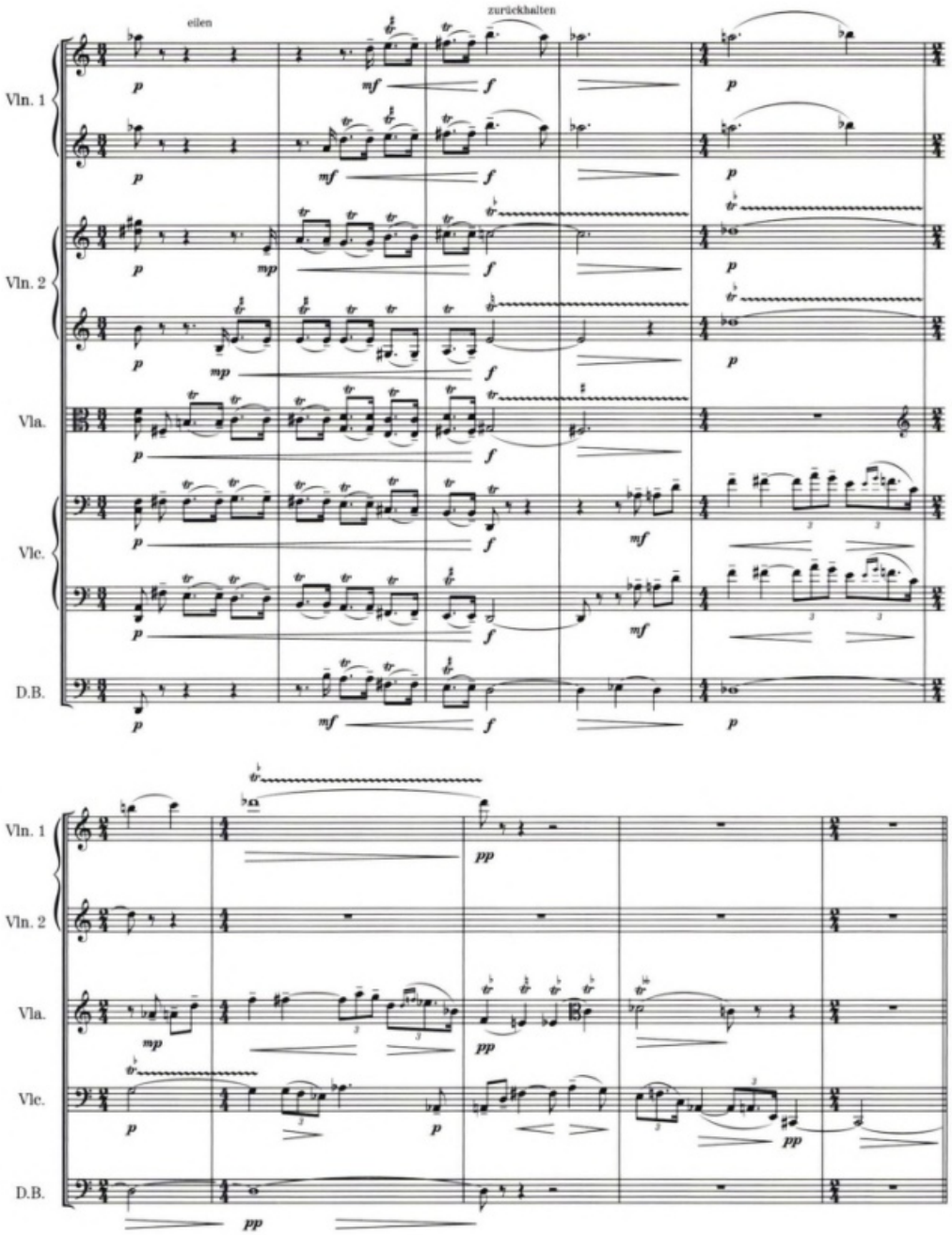
Trills

The trill is extensively used in all string instruments. Trills are executed by holding down the string of the pitch printed in the score with the appropriate finger and playing and releasing the next higher note with the adjacent upper finger as rapidly as possible for the entire value of the printed note. Performing a trill usually involves the note given and its upper neighbor. If the trill is played on an open string, it is not so effective, because the quality of an open string is quite different from that of a stopped string. The performance of a trill by sixteen violins or ten violas creates an excitingly blurred rhythmic sensation, very different from the sound made by a

single player on one instrument. The notation for the trill is *tr*~~~~, which is placed above the note. Accidentals are used with the *tr* sign as they would be if the upper pitch were written.



EXAMPLE 2-45. Hindemith, *Mathis der Maler* Symphony, third movement, at 16



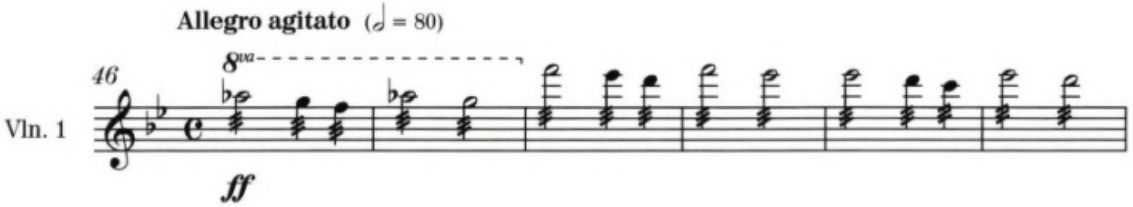
Tremolos

There are two kinds of tremolo.

BOWED TREMOLO

A single pitch is repeated as often as possible during the length of the written note by means of short, quick up- and down-bow strokes. In Example 2-46, Verdi uses the tremolo to create a special, atmospheric effect. The tremolo effect is indicated by the short diagonal lines through the stem; the compose may also mark *trem.* to confirm that the intention is rapid unmeasured notes rather than thirty-second notes.

EXAMPLE 2-46. Verdi, Requiem, "Dies irae," mm. 46–51

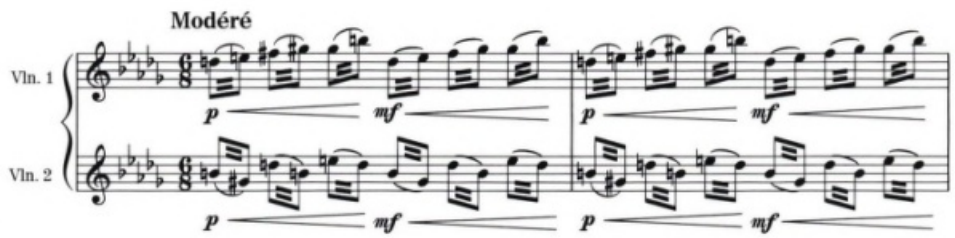


Other uses of tremolo occur in works such as Bizet's *Carmen*, Berlioz's *Symphonie fantastique*, and Mendelssohn's G-Minor Piano Concerto.

FINGERED TREMOLO

An interval of a 2nd or larger is quickly repeated, somewhat like a trill. The composer usually indicates a precise time value for each tremolo, although the notes within the tremolo are not measured. The notes to be alternated should be slurred together to ensure the legato movement of the bow. Note that the marking is between the notes rather than on the stems.

EXAMPLE 2-47. Debussy, *La Mer*, first movement, at 8



There are cases, however, where a fingered tremolo is bowed *détaché* rather than slurred; in those cases, of course, the slur is omitted.

✦ ADDITIONAL PASSAGES FOR STUDY

Berlioz, *Symphonie fantastique*, first movement, at 5
Bizet, *Carmen*, Overture, at Andante moderato
Bruckner, Symphony No. 4, beginning
Debussy, *Nocturnes*, "Sirènes," at 1
Dvořák, Cello Concerto, at 1, violas

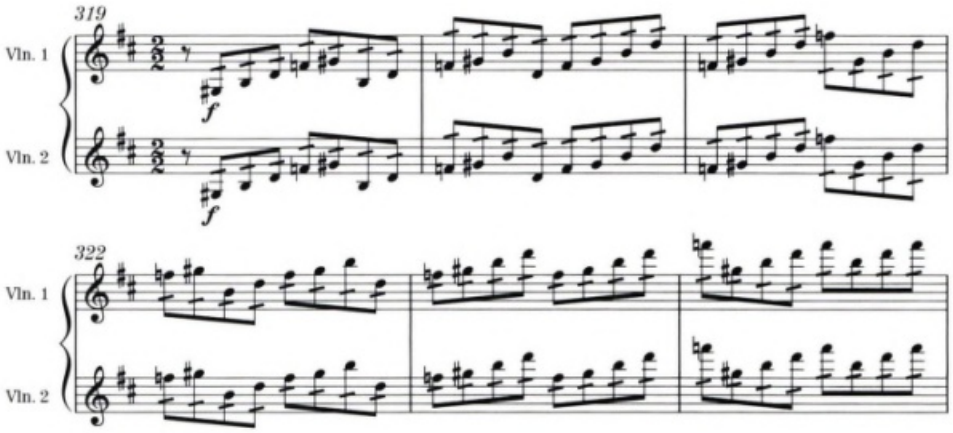
Prokofiev, *Scythian* suite, at 40 (bowed tremolos in the violins and violas); at 43 (fingered tremolos in the violas)
Schoenberg, *Begleitmusik,* Op. 34, mm. 156–159
Stravinsky, *The Firebird* ballet, beginning of the Finale
Weber, Overture to *Der Freischütz*, mm. 25–36

Measured Effects That Are Similar to Tremolos

Composers may indicate subdivided notes (fast repeated notes) with slashes through the stems, with the number of slashes indicating time values. This convenient shorthand notation should not be confused with actual tremolos. Example 2-48 gives the actual rhythmic values that are represented by the slashes; Example 2-49 shows this notation in an excerpt from the literature.

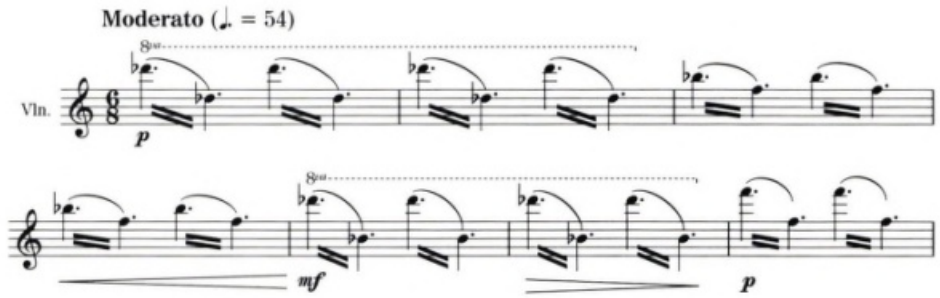
EXAMPLE 2-48. Measured Effect, Not a Tremolo

EXAMPLE 2-49. Wagner, *Der fliegende Holländer*, Overture, mm. 319–324



A second measured effect that is often deceivingly like a tremolo consists of the undulation of two notes on adjacent strings, as shown in Example 2-50, which would be executed as slurred sixteenth notes.

EXAMPLE 2-50. Martinů, Symphony No. 1, first movement, one m. after 14



This technique may be performed slurred or detached.

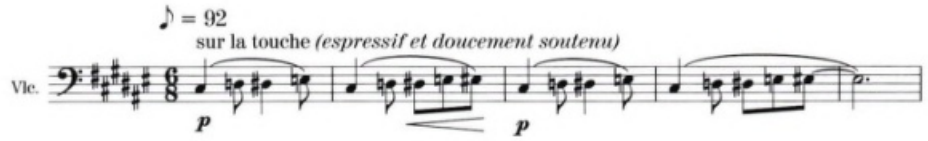
Unusual Placements of the Bow

To vary the tone color, the bow may be drawn across the string at a specified point, such as over the fingerboard or over the bridge. To change the color in a different fashion, the wood instead of the hair of the bow may be drawn over the string.

SUL TASTO (It.); *SUR LA TOUCHE* (Fr.); *AM GRIFFBRETT* (Ger.)

In order to obtain a rather flutelike, soft, and hazy tone, the composer may ask the performer to play with the bow over the fingerboard, as in the following example.

EXAMPLE 2-51. Debussy, *Ibéria*, part 2, at [40]



When the term *flautando* is used instead of *sul tasto*, the player should play *near* but not *over* the fingerboard. The difference is really minimal, and many composers make no distinction between *sul tasto* and *flautando*.

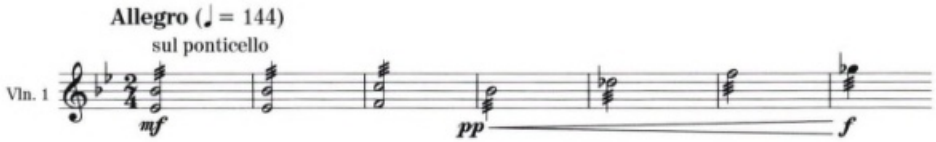
✦ ADDITIONAL PASSAGE FOR STUDY

Debussy, *Prélude à l'après-midi d'un faune*, mm. 96–98

SUL PONTICELLO (It.); *AU CHEVALET* (Fr.); *AM STEG* (Ger.)

This effect is produced by playing very near or right on the bridge instead of between the fingerboard and the bridge, the regular space allotted for the bow stroke. Since this produces upper partials of a tone that are not usually heard, the pitch takes on an eerie, somewhat glassy timbre.

EXAMPLE 2-52. Puccini, *Madama Butterfly*, Act I, 3 mm. before [38]



Sul ponticello is often combined with bowed or fingered tremolo.

✦ ADDITIONAL PASSAGE FOR STUDY

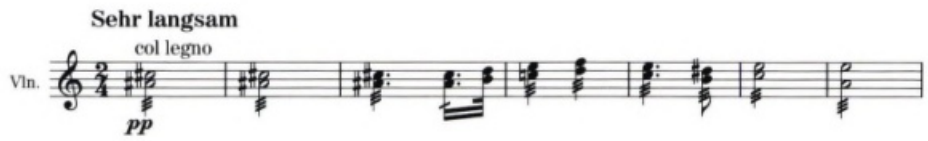
R. Strauss, *Sinfonia domestica* (throughout)

COL LEGNO (It.); *AVEC LE BOIS* (Fr.); *MIT HOLZ* (Ger.)

Two ways of playing with the wood of the bow are:

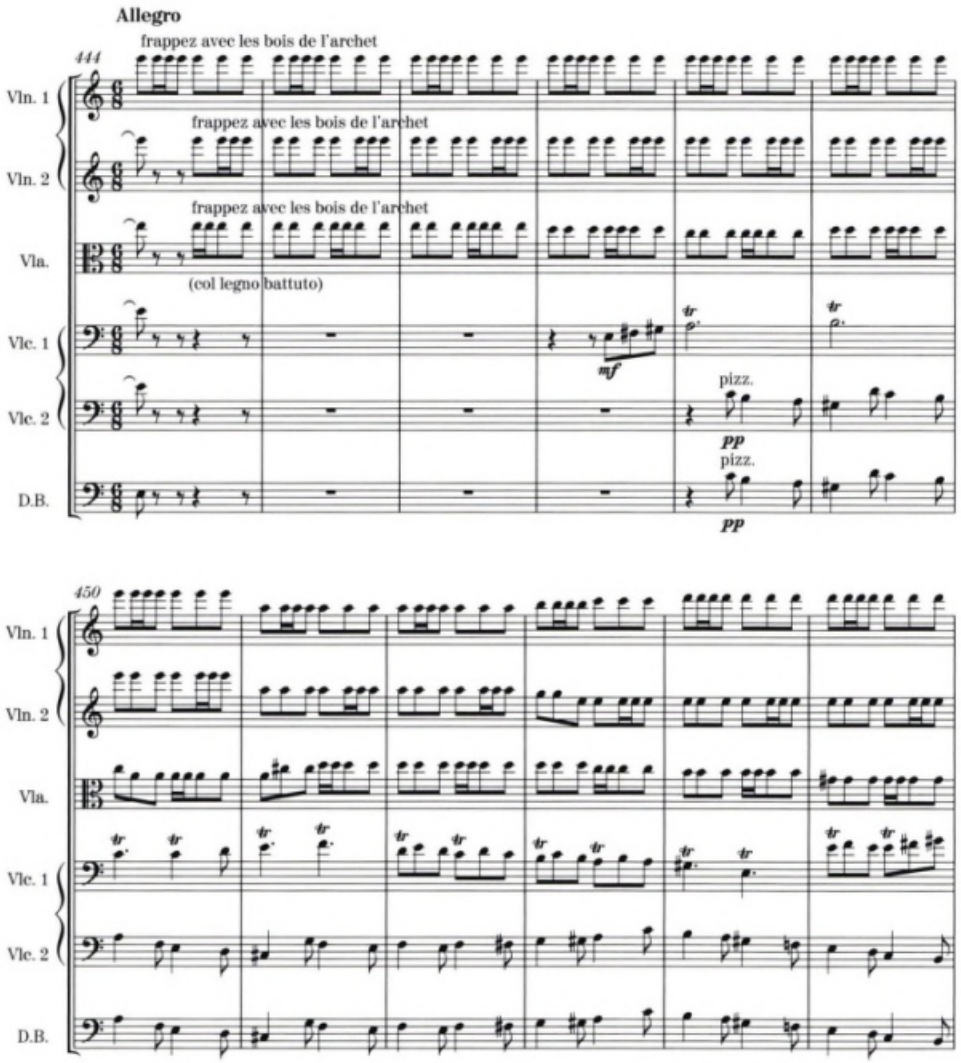
Col legno tratto. For this effect, the bow is turned over and the wooden stick is dragged across the string. Since the wood of the bow is less resistant to the string than the hair, the resulting sound is wispy and rather eerie. This technique is most useful for tremolo, as in Example 2-53, although sometimes it is used in legato passages.

EXAMPLE 2-53. R. Strauss, *Also sprach Zarathustra*, at 12



Col legno battuto. Here, the performer strikes the string with the wood of the bow. This effect is more commonly used than *col legno tratto*, and it, too, gives very little pitch definition, except in the extreme high and low registers, depending on which of the strings are struck. Its percussive sound resembles a very dry and short *spiccato*.

EXAMPLE 2-54. Berlioz, *Symphonie fantastique*, fifth movement, mm. 444–455

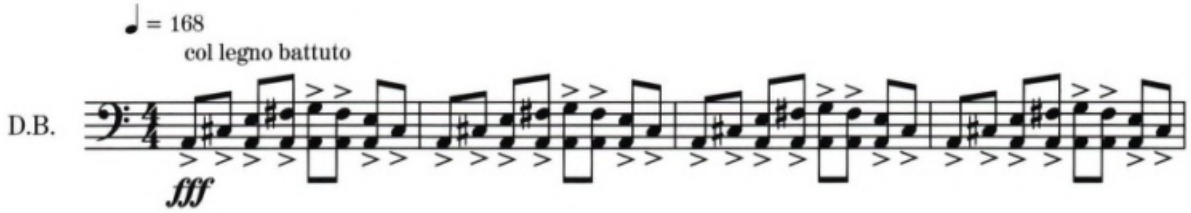


Every time a special effect, such as *col legno*, *col legno battuto*, or *sul ponticello,* is used, you must insert the indication *normale, naturale*, or *in modo ordinario* in the score at the point where the player should resume normal bowing. The English word "natural"

is sometimes substituted in American scores (for example, see those of Copland, Schuman, and Persichetti).

Michael Daugherty, in *Dead Elvis*, asks the double basses to "strike the string with a large wooden drumstick" instead of the wood of the bow.

EXAMPLE 2-55. Michael Daugherty, *Dead Elvis*, opening



✦ ADDITIONAL PASSAGE FOR STUDY

Mahler, Symphony No. 1, third movement, mm. 135–137
Sibelius, *The Swan of Tuonela*, collegno tratto letter H to I

COLORISTIC EFFECTS WITHOUT THE BOW

Pizzicato

Another mode of producing pitches on string instruments involves plucking the strings. This playing technique, called *pizzicato*, is used quite frequently.

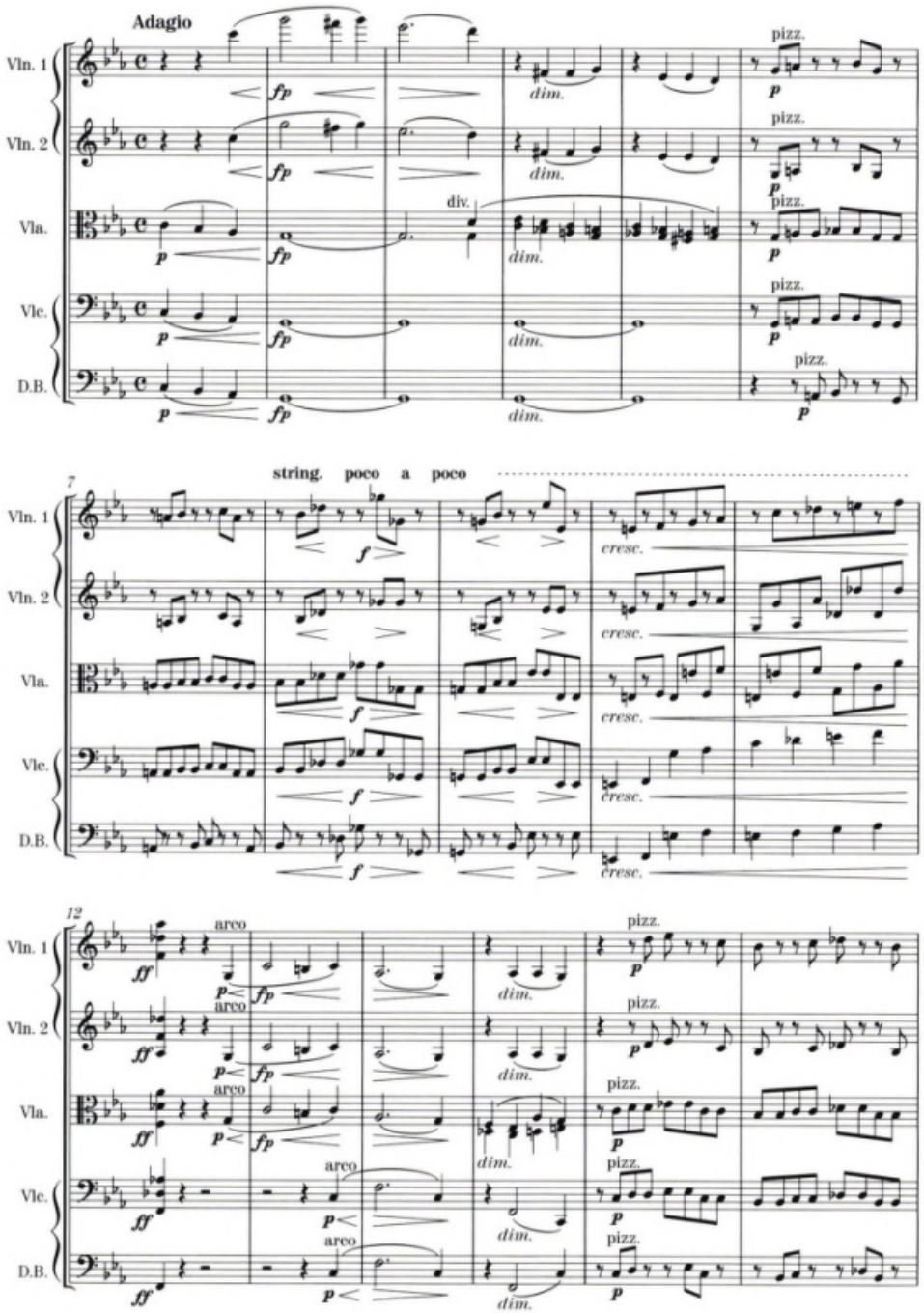
Normally, to play pizzicato the violinist or violist braces his or her thumb on the corner of the fingerboard and plucks the string with the index finger. The cellist or bassist simply plucks the string with his or her index finger, with or without anchoring the thumb. (Some violinists and violists have also adopted the nonanchored method.) During a pizzicato passage, the bow is usually held by the other three fingers against the palm of the right hand. However, if the entire piece or a lengthy section of it calls for pizzicato—particularly if that section is preceded by rests and followed by enough time to pick up the bow—the players may elect to put their bows in their laps or on the stands to give them more control in executing the plucking.

The thickness of the string and the size of the instrument greatly affect the volume of sound and the duration of the pitch that is plucked; double bass strings, due to their greater thickness, have the greatest sustaining power of all the strings of the violin family. The experienced player is aware of these effects and can better control what is specified in the score.

Whenever pizzicato is desired, the entire word, or the abbreviation *pizz.*, must appear in both the score and the parts. When the player is to resume playing with the bow, the word *arco* must be printed. To execute pizzicato, the player must take time to prepare to pluck and then to resume playing with the bow. Although there are instances in both solo and orchestral literature when no time is provided for either maneuver, these instances are rare, and this situation should be avoided if at

all possible. The return to arco is more awkward than going from bowing to plucking because the hand must be repositioned with the bow on the string for the normal playing position. It is much easier to change between arco and pizzicato if the bowing has been prefigured such that the players will have an up-bow stroke just before the pizzicato, with a down-bow after the pizzicato. If no time at all is allowed for the exchange of techniques, many players simply keep their bows in hand, extend the index finger, and pluck the string. In orchestral playing, *divisi* is often used to allow for very fast alternations.

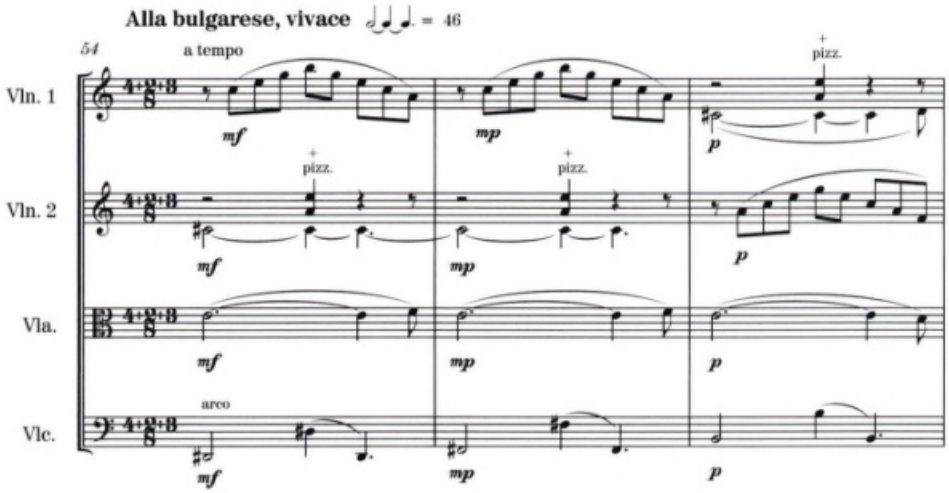
EXAMPLE 2-56. Brahms, Symphony No. 1, fourth movement, mm. 1–17



Left-Hand Pizzicato

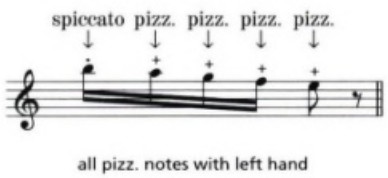
Left-hand pizzicato is much more prevalent in solo literature and chamber music than in orchestral works. When a cross, +, appears above a note, the string is plucked with one of the fingers of the left hand. Often, these are open strings, and the little finger is used to pluck.

EXAMPLE 2-57. Bartók, String Quartet No. 5, third movement, mm. 54–56



At other times a whole series of pitches is to be plucked with the left hand. In that case, the finger that is held down to produce the highest pitch plucks the next highest pitch, and so forth, in the following manner:

EXAMPLE 2-58. Left-Hand Pizzicato

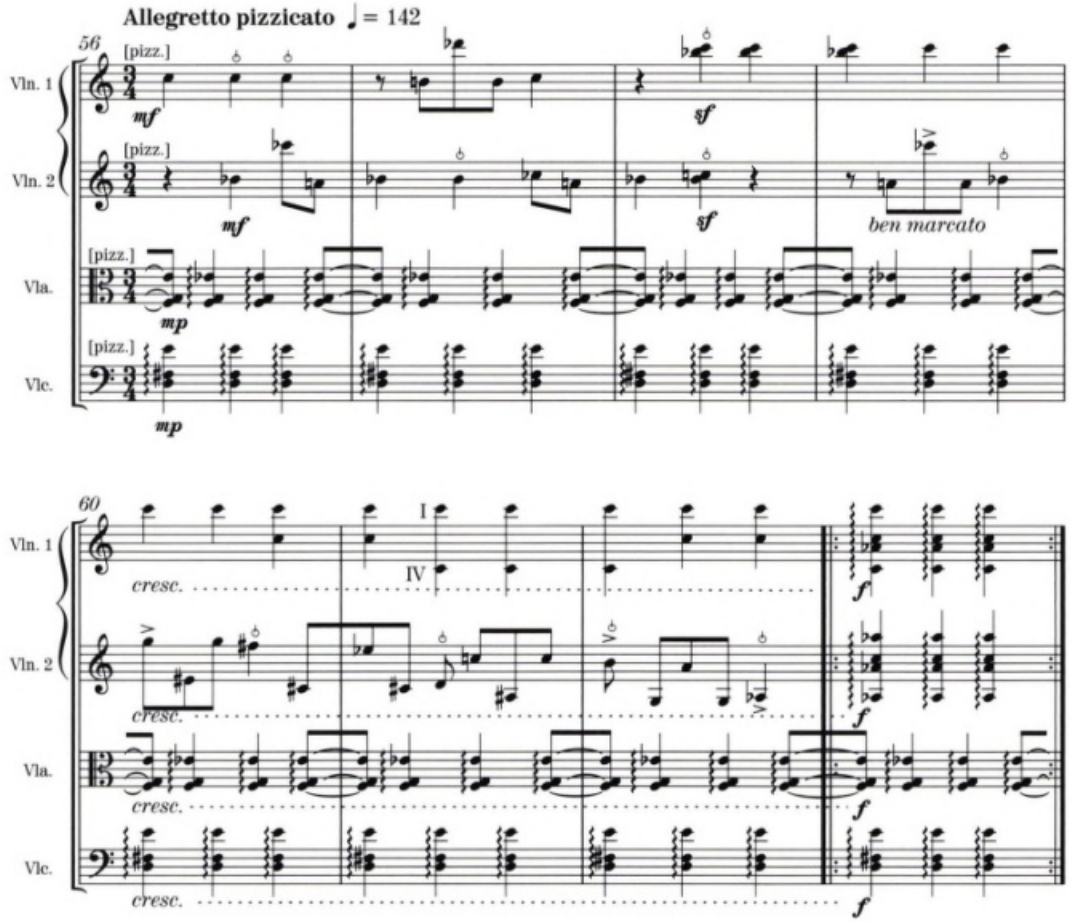


Here, the B is played with the bow *spiccato*, then the fourth finger plucks the A; the third finger, the G; the second finger, the F; the first finger, the open E string. This effect is considered a solo technique and would not be used in orchestral playing.

Snap and Fingernail Pizzicato

These two modes of playing pizzicato are twentieth-century innovations often associated with the works of Béla Bartók. The sign for the snap pizzicato is ♭, and it is performed by snapping the string against the fingerboard. The sign must be placed above the note that is to be snapped. Fingernail pizzicato is indicated by a ⌒, and is executed by pulling the string with the fingernail. In some scores, the term *pizz.* also appears with the special symbol, leaving no doubt as to how this effect should be performed. In many cases, however, *pizz.* does not appear, since the mode of playing is implicit in the snap or fingernail pizzicato sign.

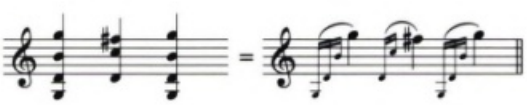
EXAMPLE 2-59. Bartók, String Quartet No. 4, fourth movement, mm. 56–63



Pizzicato Chords

When no preference is expressed by the composer or orchestrator, the performer will strum a chord of three or four notes from the bottom up, creating an arpeggiated effect that can be held to a minimum by incisive, sudden finger strokes. The pizzicato chord is performed in the following manner:

EXAMPLE 2-60. Pizzicato Chords

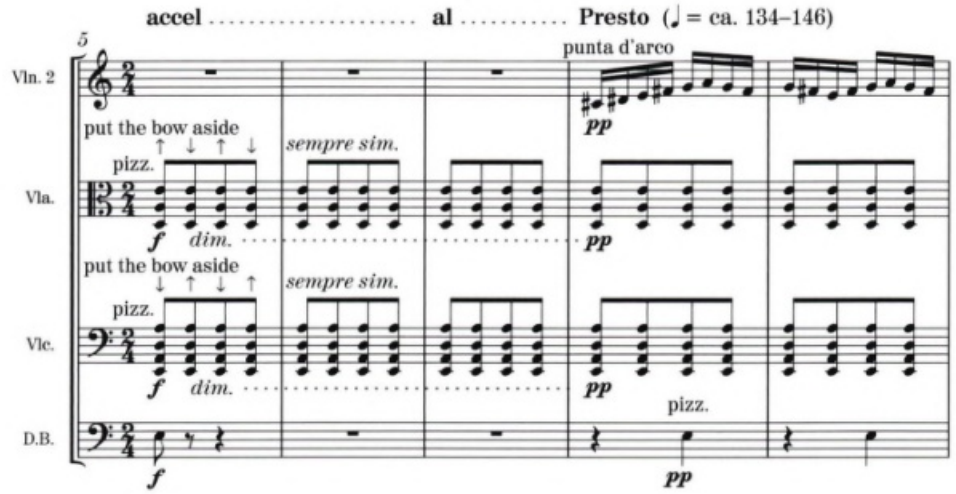


This effect may be executed by plucking the strings from top to bottom; on cello, players may pluck with several fingers of the right hand. Or the chord may be played *divisi*.

In some cases, *non arpegg.* is specified. Sometimes the composer wants the chord played from top to bottom, or in the case of a repeated chord, alternating between

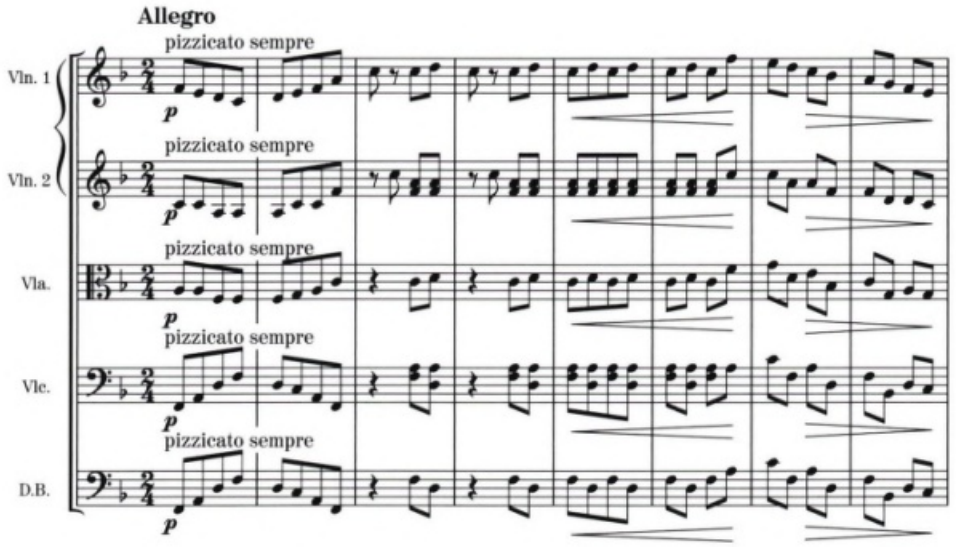
bottom to top, top to bottom. In these cases, a directional sign is placed in front of each chord. Occasionally, the phrase *quasi chitarra* or *a la chitarra* is printed in the part and score, or arrows are placed above the chords.

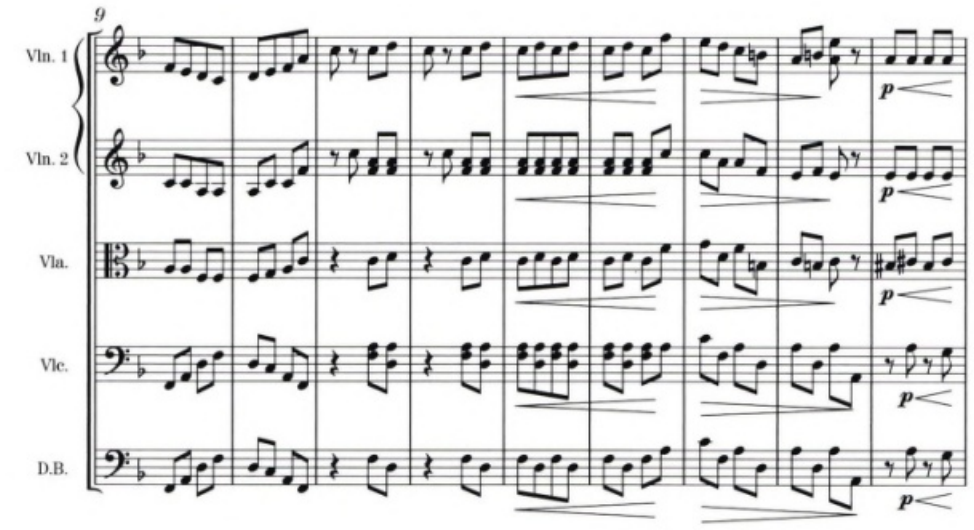
EXAMPLE 2-61. Bartók, *Concerto for Orchestra,* fifth movement, mm. 5–9



Be aware that a long, fast pizzicato passage, played without rests, becomes very fatiguing for the performer. Some string players have perfected a technique of using the index and middle fingers alternately to facilitate a lengthy pizzicato passage. Nevertheless, occasional rests and alternation between first and second violins or violas and cellos helps alleviate any physical discomforts of the players. Here is an example of a successful lengthy pizzicato passage from the orchestral literature; notice the periodic rests that are interspersed:

EXAMPLE 2-62. Tchaikovsky, Symphony No. 4, third movement, mm. 1–17

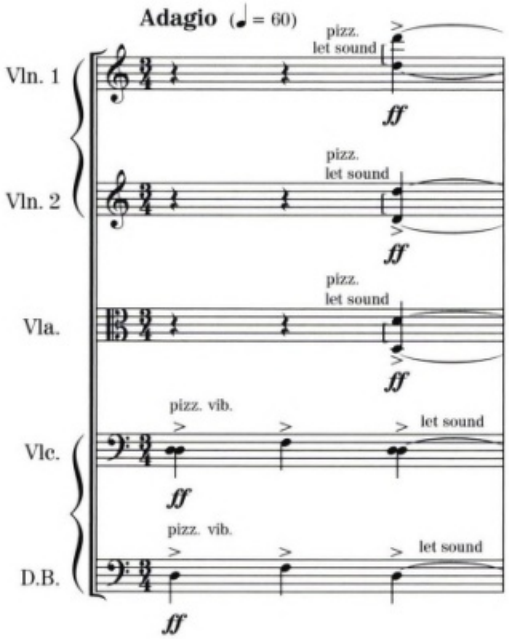




For additional pizzicato examples, see the pizzicato movements of Britten, *A Simple Symphony*; Foote, Suite for Strings in E; and Debussy, *Ibéria*, part 3.

Pizzicato is similar to staccato and spiccato bowing in that the sound dies away quickly. To indicate that a pizzicato note is to sound as long as possible, composers sometimes write pitches with indeterminate slurs following them and signal a long, "sustained" *pizz.* with the phrase "let vibrate" or "let sound," *vib.*, or *l.v.*

EXAMPLE 2-63. D. Diamond, Symphony No. 4, second movement, m. 1

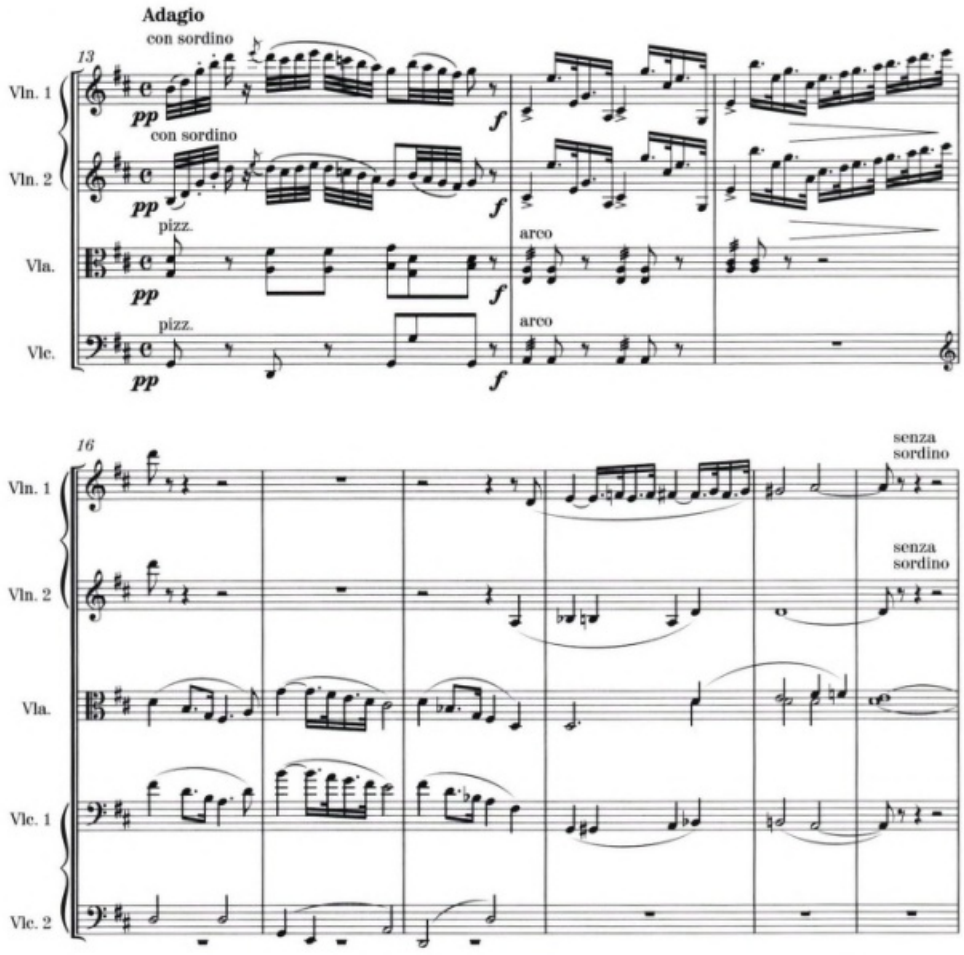


MUTES

Con sordino (It.); Avec sourdine (Fr.); Mit Dämpfer (Ger.)

All string instruments can be muted. The designation most often used when a mute is called for is *con sordino* ("with mute"). At that point in the score, the player places a small rubber, wooden, or metal object on the bridge, thus absorbing some of the vibrations to obtain a very soft and smooth sound. When a mute is used, the tone quality is radically altered, and although most muted passages are soft, it is possible to write *forte* or *fortissimo* portions of a work for muted strings. The loud muted passage takes on a special quality of restraint and a sound that is more constricted, tenser. The composer or orchestrator should listen carefully to both soft and loud muted passages to recognize and appreciate this peculiar sound.

EXAMPLE 2-64. Weber, *Oberon*, Overture, mm. 13–21



Senza sordino (It.); Sans sourdine (Fr.); Ohne Dämpfer (Ger.)

It is important to allow enough time between muted and unmuted passages so that players can put on or take off the mutes quietly. Some players now use clips that easily

slide to the back of the bridge or that attach to it easily. But others still use the older mutes, which need to be placed on the bridge, removed from it, and put away, all of which takes considerably more time to accomplish.

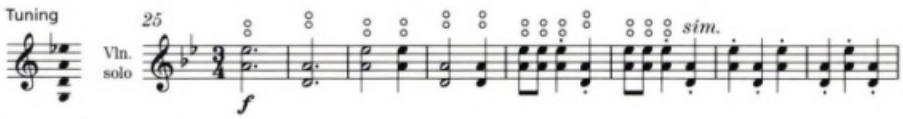
At all times the player must be careful not to divert attention from the music when mutes are put on or taken off. This is especially so in soft passages, as in Example 2-64, where the violins must take off their mutes over the violas' softly held notes.

SCORDATURA

The open strings of all string instruments can be altered in pitch to create certain coloristic effects or for other practical considerations. This is called *scordatura*, an Italian term meaning mistuning. Each string may be tightened or loosened to produce a pitch other than that of the normal tuning. Scordatura tuning has been used since the seventeenth century to facilitate the playing of difficult passages in remote keys, to obtain unusual chords, and to change the tone color of the instrument. When a scordatura tuning is required, the composer or orchestrator must indicate the tuning of the four strings in both the score and parts either at the beginning of the piece or at the point in the work when the retuning is necessary. Plenty of time must be allowed after the scordatura passage is over if the player is to return to the original tuning, which is signaled by the word *accord* or *accordatura*.

Here are some examples of famous scordatura passages:

EXAMPLE 2-65. Saint-Saëns, *Danse macabre*, tuning and mm. 25–32



(The "o" here stands for the open string.)

EXAMPLE 2-66. Mahler, Symphony No. 4, second movement, mm. 6–18