# WRITING FOR VIOLIN & CELLO

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# INTRODUCTION

Now that we have discussed solo writing for violin, we'll add the *violoncello* as a step towards the ultimate goal of writing for string quartet. The cello shares the same Italian origins as the violin, which began its development during the early 16th century. The cello makes for a perfect complement to the violin, being a tenor version of the violin's soprano voice.

# CELLO TUNING AND RANGE

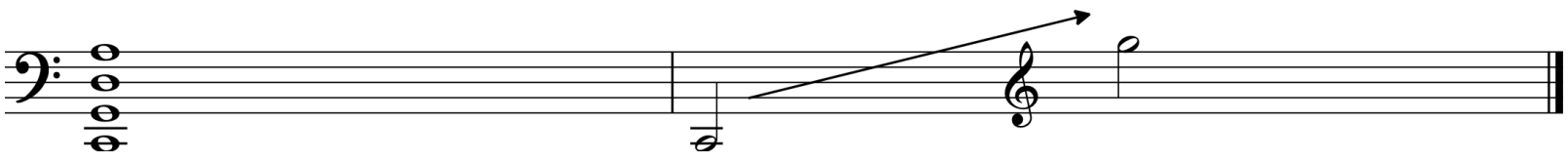

Figure 1. The tuning and range of the cello.

The cello is tuned in perfect 5ths from $C_2$ to $A_3$. It thus extends a perfect 12th below the violin's low G string ($G_3$) but also overlaps much of the violin's middle register. Because of its significant range, multiple clefs are read by the professional cellist. Though bass clef is default, it is suggested that the composer use tenor clef from $G_4$ upwards and treble clef from $C_5$ upwards.

The timbre of the cello is diverse, from its robust and strong low C string, the woody and mellow G string, through to the sonorous and lyrical tenor voice of the D string, to the brilliant timbre of the high A string.

# CELLO FINGERING

Due to the larger scale length of the cello fingerboard, the fingers do not have the same pitch reach as the violin. In the lower register the cellist can reach up to a major 3rd on one string, or double stops up to a major 6th. From the 7th position – an octave higher than the open strings – the thumb leaves its placement behind the neck and can participate in fingering notes, double stops, and expanding the reach of the hand.

The composer is encouraged to map out the cello strings and notes accessible to appraise the playability of passages that they are writing. Numerous charts such as that shown in Figure 2 are available online.

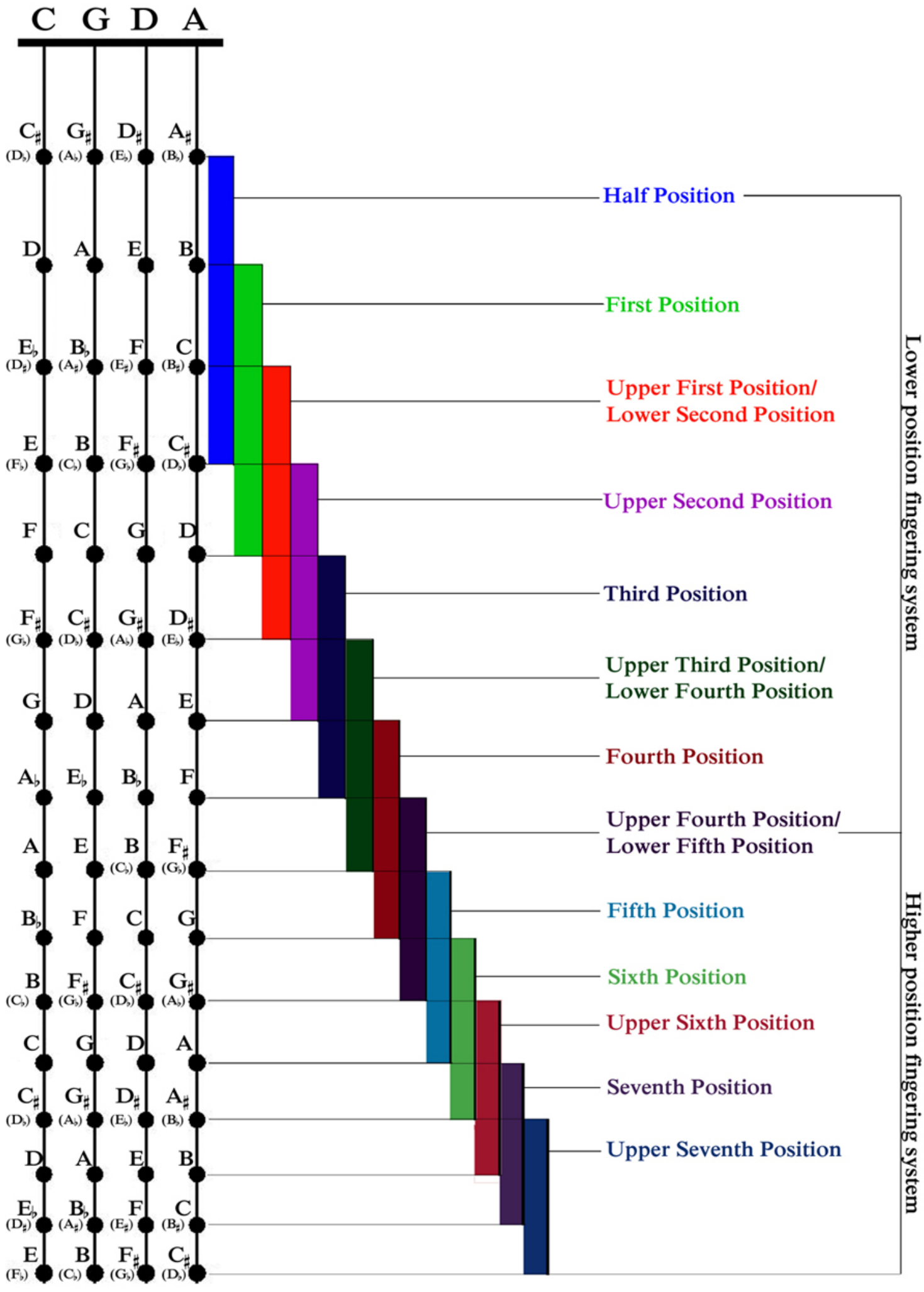


Figure 2. Cello fingerboard map to 7th position, provided by The Cello Companion.

# ANALYSES

## COMPOUND MELODIC LINE

The cello suites of J.S. Bach (ca. 1720) are some of the most celebrated, performed and recorded works (on all instruments!) for the solo cello. The beginning composer should own the score and listen to performances[1] whilst reading the cello music.

In this collection of 6 suites (each with 6 movements), Bach manages to allude to the presence of multiple voices in the solo cello – a texture called *compound melodic line*.[2] Two-part polyphony may arise through the contrast or opposition of any of the following attributes:

- melodic contour (intervals, shape, line direction)
- rhythmic activity (durations, density, subdivision)
- metric stress (strong/weak placement)
- register (high/low)
- harmony (key, pitch centre)
- orchestration (timbre)

The cello's registral agility and timbral variety is exploited by Bach, who writes in such a way as to create a sense of two-part counterpoint through consideration of these attributes.

The following excerpts identify contrapuntal moments, and propose names for the techniques contributing to the sensation of compound melodic line. Listen to a performance of the entire suite to find these and other examples.[3]

### 1) Call-and-response

In Figure 3 there are two kinds of motives, sounded in a binary call-and-response fashion eight times in succession. Beats 1 and 2 consist of (major and minor) triadic arpeggios in open voicing with the compass of a 10th. The subsequent response is a stepwise (mostly descending) line to connect to the next arpeggio.

Note also that each "call" inverts its direction, creating variation and a more complex set of relationships across the eight bars. This pattern is graphically represented in Figure 4.

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[1] Famous performances include that by Pablo Casals from 1938.

[2] Refer to the "compound curve" in Piston *Counterpoint* (23).

[3] Bar numbers are provided so that the excerpts can be easily located on your score.

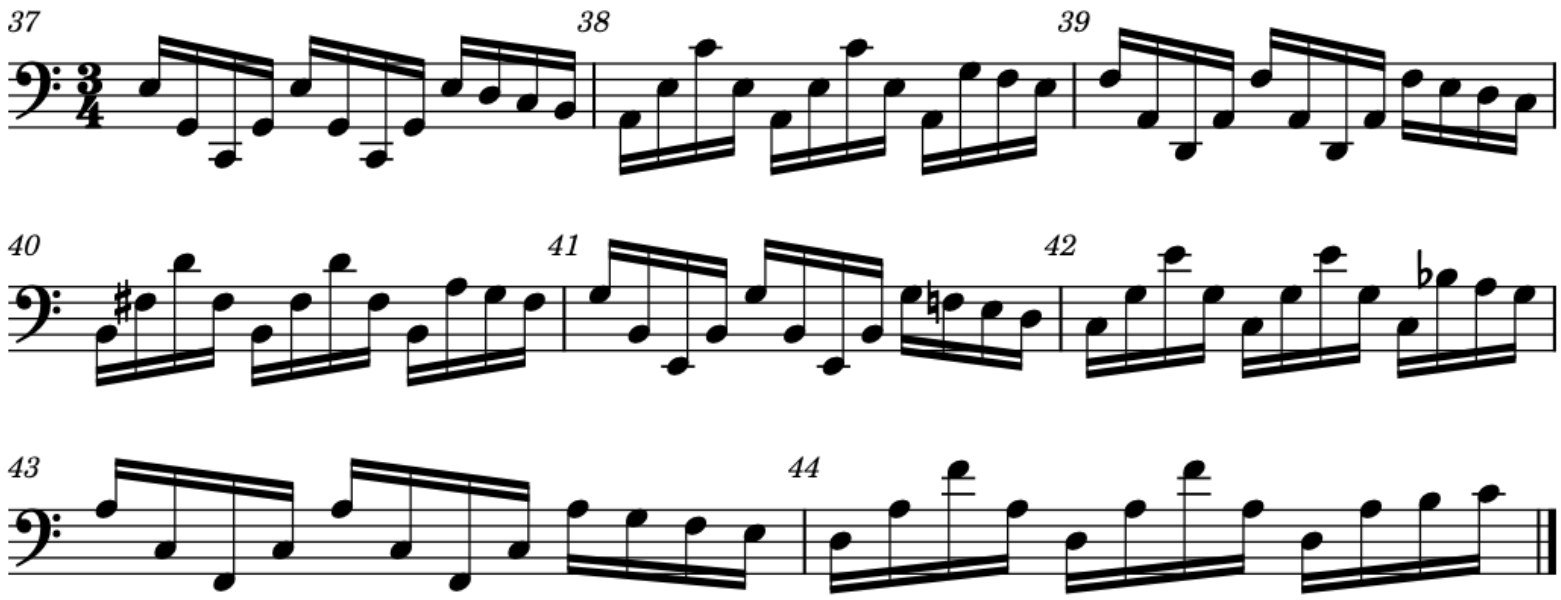


Figure 3. Bach Cello Suite III (C major) - excerpt from Prelude.

The oppositional nature of the compass (broad/tight), timbre (harmonious resonant triads/ leading melodic line), and the metric organization (arpeggios on the strong downbeat and second beat with a leading line on the third beat) contribute to a compound melodic line.

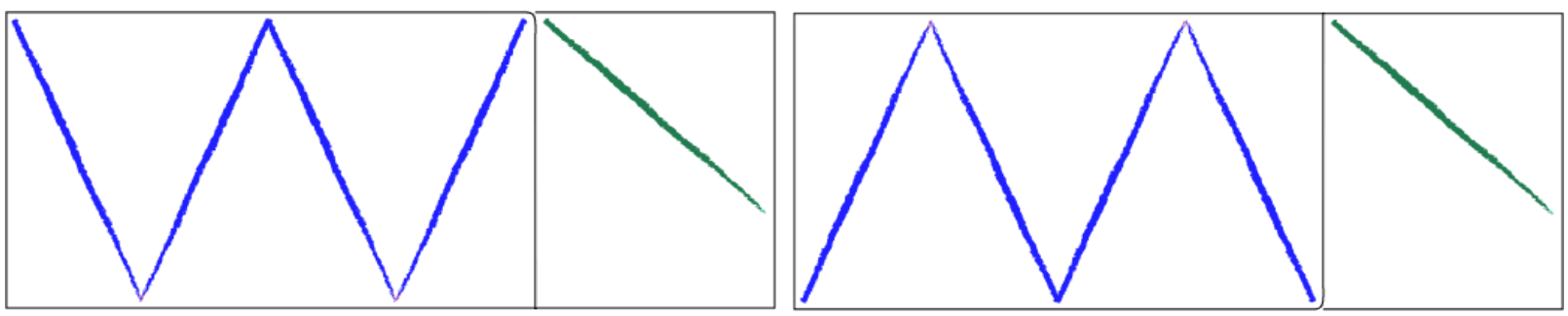

Figure 4. Bach Cello Suite III (C major) - excerpt from Prelude. Call-and-response motive as graphic representation (bars 37 – 38).

2) Wedge

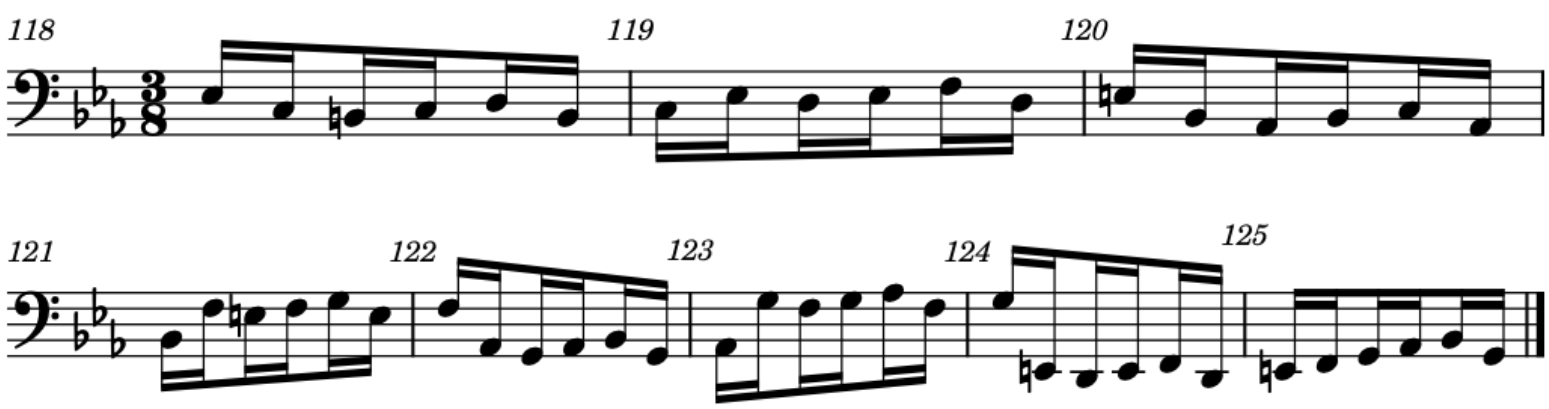


Figure 5. Bach Cello Suite V (C minor) - excerpt from Prelude.

In Figure 5 Bach creates an expanding zig-zag from the placement and relationship of the first beats of each bar. This wedge-like shape expands from the initial $Eb_3$ down to $C_3$, up to $E_3$, down to $Bb_2$, up to $F_3$, down to $Ab_2$, up to $G_3$ and down to $E_2$. The placement on the strong beat aids the non-linear connection of this line, which acts as a kind of *structural background*[4] to the 8 bars. The intermediary material sandwiched by this wedge is a contrastingly tight sequence of intervals with the contour <step down, step up, step up, third down, step up> which creates a net zero movement in terms of pitch letter names. This is graphically represented in Figure 6 split across two staves. Notice that the intermediary material (in pink) also follows an expanding wedge pattern.[5]

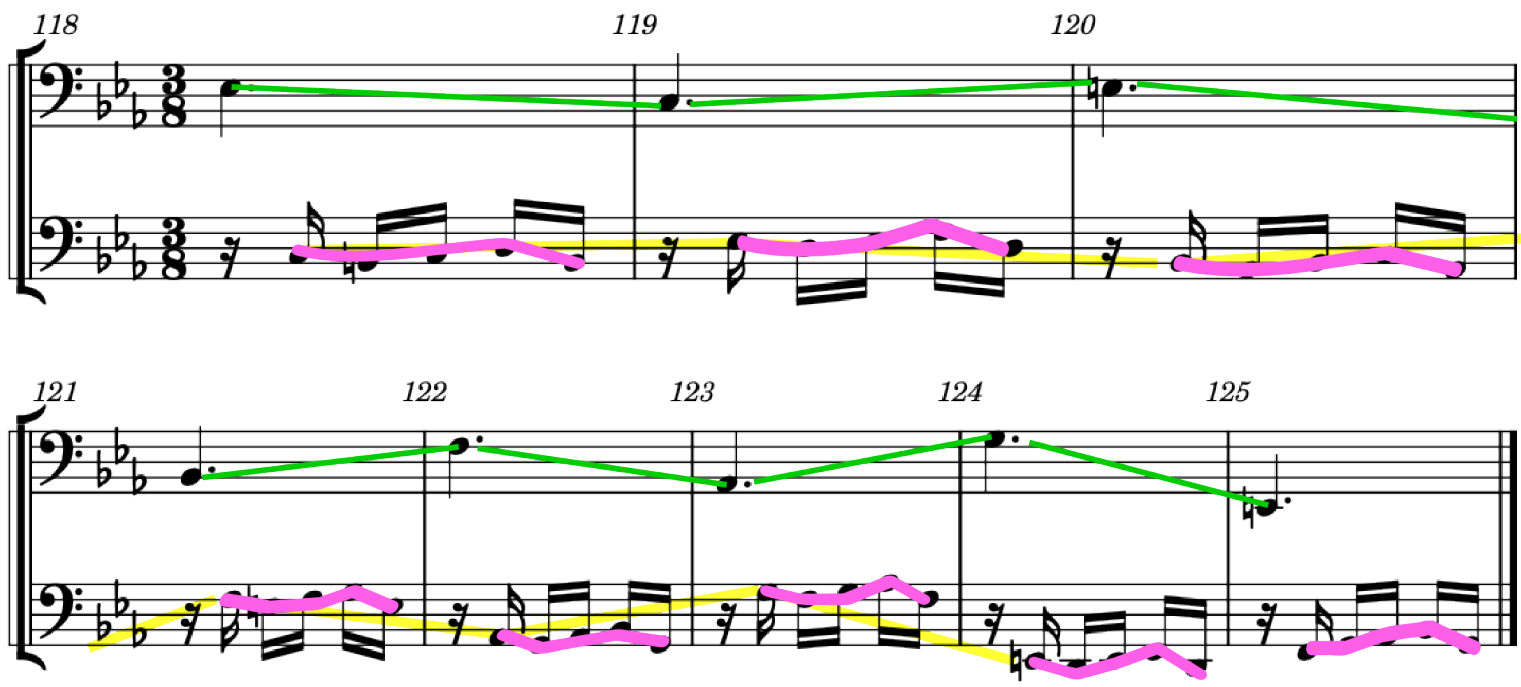


Figure 6. Bach Cello Suite V (C minor) - excerpt from Prelude in two voices with graphic annotations.

## 3) Pedal Point

Whilst pedal points are by definition sustained pitches, Bach's use of them in these solo cello suites does create a two-voice effect born of a moving melodic line against an implicit held note.[6] The persistence of the pedal is reinforced by its rhythmic reiteration at consistent places in the measure.

There are two kinds of pedal point illustrated in the following excerpts – the traditional lower pedal point in the bass voice and the upper (inverted) pedal point in the high voice.

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[4] Also known as a *guide-tone line*.

[5] Patterns like these that manifest on multiple scales could be argued as being *self-similar* in nature, and contribute to deep structure and a sense of formal congruence.

[6] Bach's use of multi-stops could theoretically provide examples of true pedal point, but his use of double- and triple-stops largely provide moments of harmonic reinforcement such as cadences in the suites.

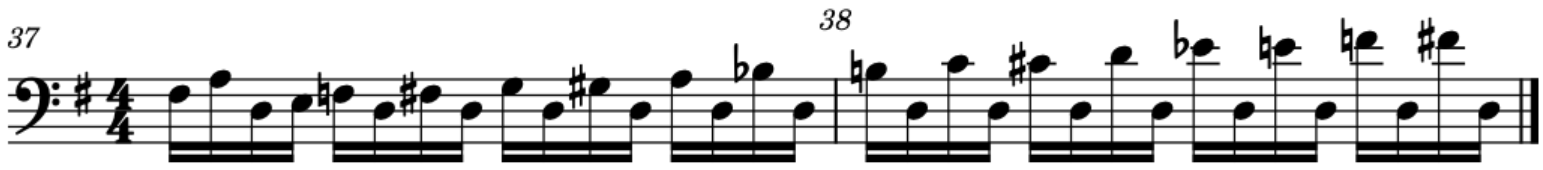


Figure 7. Bach Cello Suite I (G major) - excerpt from Prelude.

Figure 7 shows the climactic build on the dominant of the G major suite's prelude through use of a D pedal point against an ascending chromatic line in the final six measures of the piece.

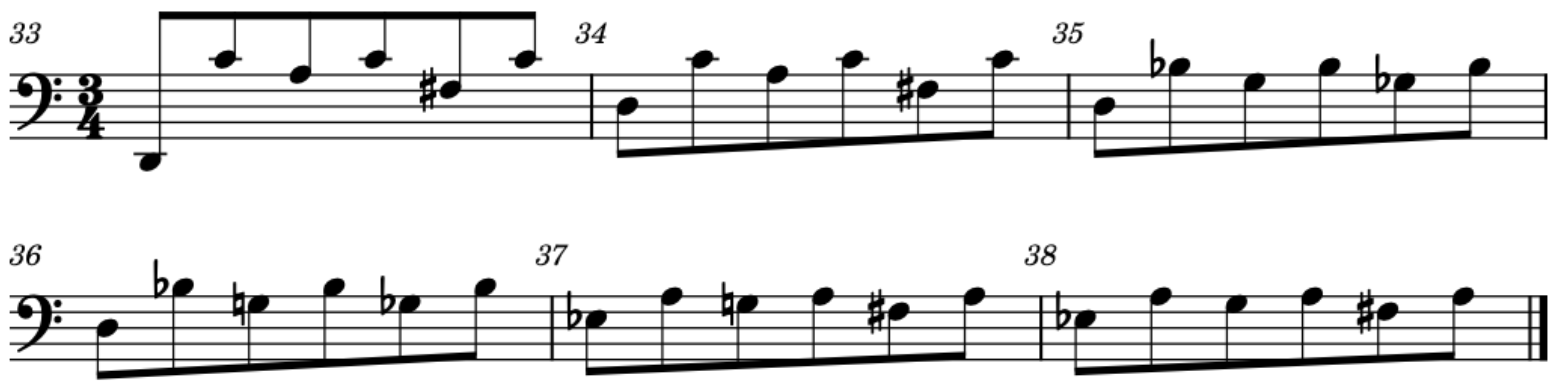


Figure 8. Bach Cello Suite III (C major) - excerpt from Courante.

Figure 8 shows another example of pedal point. Whilst the down-beat placement of the D through bars 33 to 36 and Eb bars 37 and 38 comprises the principle harmonic gravity for this pedal point passage, there is a secondary higher line with two bars of C, Bb and A, notably together forming another example of a structural background. This could be construed to be an example of upper pedal point. Figure 9 illuminates this perspective, with the on-beat voice featuring arpeggios and the off-beat upper voice featuring pedal point.

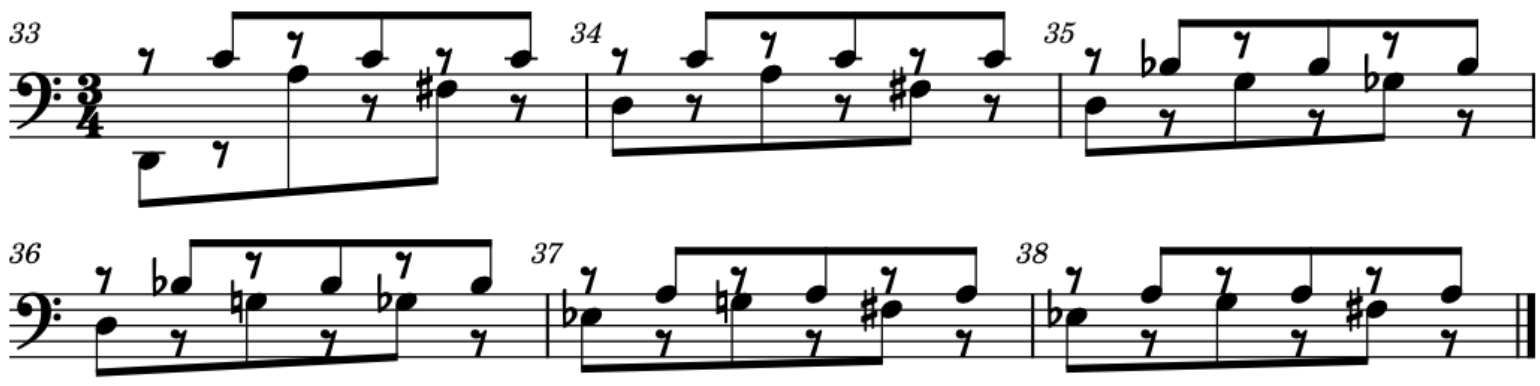


Figure 9. Bach Cello Suite III (C major) - excerpt from Courante in two voices.

## SUSPENSIONS

Schoenberg writes that suspensions are amongst the "conventional formulas" for introducing controlled dissonance, which result in "fluency and interest of the phrase", and actually supports harmonic clarity through resolution of chromatic pitches into the harmony (*Fundamentals of Musical Composition* 3). Messiaen also writes that such "foreign notes" are "indispensable to the expressive and contrapuntal life of music" (55).[7]

Arcangelo Corelli (1653–1713)[8] was a Baroque composer who composed a dozen Trio Sonatas, including the *Allemanda* excerpt from Opus 4 No.11 in C minor shown in Figure 11. The ensemble consists of two violins, and a *basso continuo* section consisting of harpsichord and a bass instrument – either cello, double bass or bassoon. This movement features a "walking bass" part as well as *suspensions* as a central compositional technique (Burkhart 53).[9]

The harpsichord (It. *clavicembalo*) player of the continuo group in a Baroque or Classical ensemble will improvise accompaniment based upon the *figured bass* (or *thoroughbass*) notation provided. These numerals relate to intervals that apply to the provided bass notes, and can be considered a precursor to the chord symbols of jazz improvisation. A second inversion triad would be figured as $^{6}_{4}$, for example, as these are the scale degrees required above the fifth. Schoenberg shows that the origin of the suspension chord is from the dual requirements of resolution of "dissonant" second inversion ("sixth") tonic chords as well as the ornamental prolongation of pitches in perfect cadences (*Theory of Harmony* 143).

Suspensions involve the prolongation of a note when the harmony changes, creating a momentary dissonance, and then a (delayed) resolution by step (usually descending) to a chord tone. Chord tone targets traditionally involve resolution to the third degree, and may either be re-articulated or tied (as is the case in the example by Corelli), prepared or unprepared ("free suspensions"). The dissonance is accentuated and the resolution is usually softer in execution.

Figure 10 provides some alternative approaches to suspensions in 4-note voicings of a perfect cadence in C major. These include ascending and descending resolutions to the tonic and the third of the I chord.

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[7] Messiaen gives examples from his music where conventional chromatic techniques are enlarged into "groups" effecting whole portions of music in rhythm, harmony and melody (rather than single occasions of foreign notes).

[8] Corelli was a renowned violinist who was formative in establishing what became modern violin technique.

[9] Here is one interpretation using flute, violin, cello and harpsichord (which may be clearer to follow than an orchestration with 2 violins, due to the voice-crossing that we will discover). https://youtu.be/eWq5ncpH_5k

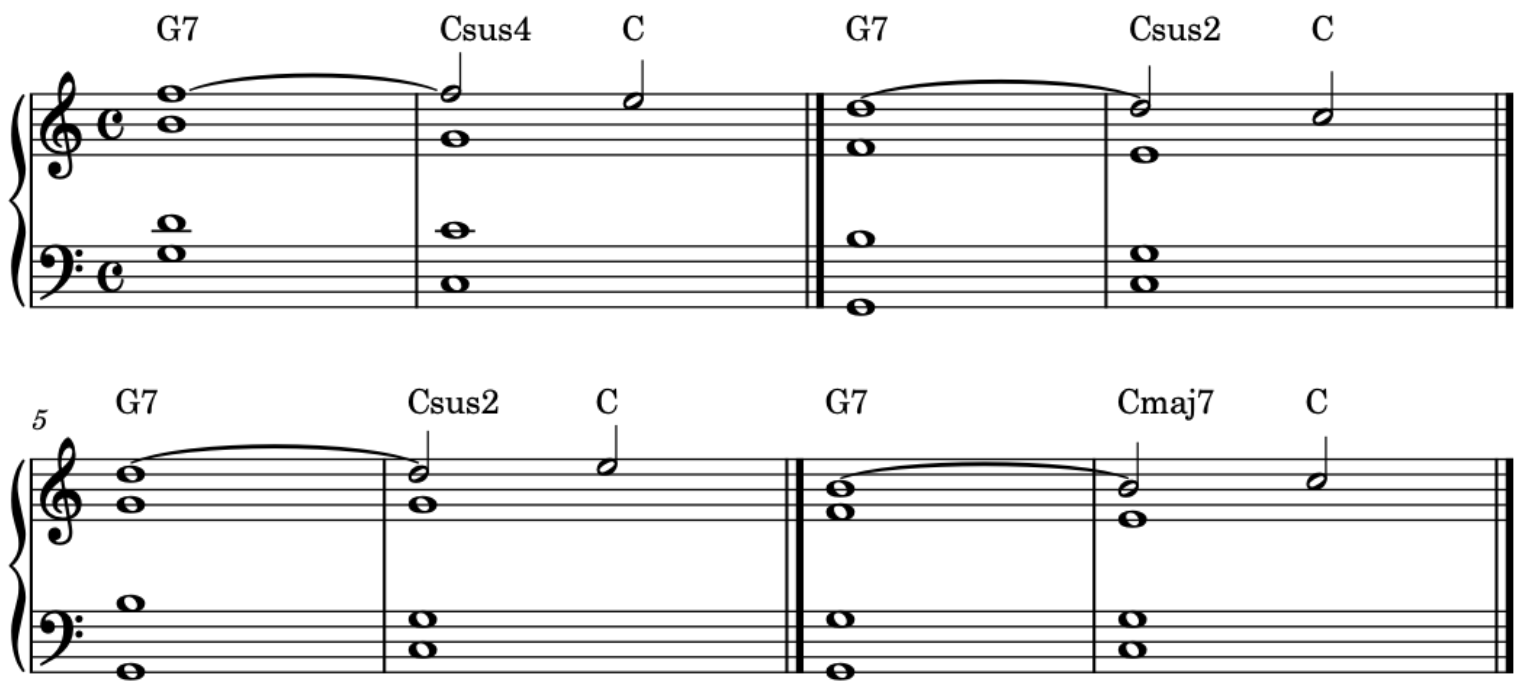


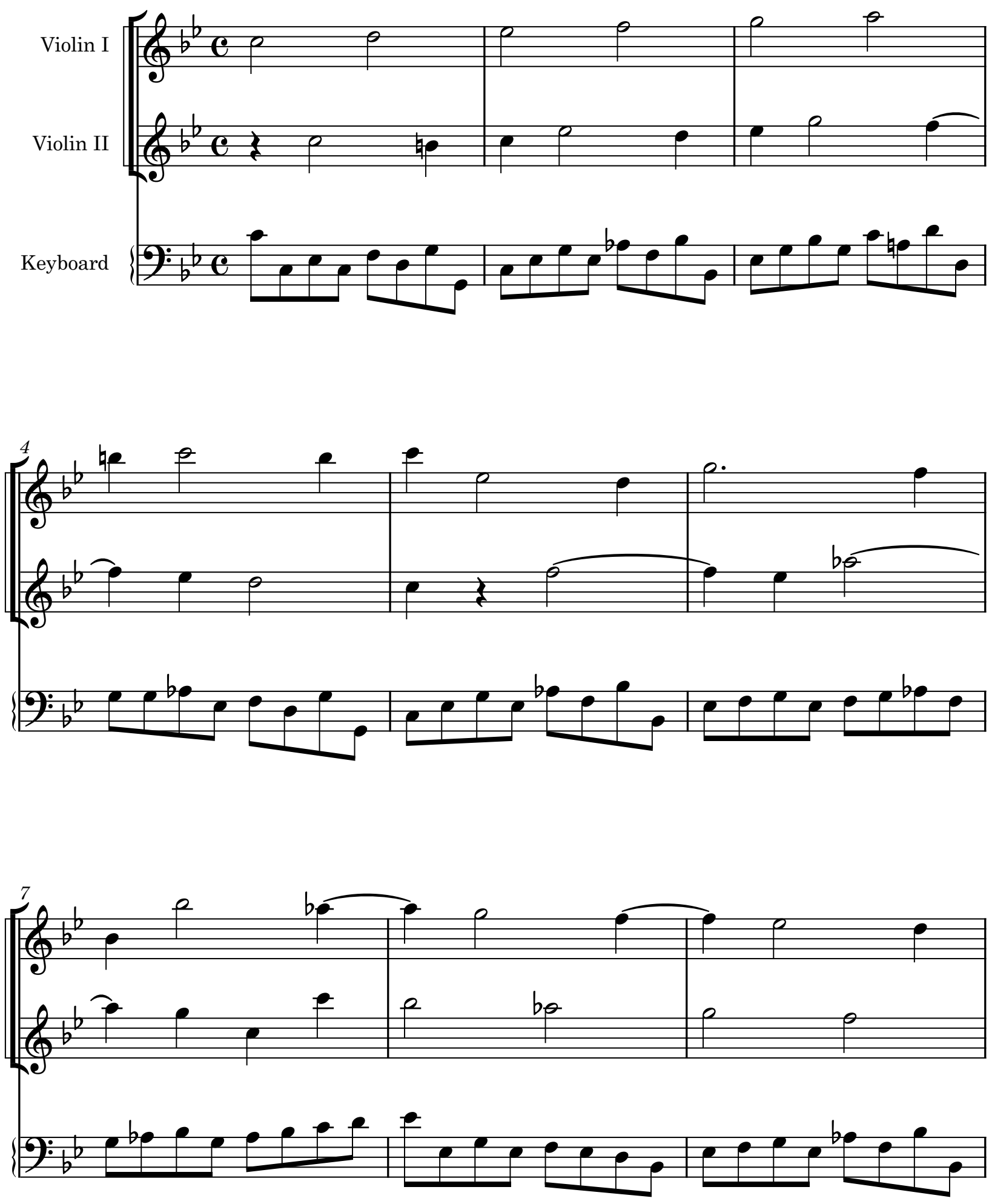

Figure 10. Suspensions in perfect cadences. (Adapted from Schoenberg *Theory of Harmony* p.333)

Examine bar 5 of Figure 11. C minor is re-established as the (home) key in beats 1 and 2. Beats 3 and 4 are largely Bb7, but the arrival of the D in violin 1 is delayed by a beat as the Eb is prolonged from the preceding C minor harmony. Analyse the successive bars 6 through 9 and identify the suspensions that occur. Is there a pattern to be found?

# Allemanda

from Trio Sonata Op.4 No.11

Corelli



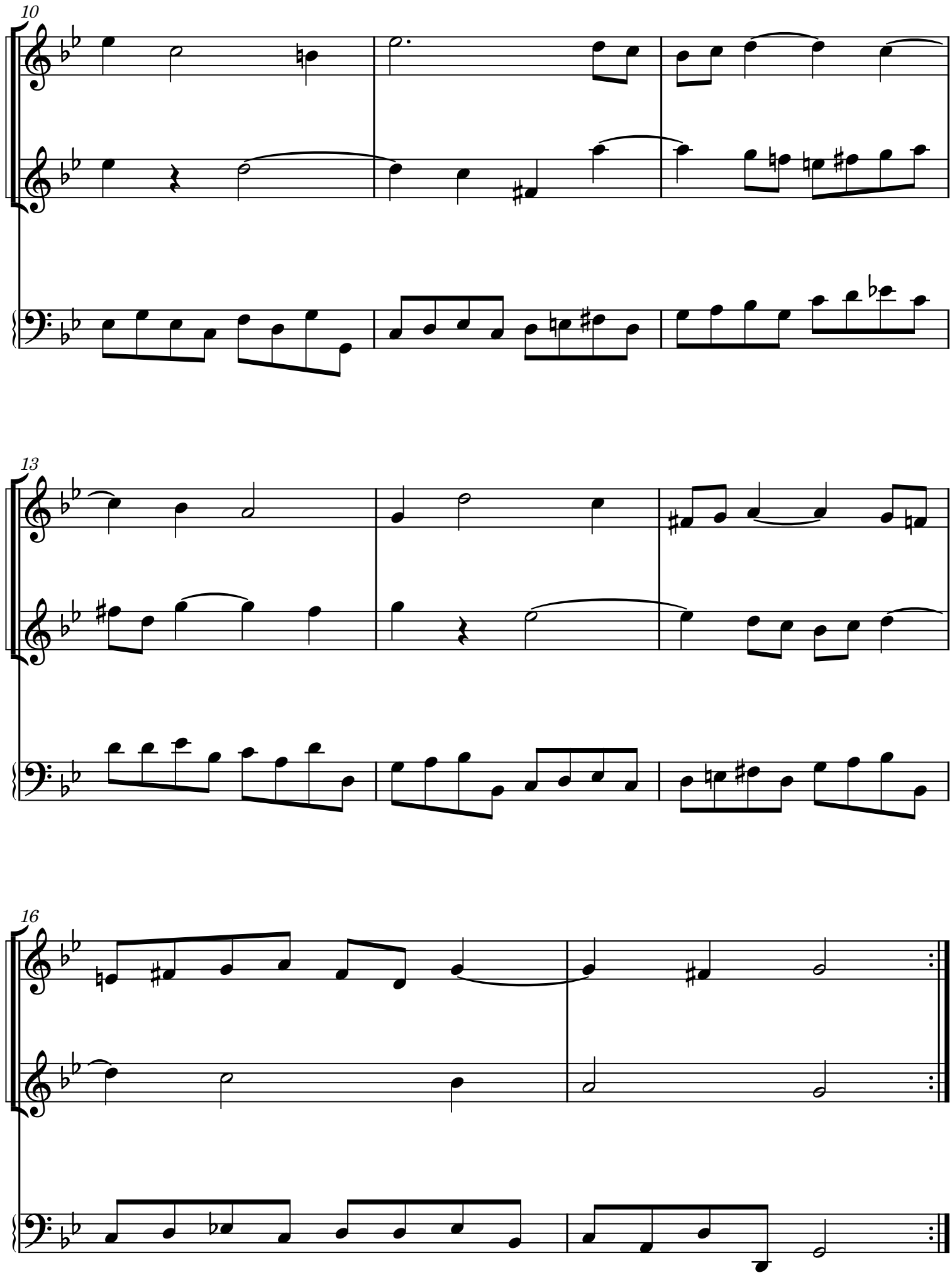



Figure 11. *Allemanda* excerpt from Opus 4 No.11 in C minor.

Figure 12 tracks the harmony and melodic devices present from beat 3 bar 5 through to the end of bar 9. The harmonic rhythm of 2 beats per chord is represented by the bar-numbered rectangles, the suspensions and their resolutions by the blue dotted lines and the upper and lower voices by the two rows. Referring also to the score, notice that violin 1 and 2 actually switch their positions during the first 5 chords, trading voices as part of the melodic sequencing. This is represented through colour coding of the blocks. So perhaps the resulting pattern could be named a *braided suspension sequence* - due to the voice-crossing that takes place during the sequence of suspensions.

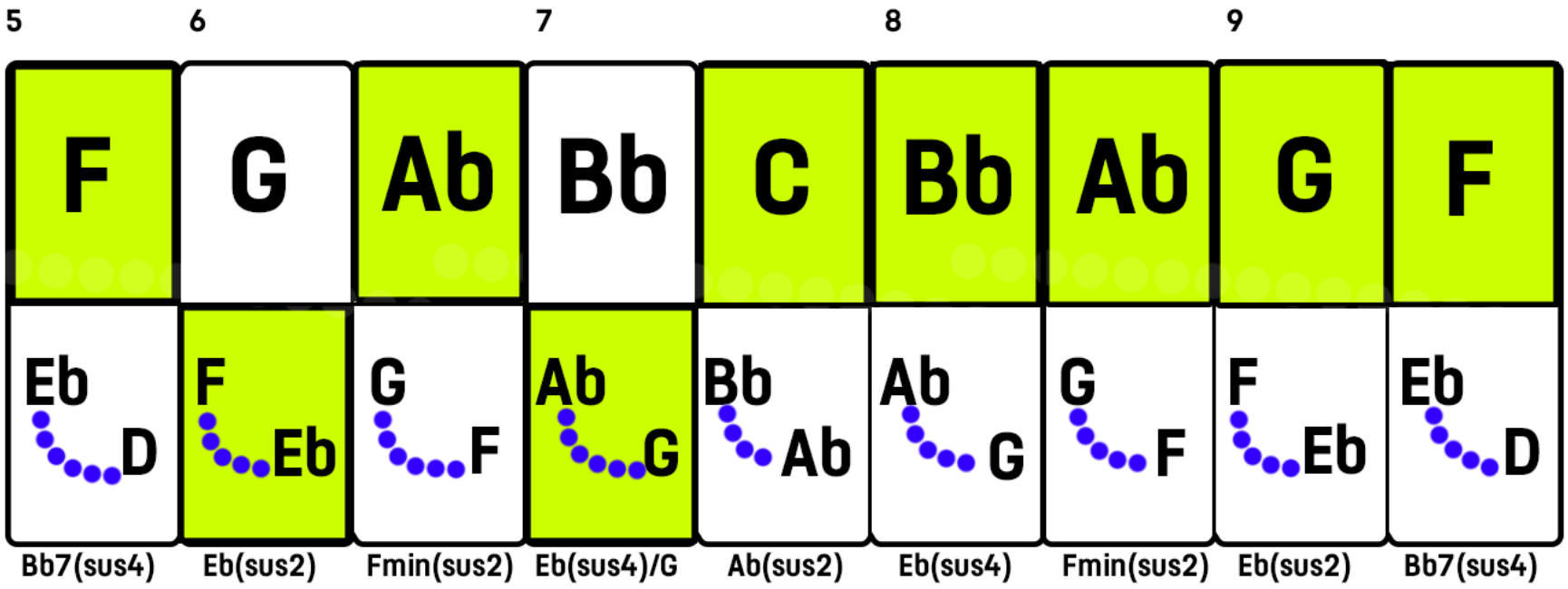



Figure 12. *Allemanda* excerpt from Opus 4 No.11 in C minor as graphic representation.

Whilst suspensions have their origin as melodic devices from contrapuntal music in the 16th century, it is worth mentioning contrasting approaches employed from the 20th century. Replacement of dominant 7 with suspended chords and associated mixolydian modes is a conventional approach for V function jazz harmony (Levine 43), and *slash chords* of ii-7/V often represent this quality. With the advent of the modal jazz era from the late 1950s *sus chords* became featured not functionally but rather as colour chords.[10] Also notable is the prevalence of suspended chord voicings along with the missing third degree, either with the third degree added to the top (creating a major seventh dissonance) or with the third degree underneath the fourth (creating a stronger minor ninth dissonance).[11] Suspended triads are found in the harmonic series (6:8:9) and in atonal theory, all possible interval combinations are represented by the set type (0,2,7).

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[10] Herbie Hancock's *Maiden Voyage* is one example from this era.

[11] Refer to Levine 46–47 for examples.

## APPOGGIATURAS

One of the most famous moments in West European musical composition in my opinion is the opening moment of the Prelude to Act I of Wagner's *Tristan und Isolde* (1857-59), where the cello sets the scene for the subsequent entry of one of the most controversial chords in musicology – the "Tristan chord".[12] This is one decisive moment that foreshadowed the future of extended tonality.

Refer to a full score whilst listening to a good recording of this epic music drama. In these initial bars, transcribed in Figure 13, notice in the score how the use of dynamic contouring and orchestration, along with the tempo marking ("slow and languishing") combine to reinforce the dissonance and attenuate the resolution. Notice also the modulatory return of these waves of tension with the return of this elusive cadence in bars 6, 10 and 12.

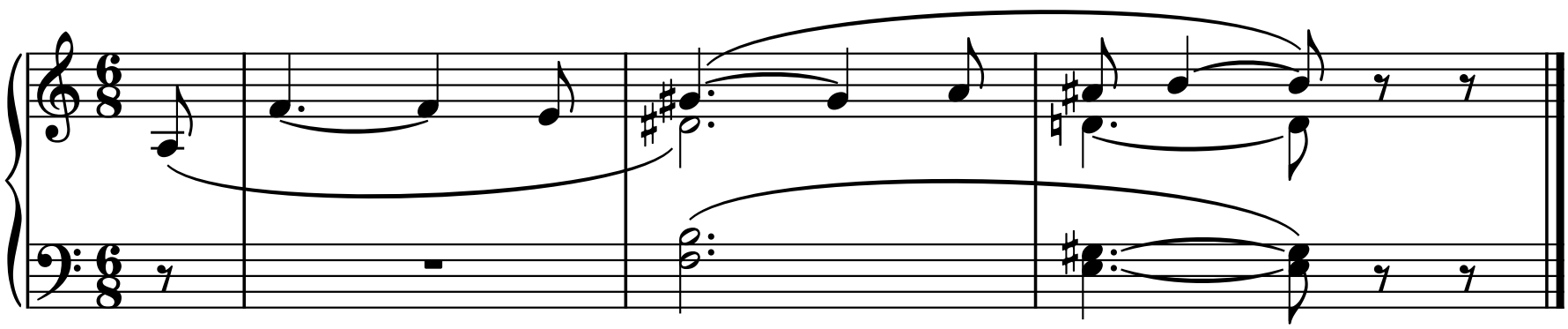

Figure 13. Score reduction of the opening bars of Wagner's *Tristan und Isolde*.

The harmony in Figure 13 is best viewed as melodic in origin, via *appoggiaturas* which are melodic cadential devices related to suspensions. *Appoggiare* means "to lean upon" (Italian). Appoggiaturas typically consist of a leap to a non-harmonic note followed by a stepwise resolution in the opposite direction. The long appoggiatura suspends the accentuated chromatic note by taking away duration of the resolution that follows. Tension is maximised by placing the non-harmonic note on a strong beat.

Figure 14 summarizes the piano reduction of Figure 13, notating the appoggiaturas as grace notes, seen to be functioning as embellishments of a i-V cadence in A minor. Notice that the cello's opening three notes (A-F-E) obey the typical appoggiatura format by making a leap to a non-harmonic note on a strong beat, followed by stepwise resolution in opposite direction.

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[12] Here is one example on YouTube with the score accompanying a recording. https://youtu.be/-QX7dgBqfgw

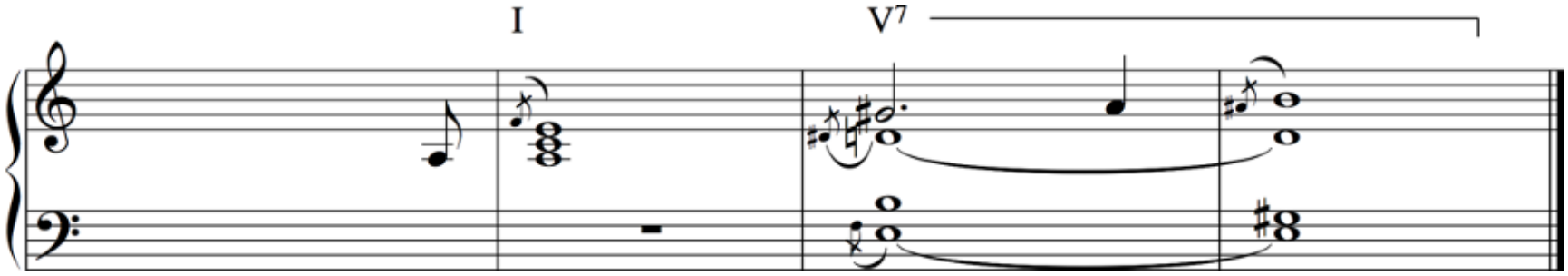


Figure 14. Score reduction of the opening bars of Wagner's *Tristan und Isolde,* re-notated as appoggiaturas.

Figure 15 provides four examples of appoggiaturas following the typical appoggiatura format by making a leap to a non-harmonic note on a strong beat, followed by stepwise resolution in opposite direction. Invent further examples in this progression for the cello.[13]

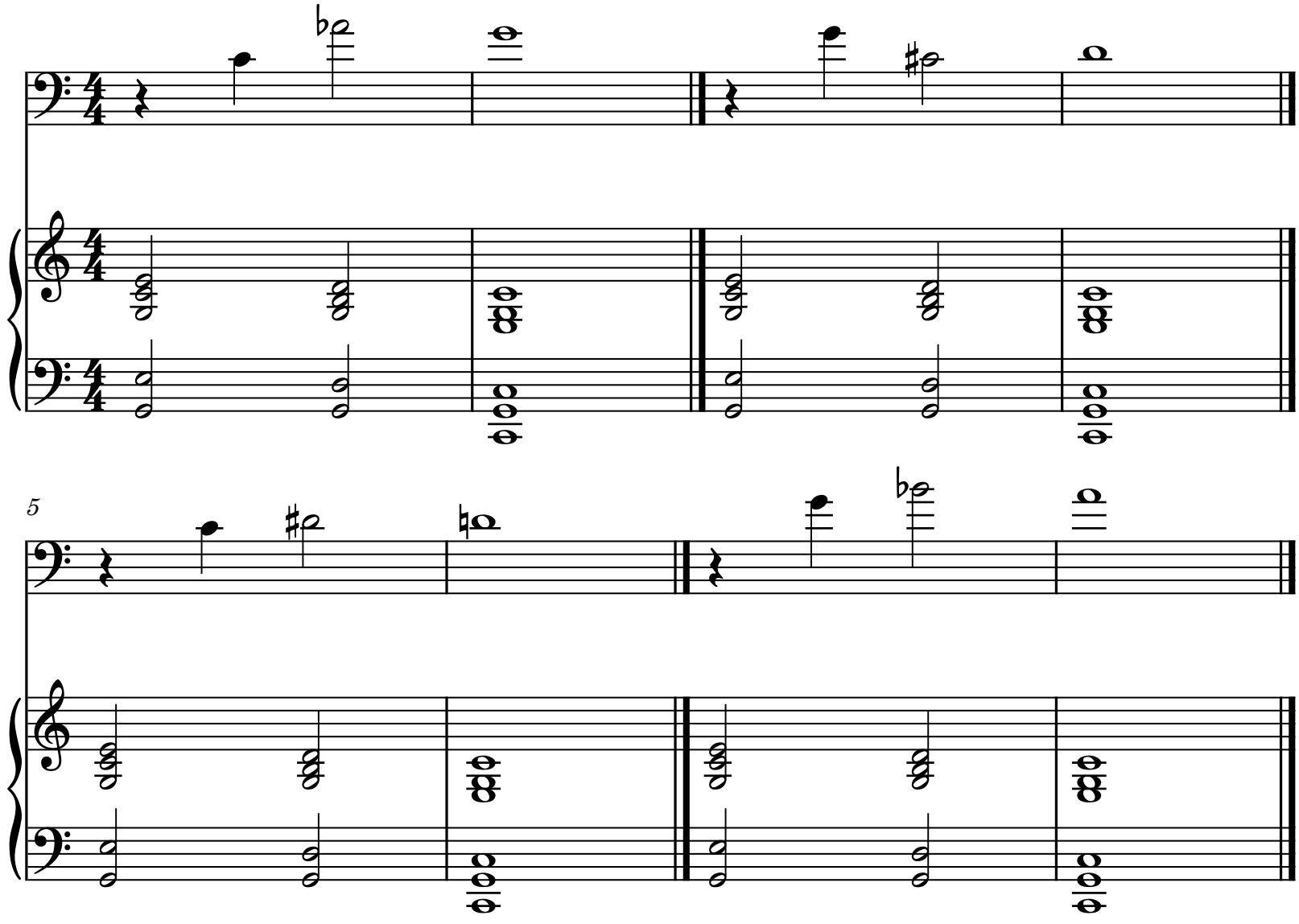


Figure 15. Four examples of appoggiaturas on a I V I cadence in C major.

[13] Schoenberg provides examples of how a phrase can be embellished with appoggiaturas in Ex.7 and Ex.11 of *Fundamentals of Musical Composition,* p.6-7.

## NON-RETROGRADABLE RHYTHM

Olivier Messiaen (1908-1992) was a French composer and pianist who was a preeminent driving force in contemporary music from pre-WWII through to the 1990's when he died. Notable is Messiaen's independence from any specific school or grouping – he developed his own personal voice early on and experimented with many different composing methods during his life. Messiaen has described himself as a "*compositeur et rythmicien*", which underlines the importance of this parameter in his music. His *modes of limited transposition* have a temporal analog in his *non-retrogradable rhythms*, for which we will use his famous *Quatour pour la Fin du Temps* (Quartet for the end of Time, 1940-1) as a case study. Listen to movement VI (*Danse de la fureur, pour les sept trompettes*).

The term *non-retrogradable* means in practice that mathematical invariance exists in the reverse order. For rhythms, which play out chronologically (and notationally with onsets appearing from left to right), it means if one were to play the last onset (with its affixed duration) first, and proceed from right to left, the same rhythmic pattern would be produced. These are called *palindromes*. Thus, non-retrogradable rhythms are constructs exhibiting temporal bilateral symmetry.[14]

All bilaterally symmetrical constructs reflect about an axis, just like a mirror. Pitch symmetries are x-axis symmetries whilst rhythmic symmetries are y-axis symmetries. This means that there is always a middle point in non-retrogradable rhythms about which the values repeat in the opposite order. The exact location of the axis depends on the total number of onsets in the pattern. The formula for determining the location of the bilateral axis of reflection ($a$) in any sequence of members ($m$) is:

$$a = (m + 1) / 2$$

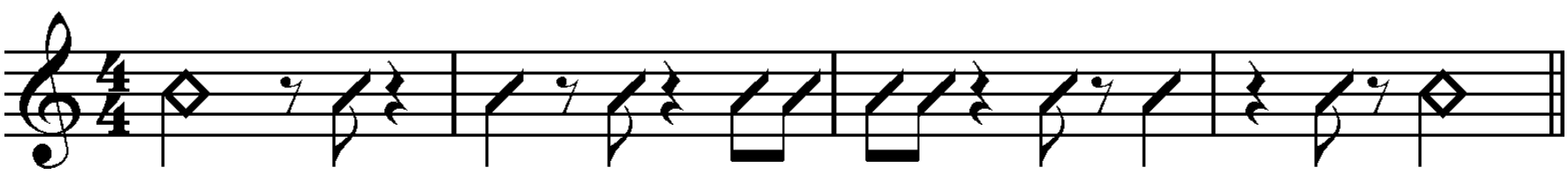

Figure 16. Non-retrogradable rhythm with 12 onsets (even) and axis on a barline (between onsets number 6 and 7).

[14] Csapó presents and categorizes a number of musical approaches to symmetry, accompanied by examples and related issues. Messiaen's are considered symmetries of duration (rhythmic series).

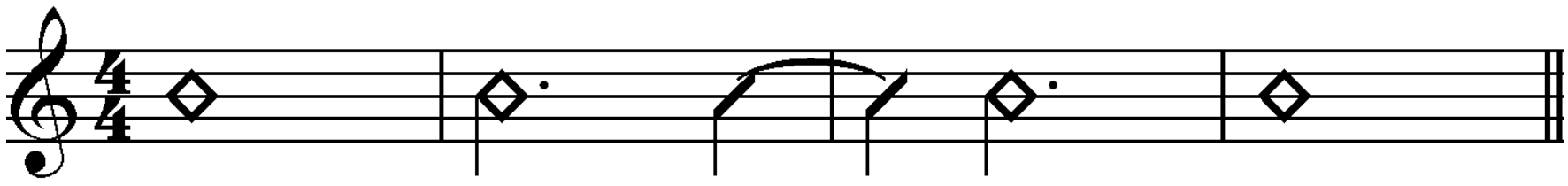

Figure 17. Non-retrogradable rhythm with 5 onsets (odd) and axis on an onset (3).

Examine the excerpt from the cello part in Figure 18. The bar lines indicate the phrases, and each is a non-retrogradable rhythm. For each phrase:

- Determine the subdivision. This will be the basis of the additive rhythm.
- Count the number of subdivisions contained in each duration of each phrase. Write these under the stave.
- Count the number of onsets and calculate the location of the axis of symmetry. Draw it in.
- Count the number of phrases.
- Identify rhythmic patterns of phrase construction. (Label the phrases A B etc.)
- Look for patterns of pitches.

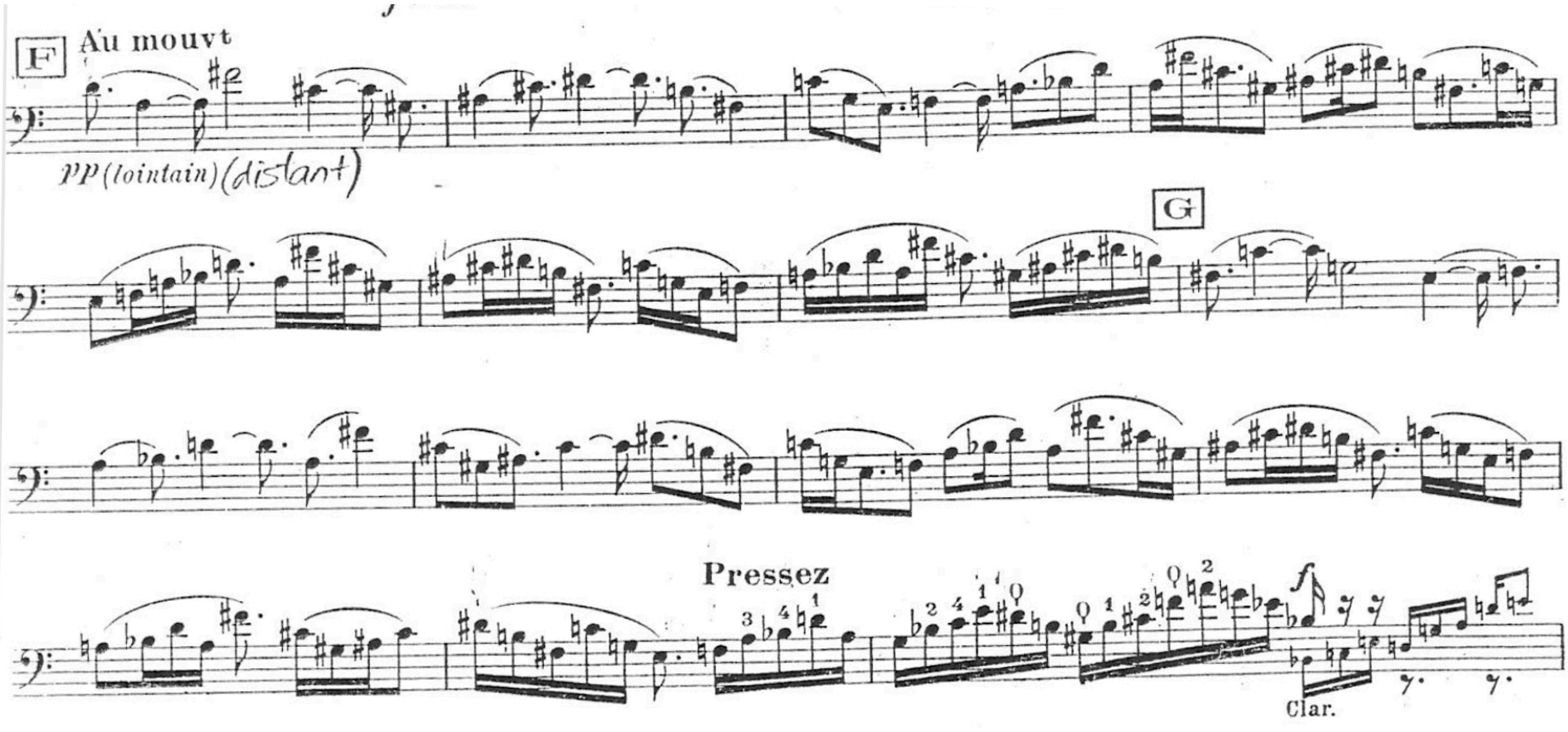


Figure 18. Cello excerpt from Quartet for the end of Time, section F & G, *Danse de la fureur, pour les sept trompettes* ("Dance of fury, for the seven trumpets").

Here are some observations to add to your findings:

- 16-onset pitch series (starts of D, ends on Bb) which phases over the bar line, and against the rhythmic phrases.[15]
- All 12 chromatic pitches are sounded per 16-note phrase.
- Sounds pantonal, with references to changing key centres (D Maj7, G# Maj, B Maj, etc).
- 7 statements of the 16-pitch phrase, symbolising the movement's title perhaps ("Seven Trumpets").
- There are also 7 bars of non-retrogradable rhythmic phrases in section F, repeated in section G (up to the transitionary section labelled *pressez*).

Non-retrogradable rhythm need not be constrained to odd metres such as in this Messiaen example. E.g. 2 bars of 4/4 with a 16th note subdivision can have non-retrogradable approaches to grouping the 32 subdivisions. For example:

3 3 2 2 3 3

2 3 3 3 3 2

3 2 3 3 2 3

The first two are rotations (*necklaces*) of each other. Similarly, you could start the last example from the second onset and still create a symmetrical rhythm (2 3 3 2 3 3). Repeating this rhythm would effectively displace the axis of symmetry.

[15] Refer to the 14th century technique of *isorhythm*, where pitch and rhythmic patterns of different sizes phase.

## HARMONICS

The case-study for harmonics will be Ravel's *Sonata for Violin and Cello* (1922).[16] Listen to the first movement with the score, and focus repeatedly on the final bars (from around 4:15 of the recording).

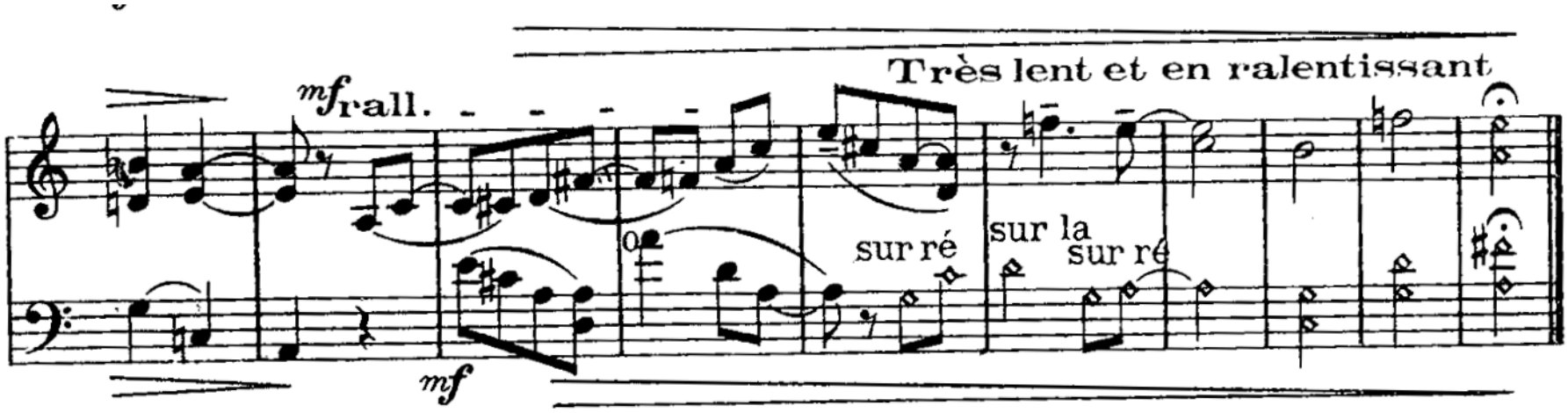


Figure 19. Final bars from Ravel's *Sonata for Violin and Cello*, movement 1.

There are various methods used for notating and playing harmonics on string instruments.[17] *Natural harmonics* differ from *artificial harmonics* only in that the latter, the string player fingers the open strings to transpose the natural series of harmonics to different keys.[18] In either case, the natural harmonic series of Figure 20 applies.

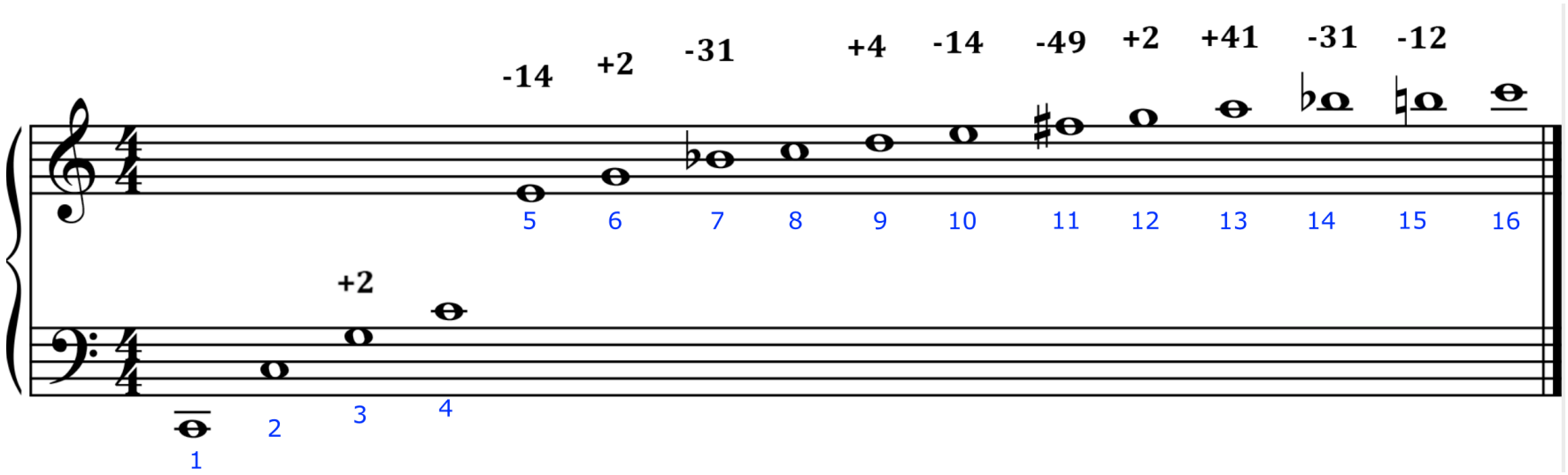


Figure 20. The harmonic series showing the first 16 partials from C and their divergence (in cents) from equal temperament.

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[16] This version of the recording has an accompanying score. https://youtu.be/-z_Ee3E3C0Q

[17] The term *flageolet* tones is used in French and Italian for string harmonics. Harmonics on the cello tend to be even more effective than on the violin due to the scale of the instrument and mass of the strings.

[18] Technically this is more challenging as the player must use the left hand to finger the string as well as find the touch-point for the node accurately. For the cello, the thumb depresses the string whilst the third or fourth finger touch the harmonic point. "Touch 3" and "Touch 4" harmonics are effective on the cello.

Method 1. Natural Harmonics - touch point.

Use a diamond note head to indicate where to touch the string. For strings, the word *sul* (Italian) or in the case of Ravel, *sur* (French) means “on”, and may accompany the notation to indicate which string is to be used. Ravel uses this method in this Sonata.

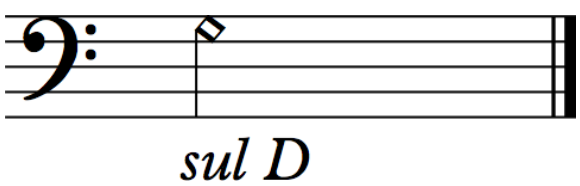
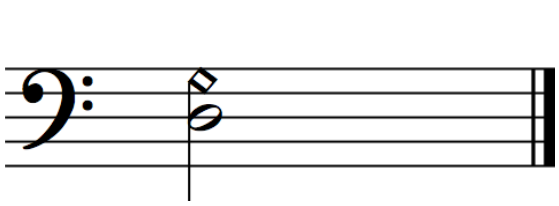



Figure 21. Method 1 for notating harmonics.

Method 2. Natural and Artificial Harmonics - touch point with string.

A dyad is notated. On top, a diamond note head is used to indicate where to touch the string. On the bottom appears a regular note head that indicates either the open string to be used (for a natural harmonic) or the note to be fingered (for an artificial harmonic). Figure 22b shows the latter with the symbol for the requisite thumb usage. This method can’t be used for double-stops, which exist in the Sonata examined.



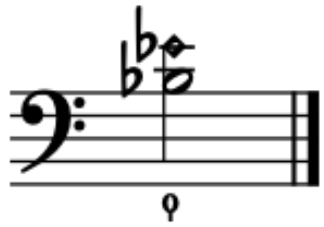


Figure 22a & b. Method 2 for notating harmonics.

Method 3. Natural and Artificial Harmonics - touch point with string and resultant pitch.

A triad is notated. On top, a bracketed note indicates the resultant pitch. Below that, a diamond note head is used to indicate where to touch the string. On the bottom appears a regular note head that indicates either the open string to be used (for a natural harmonic) or the note to be fingered (for an artificial harmonic). This method can’t be used for double-stops either.

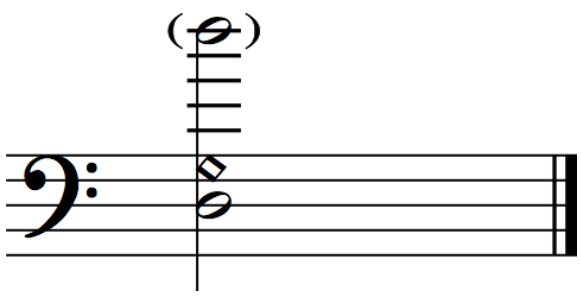


Figure 23. Method 3 for notating harmonics.

Method 4. Natural and Artificial Harmonics - Resultant pitch only.

A single note head indicates the desired pitch, accompanied by a small degree symbol °. (This symbol is also used to indicate open strings.) This method requires that the composer and performer have a clear idea of how to play the resulting harmonics!

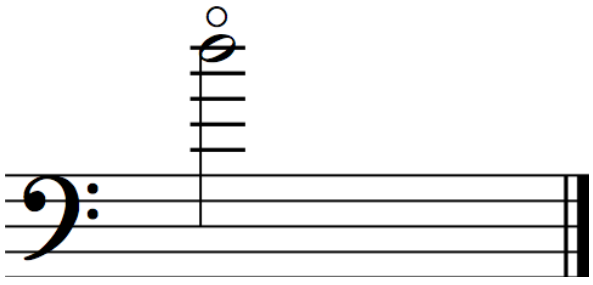


Figure 24. Method 4 for notating harmonics.

The last step is to bring together the notation with the harmonic series. The integrating element is to know how the string vibrates in partial sections and therefore the location of the nodal points of the various points in the series. For the purposes of the Ravel analysis, the following natural harmonic locations apply.[19] Figure 25 applies to the cello's C string and this corresponds to Figure 20, but can be transposed to the other strings, and all string instruments, including artificial harmonics (that are within the reach of the hand).

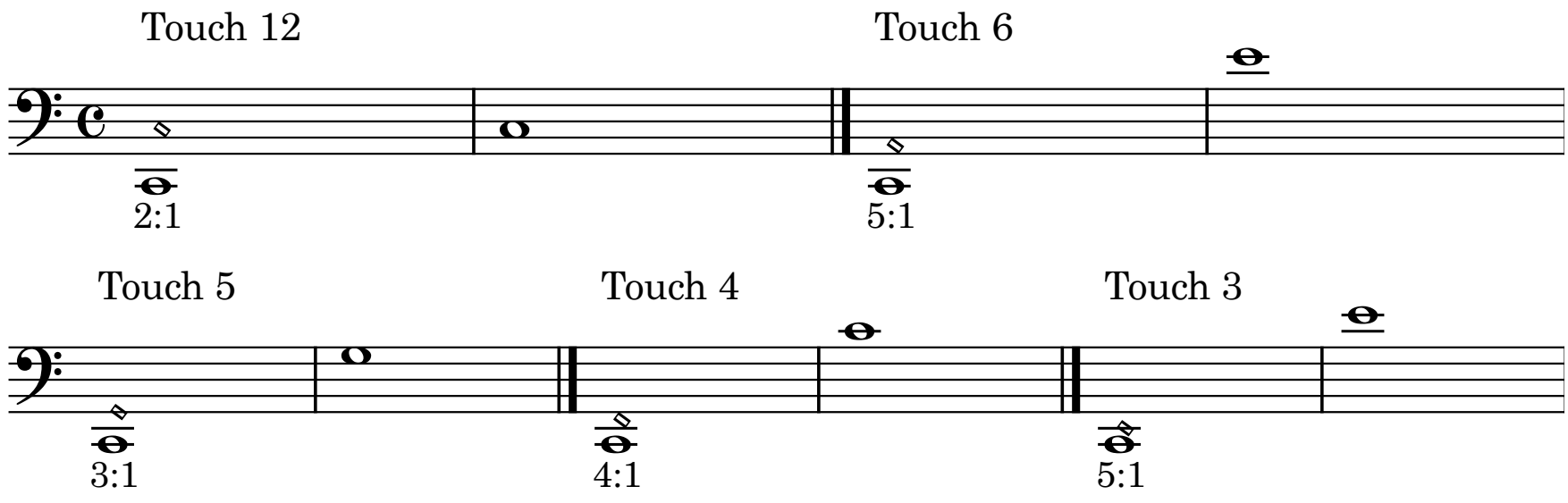



Figure 25. String natural harmonics showing touch position with respect to open C string, corresponding location in the harmonic series and resultant pitch.

Your task is to re-notate the final 6 bars of the Ravel excerpt as resultant pitches. Then compare your analysis with the transcription in Figure 26.

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[19] These string harmonics cover the majority of applications of harmonics for the composer. Note that for many harmonics (after 2:1) there exist more than one nodal point that can sound the harmonic. Mapping all these is outside the scope of this paper, but it can be seen that the Touch 3 and Touch 6 harmonics are an example.

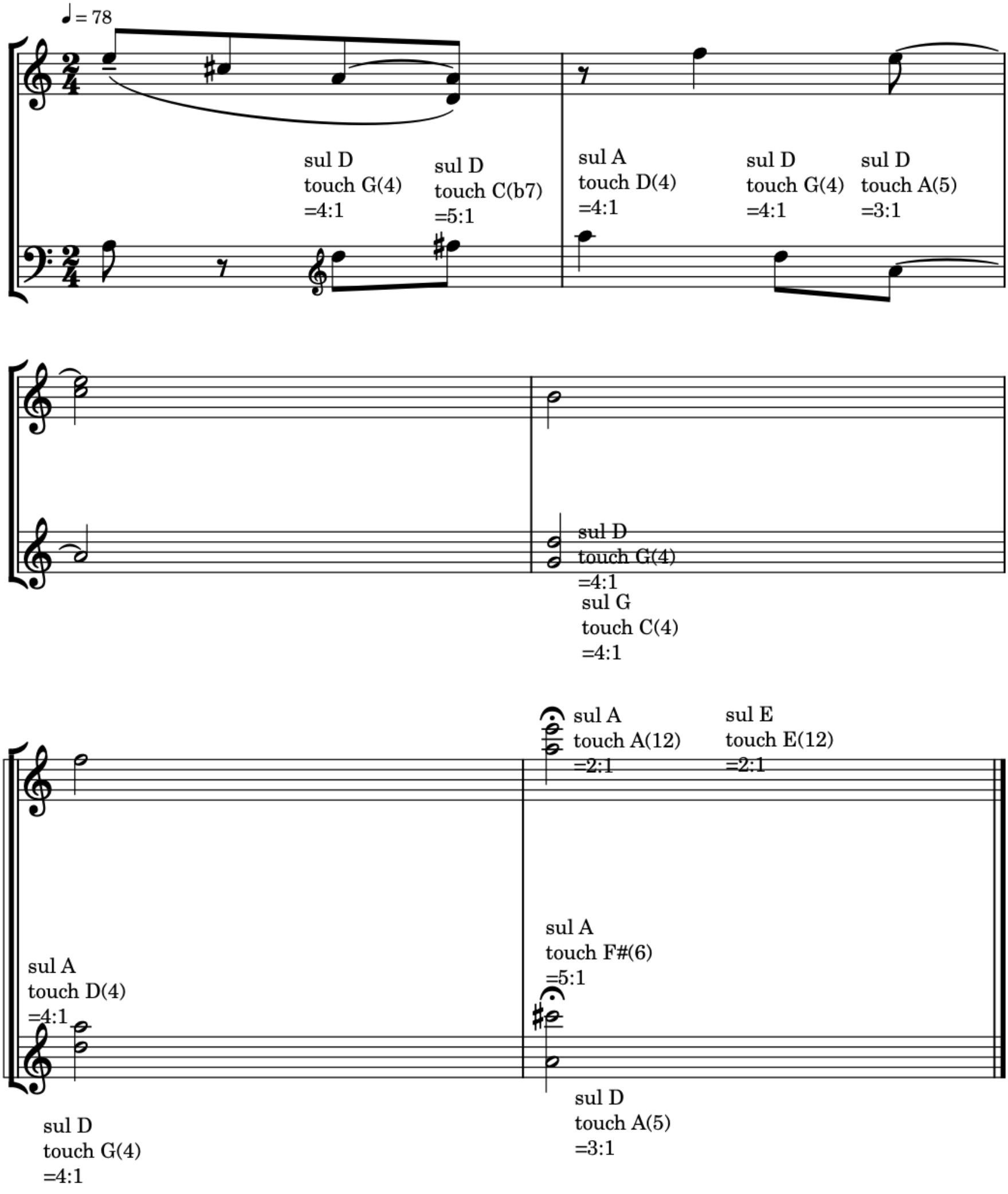


Figure 26. Final bars from Ravel's *Sonata for Violin and Cello*, movement 1, as resultant pitches with harmonic analysis.

## SLURRED STACCATO

As for other instruments, *staccato* results in detached, separate durations (as opposed to *legato*). For string instruments, there are various related techniques that range from separate (changing) bow strokes per onset, separated onsets on one bow (*slurred staccato*), through to more dramatic effects such as *martele* (*marcato*) and *jete* (*ricochet*). Tempo, dynamic and length of bow are also factors to consider.[20]

To experience the effect of slurred staccato we will compare two moments in Bartok's Fifth String Quartet (1934). These moments derive from the arch-form related movements II (Adagio Molto) and IV (Andante).[21]

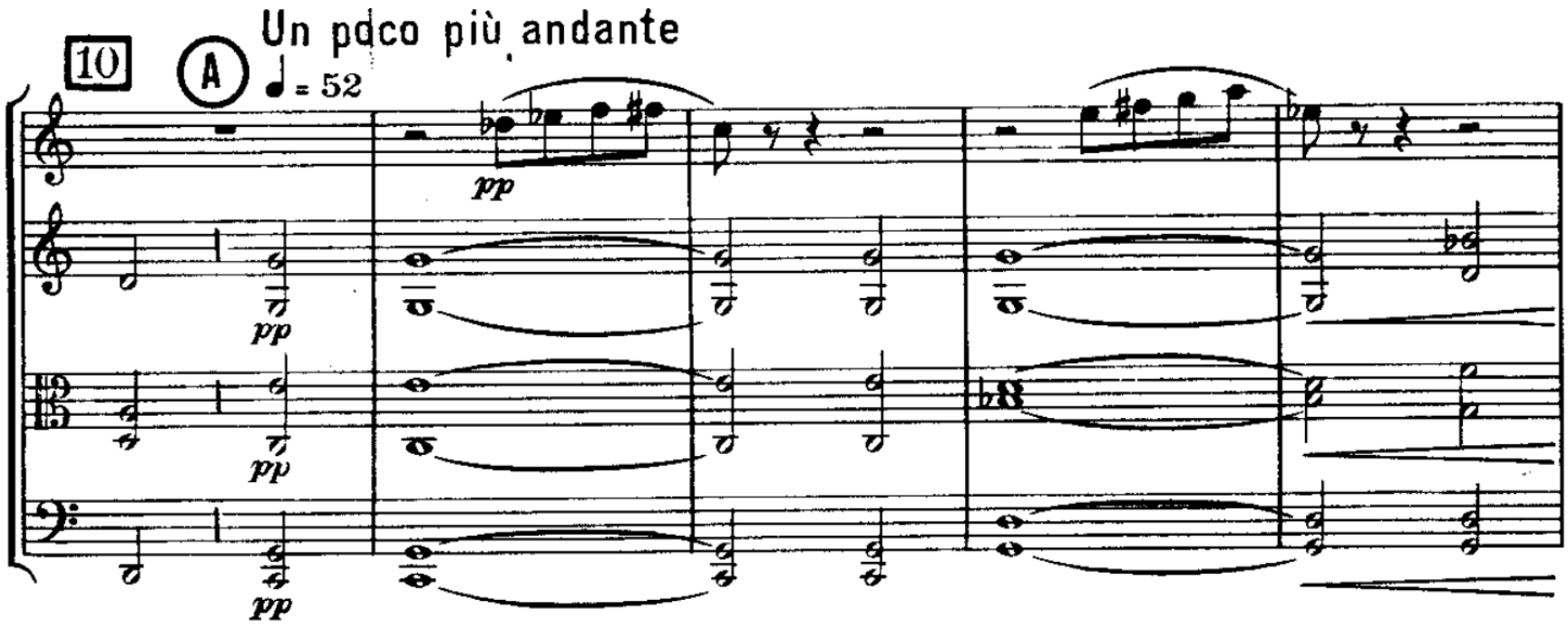


Figure 27. Bartok Fifth String Quartet, movement II excerpt (Adagio Molto).

[20] The bows of the cello and double bass are shorter than that of the viola and violin.

[21] A video of one live performance, starting at movement IV is here https://youtu.be/MpyoHFjIcVY?t=1283

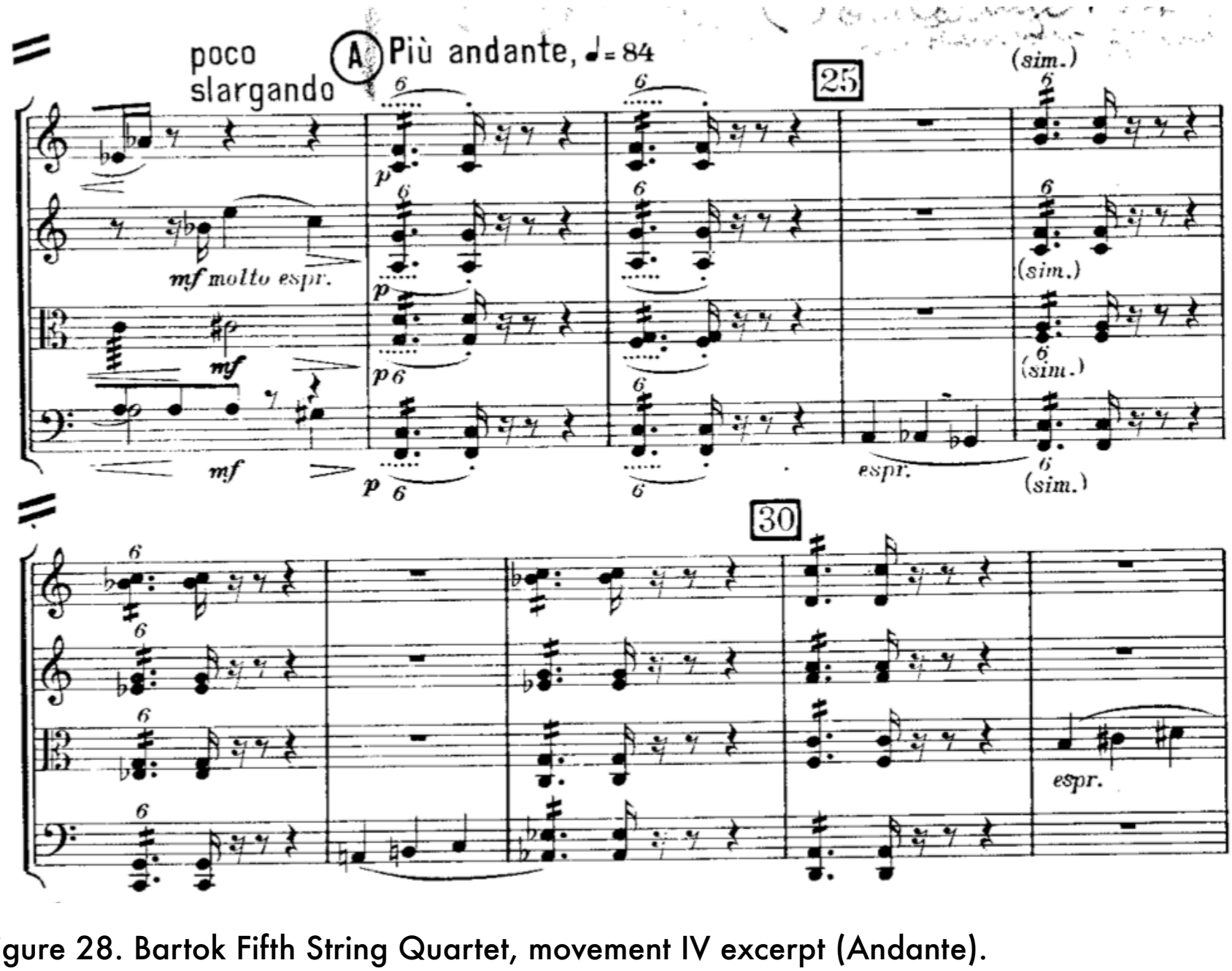


Figure 28. Bartok Fifth String Quartet, movement IV excerpt (Andante).

Watch the video of these two movements (and the entire quartet!). Pay attention to how the material of the second movement undergoes development in the fourth movement. Whilst both slow movements maintain an atmospheric[22] quality, in the latter adagio movement pizzicato replaces the former's trills. Observe also the pizzicato glissandi on the cello, and the effect of alternating open and identical fingered pitches in the first violin and viola. The "chorale-like" section excerpted in Figure 27 is transformed in the later movement with the aforementioned slurred staccato. Pay particular attention to how this is executed in the video, and then listen to other recordings by other quartets. Is this passage executed differently? What technique is substituted?

[22] Bartok's famous "night music" approach applies in this quartet as it does in other works. For example bars 42–54 of movement IV.

# EXAMPLES OF DUETS

There are plenty of examples of available repertoire for violin and cello. Compositions in Public Domain can be found in a dedicated category in the Petrucci Music Library online.

YouTube is obviously an easy way to access performances of many duets, some being of live performances and others even with the score. Download PDFs from the aforementioned library (e.g. duets by Stamitz, Beethoven, Albrechtsberger or Ravel) and listen to them on YouTube whilst following the score/part.

Inspiration and ideas for duets can be gleaned in fact from repertoire of any kind, with any instrumentation. Search for string quartets, piano trio (typically violin and cello with piano), and other kinds of chamber music such as the Pierrot ensemble (which adds flute and clarinet to the piano trio and is named after Schoenberg's *Pierrot Lunaire*).

# CONCLUSION

The student is recommended to model techniques that can be observed through the analysis of works by exemplary composers. This paper sought to stimulate awareness of a small but broad range of repertoire, and to subject it to a few analytical approaches that can then be applied in a generative manner to create new material for the budding composer. The approach towards analysis is clearly formalist, though a hermeneutic approach is also valuable.[23]

As always, the student should prioritise their practical experience of a broad range of repertoire through listening to performances, reading and analysis of scores and excerpts, and playing parts on their instruments.

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[23] Such a musicological approach involves social, political, and cultural contexts as well as including expressive and aesthetic considerations.

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