

Building a Framework for Scordatura: New Possibilities for the Viola and Beyond

Andrew Filmer, New Zealand School of Music/ Victoria University of Wellington and Massey University

Scordatura has a remarkable history, with some of the most adventurous forms now four centuries old. The Baroque performer-composer Heinrich Biber turned his violin world upside down – or at least right side left – when he switched strings and even crossed them. Some of the greatest names in classical music including Vivaldi, Paganini, Bach and Mozart, also used this device. The American Founding Father Benjamin Franklin is attributed to have experimented with it as well, producing a string quartet played entirely on open strings.¹

From the 19th Century a period of simplification and standardization emphasized convenience, limiting re-tunings to the projection-focussed transposition scordatura to retain tuning in fifths. When scordatura re-emerged in the 20th Century, it became a way of exploring new sounds. It was addressed as a form of extended technique, which is ironic on two counts: firstly, this “extension” had been around since the Baroque era (if not earlier), and secondly, this “technique” was used only at the determination of the composer (not the performer).

This article proposes that this historical process reduced the artistic possibilities of the performer and that there are new options for scordatura – not only for contemporary composers but particularly for performers of works from the Baroque and Classical eras. The following includes a framework for a renewal of its use, and discusses three current developments in which well-known and much-performed works can be advanced with the application of scordatura.

The Case for Scordatura

In advocating a return to experiments in scordatura tunings particularly on the viola, it may be useful to consider why musicians gave it up in the first place. David Boyden and Robin Stowell offer some reasons for its downturn:

Most 19th-century composers believed that there was more to be lost than gained from scordatura, on account of its special notation and playing requirements, the detrimental effect of higher tensions on the strings and the instrument, the inherent

¹ Marrocco, W. Thomas. “The String Quartet Attributed to Benjamin Franklin”. *Proceedings of the American Philosophical Society*, Vol. 116, No. 6 (Dec. 21, 1972) pp. 477-485. Marrocco notes that the authorship is inconclusive as he was unable to verify through means of examining the watermarks. M. E. Grenander through a wider look at Franklin’s life supports the attribution, while Hubert Unverricht puts forward that it was more likely an unknown German musician who wrote the work that was eventually attributed to multiple composers, including Haydn, Pleyel, and Franklin.

intonation problems (especially if several pieces with different tunings were to be performed in the course of a concert), the need to adapt the bow speed, bow pressure and contact point to suit string textures, tensions and thicknesses, and the resultant changes in instrumental timbre.²

Although articulated some two centuries later, it is useful to assess these five concerns about scordatura:

- (1) Two of these five factors – notation and bow use – are a matter of convenience rather than a concrete argument against scordatura – the former for the composer and the latter for the performer.
- (2) The factor of tension on the instrument is the most serious of the five, but would likely refer to scordatura tunings that push the strings upwards rather than downwards in pitch, or possibly a mixture of tunings that are unstable for the bridge or body of the instrument.
- (3) The issue of intonation (insofar as the stability of the strings is concerned) may indeed limit a programme, but arguably programming should be arranged to provide the best context for performance, rather than limiting performance options for the sake of a particular programme.
- (4) Changes in timbre would seem to be limited to cases where scordatura is used to facilitate an extension of range or harmonic possibilities and timbral side effects are unintentional. Even if one accepts that these particular scordatura tunings may be disadvantageous, it should not be seen as a reflection of the endeavour as a whole – particularly considering the number of scordatura tunings specifically intended at creating changes of tonal colour.

It would seem that convenience has overtaken aesthetic concerns (and in some modern editions, historical fidelity as well) and perhaps a misconception or generalisation that scordatura was used only as a cure for poor projection. The case of Amon's *Viola Concerto in A Major*, discussed by Maurice Riley,³ highlights this even further. When faced with scordatura some performers would rather transpose an entire orchestra in order to conform to today's standardized tuning.

The arguments for the revival of scordatura do not ignore its limitations. This writer's opinion is that it should not be categorically discounted and should instead be regarded and further explored as a specialized technique. Musicians of the 21st-century performing music of the Baroque and Classical periods face more limitations than their 19th-century counterparts, most importantly the presence of two more centuries of music largely written for an era of more homogenous tuning. In the case of the viola, Franz Zeyringer notes the issues of standardizing performance of an instrument with an

²David D. Boyden, et al. "Scordatura." In *Grove Music Online. Oxford Music Online*, <http://www.oxfordmusiconline.com/subscriber/article/grove/music/41698> (accessed April 18, 2011).

³Maurice Riley, *The History of the Viola*. (Volume II) (Braun Brumfield Pub., Ann Arbor, MI, 1991), 138.

early history of diversity in size and with alto and tenor violas in five-part harmony.⁴ It is similarly limiting to require performances today to conform to standard tuning when dealing with works of the Baroque era and to some extent the Classical era as well. The technique need not be limited to specific scordatura tunings composers prescribed for specific pieces, although this is a crucial first step. Maurice Riley notes that scordatura was “used by mature players who performed solos requiring advanced technique” which accounted for its omission in method books of the period geared towards a younger target audience.⁵ In 1688, Georg Falck went a step further when considering the experiments of Heinrich Ignaz Biber, calling it a tool of the “masters”.⁶ The point here is that beyond specific instructions by composers, historically the adventurous challenges of scordatura were considered a part of professional technical expertise.

Functions and Application of Scordatura

In the New Grove entry on scordatura, Boyden and Stowell list these as the various ways in which scordatura has been used:⁷

- (1) Alternative harmonic possibilities;
- (2) Extending the range of the instrument;
- (3) Imitating other instruments;
- (4) Enabling the execution of large intervals, string crossing, or unusual double-stopping (including *bariolage* string crossing);
- (5) Emphasis of particular keys;
- (6) Increasing projection.

Many of the examples provided served as independent, specific goals of a particular scordatura. This list can be thus viewed as selected possible options rather than as categories of overall effects. From another perspective the unusual quartet by Benjamin Franklin surprisingly reflects more than one of these: it extends options for the ensemble allowing a performance using only open strings, in part as a musical joke. It possibly also serves as a philosophical metaphor, “so the ‘common man,’ with very little tutoring, could participate”.⁸ It also possibly imitates the technique of water-filled wine glasses which led him to develop the *glass armonica*.

To discuss this in more detail, we have to approach the scordatura traditions of different instruments.

⁴ Franz Zeyringer. “The Problem of Viola Size.” (*The Journal of the Violin Society of America*, Vol. V, No. 4, Queen’s College Press, 1979), 19.

⁵ Riley, *The History of the Viola. (Volume II)*, 138.

⁶ Boyden and Stowell, et al. “Scordatura.” In *Grove Music Online*.

⁷ Ibid.

⁸ Grenander, M. E. “Reflections on the String Quartet(s) Attributed to Franklin.” *American Quarterly* Vol. 27, No. 1 (Mar., 1975), 73-87.

Convergences of Scordatura Use on the Violin and Cello

The violin and the cello share a number of surprisingly similar traditions in the use of scordatura, in ways that are somewhat distinct from that of the viola.

Biber's *Rosary Sonatas* for unaccompanied violin and Bach's *Suite No. 5* for unaccompanied cello have very obvious initial differences. The *Rosary Sonatas* take advantage of switching strings and even taking the term "cross-tuning" literally in having strings cross paths behind the bridge. There is ambiguity in the use of scordatura in the fifth suite, with the A string tuned down to G possibly to link it to lute tuning, or as an attempt to better place voicing and voice-leading across the four strings – a concept called vocal fingering which will be discussed further below. However, a commonality of both works is the use of scordatura not only to affect timbre, but the underlying changes in resonance. Patricia and Allen Strange write of the *Rosary Sonatas*:

"It was originally assumed that the tunings in von Biber's works were specified to facilitate various fingerings, but contemporary musicologists have put another spin on his works: the scordatura in the *Rosary Sonatas* brings out the fundamental resonance of each individual work, and something of a qualitative change in mood develops through the course of the sonata cycle".⁹

In contemporary works, composers for both the violin and the cello have used what would seem to be a disadvantage of scordatura in so far as the affected string is tuned differently to the specified pitch of the string makers. In other words, the usual handicap of reaching a scordatura on a string that is too loose or too tight – more so the former than the latter – instead creates novel sound effects.

In tuning to A flat–G–d flat–f and applying the bow with considerable pressure (and held with two hands) vertically over two strings, Lachenmann's *Pression* for cello produces contrasting timbres between a string at the calibrated tension and one intentionally departing from its intended tension. This is similar to the use of "dynamic scordatura"¹⁰ for the violin, progressively detuning strings to the point that the volume is diminished alongside a rusty timbre.¹¹ In Ulrich Suesse's use of this device the direction is unambiguous: "Scordatura by ½ tones 'till string is almost totally loose!" and still underscored by additional sound effects: "Imitate sleeping, snoring voices interrupted with light scraping noises".¹²

⁹ Patricia Strange and Allen Strange. *The Contemporary Violin: Extended Performance Techniques*, (University of California Press, Berkeley, 2001), 177-8.

¹⁰ *Ibid.*, 182.

¹¹ It is similarly applied to the bowed guitar in Samuel Holloway's *Sillage* in imitating the sound of water in the wake of passing ships (2010).

¹² Strange and Strange. *The Contemporary Violin: Extended Performance Techniques*, 182.

This use of scordatura seemingly for extra-musical effect has been around for quite some time with Haydn placing an instruction for the violins to tune down G strings to F, and back up again to sonically point to a 'distracted' conductor.¹³ As for the cello, the initial part of the humorous introduction in the Musette of *Hush*, by Yo-Yo Ma and Bobby McFerrin, could be said to be in the same vein.

The violin diverges from the cello in the occasional use of the "transposition scordatura" – keeping the strings in fifths, but moving the strings upwards in pitch to produce additional projection (in effect to the opposite end of Lachenmann and Suesse's approaches in using strings calibrated for lower than standard pitches). Even with its notable use on the violin by Mahler and Paganini, the violin finds itself with a partner with unusually far more experience in the transposition scordatura: the viola.

Scordatura for the Viola

Scordatura was largely used to increase projection of violas in the 18th and 19th centuries. Riley lists nine concertos with the technique during this period, by Mozart, Vanhal, Stamitz, Druschetsky, Voigt, Sperger, and Amon.¹⁴ All of these fit the description of "transposition scordaturas"¹⁵ which reflects withdrawal from experimentation to conform for difficulties of notation and tonal side effects when strings are not tuned in fifths. As a likely unintentional result, there is one chord in the viola part of Mozart's *Sinfonia Concertante for Violin, Viola and Orchestra in E-flat major KV 364* that can be played without alteration only in the scordatura tuning.¹⁶

In modern repertoire, Riley mentions Fernando Griller's 1984 concerto for viola, which combined projection with increasing options of natural harmonics.¹⁷ It is unclear whether the additional effect of tonal colour was a simultaneous goal or incidental. The former would demonstrate the ability of scordatura to perform multiple roles, while the latter would engage the 19th-century argument against timbral side effects resulting from the use of scordatura.

The application of the other functions of scordatura in the Baroque era is more relevant to violin rather than viola repertoire. This is largely due to the extent in which solo material for the violin outnumbered that of the viola and also to the large role that Biber played in the extension of scordatura possibilities in his violin sonatas. In later repertoire, the third variation of Richard Strauss' *Don Quixote* requires a solo viola to tune the C string down to a B – using one of the rare instances of notating at pitch rather

¹³ Haydn, Joseph. *Symphony No. 60 in C major "Il Distratto"*, Salzburg: Haydn-Mozart Presse, Salzburg (1959), 68.

¹⁴ Riley, *The History of the Viola*. (Volume II), 139-140.

¹⁵ Boyden and Stowell, et al. "Scordatura." In *Grove Music Online*.

¹⁶ The tenth utilizing an open G-sharp string, m. 12 of the first movement cadenza.

¹⁷ Riley, *The History of the Viola*. (Volume II), 143.

than of fingering. In Sun-Young Pahg's *Thresholding*, the viola is asked to tune up the D string as far as E quarter-sharp.

For both the violin and the viola it is interesting to note that all but one of the examples provided by Boyden, Stowell and Riley illustrate scordatura as a composer-dominated activity – the exception being North American and Scottish fiddlers.¹⁸ Once again, it would seem ironic that the application and success of an instrumental *technique* would result from the vision of the composer, rather than from the hands of the performer whose role it is to explore the optimal way to realize a composition instrumentally. Performers have felt free to change bowings, dynamics and in the case of Walton's *Concerto for Viola and Orchestra*, even pitches,¹⁹ but in the realm of scordatura it took some time before it became normal to perform Mozart's *Sinfonia Concertante* in the only form the composer put to paper. Writing in 1991, Riley pointed out that only one modern edition at the time provided the D major scordatura version²⁰ and only after more than three decades of an illustrious career did Nobuko Imai try out and record the original scordatura, afterwards saying, "My only regret is that we haven't done it sooner!"²¹

Extensions of Scordatura: Bach and Mozart

Current approaches are placing scordatura decisions back in the hands of the performer. Donald Maurice's approach of adjusting fingering that best provides for voicing is applied in an upcoming edition of Bach's *Suite No. 5* for unaccompanied viola, where the scordatura is extended to the top two strings.²² In *The Art of Vocal Fingering in String Playing*,²³ Maurice puts forward a historical perspective that Bach's works for solo violin in particular indicate an inclination to see the four strings as four voices. That, in consideration with the theoretical perspective of changing strings in relation to tetrachords, allows for a new perspective of the intent of the scordatura in Bach's *Suite No. 5*. If indeed Bach's instruction of tuning the A string down to G was an experiment to allow for A flats of the soprano line to be placed on the top string, then tuning the D string down to a C would complete the voicing patterns for the alto line. The new edition uses note-tail directions as well as a double-stave format to indicate the division of notes and voices.

¹⁸ Boyden and Stowell, et al. "Scordatura." In *Grove Music Online*.

¹⁹ James F. Dunham, "The Walton Viola Concerto – A Synthesis." *Journal of the American Viola Society*, Vol. 22, No. 1 (Spring 2006), 15-16.

²⁰ Riley, *The History of the Viola*. (Volume II), 139. Currently, Bärenreiter and Henle publish the original scordatura version.

²¹ Paul Myers. Programme notes to the Sony-NDR recording, Sony Music Entertainment Inc., 2001.

²² Andrew Filmer and Donald Maurice, *Suite for Unaccompanied Viola Arranged from the Cello Suite No. 5 BWV1011 and the Lute Suite BWV 995*. [In press, Comus Edition.]

²³ Donald Maurice. "The Art of Vocal Fingering in String Playing" (*American String Teacher*. August 2006, Vol. 56, No. 3), 27-31.

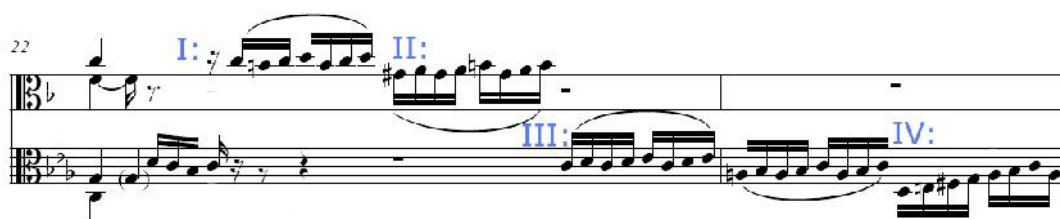


Illustration 1: Division of voicing by staves and note-tail direction, Prelude m. 22-25

In an extension of this model, data on the viola's resonance frequencies has been applied in order to approximate the role of the *viole da gamba* in Bach's *Brandenburg Concerto No. 6, BWV1051*.²⁴ The issue of instrument size versus the standard tuning of the viola in comparison to the violin is certainly well-known. Kim Kashkashian provides this description:

"The viola is still in a state of flux, of experimentation; every few years somebody comes out with a new, differently shaped viola. But one thing they all have in common is that the string length and the pitch aren't exactly right for each other. The viola is tuned a fifth lower than the violin but is only a few inches longer. Ideally, the viola should have a longer string, acoustically speaking, but then you couldn't play it. This discrepancy gives it that particular kind of tone quality that we might characterize as human, perhaps because it's less reliable."²⁵

This issue has been approached largely from the point of view of construction with Hermann Ritter in the early part of the last century trying to adjust the instrument's dimensions to better match the proportions of the violin. Even then it was recognized that "violas which are too large approach in sound the baritone quality of the cello, which should be avoided."²⁶ Ritter was possibly moving the viola's resonant frequencies and in that process departing from Kashkashian's description of the 'human' nature of its tone.

The approach taken in the new substitution of the *viole da gamba* parts in Bach's *Brandenburg Concerto No. 6* is to emphasize resident resonant frequencies, determined by Hans Johansson to be at approximately 230Hz and 350Hz, equivalent to B flat and F, relative to A = 437.²⁷ This is the *scordatura* substitution:

²⁴ J.S. Bach. *Brandenburg Concerto No. 6*. Study score, prepared from the autograph, and edited for scordatura viola substitutions of the viola da gamba parts, ed. Andrew Filmer. Comus Edition, UK. (forthcoming)

²⁵ Edith Eisler, "Profile: Violist Kim Kashkashian", *Strings*, Aug./Sept. 2000. <http://www.stringsmagazine.com/News/Interviews-Profiles/Profile-Violist-Kim-Kashkashian> (accessed April 16, 2011).

²⁶ Zeyringer, "The Problem of Viola Size.", 22. There is a similar passage in: Maurice Riley, *The History of the Viola*. (Volume I) (Braun Brumfield Pub., Ann Arbor, MI, 1993), 232.

²⁷ Hans Johansson, www.centrum.is/hansi/modal%20analysis.html



Illustration 2: Scordatura model for viole da gamba substitution in the Brandenburg Concerto No. 6 based on resonant frequencies

The significance of it is the new application of scordatura based on resonant frequencies with the additional benefit of some clearer voicing than would be possible with regularly tuned violas and a tessitura that avoids the jumping of octaves that would otherwise be necessary.²⁸ In having strings at a lower tension, the overall texture also better approximates the role of the *viole da gamba* – in a sense, similar to the approaches of Lachenmann and Suesse on the cello and violin, respectively.

Mozart's *Sinfonia Concertante, K364* contains possibilities of a further development of scordatura. It is important to address a possible and credible argument on historical fidelity, namely that this undermines the very concept of preserving a composer's intention in relation to scordatura. There are a few factors to consider when dealing with interpretation in this context. Firstly, the aim is to preserve the use of scordatura as a technique rather than an instruction, which would then involve the idea of experimentation. Secondly, the historical use of this transposition scordatura was intended to increase projection with the possible benefit of convenience in keeping the strings in intervals of fifths. Projection is a musical consideration and any developments to the scordatura should preserve this intent; convenience, however, is negligible in a musical sense. Thirdly, we should consider that in this specific case of the *Sinfonia Concertante* as a genre, there was a marked emphasis towards the work's commercial potential in providing independence to a composer,²⁹ rather than art exclusively for art's sake which returns the argument to pragmatic considerations. Two centuries later we are able to adjust priorities and to advance artistic concerns over pragmatism in a way that Mozart or Bach could rarely afford in their day.

For the most part, Mozart's scordatura serves the viola well in allowing not only emphasis through increased projection, but also the use of open strings. This is balanced by muting the solo violin and the orchestra with the key of E flat major. In addition Mozart scored the work in the upper part of the viola's range, roughly evidenced by the number of measures of the solo sections that employ the lowest string:

Allegro maestoso: 9 measures out of a 357-measure movement
Andante: 8 measures out of 129-measure movement

²⁸ Andrew Filmer, "An Acoustical Journey in Bach's Brandenburg Concerto No. 6: Genre, Instrumentation, and the Quest for Timbre," *Journal of the American Viola Society* 27, Online.

²⁹ Barry S. Brook, "The Symphonie Concertante: its Musical and Sociological Bases," *International Review of the Aesthetics and Sociology of Music*, Vol. 6, No. 1, June 1975), 140-1.

Presto: 16 measures out of a 490-measure movement

This is unusual by any comparison be it patterns of the composer himself (e.g. the Mozart violin-viola duos) or be they similar works (e.g. Bach's *Concerto for Two Violins* or *Brandenburg Concerto No. 6*).

The limited use of the lowest string allows us to address one equally unusual pattern in the cadenza of the first movement: in its opening, the violin uses the open G string, while the viola has to resort to a stopped note. While the discrepancy between open and stopped notes occurs throughout the *Sinfonia Concertante*, it occurs everywhere else in the opposite direction to add additional resonance to the viola and on top of the projection the higher string tension provides. Considering that the lowest open string (C sharp) is not utilized anywhere in the work, a further scordatura upwards of this string to D not only allows the viola to match the violin in the use of the open string, but allows the sequence to match in fingering.



Illustration 3: Opening sequence, 1st movement cadenza, scordatura of A sharp-D sharp-g sharp-d

The application of this new scordatura was tested in every part of the work that uses the C string, and while some fingerings became more complicated, there were no instances that affected the work detrimentally from a musical perspective. The use of the open string D is additionally useful earlier in the first movement:



Illustration 4: 1st movement, mm. 98-101

The support of the open D string also helps to boost resonance in the second measure of the second movement cadenza (the printed C sharp being a sounding D):



Illustration 5: Opening measures, 2nd movement cadenza

This unusual scordatura may only be applicable in this one work, which highlights it as a particular feature. Placed in the hands of the performer rather than the composer, it would be interesting to consider scordatura in the realm of instrumental technique rather than purely through musical composition.

A Framework for Scordatura

With both the history and current developments of viola scordatura in mind, it is possible to outline a model illustrating the functions of scordatura and areas in which it can be developed.

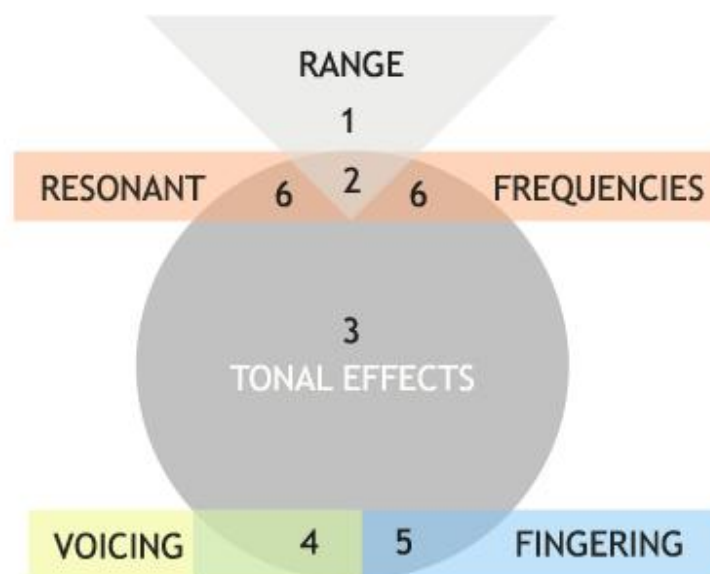


Illustration 6: A Framework for Scordatura

The model above illustrates the primary functions of scordatura as affecting range and tonal effects, intersected with larger areas of resonant frequencies, voicing, and fingering.

Section 1 refers to the range and covers both the pitch range of the instrument as well as the range of harmonic possibilities available in a particular tuning. A clear example of pitch range is Strauss' *Don Quixote*, while Griller's *Viola Concerto* extends the range of harmonic options.

Section 2 relates to the present author's use of scordatura in Bach's *Brandenburg Concerto No. 6, BWV 1051* allowing violas to approximate the sound of *viole da gamba* and extending the range of the instrument a full tone, while using data on resonant frequencies to adjust its timbre.

Section 3 includes, but is not limited to, the frequent use of the transposition scordatura (e.g. in Mozart's two *Sinfonia Concertante*³⁰). In most cases this limits the lower range of the instrument to provide higher string tension resulting in greater projection.

Section 4 relates to cases such as the forthcoming arrangement of Bach's *Suite No. 5* for viola with extended scordatura aimed at facilitating fingering to match voicing. These represent an overlap of the areas of voicing and fingering. The application of vocal fingering has both the intentional tonal goal of voicing as well as extending the more sombre tone some have argued may be characteristic of this suite.³¹

Section 5 refers to cases such as Mozart's *Sinfonia Concertante, K364* discussed earlier which can be advanced with a scordatura D string. This facilitates the use of open strings to match sequences, particularly in the first movement cadenza, additionally emphasizing certain relevant notes elsewhere in the work.

Section 6 demonstrates various new possibilities for contemporary composers to use data on resonance frequencies to determine scordaturas that produce new timbral effects.

Concluding Thoughts

There is some grey area whether the term scordatura should be applied to instruments with no standard tuning system or whether the term *accordatura* is more suitable here.³² Apart from a question of terminology (and of course the many other instruments to which that would then apply, not least being the *lyra viol*) it is a question whether deviation from a standard tuning is part of the scordatura experience. This author would argue that it is: Lachenmann's contrast of a regularly tuned string against one tuned lower than the string tension calibrated during manufacturing creates a distinct effect; likewise, the use of transposition scordaturas for projection is partially due to the added tension and the resonances with open strings and not with distinctly calibrated strings for the new tuning. Even where changes in string tension are not the primary focus (as in the case of Bach and Mozart discussed earlier) these often become a useful secondary function or at the very least a convenient by-product.

Perhaps the most significant question posed here is: who gets to 'do' scordatura? As a noun it seems to imply a permanent instruction; as a hypothetical verb, it underscores that it is essentially a technique of the performer. Beyond the classical string world, fiddlers and guitarists use this technique on a regular basis. Within it our current

³⁰ The second being the fragment of the *Sinfonia Concertante in A for Violin, Viola, Cello and orchestra KV Anh. 104 [320e]*, with a reconstruction by Philip Wilby available.

³¹ Malcolm Boyd, *Bach*, (J.M. Dent and Sons, 1983). It should be noted that Boyd, while acknowledging this opinion, suggests that Bach was reviving an earlier tuning of the cello.

³² David Boyden, et al. "Scordatura." In *Grove Music Online*.

musical age separates composers and performers while much scordatura use prior to our times was put forward by composer-performers such as Biber, Mozart and Bach. Perhaps for Mozart, even Bach and most clearly for Paganini scordatura remains a tool for performers as much as for composers. For Biber it also becomes a tool of composition intended to increase the possibilities of the instrument and the new opportunities then presented to him as a violinist. In this light we have to ask whether scordatura has been an item which was handed by the performer to the composer some time ago and if so whether the time has come for its welcome return to the performer's toolbox.

Andrew Filmer, New Zealand School of Music/ Victoria University of Wellington and Massey University
andrewfilmer@gmail.com

References

- Bach, Johann Sebastian. *Brandenburg Concerto No. 6*. Study score, prepared from the autograph, and edited for scordatura viola substitutions of the viola da gamba parts ed. Andrew Filmer. Comus Edition, UK (forthcoming).
- Boyd, Malcolm. *Bach*. London: J.M. Dent and Sons, 1983.
- Brook, Barry S. "The Symphonie Concertante: its Musical and Sociological Bases." *International Review of the Aesthetics and Sociology of Music*, Vol. 6, No. 1 (June 1975).
- Cook, Nathan. "Scordatura Literature for Unaccompanied Violoncello in the 20th Century: Historical Background, Analysis of Works, and Practical Considerations for Composers and Performers." DMA thesis, Rice University, 2005.
- Dunham, James F. "The Walton Viola Concerto – A Synthesis." *Journal of the American Viola Society*, Vol. 22, No. 1 (Spring 2006).
- Filmer, Andrew. "An Acoustical Journey in Bach's Brandenburg Concerto No. 6: Genre, Instrumentation, and the Quest for Timbre," *Journal of the American Viola Society* 27, Online (forthcoming).
- Maurice, Donald. "The Art of Vocal Fingering in String Playing." *American String Teacher*, Vol. 56, No. 3 (August 2006).
- Riley, Maurice. *The History of the Viola*. (Volume II) Braun Brumfield Pub., Ann Arbor, MI, 1991.
- Stowell, Robin. *The Early Violin and Viola: A Practical Guide*, Cambridge University Press, 2001.
- Strange, Patricia and Allen Strange. *The Contemporary Violin: Extended Performance Techniques*, Berkeley: University of California Press, 2001.
- Unverricht, Hubert. "Haydn and Franklin: The Quartet with Open Strings and Scordatura." *Haydn Studies: Proceedings of the International Haydn Conference*, Washington, D.C., 1975.
- Zeyringer, Franz. "The Problem of Viola Size." *The Journal of the Violin Society of America*, Vol. V, No. 4, Queen's College Press, 1979.

Electronic Resources

- David D. Boyden, et al. "Scordatura." In *Grove Music Online*. *Oxford Music Online*, <http://www.oxfordmusiconline.com/subscriber/article/grove/music/41698> (accessed April 18, 2011).
- Eisler, Edith. "Profile: Violist Kim Kashkashian", *Strings*, Aug./Sept. 2000.
<http://www.stringsmagazine.com/News/Interviews-Profiles/Profile-Violist-Kim-Kashkashian> (accessed April 16, 2011).
- Druckenbord, Andrew. "Scholars revive debate on whether Ben Franklin composed tongue-in-cheek string quartet", *Pittsburgh Post-Gazette*, Sunday, July 30, 2006. <http://www.post-gazette.com/pg/06211/709108-42.stm> (accessed April 19, 2011).

Grenander, M. E. "Reflections on the String Quartet(s) Attributed to Franklin." *American Quarterly* Vol. 27, No. 1 (Mar., 1975), pp. 73-87. <http://www.jstor.org/stable/2711896> (accessed August 8, 2011).
 Marrocco, W. Thomas. "The String Quartet Attributed to Benjamin Franklin". *Proceedings of the American Philosophical Society*, Vol. 116, No. 6 (Dec. 21, 1972) pp. 477-485. <http://www.jstor.org/stable/985761>. (accessed 2 August, 2011).

Scores

Bach, Johann Sebastian arr. Filmer, Andrew and Donald Maurice. *Suite for Unaccompanied Viola Arranged from the Cello Suite No. 5 BWV 1011 and the Lute Suite, BWV 995*, Comus Edition, UK (forthcoming)
 Haydn, Joseph. *Symphony No. 60 in C major "Il Distratto"*, Salzburg: Haydn-Mozart Presse, Salzburg, 1959.
 Holloway, Samuel. *Sillage* for guitar, tape and auxiliary instruments/voices, 2010.
 Lachenmann, Helmut. *Pression für einen Cellisten*, Wiesbaden: Breitkopf & Härtel, 1980.
 Mozart, Wolfgang Amadeus. ed. Christoph-Hellmut Mahling. *Sinfonia Concertante in E flat for Violin, Viola and Orchestra, K. 364*. Kassel: Bärenreiter Urtext, 1975.
 _____. arr. Wilby, Philip. *Sinfonia Concertante in A (KV Anh. 104 [320e]) for Violin, Viola, Cello and Orchestra*. London: Chester Music, 1998.

Additional Sources

Myers, Paul. Programme notes to the Sony-NDR recording, Sony Music Entertainment Inc., 2001.
 Ma, Yo-Yo and Bobby McFerrin. *Hush*, Sony Music Entertainment Inc., 1991.
 W. Thomas Marrocco. "Franklin, Benjamin." In *Grove Music Online. Oxford Music Online*, <http://www.oxfordmusiconline.com/subscriber/article/grove/music/10156> (accessed April 18, 2011).