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Scordatura Literature for Unaccompanied Violoncello in the 20th Century: Historical Background, Analysis of Works, and Practical Considerations for Composers and Performers

by

Nathan Cook

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE Doctor of Musical Arts

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MAY 2005
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ABSTRACT

Scordatura Literature for Unaccompanied Violoncello in the 20th Century:

Historical Background, Analysis of Works, and Practical

Considerations for Composers and Performers

by

Nathan Cook

The 20th century has seen a flowering of the use of alternate tunings on the cello. Numerous works for string instruments throughout history make use of scordatura, which is a term that refers to any tuning that is not the standard one for an instrument. The focus of this research has been the use of scordatura in unaccompanied works for cello in the 20th century. Significant discussions of historical practices on the lyra viol, an instrument that used more than 60 different tunings, Heinrich Ignaz Franz von Biber's Mystery Sonatas for violin, and Zoltán Kodály's Sonata for Solo Cello, Op. 8 lay the historical background for the use of scordatura in unaccompanied works for cello later in the 20th century. The analyses of works by Peter Sculthorpe (Requiem for 'cello alone'), Lászlo Borsody (Alone), Ralph Shapey (Krosnick Soli), Alfred Schnittke (Klingende Buchstaben), Kaija Saariaho (Spins and Spells), and Henri Dutilleux (Trois Strophes sur le nom de SACHER) focus on how scordatura is used and to what effect. These investigations allow for a detailed classification of the various rationales behind the use of scordatura techniques as 1) feasibility scordaturas, tunings that make the otherwise unplayable possible, 2) timbral scordaturas, tunings that affect a change in the color of
sound the instrument produces, and 3) special effects scordaturas, tunings that are used primarily for glissando or other special effects. These discussions also offer performance suggestions. A final chapter includes considerations about practical concerns for both composers and performers of scordatura works. A significant discussion of as-fingered, at-pitch, and hybrid notational practices along with suggestions for performers regarding dynamic scordatura performance aids and instrument care appear in this last chapter. One appendix contains a catalogue of 20th century solo cello works that use scordatura, and another presents the results of a preliminary comparison between the sound spectrum of the cello’s A string when the instrument is tuned normally versus when it is tuned B'-F#-d-a as in Kodály’s Solo Sonata, Op. 8. Graphs of the relative strengths of the overtones present in the sound of the cello’s A string are given.
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Preface

For the most part, tunings in this document are given in staff notation to avoid confusion between the numerous systems of specifying pitch. When pitches are indicated within the body of the text, the system shown in the diagram below is consistently adhered to. As is the case in most of the literature, tunings on string instruments are indicated from the bottom up. The tuning of the modern bass, cello, viola, and violin are therefore given as E’-A’-D-G, C-G-d-a, c-g-d’-a’, and g-d’-a’-e” respectively in concordance with these systems. The one exception to this practice is the labelling of strings by pitch class. Capital letters will be used to designate, for instance, a D string, even if it is tuned to d’.

Pitch Designations Used in this Document

The discussion of scordatura works frequently requires the numbering of strings to avoid confusion. Discussing a passage played on the C string may be confusing if there is more than one C string or if what is normally a C string is tuned to a different pitch. Strings are numbered from top down in accordance with the use of roman numerals as string indications in scores. The highest pitched string on the
violin is therefore designated the first string, and with a roman numeral I, whether it
is tuned to e” or not.

Musical examples of scordatura works may be given at sounding pitch, in an
as-fingered notation, or both, depending on the context. Captions clearly indicate
which notational practice is in use for each figure.
Introduction

The focus of this study is chiefly to describe the purposes to which scordatura techniques have been put in unaccompanied repertoire for violoncello in the twentieth century. Scordatura is the term applied to any non-standard tuning for a string instrument. Since the modern violoncello is normally tuned C-G-d-a, any tuning that is different from this is a scordatura for modern players.

Any discussion of current trends must of course incorporate an investigation of past influences, and chapter one therefore discusses uses of scordatura on rebecs and viols, the most important of the bowed string instruments in use in Europe prior to and during the rise of the violin family. Of particular interest here are the multiple tunings historically used on the lyra viol, a small bass viol that played in a similar register to that of the modern violoncello. The aim of this first section is quite broadly to provide food for thought about tuning schemes used in the past, potentially providing composers with some good ideas for modern works.

Chapter two discusses the historical uses of scordatura on the members of the violin family with a focus on the cello, but the significance of Heinrich Ignaz Franz von Biber’s Mystery Sonatas for violin cannot be ignored. The chapter closes with a look at the important contribution to the solo cello repertoire of Zoltán Kodály’s Sonata, Op. 8.

A close analysis of the use of scordatura in several twentieth-century, unaccompanied works for violoncello comprises chapter three. Discussed in this chapter are tunings used a) to make impossible things feasible, b) to effect a timbral
change to the instrument, and c) to accomplish special effects such as glissandi.

Chapter four provides practical suggestions for composers and players embarking on their own exploration of *scordatura* techniques.

Two appendices are included. The first is a catalogue of works. Every effort has been made to make the list of twentieth century *scordatura* works as complete as possible. Nevertheless, it is entirely likely that there are some pieces absent from this list, and apologies are due to the composers of these works. The second appendix presents some preliminary measurements of the relative strengths of harmonics present in the sound of an open string as the tension on the cello is altered by changing the tuning of other strings.

As is well known, nomenclature issues plague the discussion of early string instruments. Multiple names for identical instruments exist and, even worse, the same names are frequently used for instruments that vary quite widely in size, shape, tuning, and number of strings. For the purposes of this study, however, the confused history of nomenclature for the various families of string instruments need not be dwelled upon. Brief clarifications will be necessary at times, since it should be clear at the very least what instruments are being discussed. The variations of tuning within a family of instruments will be the focus, however, not the variations in the names of the instruments.
Chapter 1
Scordatura Practices on Rebecs and Viols

The rebecs

"Rebec-type instruments have been known in Europe under different names and in various shapes from the late 10th century or early 11th to the present day, but their use in art music was chiefly during the Middle Ages and Renaissance." ¹ They are accepted as the earliest of bowed string instruments in Europe, but the relative lack of extant music written for them means that very little is known about rebec tuning practices. The rebec "dates from the period when music was seldom written for specified instruments but was played on whatever was available and suitable for the occasion, and although it [the rebec] survived into the Baroque era it did not at that time normally appear in art music." ²

Figure 1.1: Detail from 'Virgo inter virgines' by Gerard Davis (c.1509). ³ This rebec has three strings. The bridge appears not to be significantly arched indicating that perhaps all three strings sounded at once. The left hand thumb position might facilitate the playing of different drones, something alternate tunings may also have been used for.

² Ibid., 901.
In its most common form after the fourteenth century, the instrument is described as "approximately pear-shaped, with a wooden soundboard, a sickle-shaped pegbox, usually ending in a scroll or carved head, and a tailpiece." \(^4\) (See figure 1.1 for an example.)

Tuning in fifths and fourths predominated on rebecs. Some had only 2 strings tuned usually a fifth apart, and, though the norm was three strings, from one to five was common. \(^5\) These instruments only occasionally had frets, but, like viols, they were typically used in consorts comprising instruments of multiple sizes and ranges. Rebec consorts generally had four members: soprano, alto, tenor, and bass, though this too varied. Martin Agricola discusses the tunings of both rebecs and viols in his *Musica instrumentalis deutsch* (1545), and figure 1.2 summarizes the tuning information he gives for three different sizes of rebec.

![Discant, Alto and Tenor, Bass tunings](image)

**Figure 1.2:** Agricola tunings (1545) for Discant (g-d'-a’), Alto and Tenor (c-g-d’), and Bass (F-G-d-a) rebecs. \(^6\) The name for the highest pitched rebec cited by Agricola comes from the Latin term indicating the soprano or treble voice.

The tuning of the bass rebec indicates that fifths and fourths were not used exclusively since the interval of a major second between adjacent strings is present here. Why this tuning was common is hard to determine, again, simply because of the lack of

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\(^4\) Ibid., 899.

\(^5\) Ibid.

extant music. Drones, or sustained accompanimental pitches, were common in early music, and this tuning may have facilitated the playing of particular drone pitches. Unlike modern violin family instruments, rebecks with three or more strings were likely used to sound multiple notes at once as is evidenced by the low arching of the instrument’s bridge. Mary Remnant states, “Those rebecks that had three or more single strings sounding together needed a tuning suitable for regular drones.” 7 This is perhaps the reasoning behind the tuning of the bass rebecc shown in figure 1.2.

The Viols

The viol family appeared toward the end of the fifteenth century in Europe and made use primarily of fourths and thirds between strings. Agricola provides the first source for viol tunings. These are shown below (figure 1.3) for a consort of four instruments. 8 It is important to note that the term “bass viol” refers to an instrument of approximately a violoncello’s size and range. Confusion between this and the modern use of the term “bass” (short for contrabass) must be avoided.

Discantus  Altus and Tenor  Bassus

Figure 1.3: Agricola’s tunings for discantus (f-a-d’-g’-c”), altus and tenor (c-f-a-d’-g’) and bassus (G-c-f-a-d’-g’) viols (1529).

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7 Remnant, s.v. “Rebec,” 900.
Though only Agricola’s bass viol uses six strings, this number became the norm for all viols later, and it also became common to conserve the placement of the third from instrument to instrument save on the alto viol. The tunings shown in figure 1.4 are considered now to be standard for the modern performance of period viol music. The placement of the third in the alto viol tuning is between strings four and five, not three and four, as is the case on all the other members of the family. One possible reason for this alteration may be that a certain similarity between the tunings of the alto and tenor viols is retained as a result. Early ensembles of viols contained two instruments of identical tuning but different sizes.⁹ (See the altus and tenor viols in figure 1.3.) The placement of the third in the standard tunings of the alto and tenor viols shown in figure 1.4 may have been a result of the desire to keep much the same pitch content on these two instruments. Undoubtedly players would have switched between alto and tenor viols when the two differed by only a few inches in size, and not at all with regards to tuning. The standard tunings shown below may simply have facilitated this switch. Even though the tunings were no longer identical, they at least remained the same on all but the top or bottom string.

![Tunings](image)

**Figure 1.4:** Modern standard for tuning of the treble (d-g-c’-e’-a’-d’”), alto (c-f-a-d’-g’-c’”), tenor (G-c-f-a-d’-g’”), and bass (D-G-c-e-a-d’”) viols.

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⁹ Early violin family consorts also contained multiple sizes of violas, all identically tuned. The history of the tenor viola as distinct from, and larger than, the alto viola is one example. Stradivari produced a quintet of string instruments for Ferdinando de’ Medici in 1690 that comprised two violins, an alto viola of about 16 inches, a tenor viola of about 19 inches, and a cello. The two violas were tuned identically.
Between Agricola's treatise and the point at which the tunings in figure 1.4 became standard, there was quite a bit of variation in viol tunings. In his *Regola rubertina* (1542) Silvestro di Ganassi explains four different tuning methods for a three member consort, though his fourth method makes use of five-string rather than six-string instruments. In each of his three six-string methods, the tuning of only the soprano or tenor viol varies. The bass viol retains the same tuning. Table 1.1 below summarizes these various tunings and includes his five-string methods as well. The five-string tuning was perhaps the most popular at the time since Ganassi indicated that it was "used by most players." 10 Table 1.1 shows that the modern six-string tunings in figure 1.4 were in use, though not exclusively, quite early on in the viol's recorded history.

<table>
<thead>
<tr>
<th><strong>Soprano</strong></th>
<th><strong>Tenor</strong></th>
<th><strong>Bass</strong></th>
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<tr>
<td>d-g-c'-e'-a'-d&quot;</td>
<td>G-c-f-a-d'-g'</td>
<td>D-G-c-e-a-d'</td>
</tr>
<tr>
<td>c-f-b'-d'-g'-c&quot;</td>
<td>A-d-g-b-e'-a'</td>
<td>D-G-b[sic]-e-a</td>
</tr>
<tr>
<td>d-g-b-e'-a'</td>
<td>G-c-e-a-d'</td>
<td>D-G-b[sic]-e-a</td>
</tr>
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*Table 1.1:* Various viol tunings given by Silvestro di Ganassi (1542). 11 The five-string tuning for bass viol should progress from G to the B a major third up. Woodfield's table indicates a B that is an octave too high with the lower case letter B.

Other theorists give tunings identical to Ganassi's five-string ones, but some, like Hans Gerle in his *Musica teusch* (1532) hint that a sixth string may be added to each of the five string tunings given by Ganasi, extending the range a fourth below that shown in Table 1.1. 12 Still other variants existed as well. Michael Praetorius, in *Syntagma musicum* (1619), is one of many theorists to offer a lower set of viol tunings in which the treble viola is equivalent to Ganassi's tenor viol, and the contrabass viol is a full octave

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10 Woodfield, 669.
11 Ibid.
12 Ibid.
below Ganassi’s bass viol. Ian Woodfield points out that this, in effect, shifts the names applied to each instrument. “The ‘tenor’ viol of the low-pitched consort was the exact equivalent of the ‘bass’ viol of the high-pitched consort.”

As is obvious by this point, several tunings were popular on viols, and this situation persisted through the seventeenth century, particularly in the case of the contrabass member of the viol family. Praetorius gives several tunings for five- and six-string contrabass instruments. Two of them, E’-A’-D-G-c (gross bass viol da gamba) and D’-E’-A’-D-G (violone), are shown in figure 1.5. These tunings are obviously not far removed from the modern double bass tuning. The second tuning shown in figure 1.5 for the violone also provides an analogue to the bass rebec’s use of a major second between the two bottom strings. The rationale behind this tuning on the lowest of the viols may have been two-fold. Like the bass rebec, one of the functions of the violone may have been to provide appropriately pitched, low drones, and the tuning may have been designed to facilitate that. Quite likely, pitches much below E’ lacked projecting power with the strings of the period. The bottom string of the contrabass viols might have been tuned up to afford the necessary clarity of tone and projection while still retaining as low a register as possible. This particular rationale for the alternate tunings used on contrabass viols will be discussed further below.

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13 Ibid.

14 The term “Violone” is perhaps one of the most difficult names to apply to instruments accurately since its meaning changed over time and had different meanings in different countries. Violone was the widely accepted name for the contrabass member of the viol family in France and Germany in the early eighteenth century, and in England by the 1730s. The term “contrabasso” had gained some popularity in Italy by the time of Georg Muffat’s preface to his Florilegium secundum (1698). He wrote that the instrument called “contrabasso” in Italy went by “violone” in Germany. (Alfred Planyavsky, s.v. “Violone,” in The New Grove Dictionary of Music and Musicians, 2001 ed., 766.) For Corelli (1653-1713) “violone” may actually have signified a bass violin (cello). In this document “violone” will apply to a contrabass-register instrument, and in the mid- to late-eighteenth century will apply to the small double bass instrument used by the extraordinary school of virtuoso playing that had its beginnings in Vienna.
Figure 1.5: Tunings given by Praetorius (1619) for the gross bass viol da gamba (E’-A’-D-G-c) and the violone (D’-E’-A’-D-G) compared to the modern double bass tuning (E’-A’-D-G).\(^{15}\)

The tunings in figure 1.5 are interesting also because they include no interval of a third between strings, common to those viols of higher registers. Another major tuning tradition for viols that didn’t use a mix of fourths with a third is identified in Jambe de Fer’s *Epitome musical* (1556). Figure 1.6 shows the viol tunings that he contrasts with the standard “Italian” tunings (Ganassi for example) for five-string instruments.\(^ {16}\) These tunings obviously consist entirely of fourths.

Figure 1.6: Jambe de Fer’s French tunings (1556) for dessus (e-a-d’-g’-c”), taille (B-e-a-d’-g”), and bas (E-A-d-g-c’) viols.

Variations in tuning were generally seen more frequently on the lower-register members of the viol family than on the higher-register ones. The bass viol in England, otherwise tuned identically to the bass tuning given by Ganassi (D-G-B-e-a), sometimes


\(^{16}\) Woodfield, 670.
had the lowest string tuned to C rather than D, making for a fifth between the bottom two strings. French players frequently added a seventh string to Ganassi’s six-string bass tuning. This seventh string was tuned to A’ extending the range a fourth lower than that of the standard bass viol.¹⁷

*Double Bass Viols and the Eighteenth-Century Violone*

Double-bass viols have had such a rich history of alterations to their tuning that the subject can only be touched upon here. The tuning of the gross bass viol da gamba given by Praetorius and shown in figure 1.5 is a full octave below the bass viol tuning common in France given in figure 1.6. Due in large part to the technology of string making, contrabass-range instruments tended to have poorly defined pitch and weak projection on their lowest string, and their highest strings tended to break under the tensions needed to attain the desired tuning with such long strings. These problems lead to the frequent alteration of tunings and, eventually, to the establishment of a new standard. Johann Jacob Prinner (1677) and James Talbot (1697) mention F’-A’-D-F♯-B and F’-A’-D-F♯-A tunings respectively (figure 1.7), and Paul Brun even claims that the lowest string was sometimes raised all the way to G’.¹⁸ The tunings suggested by Prinner and Talbot counter the bottom string’s projection problems by increasing its tension slightly and prevent breakage of the top strings by decreasing their tension.

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¹⁷ Ibid., 664.
¹⁸ Brun, 101.
Figure 1.7: Praetorius’s tuning (1619) for the gross bass viol da gamba compared to Prinner’s (1677) and Talbot’s (1697).  

Talbot’s tuning with a D major triad on the top three strings and an inverted D minor triad on the bottom three was the favored tuning throughout much of the eighteenth century and is cited by numerous writers such as Albrechtberger (1790), Fröhlich (1810), and Jacquot (1886) even well past the middle of the nineteenth century.  

By 1790, when Johann Georg Albrechtberger’s *Gründliche Anweisung zu Composition* was published, the violone had almost universally adopted five strings and a tuning of F’-A’-D-F#-A. Albrechtberger acknowledged the existence of an older type of double bass “without frets and with only four strings,” but he claimed that these tunings and the three- and four-string double basses were only infrequently seen.  

A remarkable school of virtuoso violone performance rooted in Vienna made its mark in the middle of the eighteenth century. In Germany and Austria, the violone was equivalent to the contrabass, though by the end of the Classical period, a German violone was recognized to be significantly smaller than the instrument that went by the name “contrabasso” in Italy. From Esterházy documents and Haydn scores, James Webster offers that the term “violone” was not only equivalent to “contrabass,” but it was the

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19 Ibid.
20 Ibid., 100.
more commonly used term. The brief period of popularity for the Viennese violone contributed significantly to the rich history of repertoire and tunings for the contrabass members of the viol family even though the instrument’s use died out with the advent of the Romantic period. The tunings in use on the violone during this period varied widely, and were designed to facilitate performance in given keys, but also limited the player’s ability to perform comfortably if the music modulated to distant keys. By the start of the Romantic period, the tuning variations fell into disuse in favor of systems that allowed for more comfortable and distant modulations from a home key. The lyra viol also made use of key-specific tunings, and this phenomenon will be discussed below in conjunction with this small bass viol.

One tuning in use on double-bass instruments during the same, mid-eighteenth century period quite logically was devised to facilitate the musical role that the instrument played. Quite a large number of authors from eighteenth and nineteenth century Germany, France, Italy, and England cite a C’-G’-D-A tuning an octave below the violoncello. This tuning facilitated the doubling of the cello line at an octave lower, but caused significant difficulties in execution due to the increased stopping distances on the larger contrabass. One also must wonder about the sound quality of the lowest string on the instrument if criticisms were levelled against a low E’ string on other instruments. Competing with this tuning in fifths was the E’-A’-D-G tuning that Albrechtberger had claimed to be outdated in 1790. This tuning in fourths had a following that persisted, and eventually won out over other options. Most alternatives

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23 Brun, 114.
that existed in the nineteenth century were alterations of either the E’ or the C’ tuning, and they were designed, as was true earlier in the case of the violone’s five-string tunings, to make up for the fact that the sound of the bottom string was unsatisfactory. Either the string was eliminated, resulting in a three-string instrument tuned either A’-D-G or G’-D-A, or the bottom string was tuned up resulting in a few alternate tunings (figure 1.8). 24

An interesting difference between Germany and most of the rest of Europe persisted, and the German tradition may have been what influenced the return to popularity of the now standard tuning in fourths up from E’. “Even though some German bassists were occasionally willing to discard a string, they often remained unpersuaded to give up low-pitched tones, which they felt provided valuable substance and depth to the orchestra. Accordingly they removed the highest-pitched string instead.” 25 The German practice therefore resulted in three-string basses without the G string.

![Figure 1.8: Tuning alterations from the standard C’ and E’ tunings of the contrabass viol. Most three-string tunings eliminated the bottom string. Four-string tunings frequently altered the pitch of the bottom string to increase projection.]

24 Ibid., 120-121.
25 Ibid., 125.
The fascinating history of the double bass and other viols has only been touched upon here in order to reserve space for a discussion of the practices on a particular member of the viol family. On no other instrument was the experimentation with tuning as thorough as it was on the lyra viol.

*The Lyra Viol*

The lyra viol was "a small bass viol popular in England during the 17th century." As such, if it were to have had a normal tuning, it would probably have been similar to the tuning given for the bass viol in figure 1.4 (D-G-c-e-a-d'). This tuning was indeed one of many used on the instrument, an example of which is shown in figure 1.9. The bass viol, and therefore the lyra viol, played in generally the same range as a violoncello, and thus the history of the lyra viol is particularly applicable to this study.

*Figure 1.9:* A six-string lyra viol. The instrument has a body length of 65.8 cm and a string length of 60.1 cm. Both of these dimensions are slightly less than those of a standard violoncello whose body and string lengths are typically about 75 cm and 68 cm respectively.

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27 Peter Hüttnansberger, Lyra viol after John Rose, picture from The Orpheon Foundation Museum of Historical Musical Instruments of the 16th-18th Centuries, http://www.mdw.ac.at/1105/orpheon/Seiten/
Frank Traficante writes in his article for the New Grove Dictionary of Music, “As an instrument it [the lyra viol] differed little from the standard consort bass viol. Its importance rests on the large, specialized and musically valuable repertory which was written for it.” ²⁸ He goes on to point out that the lyra viol occupies an important place in the history of music, not just in the history of instruments.

It could approximate to the polyphonic textures and self-accompaniment capabilities which helped to raise continuo instruments such as the harpsichord and lute to a high level of esteem during the late 16th and early 17th centuries. On the other hand, it could also produce a rich singing line, the growing taste for which led to the predominance of the violin and the solo voice by the beginning of the 18th century. During its period of popularity the lyra viol successfully performed both roles. ²⁹

The lyra viol, therefore, is much more than an isolated oddity in the history of instrument making. It deserves the attention it has received, and that attention invariably must deal with the proliferation of a dizzying number of tunings. The history of alternate tunings on the lyra viol is so rich that it is in fact impossible to refer to scordatura on the instrument. The whole concept of scordatura is one of an alternative to a normal tuning, and the lyra viol has no one normal tuning. “Only three or four tuning variants had achieved popularity during the first 15 years or so of the 17th century.” ³⁰ By the last quarter of the century there were many more variants in use. Traficante published much of his original research into the tunings used on the lyra viol in an article for Acta Musicologica in 1970. ³¹ He considered in his list of tuning schemes only the interval

²⁸ Traficante, s.v. “Lyra viol,” 418.
²⁹ Ibid.
³⁰ Ibid., 420.
content, not the actual pitches each string is tuned to, even though many of the tuning schemes had been used at several different pitch levels. This is, of course, a perfectly reasonable simplification to make when music for the instrument is written in tablature, a notation that doesn’t specify actual pitches. Consider, however, that such a simplification would equate the modern tuning of the cello with the tuning of the “church bass” of old \((B^\flat-F-c-g)\) because both are tuned entirely in fifths. Even ignoring what are essentially transposition scordaturas on the lyra viol, Traficante is still able to identify 51 distinct tunings. 32

Those who play instruments of the violin family today may understandably balk at the prospect of being asked to learn how to play their instrument under as many different tunings as the lyra viol used. It must be understood, however, that except for one manuscript found to date, all extant lyra viol music is written in tablature. 33 This greatly simplifies the reading of works written for an unfamiliar tuning. Players do not read notes. They read finger placement. Lyra violists therefore did not experience the degree of confusion that modern string players do when dealing with the apparent contradiction between their finger placement and the note that is printed on the page. Chapters three and four will discuss the difficulties encountered by cellists in reading scordatura works more thoroughly. Figure 1.10 is a reproduction of a portion of this tablature notation and Figure 1.12 shows its transcription to modern notation. The tablature notation has been tidied up from the original manuscript that is virtually

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32 Ibid. In his lyra viol article for The New Grove Dictionary, Traficante later claims (2001) that nearly 60 tunings were in use by the end of the 17th century. Rather than simply counting the transpositions separately, more tunings must have been identified since his article for Acta Musicologica (1970) because counting the transpositions identified there would raise the total to well over 60.
33 Traficante, s.v. “Lyra viol,” 419.
illegible in the available facsimile. The rhythmic notation above the staff that was
original to the manuscript has also been modernized.

2. The galliard

![Musical notation](image)

**Figure 1.10**: Thomas Ford, *The Galliard*, measures 1-4. This example is from *Thomas Ford: Lyra Viol Duets*, edited by Oleg V. Timofeyev, Recent Researches in the Music of the Baroque Era, vol. 90. Madison, WI: A-R Editions, Inc., 1998. Used with permission. All rights reserved.

The tablature notation here indicates fingering positions on each of the six strings
by the placement of script letters from ‘a’ through ‘g’ in this example. An ‘a’ indicates
an open string. A ‘b’ indicates a fingering at the first fret and a ‘c’ at the second fret, and
so on. Each fret on the instrument is a semitone up from the previous one, and the six
lines on each staff represent the six strings of the instrument from the highest pitch down.
In the first beat of measure one, the player of the first part therefore fingers at the third

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34 The script letter ‘c’ appears more like an ‘r’ in this tablature. The first eighth note in the second lyra
violin part is an example of this indication for a fingering at the second fret of the fifth string.
fret on the highest string, and the player of the second part plays three open strings; the third, fourth, and fifth strings. The tuning of the instrument obviously impacts the pitch content of the piece significantly, but that tuning is not self-evident from the tablature score. Surprisingly, tunings were frequently not provided, and players simply had to figure them out. Even then, what mattered the most was the arrangement of intervals between the strings, not the absolute pitch level. In the transcription to modern staff notation provided in figure 1.12, the tuning shown below in figure 1.11 was used, but any feasible transposition of this tuning could also be used to allow performance in different keys.

![Figure 1.11: The tuning of each lyra viol used for the transcription in figure 1.12. (C-F-c-f-a-d’)](image)

![Figure 1.12: Modern notation for Thomas Ford, The Galliard, measures 1-4. This example is from Thomas Ford: Lyra Viol Duets, edited by Oleg V. Timofeyev, Recent Researches in the Music of the Baroque Era, vol. 90. Madison, WI: A-R Editions, Inc., 1998. Used with permission. All rights reserved.](image)
As can be seen in figure 1.12 the lyra viol is capable of complicated polyphony even though the instrument is bowed rather than plucked. The plucking of a lute allowed for the performance of simultaneous notes on nonadjacent strings. A bowed instrument must use adjacent strings for harmonic combinations, or make careful use of open strings and left hand fingerings to allow for notes not actively bowed to be left ringing. "Thus composers tried to devise tunings which would offer the crucial pitches in close proximity on adjacent strings." 35 Ford makes particularly good use of open strings throughout the piece, and an example of this can clearly be seen in measure 1 of the second lyra viol part from The Galliard. The player begins with a chord involving the unstopped middle three strings. While the open C (fourth) and F (third) string continue to ring, the ascending scale on the lower F (fifth) string may be played. When the A♭ is reached, the player, leaving that note stopped, and thus ringing, may use the bow to play the quarter note C on the A (second) string. The last half-note chord of measure one is playable on consecutive strings (three, four, and five) at the fifth fret, shown in the tablature in figure 1.10 as a set of script "fs" at the end of measure 1. The player needn’t skip silently over any strings with the bow in order to obtain the notes of the chord.

Traficante rightly asks, "Why did this enormous variability of tunings come about and how was it viewed by the contemporary musicians who were forced to contend with it?" 36 Early experimentation with tunings on the lyra viol may have been spurred by attempts to mimic the polyphonic abilities of the lute in a manner similar to the music of Ford shown above, but this would essentially require a different tuning for every key in order to facilitate the kind of chord playing that was desired.

35 Traficante, “Lyra Viol tunings: ‘All Ways have been Tryed to do it,’” 192.
36 Ibid.
The experimentation with tunings was gradual at first. The musical sources that were published during the early part of the century (1601-1615) call for the use of only five tunings…

As time went on, close relationships developed between tunings and specific keys. The major-minor counterpart tunings are a manifestation of this trend…

Examples of the use of one of these major-minor counterpart tunings can be seen in two short excerpts of works involving lyra viol by John Jenkins (1592-1678). Figure 1.13 shows the tuning and the first two measures of the transcription of the lyra viol part from tablature for the Ecco Coranto from the Suite in D Major, VdGS 56. Figure 1.14 provides the same for the first two measures of the Pavine from the Suite in D Minor, VdGS 57. The D major suite is for treble viol, lyra viol, and harpsichord. The D minor suite is for treble viol, lyra viol, and basso continuo.

Figure 1.13: John Jenkins, Ecco Coranto from the Suite in D Major, modern transcription. Measures 1-2. This example is from John Jenkins: The Lyra Viol Consorts, edited by Frank Traficante, Recent Researches in the Music of the Baroque Era, vol. 67. Madison, WI: A-R Editions, Inc., 1992. Used with permission. All rights reserved.

\[37\] Ibid., 192.
Figure 1.14: John Jenkins, Pavine from the Suite in D Minor, modern transcription. Measures 1-2. This example is from John Jenkins: The Lyra Viol Consorts, edited by Frank Traficante, Recent Researches in the Music of the Baroque Era, vol. 67. Madison, WI: A-R Editions, Inc., 1992. Used with permission. All rights reserved.

The D minor chord that opens the suite in figure 1.13 could not effectively be played if the tuning weren’t altered to make us of an F string rather than an F♯ string. The specialization of a tuning for use with a specific key also had the effect of improving the sympathetic vibrations on the instrument in that key, and therefore must have improved the resonance of the instrument. No notes ring on string instruments quite like open string notes. The use of open strings is an especially important technique for the rendering of polyphonic music on a bowed instrument since these strings can easily be left ringing while the bow and left hand are occupied elsewhere on the instrument. Altered tunings allowed for the appropriate drone notes or chords with a minimum of left hand machinations as well as a minimum of awkward string crossings with the bow. As a tuning becomes more specialized for use in a specific key, it becomes less useful in other keys, and the number of identifiable tunings more than doubled by the second half of the century from five to about twelve.

“Generally speaking, the repertory of tunings seems to have developed in two ways—by taking over the tunings of other instruments and by a process of varying its
own variant tunings.” 38 Eventually, the situation became almost humorous. “Apparently teachers even attempted to attract students with claims to the invention of tunings which would render the drudgery of practice unnecessary.” 39 There were also those who reacted to the unnecessary numbers of alternate tunings. Traficante points to writings and compositions of John Playford, Thomas Mace, and Thomas Salmon approaching the last quarter of the century that attempted to limit the proliferation of variant tunings. Nevertheless, there were those who defended the multiple tunings. Matthew Locke was among these defenders. Traficante summarizes the argument between the two camps in terms of “whether one should choose a tuning for the ease of fingerling and open-string chords which it provides or for the possibility it offers of playing music in many different keys.” 40 We will see in chapter three of this study that some tunings have been chosen in the solo cello repertoire of the twentieth century not only to afford the possibility of certain open string notes, drones, and chord members, but also to enhance the resonance through sympathetic vibrations, and alter the timbre of the instrument.

A brief summary of lyra viol tunings yields some practices that may in fact be usable on today’s string instruments. Traficante finds that “the interval between two adjacent strings can vary all the way from a major second to a perfect fifth.” 41 Most of the tunings found are for six-stringed lyra viols, but three are four-string tunings, one of which even makes use of an octave between two adjacent strings. All of these tunings are given by Traficante in a shorthand form designating intervals between strings, and, when known, the pitch of the highest string. A sample of these tunings is shown below in

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38 Ibid., 185.
39 Ibid., 192.
40 Ibid., 195.
41 Ibid., 184.
figures 1.15-1.18 in standard staff notation. The amount of work done by Mr. Traficante represented here is enormous. Footnotes will identify the principal primary sources in which he found each of these tunings, though frequently there are more sources for a particular tuning than need to be mentioned here.  

![Diagram of standard bass viol, "lute way," with lowered bottom strings]

**Figure 1.15:** A. The tuning of the standard bass viol was also common on the lyra viol.  
B. The lyra viol, mimicking not only the polyphonic music of the lute, sometimes duplicated the pitch level of the lute as well.  
C and D. As mentioned above, English bass viol players frequently altered the pitch of the bottom string to a fifth below that of the next highest string. This practice continued on the lyra viol as well, and both tunings from figures A and B were altered in this way to arrive at tunings for figures C and D.

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42 Ibid., 197-205.  
43 Thomas Ford’s *Musike of Sundrie Kindes* (London, 1609) is one of many sources that indicate the use of the standard tuning for the bass viol on the lyra viol. Tobias Hume, Christopher Simpson, and Thomas Mace are others who mention this tuning and title it “lute way,” “plain-way,” or “viol way.”  
44 The title “lute way” was also more appropriately applied to the transposed version of the tuning found in figure 1.12A. Tobias Hume’s *The First Part of Ayres* (London, 1605) is one of Traficante’s sources.  
45 Tobias Hume again is one of many sources for these tunings. Hume’s *Captaine Humes Poeticall Musike* (London, 1607) is the only source to identify the practice of reckoning the tuning downwards from g’ though.
"harp way sharp"  
\[ \text{A} \]

"harp way flat"  
\[ \text{B} \]

\[ \text{C} \]

**Figure 1.16:** A and C show a major-minor counterpart tuning pair. The nomenclature for such pairs consistently uses the term “sharp” to indicate major, and “flat” to indicate minor. This interval arrangement was also used for a tuning reckoned down from middle C shown in figure B. 46

\[ \text{common tuning flat} \]

\[ \text{common tuning sharp} \]

\[ \text{A} \]

\[ \text{B} \]

\[ \text{C} \]

**Figure 1.17:** A. The A minor tuning shown here differs only slightly from the standard tuning for bass viol.

B. The major counterpart to figure A is shown here. 47

C. This tuning relates to figure B, in a register similar to the lute, in the same way that figure 1.15A relates to figure 1.15B. 48

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46 Among the more commonly used tunings for the lyra viol, there are numerous sources for this major-minor counterpart tuning. John Playford’s *A Musickal Banquet* (London, 1651) is one. Traficante found the “harp way sharp” tuning transposed down a whole step only in a source from Paris’s Bibliothèque Nationale Conservatoire (Rés 1111, folio 203r).

47 Johann Cristoff Ziegler’s *Intavolatura zur Viola di Gamba* (c1680?) and a manuscript from Oxford’s Christ Church Library both mention the “common tuning sharp” and “flat.”

48 Traficante cites a source from Paris’s Bibliothèque Nationale Conservatoire (Rés 1111) that mentions the “common tuning sharp” in the lute register.
Figure 1.18: A. This tuning is interesting because it makes the rare use of a tritone.\(^{49}\)  
B. One of the lowest tunings used on the lyra viol is shown here.\(^{50}\)  
C. John Playford uses this tuning that he calls “the bagpipe tuning.” The player is instructed to replace the fourth string with the fifth in order to accommodate the low D. Though only four strings are used, this is not an indication of a four-string instrument distinct from the normal six-string one.\(^{51}\)  
D. This is a tuning for a piece found in a manuscript from Manchester Public Library that also uses only four strings.  
E. At least one tuning for a seven-string lyra viol exists.\(^{52}\)  
F. This example is a tuning that uses a major second between the bottom two strings like some of those already seen above for the bass rebec, the violone, and the contrabass.\(^{53}\)

As would be expected, the interval of a tritone between strings is not at all common in the tunings of the lyra viol, but neither is it completely absent as is seen in figure 1.18A. Intervals between strings of only a major second are much more common, but primarily the variations in tuning schemes resulted from varying applications of major and minor thirds, and perfect fourths and fifths. John Playford may have been the first to call for the reordering of the strings on the instrument with the tuning shown in figure 1.18C. This practice would be expanded upon by Heinrich Ignaz Franz von Biber in his Mystery Sonatas for violin which will be discussed in the next chapter. The

\(^{49}\) Jacob Kremberg’s Musicalische Gemüths-Ergötzung (Dresden, 1689) is the only source Traficante found to make use of a tritone.  
\(^{50}\) Alfonso Ferrabosco’s Lessons for 1, 2, and 3. Viols (London 1609) is one of many sources Traficante cites that makes use of this tuning.  
\(^{51}\) John Playford’s A Musicall Banquet (London, 1652) and his Musicks Recreation on the Lyra Viol (London, 1661).  
\(^{52}\) Traficante cites Mr. Demachy’s Pièces de Violle. Paris 1685.  
\(^{53}\) John Moss’s Lessons for the Basse-viol (London, 1671) is the sole source for this particular tuning, though others exist that call for major seconds between strings.
replacement of strings is a technique that has also been used in the twentieth century in pieces for unaccompanied cello by composers like Jonathan Harvey and Louis Andriessen who use two D strings for Three Sketches and two A strings for La Voce respectively. With these practices as evidence, perhaps the boundary given by many orchestration texts mandating that composers remain within a whole step of the normal pitch of a string is a bit too stringent. 54 Care must be taken of course not to exceed the tolerance of the strings when increasing the tension, but some twentieth century works for cello, like Nomos Alpha by Iannis Xenakis, lower the pitch of a string by as much as an octave.

54 Only one text was found that acknowledged the possibility of extreme scordaturas to as much as an octave lower than the normal pitch. That text is Andrew Stiller’s Handbook of Instrumentation (Berkeley: University of California Press, 1985).
Chapter 2

\textit{Scordatura} Practices on Members of the Violin Family

The emergence of the violin family has been described as "the final product of a long and variegated process of development." \textsuperscript{1} There cannot have been a single inventor of the instrument. David Boyden points to the lira da braccio, as a few before him did, for some of the body characteristics that the violin family borrowed, among them "its typical outline... the arched top and back supported by a sound post, the ribs, and overhanging edges." \textsuperscript{2} Elizabeth Cowling, in a defense against the formerly common belief that the violin family descended directly from the viols states, "The disposition of the peg box and the tuning in fifths, however, were borrowed from the rebec." \textsuperscript{3} As was discussed in chapter one, the tuning in fifths for rebecs was far from universal, though this was perhaps the norm, as opposed to the norm of thirds and fourths for the viols. Also borrowed from both the rebec and the lira da braccio was the fretless nature of the fingerboard.

**The Violin**

There are over thirty different \textit{scordatura} tunings known to have been used in violin repertoire. \textsuperscript{4} Many simply lower the range of the instrument beyond the normal limits by tuning only the lowest string differently. "In the 18\textsuperscript{th} century Antonio Lolli

lowered the G string of the violin to d.” ⁵ This was widely enough known for the practice to become known as a tuning in the style of Lolli. Other tunings were chosen to alter the timbre of the instrument. Carl Stamitz’s Sinfonia concertante for violin and viola makes use of a transposition *scordatura* up a semitone on both solo instruments. This tuning increases the brilliance of sound noticeably. Boyden points out that only four of the 30 or so tunings (figure 2.1) occur with any frequency. ⁶ The case was much the same with the lyra viol. There is an added incentive, however, against the use of *scordatura* on the violin. Violinists do not read tablature as lyra violists did. As alluded to above, this practice greatly increases the difficulty with which such works are notated and performed.

![Diagram of standard and scordatura tunings](image)

**Figure 2.1:** Standard tuning for the violin and four common *scordatura* tunings.

Unlike some of the tunings devised for the lyra viol, *scordatura* was never used on the violin with claims to ease the difficulties of playing for beginners or amateurs.

...*extreme scordaturas*... were used only by a few specialists like Biber, whose imagination far transcended the simple purposes of the original *scordaturas*. In any case, at least from Biber’s time onwards, the *scordatura* was aimed primarily at tonal effects and secondarily at ease of fingering. Indeed, *scordatura* was never intended to simplify the technical problems of amateurs. It was a device for the ‘masters’, as Georg Falck explicitly wrote in his *Idea boni cantoris* (1688). ⁷

⁵ Boyden, “Violin Technique,” 66.
⁶ Ibid., 68.
⁷ Ibid., 68.
Biber's Mystery Sonatas

No scordatura works for solo violin have exceeded in fame those of Heinrich Ignaz Franz von Biber (1644-1704). In his fifteen Sonatas on the Mysteries of the Rosary (c.1676), Biber calls for a different tuning in each sonata, and only the first sonata and the closing passacaglia (No. 16 of the set) use the traditional g-d'-a'-e'' tuning. Figure 2.2 below gives the tunings and keys for each sonata.

![Tunings and keys for the 15 Mystery Sonatas of Heinrich Ignaz Franz von Biber (c.1676)](image)

Figure 2.2: Tunings and keys for the 15 Mystery Sonatas of Heinrich Ignaz Franz von Biber. (c.1676)

Sonata No. 11 of this set even involves a reordering of strings so that their pitches don’t proceed in order from lowest to highest. This reordering is done so that the first string is tuned to d'', the second to d’, the third to g’ (above the second string), and the fourth to g. Awkward tenths and octaves, which may be fingered as sixths and fifths respectively, are made much easier with this tuning. Figure 2.3 shows a passage from the second movement involving octaves as it appears in the score (as fingered) and then at sounding pitch.  

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8 The at-pitch and as-fingered methods for notating scordatura works will be discussed in chapter four. Briefly, the at-pitch notation leaves the determination of how to finger the pitch on an altered string...
Figure 2.3: Biber, Mystery Sonata No. 11, Surrerit Christus Hodie, measures 83-91.
A. as it appears in the score
B. at sounding pitch

David Boyden mentions that the tuning of Sonata no. 12, c'-e'-g'-c'', is chosen to “aid the production of effects characteristic of... the trumpet.” This same effect of mimicking the music of other instruments was seen above with the lyra viol’s imitation of lute music through scordatura. Figure 2.4 is a brief excerpt from Biber’s twelfth Mystery Sonata showing the trumpet fanfare-like beginning of the piece. The entire passage shown is played with open strings save the unison c” at the end of the selection, which involves both the open top string and a stopped note on the second string.

Figure 2.4: Biber, Mystery Sonata No. 12, Intrada, measures 1-5.
A. as it appears in the score
B. at sounding pitch

up to the performer, and the as-fingered notation shows where the player should finger the note, not what the actual sounding pitch will be.

11 Biber, 26.
The Viola

The primary examples of *scordatura* literature for the viola involve transposition *scordaturas*, tunings that change the pitch of all four strings by the same interval. These tunings are frequently designed as soloist tunings to increase the tension on the instrument and to enhance its projecting power for solo situations. Mozart’s Symphonia Concertante in E♭ major for Violin, Viola and Orchestra K346/320d is perhaps the best known example of a work that brightens the timbre of the viola with a transposition *scordatura*. Each string of the viola is tuned up a half step, and the part is written and played as if the piece were in D major. Not only does this tuning brighten the timbre of the viola, but the resonance of the solo violin, with which the viola must compete, is darkened simply by virtue of the fact that the key of E♭ major allows the violin to ring much less freely. Two of the violin’s open strings are pitches outside of the key. Two viola concertos by Johan Amon (1763-1825) use soloist tunings. Amon’s concerto in A major applies a tuning a whole step up from normal which allows the violist to finger the piece as if it were in the more comfortable key of G major. His other concerto is in E major, but it makes use of a tuning only a half step higher. This tuning requires the violist to finger in the uncomfortable key of E♭ major, but it does enhance the projection of the instrument due to the increased tension on the instrument. Georg Druschetsky (1745-1819), and Johann Voigt (1769-1811) also wrote viola concertos that use soloist tunings, and Carl Stamitz (1750-1812) is the author of a sonata for viola and piano that uses a tuning a half step up for all four strings as well. The issue of the timbral effects of *scordatura* will be more thoroughly addressed in relation to the cello in chapters three and four.
The Violoncello

Jambe de Fer's *Epitome Musical* (1556) is the first treatise to discuss the violin family unambiguously. 12 Putting aside the fact that the instruments weren't called the violin, viola, and cello, they were nevertheless identified by him as sharing a G-string. The tuning for the violin and violas would be as we know it today, but the cello, according to this account, would be B♭-F-c-g. The advent of this tuning may in fact simply be the logical extension by a fifth of the three string tuning (F-c-g) given by Agricola nearly 30 years earlier for a "bass instrument." 13

The cello experienced relatively little tuning experimentation when compared to the history of the violin, the violone, and the lyra viol. It did not suffer from the low register projection issues that inspired alterations of double bass tunings, and the instrument wasn't yet a vehicle for solo music like the violin was. There were attempts to fill the gap in register between the viola and cello with small instruments like the violoncello piccolo, tuned G-d-a'-e'. Some small cellos were strung with five strings and tuned C-G-d-a'-e', though these were likely 7/8-size instruments, much larger than a violoncello piccolo. Some cellos, if they had six strings, were tuned like the bass viol C(or D)-G-c-e-a-d'. Nevertheless, instead of 50 or even 60 alternate tunings, the four-string cello essentially had only three possible tunings prior to the establishment of the standard tuning in fifths up from C. It is not entirely clear that the earliest tuning discussed by Agricola and others (B♭-F-c-g, hereafter referred to as the B♭- tuning) was in use exclusively with the larger "church bass" instruments as is sometimes implied by

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12 Numerous sources discuss Jambe de Fer's treatise and the tunings implied by it. See in particular Cowling, Mark Chambers, Gordon James Kinney, and articles on viols and violin family members in The New Grove Dictionary of Music and Musicians.

twentieth century writings. In fact, it would make sense that the player might simply adjust whatever instrument was available to suit the needs of the music. The first cellos, produced by Andrea Amati, were of the larger type, but John Dilworth has the following to say:

...almost contemporary with these [the Amati cellos] were smaller cellos made in Brescia, with a back measuring only c.71 cm. These two sizes seem to have persisted as alternatives well into the eighteenth century, and they have provoked some discussion amongst scholars as to whether they were one and the same instrument or, rather, two variants designed for different usages and tunings... In England, the first cellos appeared at the end of the seventeenth century; an example by William Baker of Oxford, attributed to 1672 when the low B♭ tuning was commonplace in this country, is of the smaller c.71 cm size. ¹⁴

These c.71 cm instruments are even smaller than the Stradivarius form B model (75.6 cm) now considered to be the accepted standard. ¹⁵ It is unclear at present whether Baker’s instruments were considered cellos, and tuned from B♭, or considered to be a different instrument entirely and tuned perhaps like the even smaller violoncello piccolo. However, there appears to be no evidence that there was a distinct tuning for the c.71cm instruments. Since it seems likely that even an instrument such as Baker’s was tuned from B♭, this tuning probably was in use on cellos of all sizes. The history of the lyra viol certainly demonstrates that a rather wide range of tunings is possible on a bass-register instrument. The lowest string of the lyra viol was seen in chapter one to vary anywhere from a low A’ up to the G almost an octave higher. The relatively small size of the lyra viol didn’t seem to limit the lower range used on this instrument in England, and so it is likely that Baker’s slightly small cellos would not be limited in

¹⁵ Ibid., 10.
this way either. One of the earliest pieces for solo cello, Domenico Galli’s
*Trattenimento musicale sopre il violoncello a’ solo* (1691), uses the low B♭ tuning.

For a time around the turn of the eighteenth century, while the low B♭ tuning
was slowly passing out of favor, as was the larger (c.78 cm) more cumbersome model
of cello, there were two other competing tunings for the cello. The Italian tuning, C-G-d-g, and what is now the traditional tuning, C-G-d-a, seem to be the only other major
options open to the instrument. The first works unambiguously written for
unaccompanied violoncello were the Ricercate, Op. 1 (1687) by Giovanni Battista degli
Antonii. Gordon James Kinney suggests that these ricercate were actually written for
a six-string cello tuned like a viol either C-G-c-e-a-d’ for numbers 1-5, 7, 9, and 11 or
D-G-c-e-a-d’ for numbers 6, 8, 10, and 12. These tunings were common on the six-
string bass viol as has already been seen. He bases this assertion on compelling
arguments about viol-like figuration and the use of clef changes at times to indicate
changes of position or string, a notational technique used before Boccherini and others
simplified the use of clefs. Kinney also points out that the upper range of these
ricercate is c’′, playable in the rarely used heights of seventh position on a traditionally
tuned cello, sixth position using the Italian tuning, or at the much more commonly used
upper limit of fourth position on a six-string instrument tuned as he suggests. However,
I do not know of any conclusive evidence that could irrefutably establish these as the
intended tunings for the pieces.

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16 Cowling supposes that G.B. Vitali (c.1644-92) and Giuseppe Columbi (1635-94) wrote works for
unaccompanied cello also. Vitali’s *Partite sopra diverse Sonate* di Gio: Batta : *Vitali per il Violone*
seems to be for a large cello tuned from B♭. Three works by Columbi seem to be for cello as well. They
are his *Chiacona a Basso, Toccata a Violone solo* (unfinished), and *Balli Diversi a Basso solo*. Only the
Chiacona is unequivocally for the B♭ tuning, though the other two may be as well. (Cowling, 78-79.)
Gabrielli and Marcello Sonatas

Many composers preferred the Italian tuning, while much of the rest of Europe was using the traditional tuning. Mark Chambers points to several composers who used the Italian tuning, not as a scordatura of course, since it was accepted at the time as a normal tuning. 17 Domenico Gabrielli (c.1659-90) wrote his Ricercari per violoncello solo (1689) only shortly after Antonii’s contributions. Chambers analyzes the writing for cello in these pieces and convincingly makes the case for the fact that the intent must have been for the cello to be tuned in the Italian way. In a few cases, Gabrielli calls for double stops or other chords that would be unplayable with a traditionally tuned instrument (figure 2.5).

Figure 2.5: Domenico Gabrielli, Ricercari VI per violoncello solo (1689), measures 67-69.

A. as fingered using Italian tuning
B. at pitch as it would be fingered on a normally tuned cello.18

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17 Mark Chambers, “The ‘Mistuned’ Cello: Precursors to J.S. Bach’s Suite V in C Minor for Unaccompanied Violoncello,” (D.M. diss., Florida State University, 1996), 25. It is crucial to note that the scores for these works are notated at pitch because the Italian tuning was considered standard. There would be no need for an as-fingered notation in this case since a player seeing the pitch A on the top line of the bass clef staff would equate that with a first finger in first position on the upper G string and would not simultaneously be confused by the belief that what he or she should really be doing to produce an A is to play an unstopped first string.

18 Again, the as-fingered notation instructs the player to finger the pitches as if he or she were playing on a normally tuned cello. When the Italian tuning is involved, anything on the top string will sound a whole-step lower than written. This is the rationale behind the application of otherwise unnecessary accidentals. In figure 2.5A, a C♯ must be fingered in order to produce a B.
As can be seen in measures 67 and 68 of figure 2.5B, there are some three-note chords that would involve the open D string as well as the stopped D string. It is possible to imitate the rolling of a chord by playing each note separately and sustaining only the top note. The effect of having all three pitches simultaneously ringing as the chord is rolled across three different strings is probably what Gabrielli had in mind though, and this is not possible to do without an extremely awkward fingerling making use of the bottom three strings rather than the top three.

Benedetto Marcello (1686-1739) composed an accompanied sonata that may also have used the Italian tuning. Chambers looks at Marcello’s sonata No. 4 in G minor (c.1734) in particular and discovers fingering patterns and string-crossings necessitated by traditional tuning that are unidiomatic for the time and can be eliminated by tuning C-G-d-g. Two passages in particular provide evidence that Marcello probably had the Italian tuning in mind (figures 2.6 and 2.7).

Figure 2.6: Marcello, Sonata No. 4, Allegro, movement II, measure 11.  
A. as fingered using Italian tuning. Performance exclusively on one string is possible.  
B. at pitch showing unidiomatic string crossings necessary if performed on a cello tuned C-G-d-a and using first position (top fingering) as would have been customary. A second option for fingering is given below the staff, but this leaves first position.

\[^{19}\] Chambers, 29.
Figure 2.7: Marcello, Sonata No. 4, Allegro, movement II, measure 20.²⁰
A. as fingered using Italian tuning.
B. at pitch, as it might be fingered on a traditionally tuned cello.

The fingering necessary to negotiate measure 11 of the second movement of Marcello’s sonata when performed on a normally tuned cello either involves numerous string crossings or a color change from D string to A string in the middle of the passage. Though it is less awkward with respect to the string crossings, the fingering given below the staff in figure 2.6B makes use of higher positions on the D string. Chamber’s argument is that since it was more common to make use of first position at this time, the passage provides evidence that the Italian tuning was probably used. The fingering for measure 20 can also be simplified to make use of an open string for the repeated sounding Gs if the cello is tuned in the Italian manner. Neither of these passages provides conclusive evidence of Marcello’s intent to make use of the Italian tuning though, since both measures 11 and 20 are certainly possible to execute with traditional tuning. We must rely on the belief that Marcello made only traditional, idiomatic demands on the technique of the performer. It is also possible that a performer would simply tune in a manner appropriate to the music, in his or her judgement, regardless of the composer’s intent.

²⁰ Ibid.
Italian Tuning as Scordatura: Taglietti’s Capriccio and Bach’s Fifth Suite

The first occurrence of the Italian tuning as a *scordatura* is in the *Suonate da camera a tre due Violini, e Violoncello con alcune aggiunte à Violoncello Solo*, Op. 1 (1697) by Luigi Taglietti (1668-1715). This set consists of ten sonatas for two violins, cello and continuo. Interspersed throughout the work are eight capriccios for violoncello solo. The capriccio in the second sonata uses the common Italian tuning, but for the first time it is referred to as a mistuning with the word “discordatura” appearing in the score along with an incipit instructing the player as to the exact tuning. Unlike the Marcello or Gabrielli sonatas, the score is also written as fingered so that those used to the traditional C-G-d-a tuning read simply where to put their fingers on the top, altered string rather than what pitches are produced. The fact that this as-fingered notation is used, and that the rest of the eight capriccios use the traditional tuning without incipits, indicates that the assumed and perhaps more common tuning in Taglietti’s mind is C-G-d-a. There is nothing in this short Capriccio that absolutely could not have been played with the traditional tuning though. Undoubtedly, Taglietti asks for *scordatura* at least in part so that he had open strings available for the first and last chords of the movement (figure 2.8).

![Chord diagram](image)

**Figure 2.8:** Chord in first and last measures of the Capriccio from Taglietti’s Sonata No. 2, Op. 1 (1697).
A. as it appears in the score in the as-fingered version
B. at pitch
Prior to the twentieth century, very little *scordatura* literature for unaccompanied cello was written. Except for Taglietti, most of those who used the Italian tuning considered it a standard tuning, not a *scordatura*. Jacob Kein le Jeune’s *VI Sonates à une Basse de Violon & Basse Continue, Premier Ouvrage, Livre Troisième* (c.1705) use a transposition *scordatura*, D-A-e-b. This was a practice much more common in solo works for the contrabass and the viola since both instruments benefited more than the cello from the increased projection afforded by the higher string tension.

The only other early solo piece for cello to employ a *scordatura* from the widely accepted C-G-d-a tuning is of course J.S. Bach’s *Suite No. 5 in C minor BWV 1011* (c.1720) that uses the Italian tuning. It is often claimed that this tuning was out of date by the 1720s, but if Marcello’s sonata discussed above really was intended for the C-G-d-g tuning, there is at least this one example that follows Bach’s suite by almost 15 years, and that still considers the tuning to be an *accordatura*, a standard tuning.

There is also a lute version of the fifth cello suite in G Minor (BWV 995) that might actually have preceded the cello version. The lute has an interesting history of alternate tunings that falls somewhat outside the scope of the current study. A brief mention however is warranted. The most common Baroque lute was a six-course instrument tuned in D minor (A-d-f-a-d’-f”). The addition of strings below the sixth course was typical, and these courses proceeded downward diatonically by step so that the common eleven-course lute could play a diatonic scale on its lowest strings without any fingering.

The lute had become essentially diatonic in its bass register, and the tuning of the lowest courses would be adjusted for the key of the piece.
(This was a major factor in the grouping of pieces by key, which led to
the baroque suite.) [This is a further example of the application of key-
specific tunings seen already on the lyra viol in particular.]

By the 1670s the 11-course single-pegbox lute in D minor tuning had
emerged as the preferred norm throughout much of Europe, and
remained so until the early years of the 18th century, when two further
courses were added, extending the lute’s range down to A'. 21

The G minor suite for lute, BWV 995, calls for a low G’, so Bach might have intended
the piece for a twelve-course lute with one more string than the one referred to in the
quotation above, or an 11-course lute might have been tuned down. There have been
studies done on the lute version of the fifth suite, since a manuscript in Bach’s own
hand is extant, which is not the case for the cello suites. 22 However, whether the
tuning practice on the lute influenced Bach’s writing for the cello, or the influence was
felt in the reverse direction is not immediately apparent.

Bach makes ingenious yet completely idiomatic use of the cello in the six suites
in a way that no composer has since duplicated. Many performers today prefer to play
the fifth suite tuned normally. They cite difficulties in keeping the instrument in tune
among other things. Frequent adjustments to the voicing of chords must be made to
accommodate the C-G-d-a tuning. There are numerous examples from the fifth suite in
which Bach uses chords that are awkward if not impossible to play on a normally tuned
cello. The chord on the downbeat of measure two of the prelude for example is the
four-note chord shown as fingered with the scordatura tuning in figure 2.9A and at
pitch as it would be played with the traditional tuning in figure 2.9B. Without an

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<http://www.grotermusic.com>
22 See, among others, Michelle Claire Dube, “Prelude of Suite V for Solo Cello by J.S. Bach:
awkward shift in the middle of the rolling of the chord it is necessary to leave out the F since that note and the A♭ both need to be played on the second string.

Figure 2.9: J.S. Bach, Suite V in C minor, Prelude, measures 1 and 2.
A. as fingered with the *scordatura* tuning of C-G-d-g. (The four-member chord sounds C-B-f-a♭.)
B. at pitch, as it would be fingered with the traditional C-G-d-a tuning

The beginning of the Allemande presents a different aesthetic dilemma to the cellist who ignores Bach’s instruction to tune down the first string. The first measure of the movement is similarly shown in figures 2.10A and B as fingered with the *scordatura* (A) and then at pitch with two possible fingerings for use on a normally tuned cello (B). In Bach’s version, the open-strings of the first C minor chord are allowed to ring unobstructed, and the figure through the first dotted eighth note (printed B♭, sounding A♭) may be played entirely in first position, maintaining the consistent color of the top string. Those using the standard C-G-d-a tuning to play the suite are forced either to leave the top string prematurely and in the middle of the sixteenth-note figuration (top fingering), or to finger the C minor chord by stopping the open G string to play the E♭ and C in fourth position on the second and third strings in order to continue the first measure entirely on the D string (bottom fingering). Neither solution is ideal since the sonority of the C minor chord is not as satisfactory when the open G string is not allowed to ring, nor is the abrupt color change from the top string to the second string (top fingering) appropriate in the middle of the sixteenth-note figuration.
Figure 2.10: J.S. Bach, Suite V in C minor, Allemande, measure 1.
A. as fingered with the *scordatura* tuning of C-G-d-g
B. at pitch, as it would be fingered with the traditional C-G-d-a tuning
with two options for fingering

The example in figure 2.10 above illustrates another point about Bach’s choice of tuning. Tuned normally, there is one open string that is not very useful in the key of C minor. That string is of course the A string, since the key signature calls for A♭s. The Italian tuning allows the full resonance of the instrument to be applied within the key, since both open G strings provide a note not only available, but crucial, as the fifth scale degree in C minor. Fingerings are simplified since a sounding A♭ can be played with an extended first finger in first position on the first string rather than needing to be played on the D string. 23 The difficulty illustrated in measure one from the Allemande occurs commonly throughout the suite, and that involves the facility with which an A♭ can be played. In essence, Bach has chosen a tuning that facilitates playing in the key of C minor just as composers before him chose key-specific tunings for the lyra viol and other instruments.

The issues of facility may of course be negotiated by the skilled player, though the occasional alternately voiced chord would continue to mar a performance making

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23 Extensions in themselves of course are not particularly awkward. With three flats in a key signature however, a simple scale upward on the D string involves both an extension backwards for an E♭ and an extension forward for an A♭. Passages involving both notes then typically require a shift rather than simply a stretch.
use of a traditional tuning. The principle effect that is lost however, when the fifth suite is performed using a traditional tuning rather than the prescribed *scordatura*, is a timbral one. There can be no doubt that the timbre of an instrument is altered by *scordatura*. Even the sound characteristics of strings whose pitches are unaltered are affected by the changed tension on the instrument resulting from the *scordatura* on other strings. (See appendix B for evidence of the changes to the overtone series of unaltered strings when *scordatura* to other strings is employed.) Sympathetic resonances are also enhanced in the key of C minor when the instrument has two G strings. There can also be no doubt as to the fact that Bach’s fifth suite is the darkest of the six suites, and the more mellow timbre of the Italian tuning suits the suite better than the relatively brighter timbre of the traditionally tuned instrument. Bach cannot have been ignorant of this fact.

There is some evidence to support the supposition that Bach was more than just aware of timbral differences. In particular, he might have wanted performers to take advantage of the differences in color between a stopped G and an open string G. More modern composers frequently include either fingerings or roman numerals to indicate their preference for what string a performer should play on. Bach didn’t normally do this, but the as-fingered notation used for the fifth suite provides some clues as to his desires with regards to the timbral distinction of a G played on the D string, and a G played with an open, *scordatura*, first string. When a printed A below middle C appears in Bach’s score for the cello suite, it will sound as a G if it is played on the first string. There are some moments in the suite in which the Anna Magdelena manuscript is careful to indicate which G should be used. Whether these distinctions were copied
correctly from Bach’s own manuscript cannot be known. Figure 2.11 shows one of these examples from the prelude to the fifth suite.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{figure2_11.png}
\caption{J.S. Bach, Suite V in C minor, Prelude, measures 26-29. Anna Magdelena manuscript. The arrows point to important pitches that sound as Gs. Two are printed As.}
\end{figure}

The chord on the downbeat of measure 27 would certainly be easier to play with all open strings, but either the manuscript contains an error here, or Bach wanted the sound of the open-string G reserved for the pickup into measure 28.

Somewhat less than 200 years following the composition of Bach’s suites, the library of unaccompanied cello repertoire finally saw new additions. It was in 1915, very early in the rebirth of interest in the genre, that the cello also received its first unaccompanied scordatura work since Bach’s fifth suite. That piece, unpublished until 1921, was Zoltán Kodály’s Sonata, Op. 8, and it deserves a detailed look here as the launching point for the proliferation of scordatura works for unaccompanied cello later in the twentieth century.
Kodály’s Sonata, Op. 8

The Op. 8 Sonata of Kodály was certainly not the first unaccompanied piece for cello written since Bach. Klengel, Offenbach, and Sibelius also had written music for solo cello, and Max Reger’s Three Suites, Op. 131c had been published in 1915. János Breuer disputes any connection between Reger’s suites and Kodály’s Sonata, stating “it is highly improbable that their scores [those for Reger’s solo violin and cello suites] reached Kodály during the wartime years.” 24 Kodály’s sonata was the first unaccompanied work for cello since Bach’s fifth suite to use scordatura. The bottom two strings are each tuned down a half step (figure 2.12).

![Tuning for Sonata, Op. 8 by Zoltán Kodály](image)

**Figure 2.12:** Tuning for Sonata, Op. 8 by Zoltán Kodály

In his comprehensive survey of unaccompanied cello repertoire composed between the time of J.S. Bach’s suites and 1960, Gordon James Kinney states that “if frequency of performance can be deemed a proper criterion, Kodály’s Sonata, Op. 8… must be ranked second in importance only to the suites of J.S. Bach…” 25

...Kodály’s sonata revealed the possibility of experimentation with new ideas and demonstrated conclusively to other composers that the violoncello without accompaniment is a compositional medium with special advantages worthy of exploitation. 26

One of the new ideas that Kodály takes particular advantage of is the application on solo cello of a Hungarian folk-based idiom. The influence of folk music in the output

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26 Ibid., 436.
of both Bartók and Kodály has been treated thoroughly elsewhere, and this Op. 8 sonata has no shortage of folk references. Melodies and harmonies in the sonata call to mind the folk music of Eastern Europe and at times even the instruments used for such music.

The sonata was written in 1915, but it was not published until 1921. It was the first piece by Kodály to be printed in Vienna, and it was also the first of his works to be published at all since 1910. 27 János Breuer claims, “It is so immensely difficult technically, presenting the performer with such novel demands, that there may have been little hope for a performance.” 28 Nevertheless, it did receive its premiere on May 7, 1918 by Jenő Kerpely, the cellist to whom the work is dedicated.

According, however, to the recollections of the rapidly dwindling number of eye and ear-witnesses, Kerpely, an extremely sensitive and refined musician, lacked the technique necessary for an accurate performance of the Sonata, and he was not really able to accomplish the enormous task...

The first time the Sonata for Solo Cello was heard in a way closely following the score, practically as the work’s real première, came at a private performance, nearly two years later in Vienna, at Arnold Schoenberg’s Verein für mus. Privataufführungen. This was the first performance of the piece abroad at the time still in manuscript, which took place on April 16, 1920. It was performed by the 18-year-old virtuoso cellist Paul Hermann, a pupil of Adolf Schiffer at the Budapest Academy of Music. Hermann studied composition privately with Kodály...

At the time, Kodály’s native Hungary was somewhat unenthusiastic about his compositions, but Bela Bartók influenced the reception of Kodály’s music abroad, and able performances throughout Europe by Hermann, Maurits Frank, and Beatrice Harrison, all prior to 1925, increased the exposure of the Op. 8 Sonata in particular. By far the most influential modern performer of the sonata has been Janos Starker. Not

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27 Breuer, 49.
28 Ibid., 47.
29 Ibid., 49.
only did Starker produce the first recording of the sonata in 1948, but his fourth recording of the piece in 1970 was the first to be released on CD. His performances are imbued with a natural understanding of the Hungarian folk idiom, and his sense of rubato is completely appropriate to the style. One has to assume that Starker’s interpretation would meet with Kodály’s approval, since the composer coached Starker on numerous occasions. In 1967, shortly before Kodály’s death, the only thing remaining for Starker to fix, in the composer’s opinion, was “the ritard in the third movement.” 30 Given that correction Kodály stated that “it will be the Bible performance.” 31 We must therefore assume that Starker’s rendition, recorded in Japan in 1970 and available on the Delos label (DE 1015), is at the very least quite close to how Kodály preferred to hear the sonata.

Starker’s early recordings of the sonata show the mid-century practice of cutting the long third movement. This was done with the claim that it improved the work’s ability to hold the listener’s attention. Starker’s first recording in 1948 made cuts to both the second and third movement for perceived musical reasons, and also on the basis that cuts were required in order to allow for the completion of the sonata within eight sides of the 78 records. Starker’s release of the sonata on LP still retained one of the cuts for musical reasons. Kinney illustrates himself to be somewhat conservative as he writes about music of the early to mid-twentieth century. He was perhaps accustomed to interpretations of the Op. 8 Sonata that took the liberty of cuts.

Kodály’s sonata is of course not without defects. Its performance time

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31 Ibid.
is too long for the medium—twice as long as any of Bach’s suites [This is actually not true.], and the succession of two long slow movements imposes too much on the patience of the listener. For this reason the last movement is sometimes performed by itself; but this is to be deplored since it leaves the R-sections [a ritornello-like theme group Kinney identifies in the second movement that is used in the third movement as well], as intrusions of foreign material, unjustified. 32

A performance of Kodály’s Op. 8 Sonata can run about 28 to 30 minutes depending on tempos, but the last movement particularly sometimes suffers from tempos that are too slow, since performers have significant technical demands with which to wrestle. Bach’s last three suites can run approximately 25, 27, and over 30 minutes respectively if all indicated repeats are observed. It is also unclear how Kinney arrives at his determination that “the third movement... is the only quick movement in the sonata, both the other movements being slow and lyrical.” 33 There certainly are lyrical passages in the first movement, marked Allegro maestoso ma appassionato, but the overall effect is certainly not that of a slow movement. Even the ternary second movement contains a middle section, marked con moto, that works itself into a frenzy from which it manages to return only partially. When the material from the first section returns, it is ornamented with fast-moving figurations and retains some of the con moto energy. There is more than enough variation here to sustain a listener’s attention, and very early analyzers and performers of the sonata were of the same opinion. The piece needed no help in the way of cuts.

To write an unaccompanied ‘Cello Sonata in three movements, as Kodály has done, demands considerable courage, but his musicianship is more than equal to the test. Our attention is held from first to last, as much by the abstract musical interest of each movement as by the wealth of resource and ingenuity of treatment which so eloquently

32 Kinney, 439.
33 Ibid., 438.
testify to the intimate understanding of the nature and capabilities of the instrument for which the work is written. 34

It is fortunate that Kodály’s work is no longer felt to be in need of shortening. Neither has it ever been subjugated to performance on a normally tuned cello as Bach’s fifth suite has. Kinney claims that “another serious drawback [to Kodály’s sonata] is the scordatura.” 35 In Kinney’s opinion, the lowered strings do not sound “with full sonority.” 36 He might wish for a version for a normally tuned cello, but the entire sonata would need to be rewritten. A mere transposition up a half step to put the low notes within the register of a normally tuned cello would accomplish little, since the tuning is so thoroughly taken advantage of as will be seen below. Kinney also ignores the effectiveness of the changed timbre of the instrument in the context of Kodály’s music. The choice and effects of Kodály’s scordatura cannot be divorced from a discussion of his music.

Much of a theoretical nature has already been written about the Op. 8 Sonata. Kinney gives a detailed formal analysis calling on sonata form terminology for the first and last movements and identifying the second movement as ternary. 37 He designates a tonal center of B in all three movements, though the first moves to E♭ and back, the second establishes a tonal center of D and wanders through many others before returning to B, and the third emphasizes predominantly D and F♯ before returning to B. Kinney also describes the interrelations of theme groups within a movement, illuminating some of the reasons that the piece holds together as a unified work. The first movement for

35 Kinney, 439.
36 Ibid., 439.
37 Ibid., 436-439.
example is a tight construction making use of the main theme (figure 2.13) at the beginning, at measure 80, and at measure 100 in an expanded form. 38

Allegro maestoso ma appassionato. (\( \text{\textit{d} = 100} \))

\( f \) risoluto

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Figure 2.13: Kodály, Sonata for solo cello, Op. 8, first movement, measures 1-5.
A. as fingered, as it appears in the score
B. at pitch

Transitional material such as the pizzicato chords in figure 2.14A is expanded later in the movement (figure 2.14B) in a form that also obviously strongly relates to the main theme. The piece abounds with motivic connections.

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38 Where it is deemed necessary, musical examples from Kodály’s sonata will be notated both as they appear in the score, as fingered, and in a second version at pitch. Pitches played on the third and fourth strings sound a half step lower than they are printed in the as-fingered examples, but are transposed for the versions given at pitch. See chapter four for further discussion of these two notational practices.
Figure 2.14: Kodály, Sonata, Op. 8, first movement.
A. measures 25-27 as fingered and at pitch
B. measures 146-148 as fingered and at pitch

The second theme of the first movement contrasts the vibrant energy of the first theme with a more lyrical feel, as is of course true in many traditional Classical sonata form movements. It is this theme group that may have given Kinney the expansive, slow-movement feel with which he takes issue. This group is not without its passion though, and it contains the first explicit contrast between the timbres of scordatura and unaltered strings (figure 2.15). The contrast is intensified further through a ponticello effect on the upper strings. The scordatura has the effect of deepening the resonance of the forte statements, and the ponticello of thinning that of the pianissimo statements.
Figure 2.15: Kodály, Sonata, Op. 8, first movement, measures 63-69, as fingered. Pitches played on the third string sound a half step lower than printed. Only the *sul ponticello* gestures therefore sound at printed pitch.

Even when the range of the last forte statement in measure 68 approaches that of the repeated pianissimo ones, Kodály requests its performance on the third string to retain the timbral characteristics of that *scordatura* string. It should be noted again that third- and fourth-string pitches will sound a half step lower than they are printed due to the tuning for the piece (figure 2.12).

The writing in Kodály’s sonata calls upon Bach and the traditions of polyphonic techniques for the cello set by his *Six Suites for Unaccompanied Violoncello*, BWV 1007-1012, almost as much as it calls upon the folk music styles of Eastern Europe. A comparison of the use of the cello by both Kodály and Bach will yield some important information regarding the use of *scordatura* by both composers. While Bach typically implies simultaneous polyphony with single notes separated in register, Kodály frequently employs two lines played simultaneously. Figures 2.16 and 2.17 illustrate the difference between the implied polyphony of Bach, and the actual simultaneous presentation of two voices by Kodály. In figure 2.15, the eighth notes that occur on beats comprise the upper voice, and those on the off-beats comprise another lower one.

In Figure 2.16A, the sustained B♭ following the B♭ major chord in measure 43
establishes what will be the upper singing line, and the pianissimo statements
underneath are a separate voice providing commentary. The music in figure 2.16B is
especially three member chords separated into two voices. One voice contains
sustained single pitches, and the other is a tremolo between the two remaining notes.
This figure also illustrates Kodály’s use of parallel motion in chords which differs from
Bach’s chordal material and will be discussed further below.

\[ \text{Figure 2.16: J.S. Bach, Suite No. 5, Gavotte I, measures 4-8, at pitch.} \]

Frequently, Kodály’s two-voice writing involves a drone, rather than a second
moving line, as in the final movement of the sonata (figure 2.18). Even in figure 2.17A
above, the upper line is static while the lower one moves. The use of drones is common
in folk music, and the influence of this aspect of folk music among many others is seen
clearly in Kodály’s sonata. A passage that makes use of an open string as a pizzicato
pedal is found in the music following measure 81 in the third movement. Every one of
the sonorities shown in figure 2.19 is impossible to create with a normally tuned cello
since the open F# string provides the pedal pitch that otherwise would have to be
fingered. Even when a fingering might be possible, the strumming pizzicato motion
would have to accomplish the impossible and strike the first and second strings, skip
the open third string, and strike the fourth string for the fingered F#.
Figure 2.17: Kodály, Sonata, Op. 8. All examples are as fingered.

A. first movement, measures 43-47. The chord in measure 43 is a B♭ major chord. All other pitches, since they are performed on strings one and two, sound at the printed pitch.

B. second movement, measure 103. Only the last two eighth-note beats of the measure involve the third string, but a sounding D is required for the tremolo in this fifth beat of the bar. As a result, many players perform the passage as shown in figure C. Only the printed B♭'s and the low G sound a half step lower (as an A and an F♯ respectively).

C. second movement, measure 103, as it is sometimes performed. This alleviates the problem of executing a tremolo between the sounding A (printed B♭) and sounding D (printed D) on the fifth eighth-note beat of the measure.
Figure 2.18: Kodály, Sonata, Op. 8, third movement, measures 62-65.
A. as fingered
B. at pitch

Figure 2.19: Kodály, Sonata, Op. 8, third movement, measures 81-87. Bowing signs indicate the direction of pizzicato strum. The bottom pitch of each chord sounds as an F♯.
Similar to the use of drones is Kodály’s utilization of rhythmic, left-hand pizzicato figures such as the ones found in the second movement of the sonata. Figure 2.20A shows the use of the open third string both as rhythmic punctuation and as an implication of a sustained drone pitch akin to that of figure 2.18. The use of left-hand pizzicato is subsequently extended (figure 2.20B) to include an alternation between strings and an expanded rhythmic role. The music in figure 2.20A could be played on a normally tuned instrument if transposed up a half step. The same is not true for figure 2.20B. A normally tuned cello would not allow for the performance on open strings of the minor tenth or the augmented fifth in the left-hand pizzicato figures of this passage.

Figure 2.20: Kodály, Sonata, Op. 8, second movement
A. measures 7-9 as fingered. Only the left-hand pizzicato notes are affected by the scordatura. They sound as F⁹'s since it is the open third string that is plucked
B. measures 39-41 as fingered. Only the first printed E♭ and the printed Gs on the lower staff sound a half-step below the printed pitch.
The use of chords in unaccompanied music for cello serves the important purpose in Bach of creating polyphonic effects. The listener imagines multiple instruments playing separate, but complimentary music. (Kodály has been seen to do the same thing, as in figure 2.17.) As is to be expected of a Baroque composer, Bach treats the members of each chord as separate, independent voices. In figure 2.21, at least three voices are discernable. The soprano voice is notated here with stems up, and a bass voice consists of the bottom notes of the chords that appear on the first beats of the measures. An inner voice that sometimes splits into two lines is also present in the Bach example. Kodály’s use of three and four-member chords differs somewhat from Bach’s. More often than not, Kodály makes use of the parallel motion common to folk music, as was evident in figure 2.14B. Figure 2.24 shows a similar use of chordal material in the third movement of the Op. 8 Sonata. Rather than a convergence of distinct polyphonic lines, this is a more textural use of chords that gives the impression of the reinforcement of a single line by multiple instruments.

Figure 2.21: J.S. Bach, Suite No. 6, Sarabande, measures 1-5. The direction of the stems in the excerpt have been chosen only to accentuate the aural perception of the top melodic line. They do not necessarily follow the markings in any of the available manuscripts.
Figure 2.22: Kodály, Sonata, Op. 8, third movement, measures 582-587
A. as fingered
B. at pitch

The fullness and richness of Kodály’s music also brings the techniques of Brahms to mind.

…both the genre and certain features of the instrumental treatment refer to Bach, but the texture, abounding in three and four-part chords, alludes also to the cello technique of Brahms. According to the Hungarian composer Pál Kadosa, a former pupil of Kodály: Kodály held Brahms in very high esteem and considered him extremely important. Although there is no proof, I think it probable that Kodály studied the works of this Romantic composer, when writing for the cello, if indeed he had not already done so during his studies at the Academy under János Koessler, a Brahms disciple. 39

With respect to the rich timbre and full music, the scordatura tuning that Kodály chose impacts his music quite profoundly. In retrospect it is interesting that Brahms, who composed for such deep and warm sounds on the cello, especially in his E minor

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39 Breuer, 47.
sonata, never saw fit to employ a *scordatura* to lower pitches as well. Kodály’s sonata produces a stunning effect with the lower register and darker timbre imparted by the decreased tension of the B’-F#-d-a tuning.

As seen above, the *scordatura* in the Op. 8 Sonata allows for left-hand pizzicato effects with open string pitches that would otherwise be unavailable. The tuning also allows melodies high up on the A string to be accompanied with an easy-to-play B minor chord that uses only open strings (figure 2.23). Tuned in fifths, the chords in measures 5-10 of the first movement would be unplayable. Even if the piece were transposed up a half step so that all the low Bs would be Cs, the requisite C minor chord in measures 5-10 would necessitate the fingerings of an E♭ in first position.

![Musical notation](image)

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**Figure 2.23:** Kodály, Sonata, Op. 8, first movement measures 5-10. All of the chords sound as B major chords due to the tuning. 40

A few experiments are suggested here for players to explore the timbral effect of Kodály’s *scordatura*. Imagine a transposition of the piece up by a half step again. The first chord of the piece would still be playable as a C minor chord, and a

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40 It should be noted here that the use of a miniaturized staff does not imply an ossia as it sometimes does. The difficulty of notating both very low and very high pitches in a single chord requires the momentary appearance of two staves. This method of notation must not be confused with that used in works such as Dutilleux’s *Trois Strophes sur le nom de SACHER*. There, miniaturized staves are used to present the as-fingered notation for pitches on *scordatura* strings beneath the at-pitch notation of the score.
comparison between the sound of this C minor chord and the sound of Kodály's B minor chord utilizing scordatura will likely suffice to convince anyone of the timbral effectiveness of the tuning. All but the upper B in Kodály's chord may be played with open strings, and this chord therefore rings somewhat better even than a C minor chord played with the standard tuning. Note also the quality of sound of the single low B left ringing throughout measure 31 and compare that to the effect of an open string C on a normally tuned cello. There are slight, but definitely noticeable differences. Try also to play the passages of the Adagio shown in figures 2.24A and B transposed up a half step and on a normally tuned cello. The music makes use only of the third and fourth strings, and its effect is drastically altered by the timbre of the low B and F\textsuperscript{#} strings that Kodály uses.

A less obvious effect of the scordatura is on the tone of strings other than those that have been tuned differently. Performers qualitatively understand that a change in tension on the instrument alters the color of sound that the whole instrument produces. This color change is not limited to a string whose pitch has been altered. The open A string on a cello tuned as Kodály instructs for his sonata sounds different than an A string on the same cello tuned in the traditional way. Play the first four measures of Kodály's first movement on a normally tuned cello and omit the chords that involve the lower two strings. Play the passage again after tuning down as Kodály directs in order

\[\text{This is an easy exercise to undertake since the score is printed as fingered. Tune the cello C-G-d-a, and read the music as written. Tuned as Kodály instructs, the pitches simply sound a half step lower in these passages.}\]

\[\text{Appendix B provides the preliminary measurements made to attempt a quantification of the timbral effects of Kodály's tuning on the sound of the unaltered strings. It is seen there that the relative strengths of the harmonics present in the sound of a cello's A string are altered when the cello is tuned B'-F\textsuperscript{#}-d-a as Kodály instructs, even though the A string itself has not had its pitch changed. When the harmonic composition of a sound changes, the listener perceives a change in the qualities of the sound. Depending on the type of change, the listener might give any number of qualitative descriptions such as "darker," "brighter," "more mellow," or "more strident" to describe the change.}\]
to note the change in the sound of the A-string melody. Kodály’s choice of tuning impacts not only what notes and chords are available to him, but also the color, timbre, and mood of the piece. I feel inspired by the timbre of the Italian-tuned cello to a slightly different interpretation of Bach’s fifth suite than I am when playing it with a traditional tuning. Kodály’s tuning likewise affects our timbral and coloristic impressions of his sonata in noticeable ways.

Figure 2.24: Kodály, Sonata, Op. 8, second movement. All pitches in both examples sound one half-step lower than printed.
A. measures 1-6, as fingered.
B. measures 18-29, as fingered.
Part I Conclusions

Most of the repertoire of any string instrument makes use of only one standard tuning even prior to 1750 when scordatura was most popular. Only the lyra viol and the various double bass register viols made use of so many tunings that no one of them could be singled out as having been standard. Scordatura has, therefore, always been more of a fringe compositional technique than a standard one. Nevertheless, instead of being isolated instances of a rogue composer’s folly, scordatura works must be viewed in light of the rich history of experimentation with tunings discussed here.

The bulk of the repertoire for violin family members that makes use of scordatura is from the period between about 1600 and 1750. “By 1752 Quantz (Versuch) considered scordatura obsolete.” 43 Of course there is not a complete absence of scordatura works for strings after 1750. Nicolò Paganini (1782-1840) for example made thorough use of the technique. There was nevertheless a significant drop in the popularity of scordatura until the twentieth century. There can be only conjecture as to why this attitude surrounding the use of alternate tunings arose after such successful use on instruments like the viols as well as in numerous artful pieces during the Baroque period on violin in particular. Perhaps the changes being made to other instruments occupied the fancy of composers after the violin family reached a certain, more or less ideal form. As evidenced by symphonies of Haydn and Beethoven in particular, many novel musical ideas were put to use in the percussion section where exotic “Turkish” or “Military” sounds appeared. Wind instruments in particular underwent their most drastic changes after the beginning of the eighteenth century. The flute began gaining keys, brass instruments gained valves, and the clarinet first

43 Boyden, “Violin Technique,” 68.
appeared. Perhaps the imaginations of composers were simply taken up with the new sounds possible on instruments other than strings. A composer’s attention was perhaps more likely to be held by the possibilities for orchestral colors using newly improved wind and brass instruments than it was to be drawn to the timbral possibilities of the strings. The aesthetic of the Classical and Romantic periods too was one of experimentation with musical forms and structures, not necessarily with the timbral characteristics available to particular instruments.

Another issue that may have impacted the likelihood of further experimentation with tuning was the direction the Western musical language was taking. The solidification of a tonal system solidly based in relationships of fifths made the modern tuning of the violin, viola and cello particularly useful. Further, as composers desired more intricate tonal plans for their works, a key-specific tuning became less and less useful. Tunings such as those used in the seventeenth century for the lyra viol that greatly facilitated playing in one key were rendered impractical by works that modulate too far a field. Gone were the days of setting a convenient tuning for a piece that would remain convenient for the duration of that piece. Composers needed to make use of tunings that would allow them to take the listener on a longer tonal journey.

It comes as little surprise then that *scordatura* techniques have experienced a rebirth in the twentieth century. Through the course of the Classical and Romantic periods, musical forms and tonal plans were stretched to their limits. A common opinion at the beginning of the twentieth century was that all things possible to say in the tonal medium had already been said. A new language needed to be developed, and that language would end up including an expanded role for the timbres or colors of
sound, not just the pitches. In this sense, Kodály’s solo cello sonata was more the end of an era of *scordatura* use than the instigator of the twentieth century’s resurrection of the techniques. The Op. 8 Sonata is written in a largely tonal medium. Nevertheless, the popularity of Kodály’s sonata brought the possibilities for the solo cello, and for *scordatura*, back into the consciousness of the modern composer.
Chapter 3
Survey of 20th c. Scordatura Literature for Unaccompanied Cello

Introduction

There are several reasons composers may choose to employ alternate tunings. Most orchestration texts offer reasons like lowering the range of the instrument or facilitating the fingering of otherwise awkward passages. David Boyden adds timbral effects to his list of many reasons why scordatura has been used in the past.1 The outline in figure 3.1 below is a slightly more precise and complete way to categorize the various uses of scordatura. “Feasibility scordatura” is the name I give to any use of scordatura designed to make the unplayable possible. Whether the bottom range of the instrument is extended, difficult passages are made easier, or impossible chords or notes are made playable, the purpose of the scordatura is to allow for things that otherwise would not be easily playable, if even possible. A second and not necessarily mutually exclusive way in which scordatura might be used is to accomplish a timbral change. “Timbral scordaturas” are those alternate tunings used to change the quality of sound produced by the instrument. A darkening of the color of sound can be effected through lowered tunings and decreased tension. Similarly, an increased brilliance is afforded by higher tunings. Some alternate tunings take advantage of sympathetic resonances to alter the quality of sound in certain keys. The timbre of a cello tuned C-G-d-g will be altered by virtue of decreased tension, but the sympathetic vibrations of the upper G string can be clearly heard (and seen) when the lower G string is bowed. This has the effect of further altering the resonance in specific keys in which G plays an important role. The third class of scordatura effects is a “special effects” category.

1 Boyden, “Violin Technique,” 66-68.
Special effects might include the use of *scordatura* glissandos accomplished by changing the pitch of an open string while playing. Some pieces may call for the use of such a loosely tuned string that the rattling against the fingerboard which results is more important than any perceived pitch. Also effective with extremely loose strings is a pitch-bending effect that accompanies an increase in bow pressure and volume.

**Feasibility Scordatura- makes the awkward or impossible playable**
1) range of instrument lowered  
2) unplayable or difficult chords made playable  
3) unplayable or difficult figurations made playable  
4) different natural harmonics made available  
5) transposition *scordaturas* that ease playing in difficult keys  
6) simplification of the mimicry of figurations common to other instruments  
7) open strings tuned so that specific natural harmonics are more in tune\(^2\)

**Timbral Scordatura- accomplishes a change in color**
1) increased tension to brighten timbre as in “soloist tunings” (transposition *scordaturas* function here as well)  
2) decreased tension to mellow the timbre  
3) mimicking timbre of other instruments (Mahler’s fourth symphony violin solo mimics the sound of a toy fiddle by tuning each string up a whole step.)  
4) tunings that take advantage of sympathetic resonances  
5) tunings that allow for open string timbre on notes that normally would need to be stopped

**Special effects**
1) dynamic *scordatura*—tuning while playing, frequently to lower the range of the instrument, but also to produce the effect of a glissando  
2) buzzing *scordaturas*—pitch may be secondary to the rattling effect of the string against the fingerboard  
3) pitch bending—the looser the string, the more susceptible the resultant pitch is to bow pressure. Playing a crescendo then has the added effect of bending the pitch upwards as well.

**Figure 3.1:** Categories of *scordatura* use.

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\(^2\) Appendix B, table B.1, provides some figures for just how far out of tune the natural harmonics of an open string can get. It is possible, however, to tune strings slightly sharp or flat to adjust for that fact if the intonation of the open strings is not at issue.
The categories of *scordatura* use given above are not isolated from one another. Boyden points out the changes accompanying the c'-e'-g'-c'' tuning of a violin that help the instrument to mimic the sounds and figurations of the trumpet.\(^3\) The resulting effect is of course a combination of many of the categories of *scordatura* use given above. When tuned this way, sympathetic resonances contribute to an open and pure sound for the key of C major, and, as Boyden points out, a work played on a violin tuned as such “sounds quite different from the same piece played in the normal tuning.”\(^4\) The tension on the instrument is also radically altered, and that alone has a large impact on the violin’s tone. This use of *scordatura* clearly has timbral effects. It is impossible, in fact, to tune a string instrument differently and not effect a timbral change to the instrument. Whether this timbral change is something that is intended by the composer and taken advantage of, or is instead an unintended consequence of the composer’s desire to make difficult figurations easier to play is a question that may not be answerable in the absence of writings on the subject by the composer. Doubtless though, the timbral changes, intended or not, impact the impression given by the piece. Another consequence of the same tuning however is to simplify the fingering of arpeggiated figures so common in brass music. Changing the tuning to make it easier for the violin to mimic musical figurations common on the trumpet is an example of *scordatura* use motivated by issues of feasibility.

What follows are detailed discussions of six different pieces for solo cello and their individual uses of *scordatura*. Peter Sculthorpe’s *Requiem for ‘cello alone,*’ László Borsody *Alone,* Ralph Shapey’s *Krosnick Soli,* Alfred Schnittke’s *Klingende*

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\(^3\) Boyden, “Violin Technique,” 66-67.
\(^4\) Ibid., 66.
Buchstaben, Kaija Saariaho's Spins and Spells, and Henri Dutilleux's Trois Strophes sur le nom de SACHER are all considered for the rationale and musical motivation behind their changes to the tuning of the cello as well as for the techniques employed in the music that take advantage of the scordatura. Provided at the top of the entry for each piece is the tuning required for the work, the type of notation employed, a summary of the rationale behind the use of scordatura, the publisher of the music, and, where readily available, a representative, commercially available recording of the work.

Peter Sculthorpe, Requiem for 'cello alone' (1979)

Tuning required: B♭-G-d-a  
Notation: at pitch  
Rationale: timbral change to entire instrument  
Publisher: ©1979 Faber Music Ltd, London  
Recording: Peter Wispelwey for Channel Classics (CCS 7495, 1995)

There are six short movements in Requiem for 'cello alone' (1982): Introit, Kyrie, Qui Mariam, Lacrimosa, Libera me, and Lux aeterna. "For the most part, the music reflects the words of the chosen parts of the Latin text, so that where the text is in the third person, singular or plural, I have used plainchant, and where it is in the first person I have used a more personal music."5 Peter Sculthorpe (1929- ) further writes in the notes to the Faber Music Ltd edition of the work:

The idea of using the Plainsong Requiem Mass as source material for a work has interested me for some years, and it continues to do so. It seemed to be especially appropriate in writing for the particular timbral and expressive qualities of the cello; and an added richness of sonority is gained by lowering the pitch of the fourth string.6

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5 Peter Sculthorpe, preface to Requiem for cello alone (London: Faber Music Ltd, 1982).  
6 Ibid.
Clearly it is Sculthorpe’s intent to alter the timbre of the cello in a way that fits his conception of the music. In this case, the decision is a particularly effective one for the introspective, pleading nature of his music. Sculthorpe also instructs, “The plainchant in the *Introit, Lacrimosa* and *Lux aeterna* should be played with little or no vibrato, and with understated phrasing… *Requiem* should be amplified, using a free-standing microphone placed near the instrument.” 7 The effects of the amplification and non-vibrato playing seem, along with the *scordatura*, to alter the sounds produced from normal, every-day cello sounds, to something just slightly different. Partially by virtue of these slight differences, *Requiem* is given a power to envelope the listener perhaps without allowing for a conscious understanding of why.

The opening melody of the *Introit* is presented in F major. Though modes like mixolydian and, of course, ionian have significant similarities with major scales, to modern ears, the chant-like tune of the *Introit* does not call to mind any modal relationships. The use of a melody with a more obvious modal feel would have strengthened the chant-like character of this opening line, but the nature of the melodic contour and the fact that the line’s range is limited to a fifth provide enough of a connection to the sound of monophonic chant to call this ancient style to mind (figure 3.2). The subsequent *meno mosso* phrase makes the first use of the lowered fourth string as a drone. The melodic line heard above the B⁰ drone centers on D, and sounds to modern ears like a presentation in D minor, the relative minor of F major. Two other movements have overt, unaccompanied chants. The chant at the beginning of the fourth movement, *Lacrimosa*, also feels a bit like D minor. It exhibits an alteration between the flat and sharp scale degree 6, though not in accordance with the practices of

7 Ibid.
ascending and descending lines in the modern melodic minor scale. The melody lacks the leading tone (C♯) as well. All of these characteristics lend a much more modal sense to this monophonic line than were heard in the Introit’s melody. *Lux aeterna* also begins with an unaccompanied chant-like melody in the Lydian mode.

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**Figure 3.2:** Sculthorpe *Requiem for cello alone, Introit*, measures 1-3.

Unified throughout by more than just the periodic return of chant-like material, the work is quite successful and tightly constructed. The material of the *meno mosso* sections of the first movement, shown in figure 3.2 and continued in figure 3.3, returns slightly altered but clearly recognizable in *Kyrie* (figure 3.4) and *Qui Mariam* (figure 3.5). The tuning allows the A-string melody to be accompanied by a rhythmic *ostinato* pizzicato of an inverted G minor chord in *Qui Mariam*.

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**Figure 3.3:** Sculthorpe *Requiem for cello alone, Introit*, measures 4-6.
Lacrimosa seems to function in a similar way to the sarabandes of the Bach cello suites. It is the emotionally weighty and spiritual center of the work. The bulk of the movement is chant-like, which accounts for its spiritual feel, and it uses the lowered B\textsuperscript{b} string as a drone accompaniment through a portion of the chant presentation.

An interesting technique, usable even with traditional tuning, is applied in the fiery Libera me movement (figure 3.6). Triple stops involving two open strings (strings II and IV) and a melody high up on the third string allow for the accompaniment of the melodic line with the outline of the same chord used earlier as the pizzicato
accompaniment in *Qui Mariam*. *Libera me* also recalls double-stop, leaping material exactly from *Kyrie* toward the end of the movement.

\[\text{Largamente (} \frac{\text{}}{3} = \text{ c. 60)}\]

* The top line should be played on the third string

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**Figure 3.6:** Sculthorpe *Requiem for cello alone, Libera me*, measures 47-51.

The choice to make use of *scordatura* in this work was motivated by a desire to alter the timbre of the instrument. The decreased tension on the instrument produces a sound befitting a requiem, but Sculthorpe obviously also makes use of pitch combinations that would otherwise be unavailable to him. Without the notes by the composer in the preface to the work, it would be hard to determine that the timbral changes, regardless of the fact that they are quite evident, were what drove him to this tuning.

*Tuning required:* dynamic scordatura of C string down to G’ and back up to C  
*Notation:* at pitch  
*Rationale:* glissando effect, registral and timbral depth  
*Publisher:* ©1980 by Editio Musica, Budapest  
Musical examples reproduced by kind permission of EMB Editio Musica

This three movement work by László Borsody (1944–) makes use of multiple percussive modes of producing sounds at the instrument including both left- and right-hand pizzicato, Bartók pizzicato, “struck notes” (struck sufficiently forcibly with the left hand to produce a tone), and col legno. The piece’s impact is largely a rhythmic one, and though there is never a time signature and rarely a barline, occasionally a fleeting sense of meter is established.

Borsody’s use of *scordatura* is isolated to the third movement and involves tuning the C string down a fourth to G’ (figure 3.7). This is done to permit the sounding of the octave Gs and a glissando in octaves from G’ to C that can be fingered as a fifth. Though Borsody’s preference must be for this rendition, he provides ossias for each passage should the performer decide not to undertake the *scordatura*. From figure 3.8 below, ossia passages A and B replace the portions of line 5 of the third movement that use the retuned fourth string. Ossia passages C and D replace the two instances of the retuning of the fourth string in lines 6 and 7 of the third movement. Borsody, however, has worked the retuning of the fourth string into the music quite successfully, and the effect of the *scordatura* is truly lost in a performance of the glissandi from the ossia passages. As is the case with most ossias, these passages are alternate, but not equivalent representations of the same music.
*) tuning down of the C-string as smoothly as possible
**) partial tuning up of the tuned down string by a slight turn of the peg
****) complete tuning up until the usual pitch with two-to three (eventually four) trialy, (sic) only upwards if possible

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**Figure 3.7:** Borsody, *Alone*, Movement III, lines 5 through 7.

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The *allargando* momentarily puts the brakes on what is otherwise an almost frenetic movement, and the sonority of the chords played there is particularly befitting of the sudden change in mood. It is as if the record playing the piece were
unexpectedly slowed. Both the tempo and the pitch drop suddenly. Borsody’s awareness of the reluctance of many players to attempt works calling for scordatura may have prompted the composition of alternate material. Nevertheless, if a performer chooses to play the ossia passages, an attempt should be made to imitate the effect that the tuning would have. Lost in the ossias are the deepened resonance and slightly sluggish string response both afforded by the drastic decrease in tension of the fourth string. These timbral effects aid in creating the slow-motion feel of the brief passage perhaps even more than the simple availability of the new pitch, G’.

The retuning of the fourth string is skillfully worked into the music following this slow-motion section. Immediately following the allargando chords, the music is differentiated in mood from upper register to lower. There are two competing moods. The high a” trill signals a return to the livelier tempo and mood. The subsequent meno mosso is the lower voice’s attempt to respond with a slight revving up of energy. The upward scordatura glissandos that follow continue this revving up and presage the return of more vigorous music in both upper and lower registers. There is no indication as to the exact timing of the repeated ad lib tunings in the last line of figure 3.7. To fit this interpretation, it might be appropriate to begin the indicated accelerando early by quickening the pace of these successive tunings. It is entirely possible to view these retuning moments cynically as a compromise the composer needed to make in order to allow for accurate tuning in the remainder of the movement. Integrated as it is into the artistic vision for the passage, however, it is much more satisfying to consider even the retuning to be of musical importance.

*Tuning required:* A’-G-d-a  
*Notation:* at pitch  
*Rationale:* timbral distinction of bass line  
*Recording:* Scott Kluksdahl for Composers Recordings (*Lines for Solo Cello*1997)

Ralph Shapey (1921-2002) had a fascination with the sound of the cello tuned A’-G-d-a. Joel Kroshnick has the following to say about Shapey and this tuning practice.

All of the cello works after 1968 [of Shapey] have the cello C tuned to A’. They include the *Kroshnick Sonata*, a *Rhapsody for Cello and Piano*, the *Sonata Appassionata*, the *Kroshnick Soli*, *Solo Duo Trio for cello and tape*, the *Evocations II and IV*, the Double Concerto for Cello and Violin, and the Double Concerto for Cello and Piano. The string quartets from #7 (possibly #6) also have the cello tuned down. The 9th and 10th (possibly the 8th) also have the viola tuned down in the same way.

Shapey was a remarkably skilled serious violinist as a young man, assistant concertmaster of the Busch Chamber Players for some time during his youth. He loved the music of Bach and always valued the role of the bass line and its relationship with whatever went on above it. He wrote many pieces that were essentially elaborations of a bass line. *Kroshnick Soli* is constructed in that way.

Shapey often referred to the bass line as the cantus firmus from which all the other music emanated. The *scordatura* C string was meant to separate the bass line from the rest of the music, to define it always clearly as a separate expressive element... The motivation for the A-string came from these musical convictions; the sound was the one he felt could most completely identify the cantus firmus as the motivating force of the piece.  

*Kroshnick Soli* makes use of the twelve-tone row stated as the bass line in the first six measures of the piece (figure 3.9). The row is F# D E♭ A B G G♭ C B♭ E F C♯. Every pitch is played on the altered fourth string in this solo!, and the tuning certainly

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8 Joel Kroshnick, e-mail correspondence with author, 5 March, 2005.
does serve to help distinguish this line from the dissonant chords above it. The double-arrow symbol indicates that the chord should be rolled quickly up from the bottom note and then back down in order to sustain the bass note.

\[ \text{Figure 3.9: Ralph Shapey, } \textit{Krosnick Soli}, \text{ Measures 1-6.} \]

A part of the vertical sonorities in these first six measures results from the retrograde row form R₀ running simultaneously in the highest voice along with the prime form. The remaining notes that comprise the chords seem to be chosen with the aim to create maximum dissonance. Small clusters whose members have been displaced by an octave or more occur frequently: D-Eᵇ-E in measure 2, Bᵇ-B-C, F♯-G-G♯, and B-C-C♯ in measure 3, and G♯-A-Bᵇ-B in measure 4.

As Joel Krosnick points out above, Shapey frequently derives much of his musical material from his bass lines. There is much in \textit{Krosnick Soli} that follows this practice since P₀ first occurs in the bass voice, and P₀, its retrograde R₀, and two
transpositions, P₅ and P₇, make up much of the work’s musical material. The piece is divided into eleven “solos” that run continuously as one movement. The first, shown above in figure 3.9, states the primary material that is presented in varying forms throughout the work. Table 3.1 below summarizes some of the important content of the solos. Solos II, III, V, VI, VIII, and IX are monophonic, while the rest are chordal.

<table>
<thead>
<tr>
<th>Solo</th>
<th>Character marking</th>
<th>Row forms used</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Maestoso</td>
<td>P₀ and R₀</td>
<td>chordal, simultaneous presentation of rows</td>
</tr>
<tr>
<td>II</td>
<td>Dolce</td>
<td>P₀ and R₀</td>
<td>monophonic, rows presented concurrently in different registers and rhythmic values</td>
</tr>
<tr>
<td>III</td>
<td>Nite (gently)</td>
<td>P₀ and R₀</td>
<td>similar to II</td>
</tr>
<tr>
<td>IV</td>
<td>Appassionata</td>
<td>P₀ and R₀</td>
<td>expansion of I</td>
</tr>
<tr>
<td>V</td>
<td>Tenero (tenderly)</td>
<td>R₀</td>
<td>a single, linear, monophonic statement of R₀</td>
</tr>
<tr>
<td>VI</td>
<td>Semplice, delicato</td>
<td>P₀, R₀, P₅, P₇</td>
<td>P₅ ends on C♯ and overlaps with the start of P₀</td>
</tr>
<tr>
<td>VII</td>
<td>Maestoso</td>
<td>P₀ and R₀</td>
<td>identical to I</td>
</tr>
<tr>
<td>VIII</td>
<td>Scherzo, vivo</td>
<td>P₀ and R₀</td>
<td>similar to II and III</td>
</tr>
<tr>
<td>IX</td>
<td>Rhythmic, spiritoso</td>
<td>P₀ and R₀</td>
<td>monophonic statements in staccato rhythm similar to I</td>
</tr>
<tr>
<td>X</td>
<td>Appassionata</td>
<td>P₀, R₀, P₅, P₇</td>
<td>non-simultaneous combination of IV and VI</td>
</tr>
<tr>
<td>XI</td>
<td>Maestoso, esaltazione</td>
<td>P₀ and R₀</td>
<td>similar to I with sustained 4⁰'s and 5⁰'s in bass</td>
</tr>
</tbody>
</table>

Table 3.1: Summary of musical material of Ralph Shapey’s *Krosnick Soli*.

Of the monophonic solos, there are two types. Solos II, III, and VIII are simultaneous combinations of P₀ and R₀ with much “free” pitch content derived from the chords of solo I. Solos V, VI, and IX are straightforward presentations of one row form at a time.
Shapey of course doesn’t limit himself to the presentation of row forms only on the fourth string. Solos II and III are much more free, and pitches from $P_0$ are signaled by the relatively long notes in the upper register. $R_0$ is arranged in the music almost exclusively at the peaks of the leaping quintuplet and sixteenth note figures between the longer notes of $P_0$. The pitches from $P_0$ are circled and those from $R_0$ are boxed in figure 3.10. The repetition of the pitch F (from $P_0$) in measure 14 mirrors the same repetition that had occurred in solo I. Shapey chooses, however, not to repeat the D of $R_0$ at this point as he had in solo I.

\[ P_0 = F^\# D E^b A B G G^\# C B^b E F C^\# \quad R_0 = C^\# F E B^b C G^\# G B A E^b D F^\# \]

**Figure 3.10:** Solo II of Ralph Shapey’s *Krosnick Soli*—$P_0$ pitches circled, $R_0$ boxed.
Solo III is very similar to solo II in that the longer sustained notes signal the presentation of a segment of $P_0$, and leaping figures typically contain members of $R_0$. $P_0$ returns to the lower register, and, though it isn’t indicated in the score, might best be performed exclusively on the bottom string for the timbral separation from the rest of the music that this string provides.

In the middle of the work, solos V (figure 3.11) and VI serve to refresh the listener’s memory of the important melodic material. Solo V is a brief appearance of $R_0$ in an unadorned form entirely in the bass register for the first time. Though Shapey again hasn’t specified that this line be performed exclusively on the fourth string, there are only two pitches ($G$ and $G^\#$) that lie in the range of the third string. The fingering that Krosnick provides for the passage is clearly for the fourth string, and it is advisable to heed his advice since the color of this *scordatura* string is undoubtedly what Shapey had in mind. Solo IV is marked sempre forte, and it is essentially a melodic expansion of solo I. It retains much of the angular feel with which solo I begins the piece, so the contrast between this and the quiet fifth solo is brought out even more by using the deeper resonance of the low A’ string.

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**Figure 3.11:** Solo V from Ralph Shapey’s *Krosnick Soli*. Measures 36-39.
Solo VI continues with a monophonic presentation of the first transposed row form in the piece, P₅. This row begins on B, and ends on F♯, which makes for a convenient elision with the subsequent presentation of P₀. Another transposition of P₀ appears in this solo, and that is P₇, the row form that begins on C♯, the same pitch on which R₀ begins and P₀ ends. Together, solos V and VI seem to form the central slow section of the piece, and they are followed by an exact repetition of solo I as solo VII.

Solo VIII expands upon the technique used in solos II and III. Sustained notes again signal the pitches of P₀, and the peaks of leaping figures typically provide the pitches of R₀. Unlike solos II and III however, solo VIII makes two complete statements of P₀. The two short portions of solo VIII that show the start of each iteration of P₀ and R₀ are shown in figures 3.12A and B. Again, pitches from P₀ are circled, and pitches from R₀ are boxed.

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**Figure 3.12:** Ralph Shapey, Kronick Soli Solo VIII.
A. measures 72-74.
B. measures 80-83. Measure 80 contains the last pitch, C♯, of the first iteration of P₀ and the first pitch, F♯, of the second iteration. Likewise, measure 80 contains the last pitch, F♯ of R₀. Measure 81 starts R₀ over again on C♯.
The second half of solo VIII is a variation of the material presented in the first half of the solo. The amount of free material between sustained notes of $P_0$ is altered. The distribution of both $P_0$ and $R_0$ is changed so that the presentation is a little less systematic. Some pitches from $R_0$, like the F in measure 81, occupy positions previously reserved for $P_0$'s pitches.

The performance of Solo IX, a portion of which is given below in figure 3.13, presents a problem to the performer in using a significantly loosened fourth string. The solo is marked *sempre staccato* and *spiritoso*. Attacking the string with the bow in the manner in which the player is accustomed on an unaltered C string in order to create the required rhythmic and martial feel will result in a less than satisfactory sound. The lowered fourth string is much more appropriate for deep, resonant, sustained notes, and the player will need to engage this looser string with patient application of arm weight in order to get the desired punch in this solo.

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**Figure 3.13:** Beginning of Solo IX from Ralph Shapey’s *Krosnick Soli*. Measures 92-94.

There is an obvious difficulty for the player in learning Krosnick Soli. The work is notated at pitch. The difficulty of reading such scores will be discussed in chapter four, but one aspect of Shapey’s tuning saves it from a level of difficulty that it might otherwise attain. Cellists are accustomed to having an A string. We know
where, for example, F♯ is on an A string two octaves higher than the lower one used in
Krosnick Soli. The difficulty of making the adjustment to Shapey’s tuning and notation
is therefore minimized.

**Alfred Schnittke, Klingende Buchstaben (Sounding Letters) (1988)**

*Tuning required:* dynamic *scordatura* of G and C strings (G down to D♭, C down to G♯)

*Notation:* at pitch

*Rationale:* Glissando effect, lower the range of the instrument

*Publisher:* Musikverlag Hans Sikorski, Hamburg (1990)

*Recording:* Torleif Thedéen for Bis (CD-507, 1990)

From the notes to Bis CD-507, Hans-Ulrich Duffek summarizes this short, one-
movement work for unaccompanied cello by Alfred Schnittke (1934-1998).

As already indicated by the title, Schnittke employs in *Klingende Buchstaben* those letters of the alphabet from the dedicatee’s name which double as musical note-names: A—E—A—D—E and A—E flat (German Es)—C—B (German H). The latter group of notes also happens to correspond to Alfred Schnittke’s initials. This material, which is heard thematically right at the outset, is varied and extended from the start by mirror-image, transposition and addition effects; it thus serves as the point of departure for a more or less free, improvisatory form. After each of two big pauses the motif from the opening starts afresh, enriched in various ways, finally *pizzicato* and increasingly fragmented by insertions and abbreviations, until the work eventually dissolves in high register with the opening notes A—E flat.”

This work is a prime example of a “special effect” *scordatura*. The piece
begins tuned normally, and only six measures from the end is *scordatura* called for
(figure 3.14). The changes in tuning are unlikely to have been intended to alter the
timbre of the instrument for the remainder of the movement. The main purpose seems
to have been to produce an unwinding effect as the piece itself winds down. The

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technique allows Schnittke to combine the feel of a coming to rest through sinking deeper into the abnormally low *scordatura* registers and a simultaneous floating away into the stratosphere of the highest registers.

![Musical notation]

**Figure 3.14**: Schnittke, *Klingende Buchstaben*, Andantino, measures 30-36.

What Schnittke asks for is also an example of the type of use of *scordatura* that limits the accessibility of the work to players, and prevents performance of the piece. The effect that Schnittke desires is an effective one in the context of the music, but it is quite difficult to pull off the effect in performance. Measure 31 requires a double stop to be played on the downbeat, and immediately following that the G string must be tuned down by half-steps to E♭. This is difficult enough even with an expansive sense of rubato to provide the time following the downbeat to tune the G string down, but there are much greater challenges ahead. The only way to play the double stop on the downbeat of measure 33 is if the third string has been tuned down to D. This tuning to D must either be accomplished before playing the high B♭ in measure 32 or
immediately after. Since the player must tune the C string to B' in measure 33, it may be advisable to attempt the tuning of the G string to D silently, and immediately after sounding the E^b at the end of measure 31. A similar problem is encountered at the beginning of measure 35, only this time both lower strings are involved. There are only two reasonable ways to play the B^b/ D^b double stop in measure 35. One way is to have strings III and IV tuned to those pitches, and the other is to have the fourth string already tuned down to G'^^ since the player's left hand will already be in position on the tuning peg. After playing measure 34 the performer can then silently tune the third string down to D^b before beginning measure 35. In measure 35, the player must then tune string IV down further by step to G'^^ while playing. The machinations involved in these tunings are summarized in figure 3.15 below.

![Figure 3.15: Tuning suggestions for measures 31-35 of Schnittke's Klingende Buchstaben.](image)

The other solution to the entire problem might involve tuning the third string to D^b after measure 31, and the fourth string to G'^^ after measure 32. The pitches in measure 33 and 35 could then be fingered instead of reached through successive
tunings. The C/D double stop on the downbeat of measure 33 would then be fingered as if playing an A♭/F double stop on a normally tuned cello, and measure 35 would involve use of the open third string. The score lacks glissando markings in measures 33 and 35, though it has them in measure 31. Professor Alexander Ivashkin, cello professor and director of the center for Russian music at the University of London, is one of three cellists for whom Schnittke wrote his cello works. Dr. Ivashkin has recorded the complete works for cello by Schnittke and says that some glissando markings are actually missing from measure 31 of the manuscript for *Klingende Buchstaben*. The intention in all three scordatura measures is for the pitches to be reached through successive half-step tunings regardless of whether dashes appear or not. ¹⁰ When Ivashkin performs *Klingende Buchstaben*, he actually tunes the third string down to D following measure 32 rather than prior to it. This change is the only one that Ivashkin makes to the method described in figure 3.15 above.

The difficulty of accurately rendering these few measures of the piece in live performance is certainly a deterrent to performance for many players. One aid to awkward dynamic tuning demands will be discussed further in chapter four. The technique involves marking both the tuning peg and the scroll in a dial-like fashion in order to locate approximately how far a peg must be tuned to reach a certain pitch. Such an aid to performance would certainly assist the player, but the accurate tuning of a string in performance while playing is difficult enough to do once, let alone multiple times on multiple strings. Frequently, demands such as those made here by Schnittke are deemed unworthy of the practice required to perfect the technique, and a composer

¹⁰ Alexandar Ivashkin, e-mail correspondence with author, March 26, 2005.
calling for such effects should, right or wrong, be prepared for his or her work to meet
with significant resistance from all but the most adventurous of players.


*Tuning required:* B♭-G-c♯-a  
*Notation:* as fingered  
*Rationale:* alteration of timbre and availability of altered natural harmonics  
*Publisher:* Chester Music Ltd. (1997)  
*Recording:* Anssi Karttunen for Petals (Petals 001)

Kaija Saariaho (1952-) writes the following as notes to her single-movement piece, *Spins and Spells*.

The title of this piece refers to the two gestures that are the basis of the piece: on one hand the motives I call "Spins", turning on themselves or going through transformations and, on the other hand, timeless moments, centered on colors and sound textures. The whole piece develops around or between these two gestures. I have chosen to tune the cello in an unusual way in order to personalize the harmonic language: the fifths are here replaced by structures that favor major sixths and minor thirds. Marked by this scordatura, the sonority of *Spins and Spells* reminds me of the music and instrumental colors of another time, well before the times of the cello that we know today, albeit seen through and transformed by my own universe.11

In a practical sense, the main effect of Saariaho’s scordatura is to alter the pitches available as natural harmonics. The pure sound of harmonics played this way as opposed to that of fingered harmonics in which one pitch is stopped and another location is lightly touched is undoubtedly what Saariaho was after. There are such quick alternations called for, that the pitch content she desires would be impossible to reproduce without the use of these natural harmonics. Figure 3.16 below shows the set

of natural harmonics on each string that is used in the piece as well as each open string’s tuned pitch.

![Musical notation images](image-url)

**Figure 3.16:** Natural harmonics used in Kaija Saariaho, *Spins and Spells.*

*Spins and Spells* alternates between the ethereal sound qualities of harmonic pitches and the more substantial sound of normal cello tones, and it frequently calls for the performer to effect a gradual transition from one mode of sound production to another. The first nine measures of the piece are shown in figure 3.17 below. The arrow in this excerpt indicates a gradual transition from normal (N), to sul ponticello (SP) playing. Saariaho’s music obviously takes advantage of fine gradations of tone color. The soundscape she creates and the harmonic language available to her are intimately connected to her choice of tuning.
Dolce, agitato \( \frac{\text{d}}{\text{j}} = 63-76 \)

\textit{sempre poco rubato} \( \text{rit. into semiquavers} \)

\( \text{\textit{mp}} \)

SPINS AND SPELLS
By Kaija Anneli Saariaho
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**Figure 3.17:** Kaija Saariaho, *Spins and Spells*, measures 1-9


*Tuning required:* B\(_{b}\) - F\(#\) - g - a

*Notation:* hybrid, both at pitch (large staff) and as fingered (miniature staff)

*Rationale:* tonality, timbral distinctions, possible connection to Bartók’s *Music for Strings, Percussion, and Celesta*

*Publisher:* Heugel et Cie (1982)

*Recording:* Emanuelle Bertrand for Harmonia Mundi (2000)

Paul Sacher (1906-1999) was an important figure in the European Classical music scene in the twentieth century. His name is associated with numerous orchestral commissions, and he conducted premieres of some of the century’s most highly regarded works.
As a tireless champion of 20th-century music, Sacher had few equals. He commissioned over 200 works by major composers including Bartók, Berio, Birtwistle, Boulez, Britten, Carter, Dutilleux, Henze, Hindemith, Honegger, Ibert, Krenek, Lutoslawski, Malipiero, Martin, Martin, Strauss, Stravinsky and Tippett, often conducting the premières himself; these included Bartók’s Divertimento and Strauss’s Metamorphosen. 

Sacher founded the Basle Chamber Orchestra as a young man in 1926, and Bartók wrote Music for Strings, Percussion, and Celesta for this orchestra ten years later. The work’s premiere was conducted by Sacher in 1937.

Because of Sacher’s enthusiasm for new music, one of the century’s most prominent cellists, Mstislav Rostropovich commissioned solo cello works from twelve composers for Sacher’s 70th birthday on April 28, 1976. The first movement of Trois Strophes sur le nom de SACHER is the contribution to this multi-work homage by Henri Dutilleux (1916- ) who later expanded the work with two more movements. A brief summation of the A to E♭ motion of subject entries in the first movement of Bartók’s Music for Strings, Percussion, and Celesta is included in Dutilleux’s piece, paying respects both to the work’s composer and to the conductor of its premiere (figure 3.18).

![Music notation](image)

© by Heugel et Cie, 1982

**Figure 3.18:** Dutilleux, Trois Strophes sur le nom de SACHER, measures 45-47.

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The pitches on which alternating subject entries occur in Bartók’s fugue are summarized in the graph in figure 3.19 below. These entrances proceed around the circle of fifths in both directions so that eventually $E^b$, a tritone away from A, is reached. The pairings that Dutilleux chooses for his double stops in measures 45 and 46 are all sets of notes equally far removed from the central pitch A. The pairing of E and D for example on the last beat of measure 45 involves the notes one fifth up and one fifth down from A. The $C^#/F$ double stop uses the notes four fifths removed from A in either direction.

![Diagram](image)

**Figure 3.19:** Pattern of subject entries in the first movement of Bartók’s *Music for Strings, Percussion, and Celesta*. Pitches aligned vertically correspond to those pairings chosen by Dutilleux for his *Trois Strophes*, movement one, measures 45-46.

As the title of the Dutilleux’s work suggests, thematic material is derived from the pitches indicated by Sacher’s name. Taking advantage of the German system of pitch identification in which ‘S’ implies eS, or $E^b$, ‘H’ indicates B natural, and ‘R’ is taken to mean Re or D, Sacher’s name equates to the pitches indicated in figure 3.20 below.

![Pitches](image)

**Figure 3.20:** Thematic pitch content for Dutilleux, *Trois Strophes sur le nom de SACHER*. 
There is more to be made of the connection between Dutilleux’s solo cello piece and Bartók’s *Music for Strings, Percussion, and Celesta*. The first note of Dutilleux’s work is E♭, and indeed this pitch is strongly established as a tonal center at the beginning of the piece. The first 30 seconds of music make use of nothing but the pitches found in Sacher’s name, shown above. The primary resting points in these 30 seconds are all E♭, and so the listener perceives this pitch to be of central importance. Figure 3.21 provides a short excerpt that amounts to approximately half of these 30 seconds of music.

![Musical notation image](image)

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**Figure 3.21**: Dutilleux, *Trois Strophes sur le nom de SACHER*, Movement 1, measure 1, first line. The at-pitch version of the music is given in the full-sized staff. The miniaturized staff shows the identical music as fingered.  

The end of the movement arrives only seven measures after the excerpt given in figure 3.18 above. From measure 47 to the end of the movement, the central, highlighted pitch is A. Dutilleux’s journey from E♭ to A mirrors that of Bartók’s famous fugue.

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13 The various methods of notating *scordatura* works will be discussed further in chapter four. The miniaturized staff below the music presents the as-fingered notation for those portions of music played on the third and fourth strings, tuned F♯ and B♭ respectively. This notation is perhaps the most precise and helpful way of notating a *scordatura* work, though some object to the cluttering of the score with numerous as-fingered performance aids.
The issue of Dutilleux’s choice of tuning remains to be considered. Tuned normally, the cello has three open strings (A, D, and C) that coincide with pitches in Sacher’s name. It would also be possible to tune the third string down to either E or E♭ and have four out of six SACHER pitches available as open strings. Instead, Dutilleux tunes the fourth string down to B♭ and the third string down to F♯ and uses these strings primarily to present contrasting rather than thematic material. When pitch content other than that contained in Sacher’s name finally intrudes toward the end of the long first measure of the piece, it is the open third and fourth strings (B♭ and F♯) that begin to put pressure on the perception of the centrality of E♭.

The pitches B♭ and F♯ have a certain significance in Bartók’s fugue as well, and it may be for this reason that Dutilleux settled on this particular tuning for the Trois Strophes. When the subject of Bartók’s fugue is presented on F♯, the entrances come in stretto. This is the half-way point in Bartók’s ascent through fifths from A to E♭, so it makes some sense that he would mark this point in some manner in his music. The importance of B♭ lies in the fact that it is only one fifth removed from the E♭ goal of the Bartók’s descent by fifths. At this point in his fugue, Bartók’s tempo changes, and the first interval of his subject is expanded from a half step to a tritone. These landmark pitches for Bartók signal important changes in his music, and, for Dutilleux, they are the means by which contrasting material is presented, and his journey from E♭ is initiated.

We saw above in the Op. 8 sonata of Kodály and in Shapey’s Krosnik Soli that altered strings could be used to distinguish two musical lines from one another by virtue of their timbres. For a long time, it has been the aim of many composers to
present or imply polyphonic music on instruments that primarily play only one note at a time. Bach succeeded marvelously with his solo violin and cello works. In the twentieth century, Kodály, Shapey, and Dutilleux provide examples of the use of *scordatura* to distinguish separate voices even further and similarly to imply or present polyphony on solo cello. Shapey used his drastically lowered forth string to distinguish his bass line from the rest of his music. (See figure 3.9 in particular.) Kodály used the lowered strings for one musical statement and contrasted its color with that of a pianissimo, *sul ponticello* gesture on the upper strings (figure 2.13). Dutilleux at times makes use of the same type of technique to present two voices. Figure 3.22 shows a passage from the first movement of *Trois Strophes* in which the timbre of the *scordatura* strings, the mode of sound production (*quasi col legno* or *pizzicato* versus *sul ponticello*) and pitch content all serve to highlight musical gestures made up of SACHER pitch content.

![A Tempo (♩ = 92/96)](image)

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**Figure 3.22:** Dutilleux, *Trois Strophes sur le nom de SACHER*, measures 3-7. This example again uses the miniaturized staff to indicate the as-fingered option for performers. Dutilleux uses two full-sized staves to present the two distinct voices at this point in the piece.
While Bartók inverts his theme once he reaches his climactic arrival at E♭, he also uses a large-scale retrograde motion back through the circle of fifths to A to end the movement. Dutilleux makes sparing use of retrograde motion in the Trois Strophes. The first literal mirroring technique applied to the entire set of pitches of Sacher’s name is seen in measure 9 (figure 3.23) in Dutilleux’s first movement. The second and final instance of this technique applied to the entirety of Sacher’s name is in the third movement.

![Musical notation]

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**Figure 3.23:** Dutilleux, *Trois Strophes sur le nom de SACHER*, measure 9.

The entirety of Dutilleux’s *Trois Strophes sur le nom de SACHER* takes the listener through the tightly constructed first movement, a slow movement that makes thorough use of the cello’s extended lower register and deepened timbre of the altered strings, and a frenetic last movement whose climax repeats the pitches of Sacher’s name over and over in a register well above the treble clef staff. The first movement however has provided us with all the necessary insights into Dutilleux’s choice of tuning and his desire to pay respects both to the ingenious composition of Bartók and the motivating force for new music that Paul Sacher was through the entirety of his adult life.
The one remaining issue regarding Dutilleux’s piece that needs to be addressed is the ground-breaking form of notation. Rice University Professor of Cello Norman Fischer related a conversation he had with Dutilleux in which the composer admitted his frustration with the score for Kodály’s Solo Sonata, Op. 8. Dutilleux found the score needlessly confusing since portions of it were at pitch, and portions of it were transposed by a half step due to the tuning of the instrument. The crux of the problem was that someone looking at the score needed to know what string each note would be played on, and non-cellists, even if they are talented composers, cannot necessarily make this determination quickly. When he was writing the Trois Strophes, Dutilleux insisted on an at-pitch score. Rostropovich evidently advised that an as-fingered score would greatly simplify the learning process for future performers, and the resulting hybrid notation was a compromise between the two notational practices. This hybrid notation is now used to great effect by many composers, and it will be discussed briefly in chapter four.

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14 Norman Fischer, interview with author, 11 April, 2005.
Chapter 4
Practical Issues for Composers and Performers of Scordatura Works

The purpose of this chapter is to provide those wishing to perform or compose scordatura works with some practical suggestions and information. Music for scordatura cello is written either at pitch, in which case the performer must be able to circumvent years of training that reinforces the belief that a certain note resides at a specific location on the fingerboard, or it is written in a type of tablature notation referred to as an as-fingered or a hand-grip notation. These notational practices will be referred to here as “at pitch” and “as fingered.” The as-fingered practice is used to indicate finger placement in a way similar to the tablature notation of the lyra viol that significantly eased the playing of pieces with widely varying tunings on that instrument. As-fingered notation instructs the player only where to place the finger, not what pitch is produced. The chief difficulty with the as-fingered notation results from the fact that, typically, not all strings in a scordatura work are altered from the instrument’s traditional tuning. A portion of most as-fingered scores therefore is at pitch (that portion that is performed on unaltered strings) and part is written as-fingered.

Notational Concerns for the Composer and Performer

At Pitch or As Fingered?

In writing scordatura works for strings, a critical decision for a composer to make is whether to notate the score “at pitch” or “as fingered.” Frequently the

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1 Chambers, 14. also Boyden, The History of Violin Playing, 130, 250.
preference of the work's dedicatee influences this decision. Ralph Shapey's *Krosnick Soli* was written at pitch because Joel Krosnick prefers to see the actual pitch that he hears rather than a transposition of that pitch at some interval equivalent to the alteration in the tuning of the instrument.

In the quartets, Shapey often acceded to requests by various performers and wrote the fingered pitch large with the actual pitch in parentheses, or sometimes the other way around. I never liked that because I thought it made more confusion than simply learning how to transpose. (In the Scherzo of the 10th (and last) Quartet, the notes come so fast back and forth between the 3rd and 4th strings, that I finally gave up and wrote the fingered pitches only for the lowered string notes and colored them green.)

Krosnick has summed up the difficulties. He prefers to see the actual intervals he plays, and that requires an at-pitch score. When the music is too fast however, even he needs the as-fingered notation and must sacrifice the accuracy of the intervals notated between altered and unaltered string pitches. Composers would do well to be aware of the desires of those performing their work, as well as of the difficulties inherent for performers in both the at-pitch and as-fingered notational methods.

From a young age, string players learn to equate the graphic representation of a note on the staff with a specific finger on a specific string. Somewhat later, we develop the ability to conceive of that pitch as a set of possibilities. Middle C, for example, is known by young cellists as "second finger on the A string." Eventually, it becomes reasonable to play middle C with any finger, including the thumb. Adding to the list of options a player has is the fact that middle C may be played on all four strings. An experienced player judges from the context what fingering is most appropriate. I would

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2 Joel Krosnick, e-mail correspondence with author, March 5, 2005.
3 Fingering a C with a fourth finger on the A string would be reasonable only in very rare instances though. Microtonal music might provide a rationale for such a fingering if intervals smaller than a half step are desired between A and C on the A string.
conjecture that the mental process of most string players, however, does not involve the
conceptualization of the visual representation of a pitch on the page first as a note name
and then as a set of possible locations on the fingerboard. Especially in fast passages
there is time only to relate the graphic representation of the pitch directly to its location
on the fingerboard or to a set of locations when more than one is possible. Therein lies
the problem for performances of scordatura works. Changing the tuning of the strings
changes the location of the notes, and the composer must choose whether to represent
the location of the note graphically in a kind of tablature notation (as fingered), or to
represent the correct pitch and leave the determination of that pitch’s location to the
player (at pitch notation).

If a composer chooses to write a scordatura piece at pitch, the integrity of
relative pitch relationships is of course conserved, and the player is not confused by
hearing different pitches or intervals than he or she sees on the page. The problem with
the at-pitch notation involves the need for the player to relearn how to finger the
instrument. Say, for example, a piece calls for the lowering of the pitch of the third
string from G to F#. An A, written at pitch, resides a half step closer to the bridge than
years of experience and habit tell the player that it does. These years of training have
built in powerful habits that are difficult to overcome.

A brief section of Ralph Shapey’s Krosnick Soli will clearly illustrate the
difficulties of the at-pitch notational system for performers. Figure 4.1 traverses
obviously unfamiliar territory for the cellist. Even pitches that are playable on a
normally tuned C string will be in different locations on this low A’ string.
Figure 4.1: Ralph Shapey, *Krosnick Soli*, measures 1-3. Fourth string tuned to A’. Selection written at pitch (as published).  

In effect, the cellist’s brain must accomplish a transposition up a minor third in order to determine the fingering of the fourth-string notes. For example, A’ equates to an open string (location of C on a normally tuned instrument) and F# equates to the location of the player’s third finger in fourth position (location of an A in fourth position on a normally tuned instrument). This process is simplified slightly if the player realizes that he or she already knows how to finger pitches on an A string, albeit an A string that is two octaves higher than Shapey’s fourth string. In playing the numerous, awkward chords in *Krosnick Soli*, however, even this ready knowledge of where each fourth-string pitch resides is of little help. An as-fingered score helps the player immediately to locate the place the string needs to be stopped (figure 4.2).

Figure 4.2: Ralph Shapey, *Krosnick Soli*, measures 1-3 as it would be fingered. Notes with stems down would be played on the fourth string and sound a minor third lower.

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4 The arrow symbol in figure 4.1 instructs the player to role the chord from the bottom note up to the top and quickly back down in order to sustain the bottom pitch.
Applying the as-fingered notational practice to the selection from *Krosnick Soli* unfortunately results in the possibility for significant confusion. With just a look at figure 4.2, the primary source of confusion is evident. Every note that is to be played on the fourth string has been written a minor third higher in order to indicate where it must be fingered on this detuned string. The double-dotted eighth-note printed A with its stem pointing down in measure one therefore is played on the fourth string and sounds as an F#. Notating this piece as fingered makes it easier for players to decide on fingerings—they just play what they see—but this disturbs many performers who want to see what they hear. Notating *Krosnick Soli* as fingered would result frequently in the perplexing graphic inversion of the bottom two notes of a chord, as is seen in the very first chord of the piece. With the exception of those graphically inverted chords though, fingerings are much easier for most players to interpret quickly. Nevertheless, visual interval relationships throughout the work would be destroyed in every comparison between a fourth-string note and a note on any other string.

When chords are not involved, it is a much simpler matter for the player to take advantage of the intellectual playing aid that results from the fact that the bottom string is tuned to A'. As mentioned above, we know how to finger notes on an A string already, and so the difficulty of making the mental adjustments for finding, say, an E on Shapey's low A string is minimized. An E on Shapey's fourth string is in the same location as it is on the cellists normally tuned, upper A string. Composers who make use of A, D, G or C tunings of any string on the cello, regardless of what octave, will simplify the mental gymnastics required of their performers. Tuning the instrument D-A-c-g for example lowers the pitch of the top two strings each by a whole step and
raises the pitch of the bottom two strings each by a whole step. This drastically altered
tuning at first looks daunting to a player, but we already know how to finger notes on
strings of these pitch classes, so the difficulties are not as great as they might seem to
be. Though some would still prefer an as-fingered score for a piece using this tuning,
interpreting an at-pitch one would not be nearly as difficult as if the open strings were
altered to unfamiliar pitch classes.

Because of the relative ease afforded by the as-fingered notational method for
determining the location of notes in a scordatura work, many players do prefer this
notation. Composers using this method must be very careful to indicate what string the
player should use in any section in which there is any ambiguity. The following
example from Kodály’s solo sonata, utilizing a tuning of B'-F#-d-a, will illustrate the
result of misinterpreting what string to play on. The published score for the piece is
written as fingered, and figure 4.3 includes Kodály’s instruction to use the third string
for most of measure 117. Figure 4.4 shows the correct result of this rendition at pitch.
Some writers indicate that the default fingerings in a scordatura work makes use of first
position and open strings.⁵ The purpose of this is probably to avoid the need for too
many clarifications of which string to use in scordatura pieces notated as fingered. If
Kodály hadn’t been careful to indicate what string to use though, measures 116-118
might come out sounding as shown in figure 4.5.

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⁵ Boyden, The History of Violin Playing, 250.
Figure 4.3: Kodály Sonata, Op. 8, first movement, measures 116-118. As fingered (as published).

Figure 4.4: Kodály Sonata, Op. 8, first movement, measures 116-118. At correct sounding pitch.

Figure 4.5: Kodály Sonata, Op. 8, first movement, measures 116-118, at pitch with performance mistakes, incorrectly fingering the passage entirely in first position.

Fingerings are an extremely personal thing for players, and two cellists may prefer widely differing fingerings for a passage. Extreme care must obviously be taken in designing alternate fingerings when *scordatura* is involved. Rather than performing measure 117 from figure 4.3 entirely on the third string, many find it easier to shift to fourth position and stay there, utilizing the fourth string for the printed A♭s and printed G in the first two beats of the measure. A conveniently placed open D string then allows time for the shift back to first position. Since both the third and fourth strings are tuned down a half step, what is fingered as an A♭ will sound as a G regardless of
whether it is played with a first finger in half position on the third string or with a second finger in fourth position on the fourth string. The note that sounds as a D played on the “and” of beat three corresponds to a written E—a note Kodály expected to be played on the detuned third string. This D, if played with an open string, will allow the time for a convenient shift back to first position. Figure 4.6 below shows this alternate fingering and how the score would need to be rewritten for that one note.

Kodály’s chosen method of notating the passage avoids a confusion obvious with figure 4.6’s use of two consecutive printed Ds, one of which is a sounding C♯ and one of which is actually a D. Nevertheless, many players would find the fingering option in figure 4.6 to be much preferable to any solution that strictly follows Kodály’s prohibition against leaving the third string until the F♯ on the last sixteenth note of measure 117.

![Figure 4.6](image)

**Figure 4.6:** Kodály Sonata, Op. 8, measures 116-118, written as fingered, and rewritten for alternate fingering involving not just the third string, but the fourth as well.

A few notational practices are designed to accommodate for the as-fingered method of notation. In general, as mentioned above, first position is assumed if nothing is indicated. This avoids confusion when some strings are tuned differently and others are left as normally tuned. Any pitch printed as D, E, F, or G in the octave immediately below middle C will be played on the second string for example unless indicated
otherwise. Incorrect notes might result if the composer writes as fingered and the player chooses the wrong string on which to play.

Another convention in scordatura works is to apply accidentals only to the octave in which they occur if the work is notated as fingered. Imagine that measures 116-118 of the Kodály were written as one big measure so that accidentals would carry through the entire passage. The flats applied to the As in the lower octave (from measures 116 and 117) would not apply to the As in the upper octave (from measure 118). The reason for this is that the A\(^\flat\)s from measure 116 and 117 are not actually A\(^\flat\)s. They are Gs that require fingering as if they were A\(^\flat\)s.

As a general rule however, composers probably shouldn’t assume that players are familiar with these conventions due to the infrequency with which most performers encounter scordatura in their playing. A performer trying to decipher a score will welcome a brief description in footnotes or in a preface explaining any peculiarities of notation, even if those peculiarities are standard ones. Making thorough use of roman numerals to indicate the intended string is an absolute must. Many composers hesitate to include fingerings in their music, with good reason since different cellists prefer different fingerings, but roman numerals are not fingerings, and their use is a necessity in scordatura works written as fingered. The pitch content itself may be ambiguous without their presence.

**Hybrid Notation**

Some pieces combine the notational practices discussed above and achieve the best of both worlds. As was seen in the discussion of *Trois Strophes sur le nom de*
SACHER in chapter three, Henri Dutilleux notates the entire work at pitch, but passages that might be confusing include a second, miniaturized staff that presents the as-fingered notational options. These look as though they are ossia passages, but they are identical music presented with an alternate notation (figure 4.7).

Un poco indecisio (\( \frac{3}{8} \) = 92 environ)

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**Figure 4.7:** Dutilleux, *Trois Strophes sur le nom de SACHER*, first movement, line 1. (tuning B\(^b\)-F\(^#,\)-d-a) The main staff is notated at pitch, and the miniaturized one is as-fingered.

It should be noted that this is a different use of a miniaturized staff than Kodály’s use of a similar-looking notation discussed in chapter two. Kodály needed to write both very low and very high pitches in a single chord, and this required the momentary appearance of two staves.

It is obvious from figure 4.7 above that the score notates this wonderful piece in an extremely precise way, and from a performer’s point of view there can hardly be a better solution to the problems of notation than this one. There can be no doubt at any point as to what pitch is intended and how it is to be fingered. This isn’t to say that learning this work is much easier than learning any other *scordatura* work. The notation is simply without ambiguity, and it provides another level of help to the player in the most confusing sections. Nonetheless, the very first note of the piece is an $E^b$
that is unambiguously to be played on the third string. Since this string is tuned to F♯ however, rather than G, the player must locate the note without the aid of any as-fingered guide.

Some composers and publishers prefer to avoid cluttering a performance score with too many aids to the performer. The score for Kaija Saariaho’s *Spins and Spells* comes with an as-fingered part for the player as well as a study score that shows the as-fingered part and the sounding pitches on separate staves. This is especially helpful for Saariaho’s piece for the added reason that numerous natural harmonics are called for, and the player can easily check that they are being played correctly.

*More on Key Signatures and Accidentals*

As mentioned above, accidentals in *scordatura* works notated as fingered are assumed to apply only to the specific octave in which they appear. When the as-fingered notation is used, and accidentals appear on notes played on alternately tuned strings, the player is being instructed to finger the note *as if it were* the note printed. The sounding note could be anything however, depending on the tuning of the string. The accidental should not apply to printed notes in any other octave or on any other string since those printed notes most likely are not the same pitch class as the sounding notes. Cautionary accidentals are recommended in any case to avoid ambiguity.

Of the twentieth century works for unaccompanied cello involving *scordatura* whose scores were available, only two used key signatures. Kodály’s *Capriccio* (tuned B’-G-d-a) uses an E minor key signature, but on the altered lower string, he is careful to provide natural signs for each printed F that he wants to have sound as an E. Without
that the player might finger an F#, due to the key signature, producing a sounding F.

Kodály’s solution is to use accidentals, not odd alterations to the key signature, for pitches on scordatura strings. Osvaldo Golijov uses a D major key signature for Omaramor (also tuned B’-G-d-a), but his score is at pitch, and therefore doesn’t require any alterations to account for the fact that he too asks for a fourth string tuned to B. If a composer wishes to use a key signature for a scordatura work notated as fingered, there will likely be a need for numerous cautionary accidentals. The nontraditional key signatures of Biber’s Mystery Sonatas confirm the potential level of confusion inherent in their use. These key signatures appear as they do because the accidental applied to a printed pitch in one octave may not apply in any other octave due to the tuning.

![Key signatures for Biber, Mystery Sonatas](image)

**Figure 4.8:** Tunings, key signatures, and keys for Biber, Mystery Sonatas.

The key signatures in figure 4.8 are a direct result of the as-fingered nature of the score. Such key signatures are not necessary when writing a scordatura work at pitch. Sonata number 14 provides an easily understood example of the need for such key signatures when writing a score as fingered. The lowest string in this sonata is tuned up a whole step from G to A. When the pitch C is printed and fingered, the pitch D will sound. Obviously, though a key signature for D major would normally contain a C#, if the violinist fingers a C#, a D# will sound. In this lower octave then, the player
must finger as if they were playing C naturals, and the key signature for the low A string must reflect this. A similar problem occurs on the violin's third string which has also been raised by a whole step. If the violinist were to finger an F# on this string, a G# would sound. Obviously a sounding G natural is desired for the key of D major, and so an F natural must be printed and fingered. The key signatures for these sonatas are string specific, which is why the sharps or flats in one octave must be cancelled out at times in a different octave.

There is essentially no reason to write a part at pitch when notating a piece that makes use of a transposition scordatura, a tuning in which all four strings are altered by the same interval. Tuning all strings down a half step, for example, allows the performer to play in the sounding key of B major by fingering as if the piece were in C major. A part for such a piece should be written in C major. The tuning accomplishes the transposition to B major for the performer. Needless difficulty in reading the part would result from writing the part at sounding pitch. For harmonic analysis, a score might reasonably be produced in such a form so that actual pitch comparisons can be made between scordatura instruments and non-scordatura ones without having to accomplish a transposition for one part. For the player of the scordatura part however, there is no confusion resulting from part of the staff being written at pitch and part of the staff being written as fingered. In the case of a transposition scordatura, the interval relationships between pitches are conserved, and only those with perfect pitch might perceive that the note they play is not the note they see.
From the Performer’s Perspective

There are several issues that confront the performer when undertaking a scordatura work. There are the obvious difficulties of learning the work since there are extra cognitive steps to figuring out the fingering if the score is at pitch or understanding which string to play on and the pitch content of the piece if the score is written as fingered. Dynamic scordaturas, those tunings accomplished while playing, pose their own set of problems. There are also hardware issues such as breaking strings and shifting bridges to be alerted to as well.

Learning the Piece

Be aware, should you desire to devise your own alternate fingerings, that what string you chose to play on might alter the pitch content if you aren’t careful. An as-fingered score doesn’t always indicate the sounding pitch, so what looks like a B for example on an altered string can’t be fingered as a B on an unaltered string. It’s a good idea to make note of how the notes sound on the altered strings as well. If a composer desires the performance of a passage on a particular string, it may be for timbral effects that are destroyed by your alternate fingering. The passage from the Kodály sonata shown in figure 4.6 above is not appreciably changed by the alternate fingering given there, but this may not always be the case when a fingering is changed.

If a string has been tuned to the same pitch class as a string that you normally have at your disposal, don’t ignore the fact that you already know how to finger notes on such a string. If the C string is raised a whole step, and the piece is written at pitch, make use of the fact that you know where certain pitches are on a D string already.
You will still be tempted to finger a low F# with an extended fourth finger in first position on the bottom string, but the mental gymnastics involved in training yourself to think of it as a third finger in first position aren’t as strenuous since that’s where F# lies on the cello’s normal D string.

Performing scordatura works from memory provides extra challenges as well. Many players rely substantially on their “automatic” sense of where pitches are on the fingerboard. In the course of playing from memory, cellists have reason to call on their muscle memory and aural memory as well as their memory of pitch names, fingerings, and harmonic structure of the piece. Any one of these areas may be enough for a performer to negotiate a passage successfully, but when a memory slip happens, it is especially important in scordatura works to have built up a repertoire of memorized knowledge about the piece. The aural memory of what comes next is frequently not enough, and can even be misleading, if it is the only immediately accessible memory, since the locations of pitches have been redistributed by the retuning of the instrument. Extreme diligence with the memorization process is a must when attempted with scordatura pieces.

There are two final issues that players should be aware of. As happens when a cello is muted, and the resonance of the instrument is altered, scordatura tunings frequently also have the result of shifting the position of the instrument’s wolf note. The effect of this shift may not impact a piece at all, but it may require alternate fingerings where the need was not expected. Another consequence of scordatura tunings on the practical issues of sound production relates back to an issue discussed briefly in chapter three with respect to solo IX of Ralph Shapey’s Krosnick Soli (figure
3.13). Players must be prepared to experiment with the depth of bow stroke needed and patience with the application of arm weight required to initiate good sounds especially on lowered strings. This is not a difficult thing to do once aware of the need. Cellists automatically make this adjustment already between the highly responsive A string and the slightly more sluggish C string. Lowered tunings will challenge the player’s habits, however, and require a certain degree of conscious alteration in bow technique.

*Dynamic Scordatura*

If difficult dynamic *scordatura* effects are called for, it may be desirable to make use of a marking technique for the tuning pegs and pegbox of your instrument. Making a mark on the tuning peg and another mark or set of marks on the pegbox, perhaps with small pieces of tape so as not to damage the varnish of the instrument with a pencil, would allow for a visual guide for dynamic *scordatura* effects. One can locate and mark ahead of time, in the fashion of a dial, just how far the tuning peg must be turned to reach the desired pitch or pitches. This technique can only be so accurate, but a visual cue might significantly simplify the split second adjustment of tuning required for pieces such as Schnittke’s *Klingende Buchstaben* discussed in chapter three.

*Hardware Issues*

The frequent tuning of strings up and down will have a wearing effect on the strings, so it is a good idea to have extra strings on hand when working on *scordatura* pieces since they might break more frequently than normal. Whenever a string is changed it is always a good idea to lubricate the grooves for the string both at the
bridge and the nut in order to allow for easy sliding of the string. This is most easily done with the graphite from a pencil and is crucial for preventing string breakage when the instrument is being tuned for *scordatura* works and back on a regular basis. Another effect of consistent, radical changes to the tuning of a string instrument is that the bridge tends to move. Well lubricated grooves for the strings can keep this movement to a minimum, but the position of the bridge should be monitored closely to avoid the warping that might result from being left in an abnormal orientation. The sound produced by the instrument will of course suffer as well if the bridge is not ideally situated.

There is a common misconception that *scordatura* tunings, especially those that significantly raise the tension on the instrument, are harmful to instruments themselves. Peter Shaw, a well respected luthier in Houston, Texas, claims that there is likely no danger to an instrument subjected even to significantly increased tensions due to raised tunings.\(^6\) Strings will break far before any permanent damage could be done to the body of the instrument. If a cello is to be kept permanently at a higher tension, Shaw would recommend a thicker soundpost to withstand the increased pressure, but for the amount of time most players will keep their instruments at a higher pitch, there is no need to worry about permanent damage. Shaw made these observations with what he called the more sturdy modern instruments in mind. He also referred to old instruments that had been modified with thicker bass bars and soundposts as well. Caution is certainly reasonable with the use of *scordatura* on any older, potentially more delicate instruments. Consultation with a trusted luthier is of course reasonable when valuable old instruments are to be subjected to increased tensions.

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\(^6\) Peter Shaw, interview by author, Houston, TX, March 30, 2005.
Some players worry about the soundpost of the instrument being susceptible to movement when extremely low tunings are called for. Again, Shaw counsels against the need to be concerned. A well-fit soundpost should stay put even if all the strings are taken off the instrument, so there is little need for worry about this issue with any degree of tension in the strings, even extremely low tension.

From the Composer's Perspective

Choosing a Tuning

As was seen in chapter three, the rationales behind specific tuning choices can vary quite widely. One aspect of the tuning has thus far only been mentioned. Composers should be aware of the potential for enhancing sympathetic vibrations on the instrument with specific tunings. It can clearly be observed that the upper G string on a cello tuned in the Italian way (C-G-d-g) is set to vibrate when the unstopped lower G string is played. It is also activated in a similar way by the open C string. Neither of these sympathetic relationships between the third or fourth string and the first string exist on a traditionally tuned cello. The A string is not set into motion by either the open G or the open C string. As might be expected, Shapey's favorite alternate tuning for the cello (A’-G-d-a) allows for significant sympathetic vibration of the upper A string when the open lower A string is bowed.

As a general rule, sympathetic vibrations will be limited to open strings an octave, a twelfth, and two octaves up from a bowed pitch. The range of the instrument, even with scordatura tunings, will not allow for much more than that. Appendix B, table B.1 shows the harmonics present in the frequency spectrum of an open A string.
These harmonics include the fundamental, A-220, the second harmonic, A-440, and the third harmonic E-660. By analogy, a low note played on the cello should have the potential to activate vibrations of an open string tuned an octave higher, an octave and a fifth higher, and two octaves higher than the note being played since these frequencies are components of the sound being created by the single, bowed low note. By careful application of scordatura tunings, a composer can theoretically create a “super-cello” with enhanced resonance on specific notes or in specific keys, or conversely can judiciously avoid the possibility for many sympathetic vibrations of open strings and create a very dry, non-resonant cello sound.

The composer interested in experimenting with timbre and scordatura effects has virtually limitless territory to explore. One final aspect affecting the possibilities for interesting musical sound structures is the type of string used on the instrument. Since strings are quite an expensive, regular investment for the player, it is somewhat impractical to do too much experimentation with varying brands and types of strings. Nevertheless, it is good to be aware of the drastic differences in sound quality between modern strings and gut strings for example. In Nomos Alpha, by Iannis Xenakis, the cellist is instructed a few times during the piece to tune the fourth string down a full octave to C’ . Xenakis mandates the use of a gut C string for this purpose because of the sound quality he desires and the feasibility of reaching such a low pitch.

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7 Minimal vibrations on strings tuned a fifth higher than a bowed note are also observed. The G string tends to vibrate minimally when the open C is bowed forcefully. Similarly, Kodály’s F string is set into motion by a bowed B string below it. The reason for these vibrations is not immediately obvious since the frequency of the higher string is not part of the sound spectrum of the lower note. The third harmonic of the open C string, however, is the G a twelfth above. This frequency corresponds to the second harmonic of the open G string, and so the G string will vibrate at the pitch an octave above its fundamental when the open C string is bowed.
Appendix B shows that certain natural harmonics on string instruments can be as much as a quarter tone out of tune with the nearest equal-tempered pitch. Should a composer choose to do so, these natural harmonics can be tuned by sacrificing the accuracy of the intonation of the open string. Many pieces in a minimalist medium make use of a very limited number of pitches. If the only pitch required on a given string is, say, the fifth or seventh harmonic, there is no need to put up with the magnitude of the intonation problem. With electronic tuners especially, it is a simple matter for the player to tune the required harmonic exactly.

*Gabriela Frank Offers Some Advice*

Gabriela Frank is a composer who is best known for her incorporation of South American folk music into Western classical forms. She has written pieces for former Boston Symphony flutist and Rice University Professor Leone Buyse, the Kronos Quartet, and the Innuendo Piano Quintet as well as orchestral pieces for the Albany, Utah, and Seattle symphonies. She is the youngest composer to have been given a publishing contract with G. Schirmer. Ms. Frank related to me the genesis of her interest in *scordatura* techniques and credits the enthusiasm of the prominent American cellist Norman Fischer with motivating her to make use of alternate tunings in her own music.  

Frank wrote *Las Sombras de los Apus* for cello quartet and calls for each cello to be tuned differently (figure 4.9).

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8 Most of the information in this section was conveyed in a phone interview with Gabriela Frank conducted by the author on March 10, 2005.
Figure 4.9: Tunings for *Las Sombras de los Apus*, Gabriela Frank.

Frank then had a unique experience with her work on a piece for cello and piano that forced her to confront exactly what her *scordatura* choices had allowed her to do. *Ríos Profundos* (Deep Rivers) was to have been a *scordatura* piece, but the cellist for whom the piece was being written unfortunately requested that it be rewritten for a normally tuned cello, claiming that having perfect pitch made such works too difficult. An as-fingered score presented greater difficulties for the player than it otherwise might, and an at-pitch score still offered the complexities of determining how to finger requisite notes. As is all too common with *scordatura* works, players frequently resist even the minimal amounts of extra effort required to master them. Ms. Frank’s conception of the piece had already been formed, and indeed the first and last movements had already been written. In the end, Frank was forced to cut some material rather than simply to rework it because its effect would not have survived the alterations. The lowered register and altered timbre of the *scordatura* cello was to have been the means through which the depths of the river were evoked. Some of the darker sounds she wanted were just not possible without the *scordatura*. Though on the surface the alterations took the form primarily of a change in tonality and pitch content, in Frank’s opinion the mood of the piece as a whole was altered as well. “It is still an evocative piece,” she says, but it is not the same piece that the *scordatura* version would have been.
In response to a question about whether the altered personality of the scordatura instrument inspires her imagination, Frank emphasized the importance of listening to the tone quality of the altered instrument. The knowledge of what pitches or chords are available is not enough for a composer to make appropriate use of alternate tunings. She was struck by the fact that she couldn’t even identify what instruments were playing in listening to works by Xenakis and Gubaidulina that involved scordatura because the colors of sound were so drastically altered. A composer’s imagination needs to have this altered character in mind when writing.

One of the biggest pieces of advice for composers that Frank had, and she returned to this a few times in our conversation, was that the composer needed to “grab on to a cellist to ask them questions.” Composers frequently are not virtuoso cellists, and they can learn valuable things about cello techniques from a close relationship with an enthusiastic performer. Generalized rules given by orchestration texts for the composition of music for string instruments can take a composer only so far. Frank warned however that it is important to find the right performer to start a working relationship with. “You have to find the right mix in a person who is eminently facile with traditional techniques, but who understands the possibilities of the instrument well and is adventurous too.” The cutting-edge composer who seeks out the conservative performer will all too frequently receive negative responses to questions about whether a technique is possible or not.
Part II Conclusions

In chapter three, examples of different uses of *scordatura* were investigated. These pieces explored the possibilities for different sound worlds, but much room for further experimentation exists. Space and time did not allow for a detailed look at Jonathan Harvey’s *Three Sketches*, a piece that makes use of two D strings, one of them replacing the G string. This change significantly alters the voice of the cello. For the composer interested in extended techniques, *scordatura* can be equally as effecting to the soundscape as bowing above the fingers or on the wrong side of the bridge. Helmut Lachenmann’s *Pression* (1969) is a piece that also must be left as the focus for another study. *Pression* (tuned $A^b$-G-$d^b$-f) attempts to do for the cello what Henry Cowell’s *The Banshee* did for the piano. The instrument being played is not easily identifiable in either case since the composer so thoroughly ignores the standard modes of sound production.

Gabriela Frank relayed to me her belief in the power of productive composer/performer relationships. An enthusiastic performer can do wonders for the composer, aiding them in bringing their imagined sound worlds to life. The music, jointly inspired by performer and composer, can then go on to encourage other composers and players. Our job as performers should not be merely to recreate existing music accurately and with insight. We can play an integral part in the composition of new works. Whether *scordatura* inspires a more traditional-sounding music with a slightly altered voice, or an entirely new and different concept of sound altogether, once bitten by the notion of expanding the limitations of the instrument, both composer and performer find new timbral worlds to explore together.
Appendix A
Catalogue of Scordatura works for Violoncello

Where known, the tuning required for each piece and the dates of composition have been given. In many cases, the publication date of a piece is all that is readily available. Pieces in boldface are those discussed in the body of this document.

The catalogue of twentieth century scordatura works for unaccompanied cello was made as complete as possible. Undoubtedly there are a number of works missing from this list, however, and apologies must be made to the composers of these less familiar works.

A few composers who used the “Italian” Tuning ¹

Degli Antonii, Giovanni. Ricercate Op. 1. These pieces may have been intended for performance using C-G-d-g tuning. Gordon James Kinney suggests that it is more likely that they were intended for a “six-stringed instrument tuned like a bass viol with the alternate tuning for the lowest string depending on the key, C (or D)-G-c-e-a-d¹.”²

Della Bella, Domenico (maestro di cappella at Treviso Cathedral c.1700-1715)

Gabrielli, Domenico (c.1659-90). Ricercari per violoncello solo 1-7 (1689).

Marcello, Benedetto (1686-1739). Sonata #4 in G minor for example.

Solo and Sonata Scordatura Cello Literature prior to 1900

Bach, Johann Sebastian. Suite No. 5 BWV 1011. (c1720) C-G-d-g.

Klein, Jacob. VI duetti a due Violoncelli, Op. 2. Duet VI of the set uses C-G-d-g tuning.

Klein, Jacob. VI Sonates à une Basse de Violon & Continue, Premier Ouvrage, Livre Troisième (c1705). All six sonatas use the transposition scordatura, D-A-e-b.

¹ The Italian tuning was an accepted tuning of the time, and therefore not truly considered to be scordatura by these composers. See Taglietti entry below.
Taglietti, Luigi. *Suonate da camera a trè due Violini, e Violoncello con alcune aggiunte à Violoncello Solo*, Op. 1 (1697). This set consists of ten sonatas for two violins, cello and continuo. Interspersed throughout the work are eight capriccios for violoncello solo. The capriccio in the second sonata uses the common “Italian” tuning, but it is, for the first time, referred to as a mistuning with the word “discordatura” appearing in the score.

20th Century Unaccompanied Scordatura Cello Literature


**Borsody, László. Alone (1980).** Three movements. The piece begins tuned normally but the third movement involves one moment of a tuning glissando of the C string down to G’ and then several performed glissandi to arrive finally back at C.

Bozay, Attila. *Formazioni*, Op. 16 (1969). 10 short movements. Movement four involves dynamic scordatura of C string down to G’ at the beginning of the movement and adjustment back up to C at the end. These tunings are accomplished through performed glissandi, not as silent preparations for the movements. The rest of the piece is tuned normally. 12 min.

Braun, Gerhard. *Portrait III* (1969-70). The piece begins tuned C-F♯-d-a and in the middle, the A string is tuned down to g♯. Cellist also plays various percussion instruments.

Dun, Tan. *Intercourse of Fire and Water*. (1995) The piece begins tuned normally but near the end calls for a tuning glissando of the fourth string down to G’ where it remains for the duration of the piece.

**Dutilleux, Henri. 3 Strophes on the name of Sacher (1982).** 10 min. B♭-F♯-d-a.


Schnittke, Alfred. *Klingende Buchstaben* (1988). The piece begins tuned normally, but in the final measures both the third and fourth strings are involved in tuned glissandi. The third string is tuned eventually down to D♭ and the fourth string reaches G♯.


Segerstam, Lief. *Epitaph No. 1* (1977). The piece begins with A'-G-d-a tuning. While performing the single-movement work, tuning the fourth string up to C is required, but the composer allows time for a switch of instruments if so desired after performing a tuned glissando. Toward the end of the piece, tuning of the fourth string back to A' is called for with the specification that a switch of instruments not be carried out.


Xenakis, Iannis. *Nomos Alpha* (1965-66). The work begins tuned normally, but in three passages, a tuning of the fourth string down an octave to C' is required. The first two of these passages end with a retuning up an octave, but the last segment ends the piece. Another brief passage requires that the fourth string be tuned down to A♯ after which the pitch is readjusted back to C. A gut C string is mandated. 10-15 min.
Appendix B
The Effects of *Scordatura* on Timbre

This appendix contains information gathered from the analysis of the overtone series of a cello’s open A string. Two measurements were taken with SoundScope 16 frequency analysis software running on a Macintosh computer. In figure B.1, the analysis of the sound of the A string on a normally tuned cello is shown. In figure B.2, the same analysis is given for the A string of the same cello tuned as Kodály instructs for his Op. 8 Sonata (B’-F#-d-a). These are obviously preliminary measurements, and even whether the differences exhibited are statistically significant or not has not yet been determined. There is, however, evidence suggesting a measurable, quantifiable difference in the frequency spectra of a cello’s A string under the two tunings investigated. If these measurements are born out by further study, the results will amount to scientific evidence of the qualitative difference in timbres that musicians have already noted. When an instrument is tuned differently, the timbre, even of unaltered strings, is affected.

To understand the data provided in these graphs and their importance, some background information is required. As most musicians know, the frequency that corresponds to the A above middle C is 440 Hz (cycles per second), which is the pitch that most orchestras use to tune. The interval of an octave corresponds to a 2:1 ratio of frequencies, so the A below middle C is 220 Hz, and the A almost two octaves above middle C is 880 Hz. It is important to note that the relationship between frequency and pitch is not linear. Only 220 Hz separate a from a’, but 440 Hz separate a’ from a”’. The interval of a just fifth corresponds to a frequency ratio of
3:2. The E a fifth above A-440 is therefore at a frequency equivalent to

\[ 440 \times \frac{3}{2} = 660 \text{ Hz}. \] A just perfect fourth corresponds to a frequency ratio of 4:3, and a just major third to a frequency ratio of 5:4.

Because the relationship between frequency and pitch is not linear, physicists sometimes measure intervals not in units of Hz, but in cents. A cent is defined so that 100 cents is equivalent to an equal-tempered half step. Every octave is divided into 1200 cents or 12 semitones. The equation

\[ \text{cents} = 1200 \times \log\left(\frac{\text{frequency}_2}{\text{frequency}_1}\right) / \log(2) \]

is used to calculate the interval, in cents, between frequencies one and two.

To put this equation to use in a meaningful way for our purposes, we must next lay the groundwork for understanding the harmonic series of a given fundamental pitch. Any pitch produced by a musical instrument is actually composed of multiple frequencies. The primary one—the one we hear as the pitch—is called the fundamental. All the rest of the component pitches are known collectively as the harmonic series and are rarely audible to the listener as distinct sounds. They are components mixed in with what we hear as a musical note. The relative strengths of these components will vary depending on what instrument is producing the sound, and hence provides one of the reasons why an oboe playing A-440 is easily distinguishable from a flute or a cello playing the same note. We recognize the sounds based not only on the differences in the kind of attack and release that each
instrument exhibits but also on the differences in the timbre of the tone.¹ Musicians, of course, rarely quantify these differences. We typically talk about color or timbre of a sound with words like “dark,” “strident,” “nasal,” “full,” or “bright.” Nevertheless, the timbre of a note produced by an instrument or a voice is influenced in part by what physicists call the vibration recipe of the sound. This vibration recipe embodies a graphic representation of how strong each of the members of the overtone series is for any given fundamental.

Not every frequency is possible in the vibration recipe of a given fundamental. Pitches are produced by vibrating strings or columns of air, for example, and stable vibrations may occur only at very specific frequencies. Cellists can easily determine what harmonics are present in the sound of A-220 by locating the natural harmonics on their A string. There will be natural harmonics present at locations corresponding to the total string length divided by 2, 3, 4, 5, 6, 7, etc. Lightly touching the string at its halfway point will double the frequency of the string’s vibration and raise the pitch by an octave. Lightly touching at a location one-third or two-thirds of the distance between the nut and the bridge will triple the frequency and raise the pitch by a twelfth. Table B.1 illustrates what frequencies and pitches are obtained with the first 15 divisions of the length of the cello’s A string.

Most of the component pitches present in the overtone series are out of tune by at least a little bit. The most noticeable of these are the 7th, 11th, 13th, and 14th harmonics. The 11th is nearly a quartertone flat of the expected equal-tempered D♯,

¹ The word timbre is here (and throughout this study) being used in the manner in which musicians use it, to distinguish the characteristics of sustained sound. Physicists consider the attack and release to be components of timbre, but musicians generally do not. It is, in fact, quite difficult to identify an instrument without the evidence of the attack and release properties of its sound.
so this harmonic could theoretically be tuned satisfactorily either to an equal-tempered D or D♯ if the player tuned the open A string a quartertone (50 cents) sharp or flat. As discussed in chapter four, composers certainly can choose to use *scordatura* in a way that sacrifices the accuracy of the equal-tempered tuning of the open strings in order to benefit the intonation of specific natural harmonics. For our purposes here, however, it is simply useful to know that all of these frequencies are present in the sound of the cello’s open A string. The string is vibrating, after all, at all of those stable frequencies simultaneously when the open A string is bowed.

<table>
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<tr>
<th>Harmonic</th>
<th>Fraction of total string length</th>
<th>Frequency in (Hz)</th>
<th>Cents up from previous A (see caption)</th>
<th>Nearest equal-tempered pitch</th>
<th>Amount out of tune from the closest equal-tempered pitch</th>
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<tbody>
<tr>
<td>1 (fund.)</td>
<td>Full</td>
<td>220</td>
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<td>a</td>
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</tr>
<tr>
<td>2</td>
<td>1/2</td>
<td>440</td>
<td>1200</td>
<td>a♯</td>
<td>0 cents</td>
</tr>
<tr>
<td>3</td>
<td>1/3</td>
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<td>701.96</td>
<td>e''</td>
<td>+1.96 cents</td>
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<td>880</td>
<td>1200</td>
<td>a''</td>
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</tr>
<tr>
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<td>1/5</td>
<td>1100</td>
<td>386.31</td>
<td>c''''</td>
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<td>e''''</td>
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<td>g''''</td>
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<td>1/8</td>
<td>1760</td>
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<td>a'''</td>
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</tr>
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<td>203.91</td>
<td>b'''</td>
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</tr>
</tbody>
</table>

**Table B.1:** Frequency, Fraction of String Length, and Resultant Pitch for the Natural Harmonics on the Cello A String. Column four presents the number of cents up from the next lowest A for ease of comparison between octaves. The pitch that corresponds, for example, with the 12th harmonic can more easily be seen to be exactly the same interval up from A-1760 (701.96 cents) as the 3rd harmonic is from A-440. The final column uses positive numbers for harmonics that are sharp relative to the nearest equal-tempered pitch and negative numbers for harmonics that are flat. These data assume an A string that is tuned to A-220.

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2 Physicists number the fundamental as the first harmonic in the series.
Figures B.1 and B.2 show an analysis of the sound of a bowed, unstopped cello A string on the same instrument tuned in two different ways. The peaks corresponding to the first sixteen harmonics, up to A-3520 (a''''), are indicated in each graph. It can be seen in these figures that indeed all the frequencies listed in the table above, and many more of higher frequency, are present as components of the sound. What is most enlightening with respect to the discussion of the timbral effects of scordatura is the fact that the graph resulting from an analysis of the open A string on a normally tuned cello is different from that for the sound of the A string on the same cello tuned B’-F#-d-a. The timbre even of strings not adjusted in a particular scordatura tuning is obviously affected by the changes made to other strings on the instrument.

Comparing the first three peaks on each graph we note that both the traditional A string (figure B.1) and Kodály’s A string (figure B.2) seem to behave quite similarly. The first difference is seen in the next three peaks. The peaks at 880 Hz, 1100 Hz, and 1320 Hz (the fourth, fifth, and sixth harmonics) are more or less of equal strength on the traditionally tuned cello, but Kodály’s A string has a much less prominent peak at the sixth harmonic. Another significant difference is noticeable in the comparison of the peaks at 2200 Hz and 2420 Hz. The relative significance of the tenth and eleventh harmonics is reversed in the vibration recipe of the two A strings.

It must be stressed that these two measurements do not constitute a thorough investigation of the effects of scordatura on the timbre of a cello’s sound. Many more measurements under more strictly controlled conditions need to be done to
establish what the physical effects of changes in tuning are. Nevertheless, the evidence presented here suggests that there are measurable differences in the timbre of the cello when it is tuned in different ways.

Figure B.1: Frequency spectrum for the A string on a traditionally tuned cello (C-G-d-a).

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3 One possibly significant effect needs to be more carefully accounted for. Playing sul ponticello or sul tasto also affects the timbre of sound, so in further studies, this variable should be closely monitored. The two measurements were made on sound produced by a bow contact point near the middle of the distance between the bridge and the end of the fingerboard.
Figure B.2: Frequency spectrum for the A string on a cello tuned B-F#-d-a.
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