Chapter One

THREE "CLASSICAL" VIOLINS AND A FIDDLE

Case Studies in Violin Values

He then looked upon his work and thought, I've almost got my music now, for he had but one job left, the killing of a snake. For some time, he had speculated that putting the tailpiece to a rattlesnake inside the instrument would work a vast improvement on the sound, would give it a sizz and knell like no other. The greater the number of rattles the better, was his thinking on the matter. He described it along the lines of a quest. The musical improvement he was seeking would come as likely from the mystic discipline of getting the rattles as from their actual function within the fiddle.

from *Cold Mountain*, by Charles Frazier.[1]

from

Reinventing the Violin

by Daniel Trueman

[1]Charles Frazier, *Cold Mountain* (New York: Vintage Books, 1997), 290.

What is it about the violin that has attracted players, composers, and listeners for more than 400 years? What qualities of the violin are so vital that if they were somehow removed, the violin would no longer be a violin? To begin exploring these questions, I quote David Boyden from the *New Grove Dictionary of Music and Musicians*:[2]

> [The violin] is one of the most perfect instruments acoustically and has extraordinary musical versatility. In beauty and emotional appeal its tone rivals that of its model, the human voice, but at the same time the violin is capable of particular agility and brilliant figuration, making possible in one instrument the expression of moods and effects that may range, depending on the will and skill of the player, from the lyric and tender to the brilliant and dramatic. Its capacity for sustained tone is remarkable, and scarcely another instrument can produce so many nuances of expression and intensity.

Like its model, then, the violin is meant to sing. But it is also meant to outdo its model; the violin's ability to combine the beauty and emotional appeal of the voice with exceptional agility and versatility allow it to transcend its model. This is perhaps a good answer to my questions—the violin is a singularly successful extension of the voice and, as such, is a vital vehicle for human expression.

But it is a short answer, and not particularly informative. In this chapter, I would like to take a closer look at the "Classical" violin in three of its forms.[3] Schubert's violin, in particular the remarkable violin of his G-major string quartet, provides me with a monumental starting point. From this peak, I will look back at Corelli's violin, focusing on the Opus V sonatas, and forward to Bartók's violin, especially that of his 4th string quartet. With each of these, I will try to see how the composer engages the various qualities of the violin and, vice-versa, how the violin shapes and inspires the composer. Finally, I will consider the interesting case of the Norwegian Hardanger fiddle. Standing outside the western "Classical" tradition and possessing a unique physical structure, the Hardanger fiddle offers an unusual perspective on the relationship between player and instrument.

One might object that I am ignoring the most important violin repertoire—the concerti, the music of Paganini and Wienawski. The "virtuoso" literature—in particular the famous *Caprices* of Paganini—greatly enlarged the conception of what was technically possible on the violin, and without it the music of Bartók (and others subsequent

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[2]Stanley Sadie, ed. *The New Grove Dictionary of Music and Musicians* (London: Macmillan Publishers Ltd., 1980), s.v. "Violin," by David Boyden.

[3]I use the title "violin" in its general sense to refer to the entire violin family, unless otherwise indicated.

composers) would not have been possible; it is worthy of study in and of itself. For my purposes, I have chosen music that is closest to my heart and that best illustrates the answers to the questions I have posed.

As the violin is "one of the most perfect instruments acoustically," this will be, by necessity, an acoustically-informed discussion. I will consider the design of the instrument as it was for each composer and examine how they took advantage of recent technical developments and dealt with instrumental limitations. My aim is not, however, to provide a comprehensive historical study of this composer/instrument interaction, but to reach a deeper understanding of the relationship between musical expression and instrument design and how this reflects the qualities of instrument, composer, and player. By considering these four special (and outstanding) cases, I hope to highlight what it is we value in the violin, and to achieve a broader perspective on what the violin means to us today and what it might mean to us in the future.

Schubert's Violin

Imagine Schubert's G-major string quartet arranged for two pianos. It is perhaps cruel to do that to the piano, but it is certainly more cruel to Schubert (and to the reader). While virtually any moment in this piece will suffice to demonstrate the futility of this arrangement, I will begin with one of the most striking events in the *Andante* (Sound Example 1):[4]

[4]Franz Schubert, *String Quartet in G-major* (New York: Dover, 1973), 295.

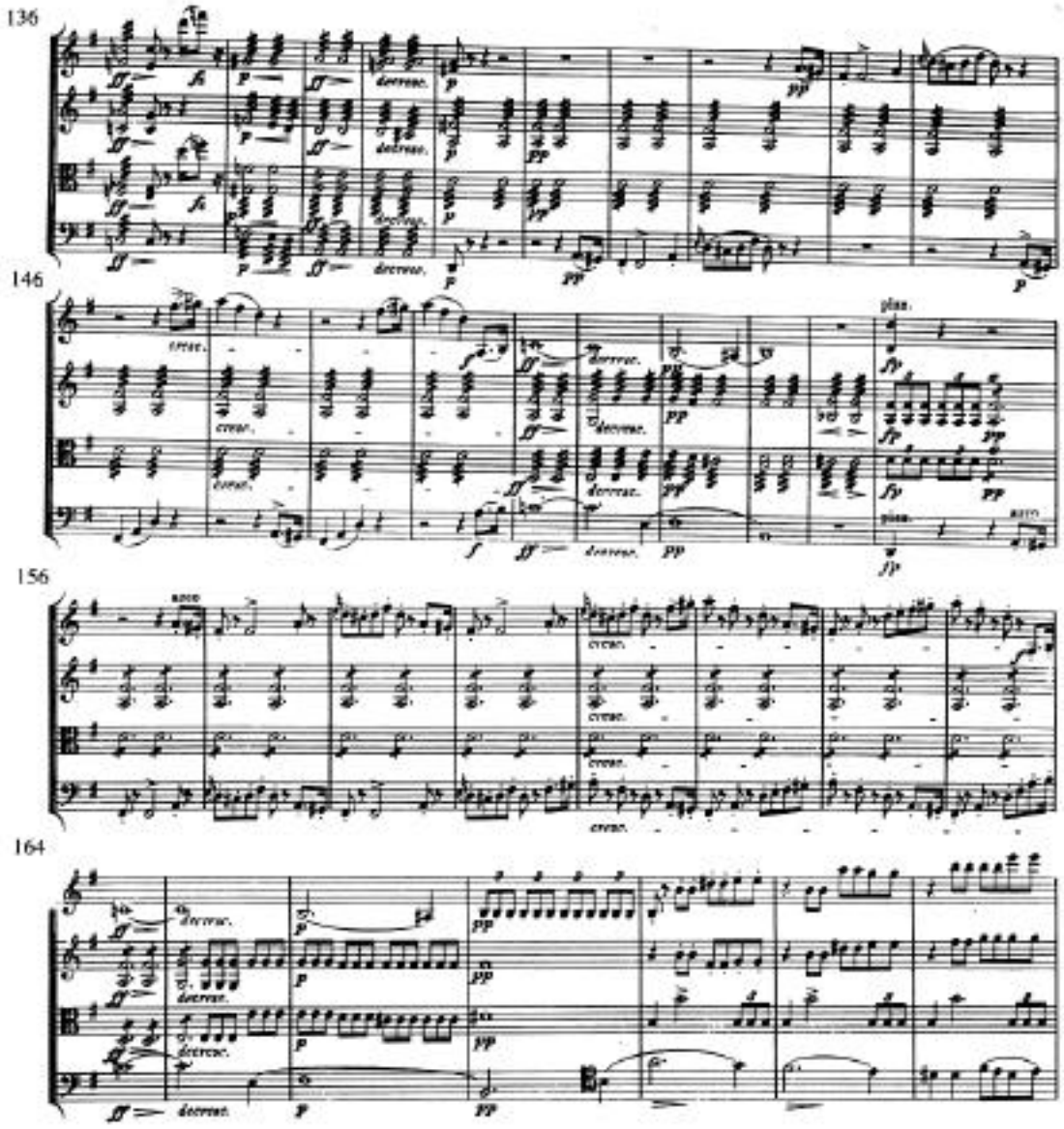

Figure 1. From the *Andante* of Schubert's *String Quartet in G-major*

The magic of the move from B-minor to D-major in m. 155 is intrinsically dependent on the nature of the violin family. At first glance, however, the downbeat of this measure, where the key change actually occurs, appears reasonably innocuous: a diminished chord resolves normally, albeit deceptively, and is punctuated by *pizzicati* in the cello and first violin.

On either side of the cadence, the cello and violin echo one another with the movement's second theme. We may even wonder why this moment happens at all; a few bars later (m. 167) we are brought right back to B-minor for the return of the first theme. Harmonically, mm. 141–153 and mm. 155–167 are identical (moreover, the voicings are the same) and a splice from m. 154 to m. 166 would not even require a cross-fade. What is it, then, that makes m. 155 feel like a continental divide?

Just as continental divides are characterized by radical, if gradual, contrasts in landscape and climate, this divide features changes in texture and mood. The harmonic and melodic symmetry around m. 155 serves to highlight what is really going on here (meaning, the action is *not* in the harmony and melody, although I don't want to understate the importance—and brilliance—of the deceptive cadence). Up to this point, all metric subdivision has been duple (if there is subdivision at all; the extensive use of tremolo tends to wash out subdivision). By switching suddenly from intense, metrically ambiguous tremolo (marked by a hairpin swell), to clear triplet subdivisions, Schubert effectively opens up and clarifies the texture. The regal, though understated, character of the subsequent duo (mm. 156–167) contrasts sharply with the preceding foreboding and introspective dialogue. It is as if a shady pair of criminals on the run suddenly emerge from a dark alley and find themselves in the town square; hoping not to attract attention, they assume a nonchalant air of innocence.

But it is the explosive character of the downbeat of m. 155 and the following rebounding triplets—debris—that really signal the divide. The *fortepiano pizzicato*—in three octaves, including the cello's lowest octave and the violin's open D-string—ignite the explosion, while the triplets, always played off the string with a light, effortless character, emerge as if they have always been there. But they haven't, and this is indeed new territory for the *Andante*. The duo which follows is subtly, but significantly modified: dots replace slurs, nonchalance replaces introspection. The consequences of this change gradually grow in importance as the movement slowly winds down. The texture continues to sustain a lighter quality—compare the accompaniment articulations of mm. 168–194 with those of the opening—and major keys begin to predominate, quelling several minor[5] uprisings. It is important to emphasize here that, in my view, the textural articulative features of the violin play the leading role, while the subsequent harmonic changes are consequential.

Could a piano duo pull this off? Perhaps, but it would be a radically different piece. Schubert could never have conceived of this piece for pianos, or any other instruments; too much of it relies on, and therefore reflects, fundamental qualities of the violin family. The textural contrasts between tremolo and light *spiccato*, the use of *pizzicato* at crucial turning points, the subtle variations in articulation all depend on the violin's peculiar

[5]In key, that is, not strength; the return to E-minor in m. 220 is anything but minor.

ability to create vivid differentiations regardless of melody or harmony.[6] And, yes, while Schubert sings with the violin, as only Schubert can (most prominently in the opening theme), it is, I believe, these differentiations that really make this piece what it is. The harmonic tricks of Schubert are familiar, as are the beautiful tunes, and are well realized elsewhere in his piano sonatas and songs, but in this movement we hear Schubert speak specifically with the violin.

Physically, Schubert's violin was of relatively recent design. Shortly before the turn of the 19th-century and the in the following years, the violin underwent a severe overhaul. In an effort to improve the projection of the instrument, makers had been experimenting with various neck lengths and angles. They found that if they replaced the traditional neck (that is, the neck with which Corelli, Bach, Mozart, and Haydn were familiar) with a longer neck and made its angle with the instrument steeper, they could increase the tension of the strings and make the upper positions more accessible.

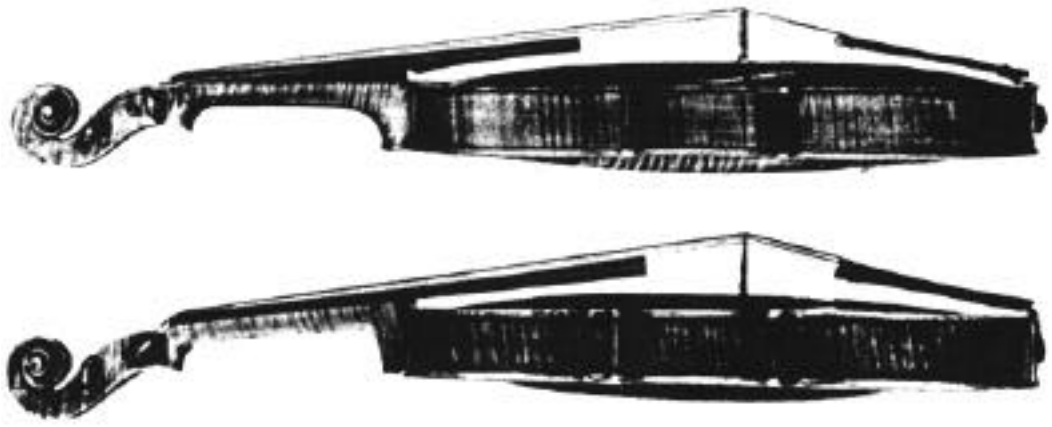

Figure 2. A violin before refitting (top) and after. Note the difference in angle of the strings over the bridge and in neck length.[7]

The increased angle and tension caused the strings to exert a much greater downward force on the bridge. To support this, the violin had to be refitted with a longer and sturdier bass-bar. As desired, this design was much louder, and many makers went about refitting the old great violins of Cremona and elsewhere.[8]

A few years earlier (ca. 1786) François Tourte produced the first bow that set the standard for all subsequent makers. By assimilating various

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[6]Consider also Schubert's subtle use of pizzicato at the end of the opening phrase and its recurrences (m. 9).

[7]Reproduced from Sadie, 828.

[8]For a brief history of the development of the violin, see John Dilworth, "The Violin and Bow—Origins and Development," in *The Cambridge Companion to the Violin*, ed. Robin Stowell (Cambridge: Cambridge University Press, 1992), 1.

designs (now seen as transitional from the convex bows of Bach and Corelli to Tourte's concave bow) Tourte was able to create a stronger, lighter bow that was capable of more varied bow strokes and sustain. The longer concave design allowed for greater tension in the bowhair. This was combined with a heavier tip that better balanced the bow and made it easier to exert a consistent downward force on the strings across the entire length of the bow.

What do these changes mean? Acoustically, the high downward pressure of the bridge on the violin top effectively *couples* the strings and resonating body much more tightly than before. For the players, this means that when they bow the strings, they engage the body more than with a lower tension setup. This is a profound difference, and it is interesting that the two changes I have described—in bow design and neck orientation—are interdependent; the higher tension violin setup requires a higher tension, heavier bow, and the new bow, which can be overwhelming for a lower tension violin, requires the higher tension violin. Both of these developments were motivated by a need for greater volume, but they also fundamentally changed the way the instrument was played; drawing sound from the instrument required more effort (even if the best players make it seem effortless), more weight, more intensity. Listening to a modern player close up, one can hear and see this effort in the way the weight of the arm and shoulder is used, in the rosin that flies, and in the extraneous noises—hissing, scratching—that the player/instrument relationship generates.[9]

Consider the opening gesture of the G-major string quartet. To me, this gesture is about weight and intensity (Sound Example 2):

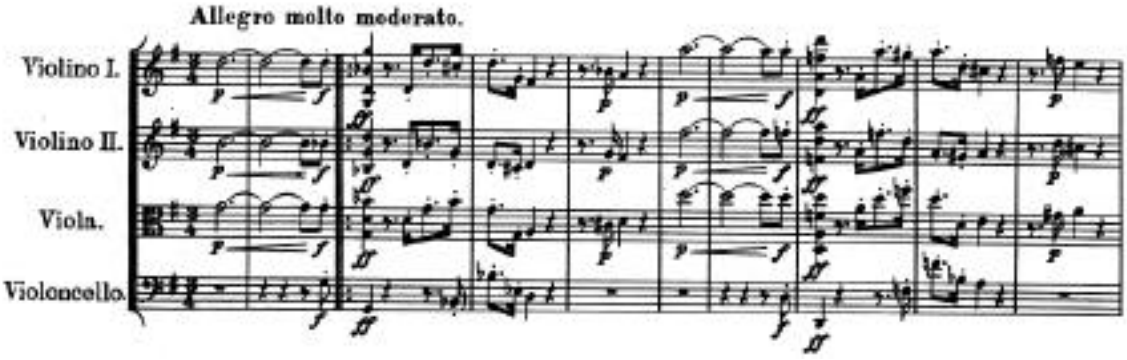

Figure 3. Opening measures of the first movement

The dramatic *crescendo* from soft single notes to *fortissimo* sweeping chords reeks of sweat; the broken quadruple-stop down-bow is a weighty gesture unique to the violin. This is not about gently drawing sweet tones from a delicate instrument. Rather, it is an example of "no pain, no gain," as the

[9]It is ironic however that these "extraneous" sounds are an important feature that many performers and composers miss in contemporary efforts to model and synthesize violin tones.

weight-lifting coaches tell us. And the analogy holds up more effectively than one might imagine; the modern violin (which is nearly identical to Schubert's violin) sustains around 55 pounds of transverse tension, and the downward weight of the bridge on the top plate is between 15 and 20 pounds. In a sense, then, the violinist *is* weight-lifting because he/she has to engage this tension with every note. If we divide the 55 pounds evenly among the 4 strings (which is not truly accurate; the strings vary in tension somewhat) we see that the violinist must "lift" 13.75 pounds for each string he/she plays simultaneously; in this light, the difficulty of quadruple stops is clear.

Obviously, I am not suggesting that string players need highly toned muscles (or steroids!) to do their job. Rather, I am trying to develop the notions of weight, effort, and intensity as they apply to (and depend on) the violin. Returning to the first movement of the quartet, we can hear Schubert's reinvention of the opening gesture as something entirely different at the recapitulation (Sound Example 3):

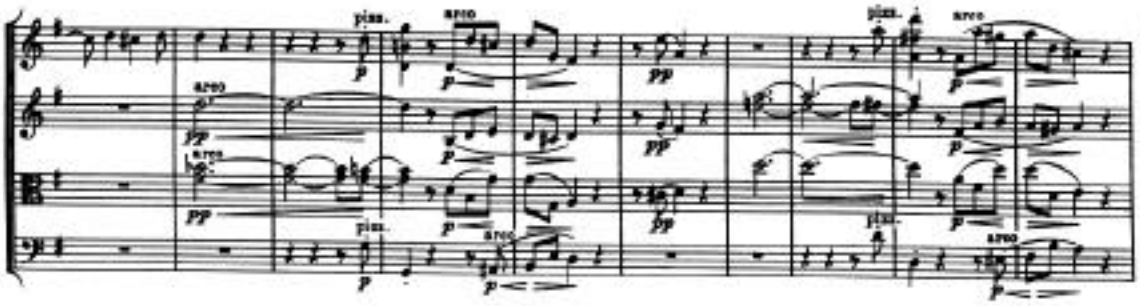

Figure 4. Recapitulation in the first movement

If we weren't convinced by the weight of the opening, then we are provided with a wonderful new perspective on it here. Schubert replaces the intense sweeping quadruple stops with gentle *pizzicato*. It is as if the violin, embarrassed by its previous outbursts, tries to disguise itself as a discreet lute when it returns to the opening party. However, when it comes time to go home for the night, the disguise comes off and the violin returns in full force (Sound Example 4):

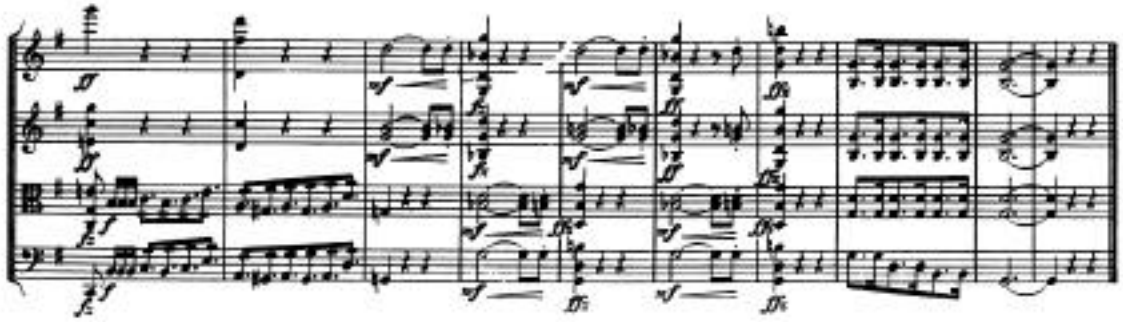

Figure 5. Final measures of the *Allegro*

These contrasts illustrate the enormous range of weights that players of Schubert's violin are asked to lift—from the gentle tug of a *pizzicato* to the heavy burden of a *fortissimo* quadruple stop—which the newly redesigned violin both provides and demands.

David Soyer of the Guarneri Quartet, who anointed Schubert's G-major string quartet the one "most challenging" in the entire repertoire, describes its difficulty:

> For forty-five minutes you're stretched drum-tight. There are passages in the first movement where he's hurling lightning bolts, and the energy and turbulence seem to go beyond the capacity of the instruments. Even the tremolos have great dramatic intensity.... Performing it is, however, so strenuous that I doubt whether we would tour with it. The Budapest Quartet once did so and decided 'Never again!'[10]

Michael Tree, violist with the Guarneri, says that "when we play one of the large-scale Beethoven or Schubert quartets, we strain our instruments to the limit, and sometimes beyond," while Arnold Steinhardt, the Guarneri's first violinist, insists that his "instrument must be able to respond immediately to the smallest gesture," but that it "must also have power, depth, and brilliance."[11]

The range of playing weights created by the redesigned violin opened up new territory for articulation, as Steinhardt's comments imply. Truly legato bow changes were finally possible, as was *martélé*. Off-the-string strokes became more effective, and all of these strokes were accompanied by an expanded dynamic range. A perhaps less tangible but equally important point: the new "weighty" approach to playing the instrument matched and encouraged the "weighty" music that Beethoven, Schubert, and the later Romantics were composing.[12] Both Soyer's and Tree's comments attest to this; one might think that Schubert's quartet could be better realized by instruments that have a greater capacity, so that they weren't "strained to the limit," but this strain, in and of itself, is an integral part of the music—to remove it would be to rewrite the piece. And part of this strain is the player's strain; they are working to get as much out of the instruments as possible—no pain, no gain. Just as the developments of the Tourte bow and the higher tension violin were interdependent, so were the changes in the violin and its music. These radical changes—in both music and instrument design—essentially *reinvented* the violin, and Schubert was one of the most successful in exploring the possibilities of the new instrument. His G-major string quartet—which, as I have argued, requires weight, strain, and an

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[10]In David Blum, *The Art of Quartet Playing* (Ithaca: Cornell University Press, 1987), 157.
[11]*Ibid*., 7.
[12]The two uses of "weighty" here are somewhat different, but I feel they are closely related.

expanded range of articulations—would not have been possible had the violin not been altered as it was.

Corelli's Violin

Lyricism abounds in Schubert's string quartet. His melodic gift is so pronounced, however, that he does not require the particular lyrical abilities of the violin to sing—he sings just as beautifully with the piano. I have argued that the essence of the G–major string quartet lies not in Schubert's tunes, but in his remarkable ability to create colorful and structurally essential textures with the peculiar features of the violin family. He also separates lyrical roles from other roles—either he is singing or he is not singing. With Corelli, however, the distinction is not so clear. In fact, I think that one of the most compelling aspects of Corelli's music—all of which is violin music—is the way in which he explores the boundary between lyricism and idiomatic violin writing.

The opening *Adagio* of Corelli's *Sonata #3* from Opus V is a model of vocal purity; the legacy of Palestrina is still strong. Even the bass line is a joy to sing:[13]

[13]Arcangello Corelli, *Sonata #3*, Opus V (New York: Dover 1993), 267.

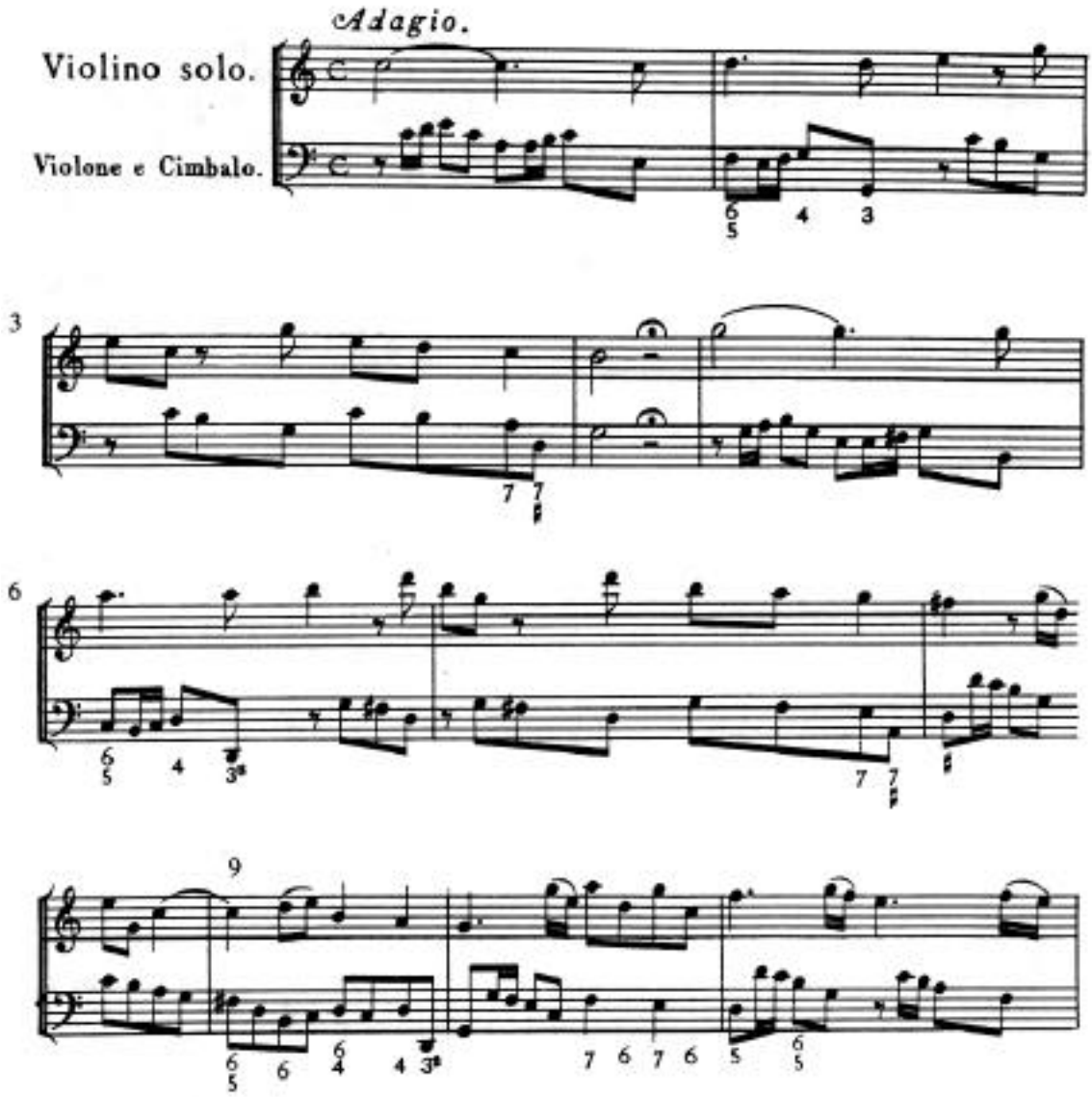

Figure 6 (1). Opening of Corelli's *Sonata #3*, Opus V

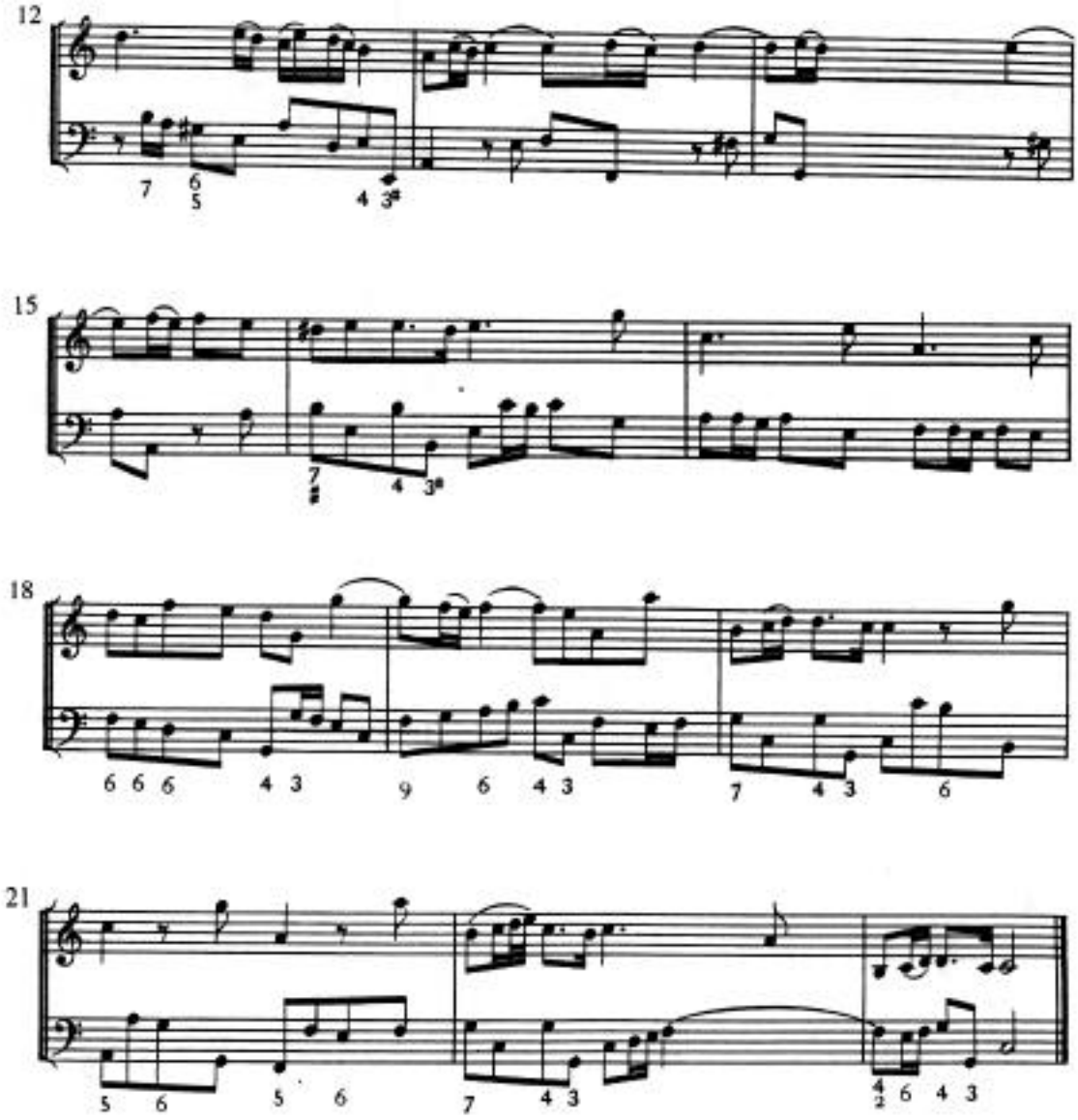

Figure 6 (continued). Opening of Corelli's *Sonata #3,* Opus V

Singing these lines is natural, and doing so reveals some of the essential qualities that we associate with the voice. Perhaps most obvious is the capability for *expressive sustain*. A good singer would do something with the opening sustained C; she might crescendo slightly and gradually add vibrato. Other features include *linearity* and *phrasing*. Stepwise motion predominates and leaps are, for the most part, handled carefully. Lines are broken up into phrases which can be easily sung with a single breath.

What qualities of the voice are not reflected here? Most importantly, there is no text, and none of the related baggage: timbral shaping with vowels, articulative consonants, textual meaning. And what features of this movement are *not* particularly vocal? The range is a bit wide, extending

from B3 to D6, and there are a few leaps that are slightly awkward (m. 10, mm. 18–20). But, overall, this is a composition modeled after the voice.

About 10 years after Opus V was first published (1700), a new edition emerged that included "Corelli's own" ornamentation (Sound Example 5):[14]

[14]The authenticity of these ornaments has been exhaustively investigated; see Marc Pincherle, *Corelli: His Life, His Work* (New York: Norton, 1956).

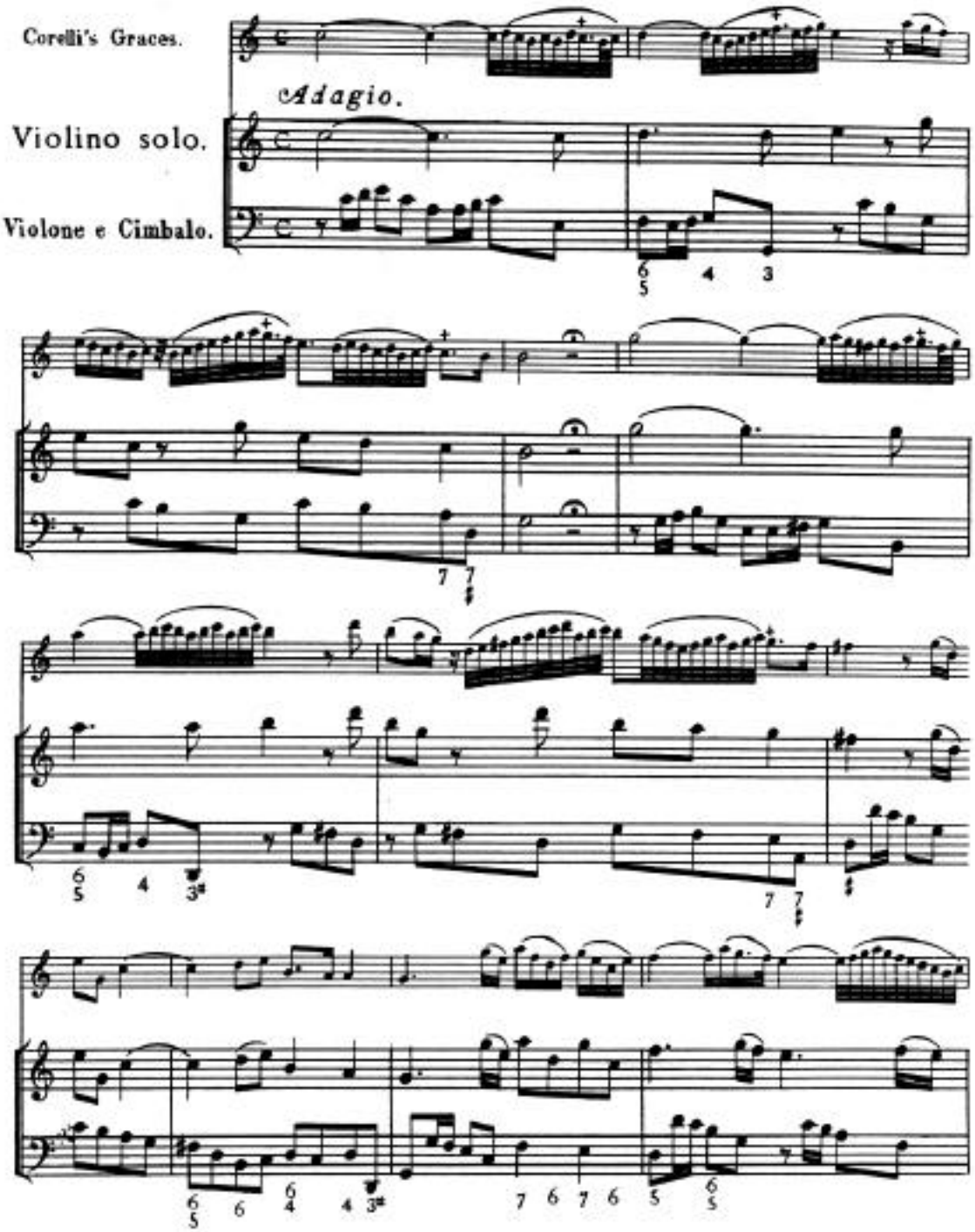

Figure 7 (1). The *Adagio*, now with Corelli's ornamentation

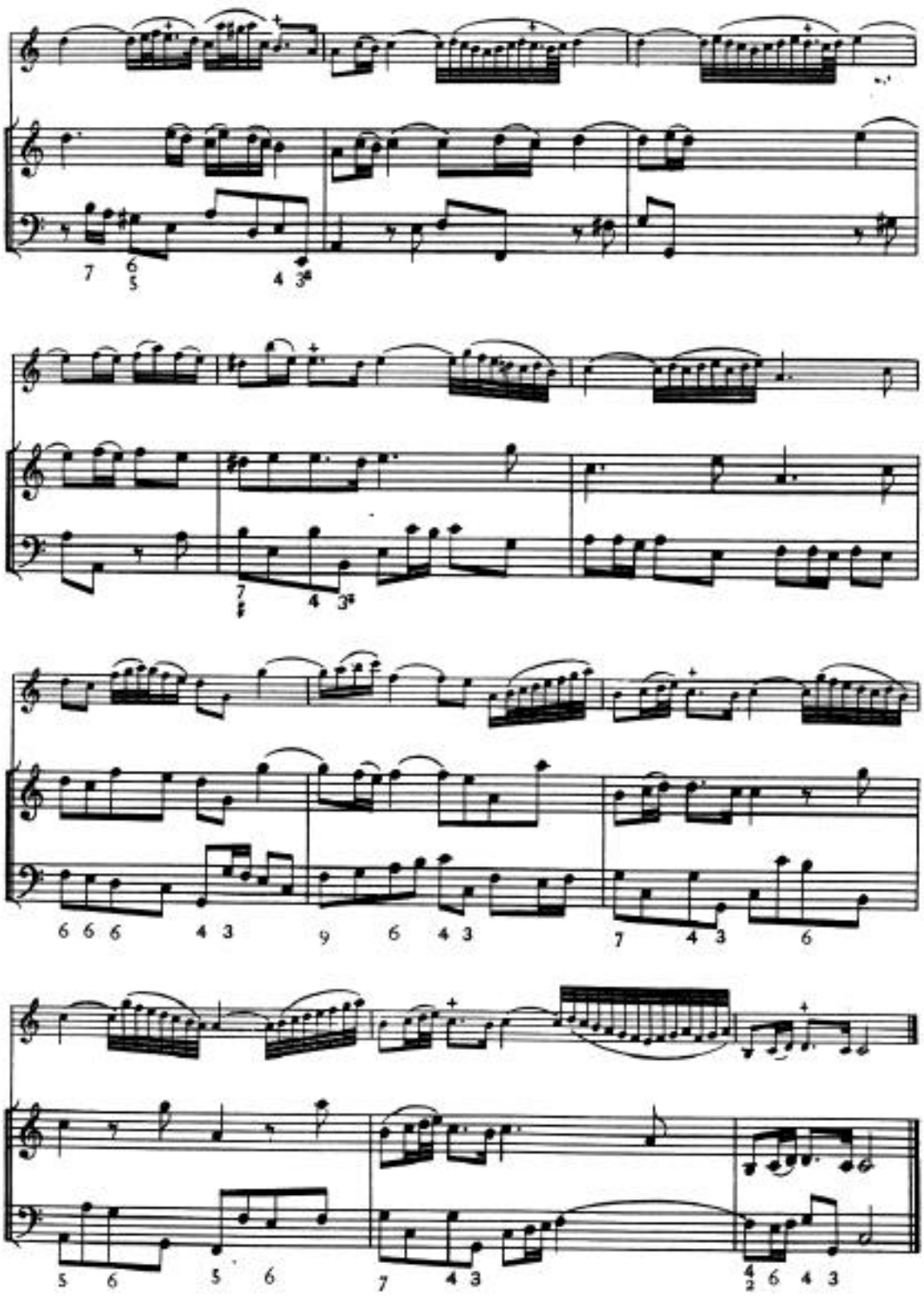

Figure 7 (continued). The *Adagio,* now with Corelli's ornamentation

These ornaments reveal Corelli's violin in its full glory. Try to sing these lines. If we belabor the 32nd notes, it is possible, but labor is precisely what this music does *not* convey, and if we slow the tempo down enough to make the rapid notes manageable, we shortly begin to run out of breath. These flourishes are delicate, effortless, expressive expansions of the vocal line. Just as a singer might crescendo and vibrate, the violinist ornaments, and in a vocally impossible manner. The vocal foundation is always clear, but the ornaments are equally, if not more, important.

The following *Allegro* offers another perspective on Corelli's violin. The violin carries the first two entrances of a three-part fugal exposition (Sound Example 6).

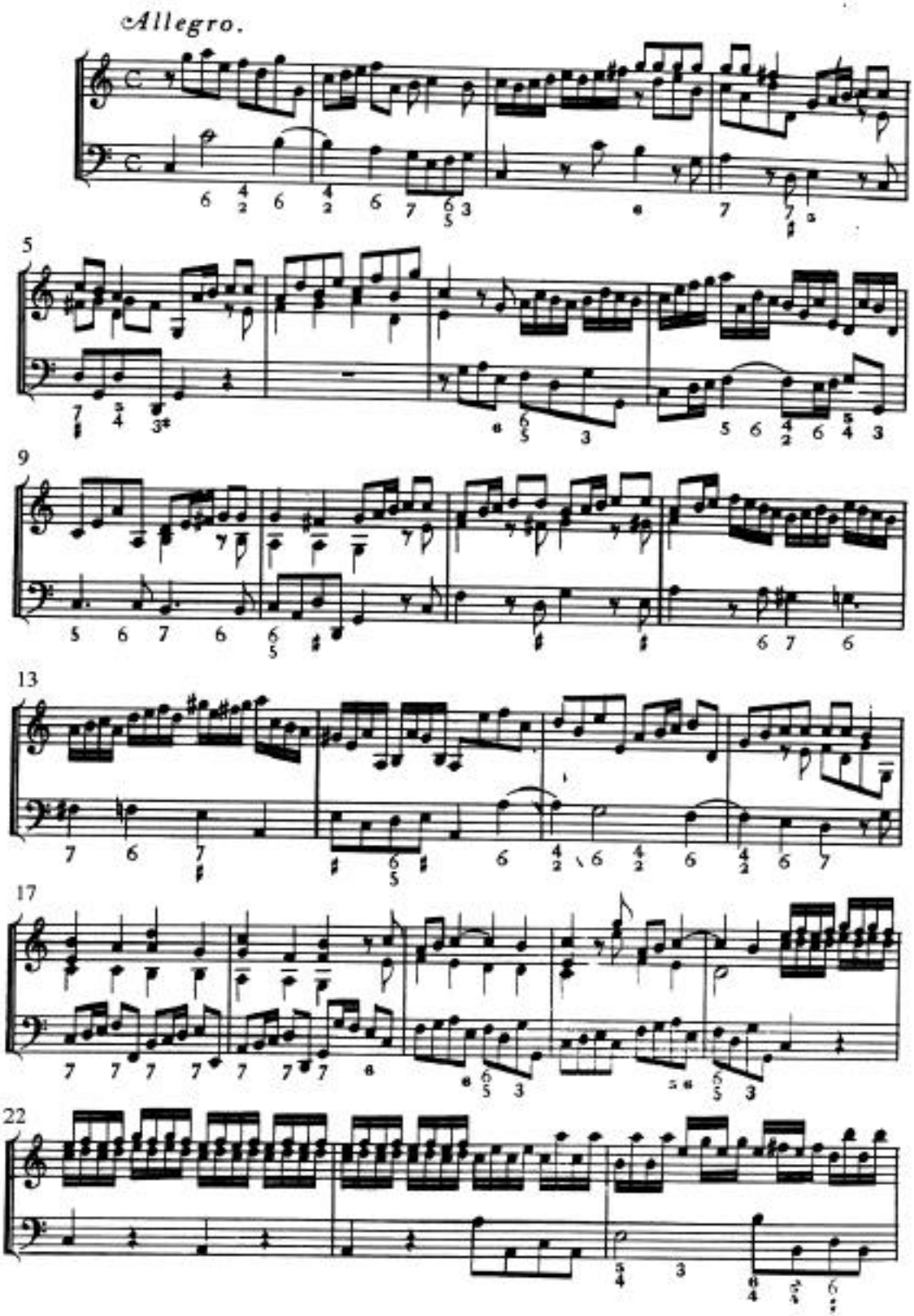

Figure 8 (1). The *Allegro* from Corelli's *Sonata #3*, Opus V

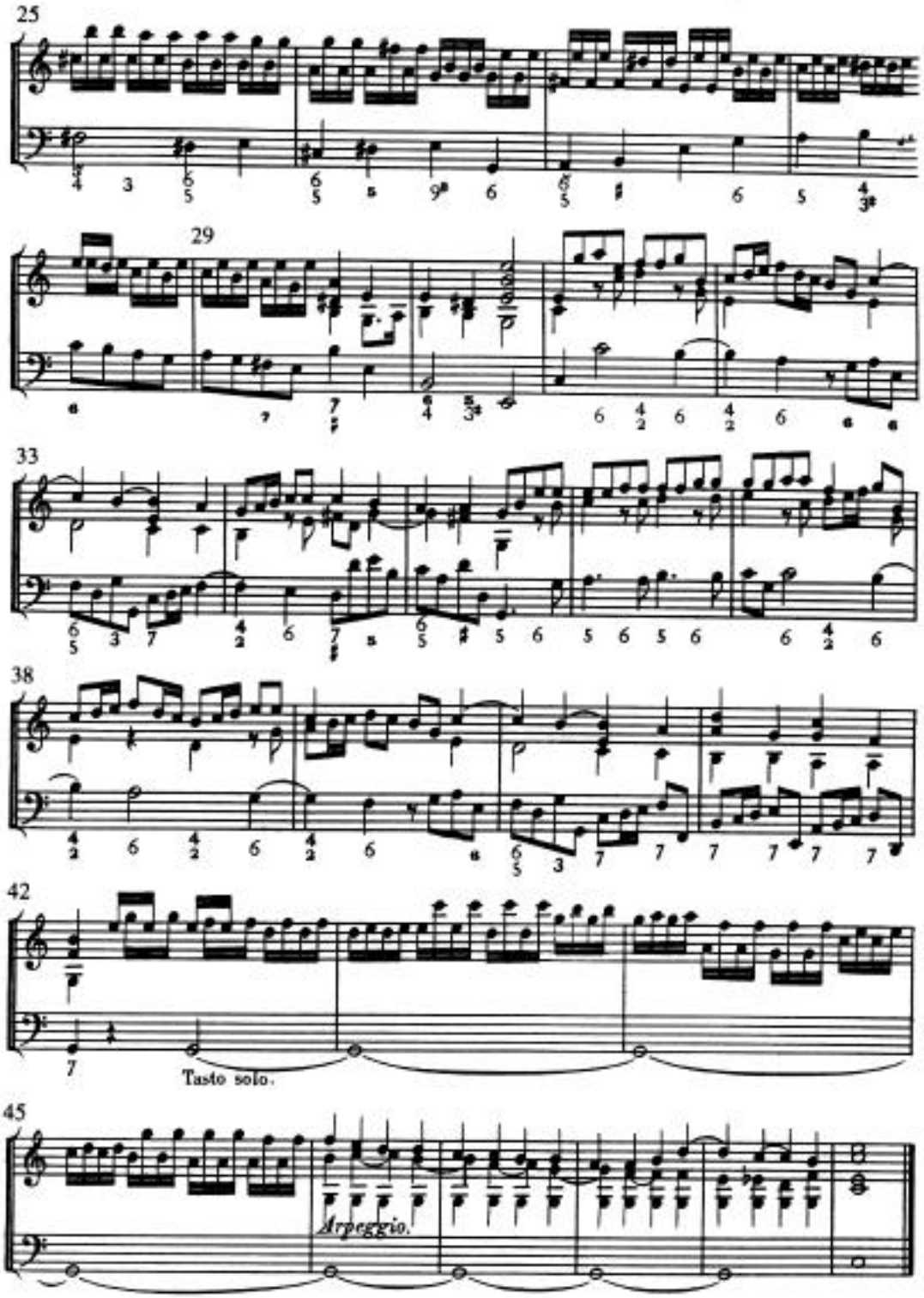

Figure 8 (continued). The *Allegro* from Corelli's *Sonata #3*, Opus V

While not easy, the subject is singable.[15] When the double stop texture begins (m. 3) the vocal model persists; Corelli has collapsed the two violins of his previous 4 opuses (all trio sonatas) into a single violin. However, the concept of voices is gradually abstracted. The top voice continues briefly over the subject (mm. 3–4) and then vanishes. It reappears at the end of m. 4, now below the subject. In m. 7, a single acrobatic voice takes over, but fragments into two-voice compound melody in m. 8. This dance between voices continues until m. 17. Here, we seem to have three voices represented in the violin, but only for two measures. In m. 21, a new episode kicks off which can clearly be heard as a vocal duo until the dramatic E-major cadence in m. 30.

At this point, it is clear that while the voice model is indeed fundamental to the organization of this music, equally fundamental is the violin model. To me, the interaction between vocally inspired lines and idiomatic violin writing is where the action is; this is the territory that Corelli is exploring. He exploits the possibilities of the violin—double-stops, rapid figuration, string-crossings—while keeping it grounded by the more limited facility of the voice:

> The submission to the model of the human voice had also been made, either by instinct or deliberate intent, by predecessors and by rivals such as Bassani and Torelli. It only acquired the force of law because of the personal ascendancy of Corelli. He alone called the necessary halt at the point when the chaotic and fortuitous discoveries of undeveloped virtuosity ran the risk of giving free rein to charlatanism. Simple as it was, his discipline guaranteed the future of the violin.[16]

Corelli's submission is hardly complete, however, as we have seen in the first two movements of Opus V, Sonata III, and as is yet more apparent in the second *Allegro* (Sound Example 7):

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[15]Vocal writing in the Baroque was frequently virtuosic; anyone who has sung Handel's *Messiah* is familiar with the large leaps and rapid runs that singers are often asked to perform.
[16]*Ibid*., 145.

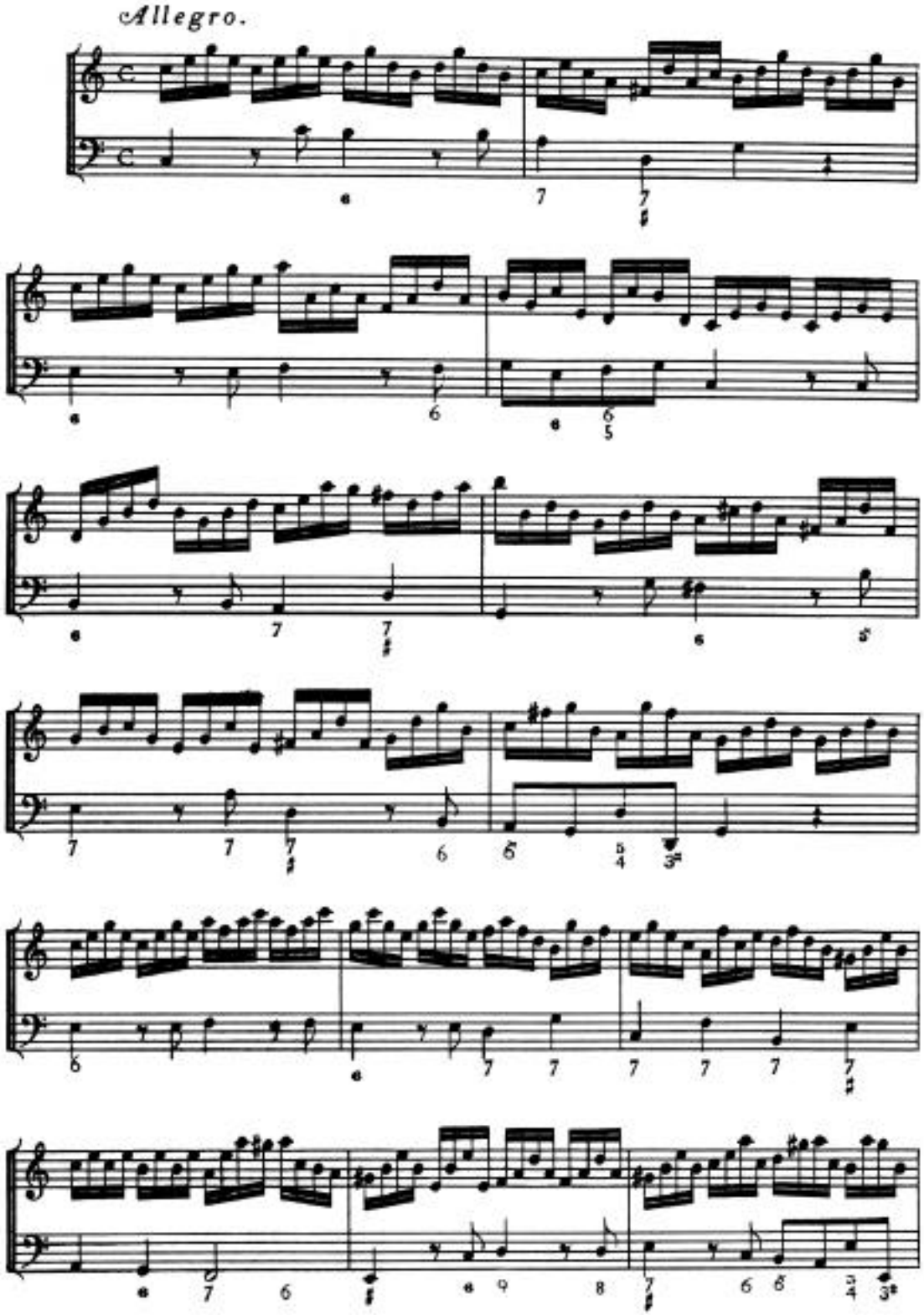

Figure 9. Opening of the second *Allegro* from Corelli's *Sonata #3*, Opus V
The 16th-notes continue, uninterrupted, until the end of the movement.
While the concepts of voice-leading and compound melody still pervade,

this movement is an inherently violinistic *texture*. It results naturally, though not without practice, from the particular layout of the strings, the way they are negotiated by the bow, and the placement of the left hand fingers, all in combination. It is not in any way motivated by the voice, or anything else outside the violin; rather, it is one of the many aspects of the violin that stands apart from the voice.

For Corelli, then, the textures and figurations of the violin serve as his primary axis for *variation.* Harmony, which has been discussed extensively elsewhere,[17] provides a secondary axis, while the voice model acts as a center of gravity—the origin for the axes—to which Corelli always returns. Opus V is *violin* music; this is not the *Art of Fugue*, composed without particular instruments in mind. It is a natural (though not inevitable) outgrowth of the instrument it was written for. Its features that are peculiar to the violin include: flourishing, ornamental expansions of vocal lines; double-stopped contrapuntal textures; rapid, continuous, arpeggiated textures; and variations by way of slurs and string crossings (see especially *La Follia, Sonata #12).*

How these features relate to the design of the violin in Corelli's era is an interesting issue. The design and sound of Schubert's violin is more familiar to us today than Corelli's, mostly because it is very similar to the mainstream "Classical" violin currently in use, and to some extent we are left to speculate as to how Corelli's violin sounded and was played. As discussed earlier, the primary differences are found in the bow and the length and placement of the neck. The differences in bow design are initially more tangible:

> The musical effect of a series of individual strokes with an early bow is analogous to a string of pearls, each of which appears to be separated from, while actually just touching, its neighbors.[18]

This is different than the legato effect aspired to with a Tourte bow, where bow changes can be disguised almost entirely. Leopold Mozart described this separation as a "small although scarcely noticeable softness" at each bow change.[19] This was a valued feature of the early bow, and it enabled players to articulate passages of rapidly moving notes with relative ease. In some ways, it seems to be similar to the modern, off-the-string *sautillé*, but was executed on the string and was the bow's most natural stroke.

Corelli's bow was nearly straight, or slightly convex.[20] It was a lighter bow and could not achieve the high tension of the concave Tourte bow.[21] It

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[17]*Ibid*.

[18]David Dodge Boyden, *The history of violin playing from its origins to 1761: and its relationship to the violin and violin music* (Oxford: Clarendon Press, 1990), 40–41.

[19]*Ibid*.

[20]Any discussion of "Corelli's bow" has to be qualified with the fact that the design of the bow in the 17th-century varied considerably in all respects, including its basic dimensions. See Dilworth, 24.

[21]In fact, the screw that is used to tighten the modern bow was not developed until 1700, the year that Corelli's Opus V was published. See Dilworth, 24.

therefore had a naturally "soft" response which accounts for the slight separation that Mozart described, and it permitted the player to execute double and triple stops more readily. Corelli's bridge was flatter than Schubert's, which also facilitated multiple stops and string crossings. The strings were considerably less taut; only the G-string was wound (by Schubert's time all of the strings but the E-string were wound and heavier than in Corelli's time) and the neck was still in its original, slighter angle.

The lower tension violin and bow in combination made for an essentially different instrument which permitted and encouraged different music and playing styles than Schubert's violin. Obviously, using this instrument to express strain—in the Schubertian sense—is futile; it is analogous to trying to develop bicep strength by lifting half-pound dumbbells. Corelli's violin submits too easily, and doesn't allow the player to exert intense pressure. Rather, grace, lightness, and fluidity are natural features. As discussed earlier, the coupling between player and resonating body is determined by string tension and angle; Corelli's violin is less tightly coupled than Schubert's, and this largely explains why it "speaks" more easily than Schubert's. The player is not required to engage the body with every note, making rapid passage work less labored. On the other hand, the player is also inhibited from engaging the body with great force; doing so simply overwhelms the instrument, resulting in the familiar sounds of a beginning violinist.

The use of *vibrato* is also related to the degree of coupling. Unlike the modern practice of using an essentially continuous, constant *vibrato*, Baroque practice was considerably more varied. Some, like Geminiani, argued for extensive use of vibrato, but most—Leopold Mozart being one—advocated moderation. There are physical rationales for both positions. It has been shown that *vibrato* causes subtle changes in the overtone content of the (modern) violin's sound, mostly because the violin body has a complex frequency response which colors the bowed string signal in complicated ways.[22] The variations in pitch drive different modes of the body, causing it to vibrate more fully than if it is driven by a single pitch; this is probably related to the player's notion of getting the violin to "speak."[23] With the high tension Schubert violin, then, *vibrato* makes sense as a tool to engage the resonating body more completely and to project a rich tone; it is a timbral technique. With Corelli's violin, however, the vibrational modes are not engaged to the same degree, hence the less colored, "white" tone of the Baroque violin as we hear it today.[24] In this

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[22]This will be discussed further in Chapter 2.

[23]This is consistent with my own experience and those of other string players I've spoken with. Violists and cellists are particular familiar with the need to vibrate in order to make their instruments speak; this is logical, given the relatively greater mass and tension they must drive with every bow stroke.

[24]See Bernard Richardson, "The Physics of the Violin," in *The Cambridge Companion to the Violin*, ed. Robin Stowell (Cambridge: Cambridge University Press, 1992), 30; Neville Fletcher and Thomas Rossing, *The Physics of Musical Instruments* (New York: Springer-Verlag, 1991), 274; and Maureen Mellody and Gregory H. Wakefield, "A Modal Distribution Study of Violin Vibrato," in *Proceedings of the*

case, *vibrato* does not have the same effect of substantially enriching the tone quality of the instrument. It is an expressive, rather than a timbral, effect.[25]

This physical picture of Corelli's violin supports my earlier claim that this music is about fluidity, not labor. This is in sharp contrast to the notions of weight and strain in Schubert. That the vocal model pervades Corelli's music is clear, but what is also clear is how Corelli essentially invented the violin as we know it;[26] if any music supports Boyden's description of the violin being a brilliant extension of the human voice, this is it. But Corelli also showed how the violin *can* outdo its model. Consider again the texture of the second *Allegro* of his *Sonata #3*. From the time the violin was first created, this texture was a *potential*, even if it was not immediately realized. The voice served (and still serves) as a natural and powerful metaphor for approaching the violin and for realizing many of the violin's inherent potentials, but it is the realization of these potentials—not the fact that they may have more or less of a vocal quality—that reveal the most compelling aspects of the violin. This is not to deny that much of the violin's beauty lies in its similarity to the voice. Rather, I am asserting that the qualities of the violin that make it unique and irreplaceable are those that are *beyond metaphor*, and in turn themselves become metaphors for other phenomena.[27] By realizing a number of these potentials in such an elegant and refined fashion, Corelli "guaranteed the future of the violin."

Bartók's Violin

If it is difficult (or painful) to imagine Schubert's G-major string quartet arranged for two pianos, it is impossible with Bartók's 4th quartet. Mappings of Schubert's various string textures and articulations—tremolos, occasional *pizzicato*, *spiccato*—into the piano are not completely unreasonable, but how could one possibly map the following passage into the piano without losing the music completely? (Sound Example 8; the whole movement).

International Computer Music Conference in Thessaloniki, Greece, by the International Computer Music Association (San Francisco: ICMA, 1997), 465. This issue is discussed further in Chapter 2.

[25]There are psychoacoustic motivations for *vibrato*. For example, "pitch deviation, specifically the wide *vibrato* of singers, allows the perceptual mechanisms to better identify the shape of the spectral envelope" (See Perry Cook, "Pitch, Periodicity, and Noise in the Voice," in *Music, Cognition, and Computerized Sound*, ed. Perry Cook (Cambridge: MIT Press, 1999), 206). Also, "vibrato allows us to group harmonic complexes more easily to do object formation and separation. That is, the violinist doing the fierce vibrato is likely to stick out of the orchestra just like a bunny jumping around in the woods, where if the bunny is not moving we likely might not even seem him there" (personal correspondance with Perry Cook).

[26]Obviously, Corelli did not do this alone; the violin existed for at least 150 years before his birth. However, as Pincherle describes, he was the first major composer to work exclusively with the violin, and he deeply influenced Vivaldi, Handel, and Bach.

[27]The quadruple-stop down-bows from the Schubert (Figure 3) are a specific example of a violin phenomenon that is beyond metaphor.

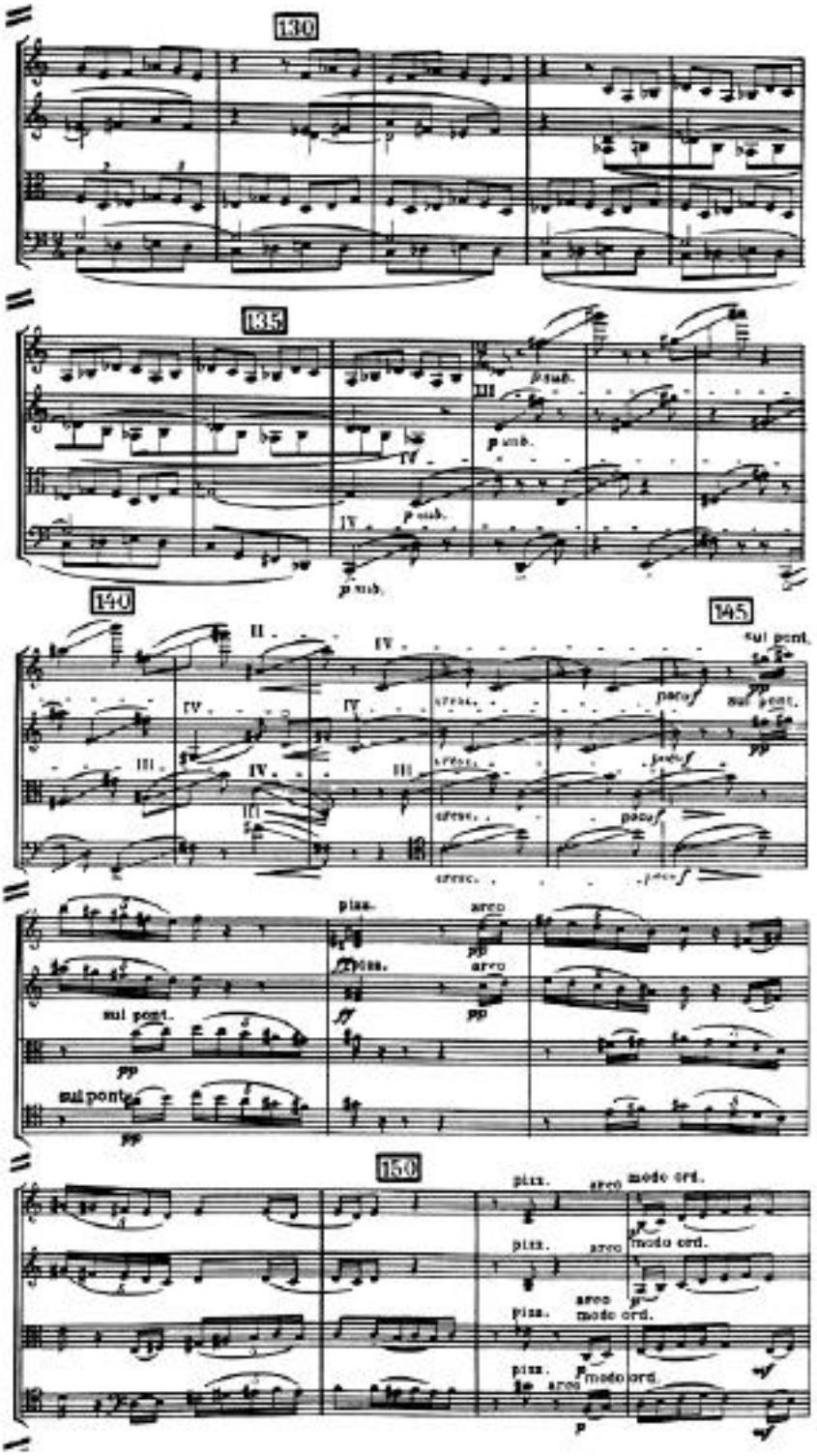

Figure 10. mm. 130–152 of the *Prestissimo* of Bartók's 4th Quartet[28]

[28]From Béla Bartók, *The String Quartets of Béla Bartók* (London: Boosey and Hawkes, 1945).

Obviously, the *glissandi* are impossible, but equally impossible is *sul ponticello*. Moreover, the rate and severity of these contrasts—from *glissando* to *ponticello* to *pizzicato* to *modo ordinaro* and back to *ponticello*, all in a few bars—is unimaginable on the piano. Paul Zukofsky, one of our century's fine violinists and champions of new music, makes the convincing argument that it is not so much the effects themselves that are new in 20th-century string music, but the rate at which they change:

> The second movement of Haydn's Symphony No. 97 (written in 1792) has a concatenated forty-three-bar passage marked *al ponticello* followed by *vicino al ponticello*. If one accepts Czerny's metronome marking, those forty-three bars of 4/4 have a total duration of somewhat longer than 1.5 minutes. As a counter-example, compare bars 15–17 of Luigi Nono's *Varianti* (1957). In the space of...barely ten seconds there are twelve pitches, each one of which has a specific right-arm indication.[29]

He then lists the various flavors of *ponticello*, *pizzicato*, and "normal" bowings that apply to each note.

Indeed, though Bartók is credited with inventing many of the "effects" that characterize 20th-century violin music, he actually invented none of them; even the so-called "Bartók *pizzicato*" was used in the 17th-century.[30] But these effects are more essential to his music than they are to any previous composer. It is through their extensive use in inventive combinations that Bartók takes *ownership* of the violin, thereby making it nearly impossible for any subsequent composer to use them in a similar way without immediately being labeled a thief. As I will argue later, these effects are essentially acoustic effects that markedly alter the relationship between player and instrument.

Bartók relies upon three primary axes—pitch, motive, and texture—for variation in his 4th quartet. He plays with a sort of counterpoint between these axes; sometimes they conjoin, supporting one another, while other times they are at odds. The interplay between chromatic, octatonic, whole-tone, and diatonic pitch-characters in the 4th quartet has been carefully explored elsewhere,[31] and the process of tracing motives is standard fare in Bartók analysis. In this quartet, Bartók's expanded palette of string textures—extensive use of *pizzicato*, *glissandi*, and *sul ponticello*—plays an equally important role.

Consider the opening of the *Prestissimo, con sordino:*

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[29]Paul Zukofsky, "Aspects of Contemporary Technique," in *The Cambridge Companion to the Violin*, ed. Robin Stowell (Cambridge: Cambridge University Press, 1992), 144.

[30]This invention is attributed to Biber by Robin Stowell, ed. *The Cambridge Companion to the Violin* (Cambridge: Cambridge University Press, 1992), 132.

[31]See Elliot Antokoletz, *The Music of Béla Bartók* (Berkeley and Los Angeles: University of California Press, 1984).

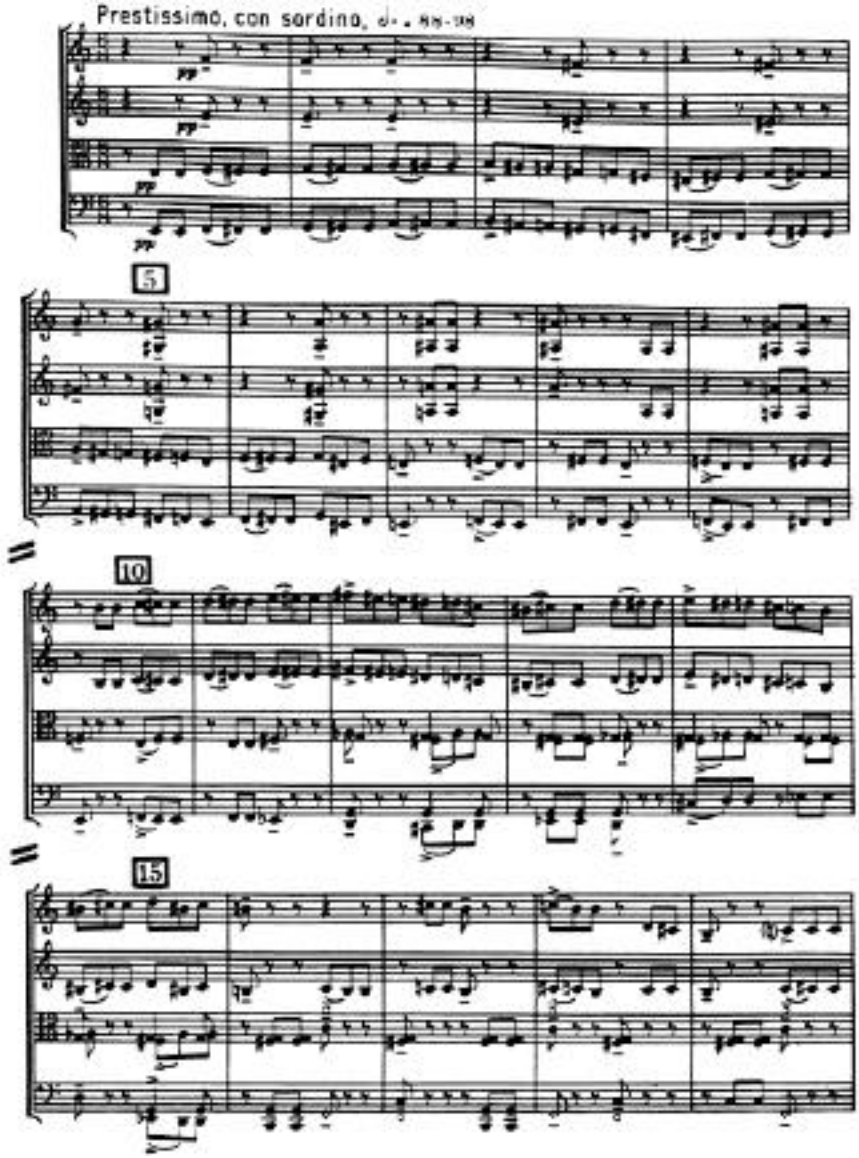

Figure 11 (1). mm. 1–19 of the *Prestissimo, con sordino*

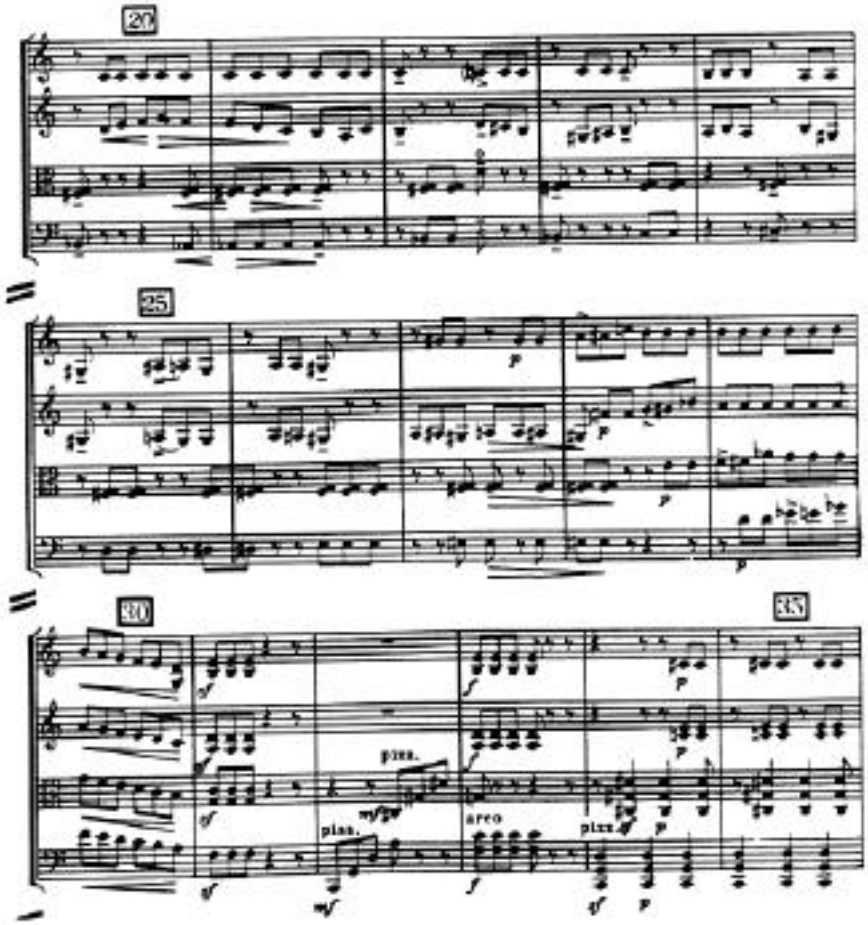

Figure 11 (continued). mm. 20–35 of the *Prestissimo, con sordino*

By m. 15, Bartók has presented two full statements of the movement's main theme and completely filled out the chromatic pitch-space. He splits the two statements with a hocket-like texture (mm. 7–9) which recurs after the second statement (mm. 16–18). This is immediately followed by a touch of diatonicism in the second violin (mm. 20–21) and six more bars of hocket (mm. 22–27). Bar 30 is marked by a whole-tone cluster which descends diatonically to a diatonic cluster on the downbeat of m. 31; this is the movement's first complete diatonic statement and is emphasized by also being its first strong simultaneity—a textural exclamation point emphasizing the new diatonic pitch material. The following *pizzicati* in the cello—all of its open strings—present the first radical change in texture, as if acknowledging the modulation from chromatic to diatonic (what could be more diatonic, or reflective of an interval-7 cycle, than the open strings of the cello?).

This ascending *pizzicato* figure recurs twice (see Figures 12 and 13) and is a signpost for disintegrating diatonicism. We see it, altered, several bars later (mm. 51–53).

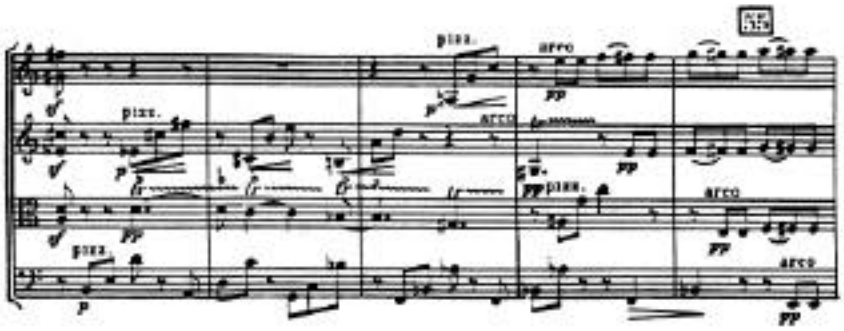

Figure 12. mm. 51–55 of the *Prestissimo*

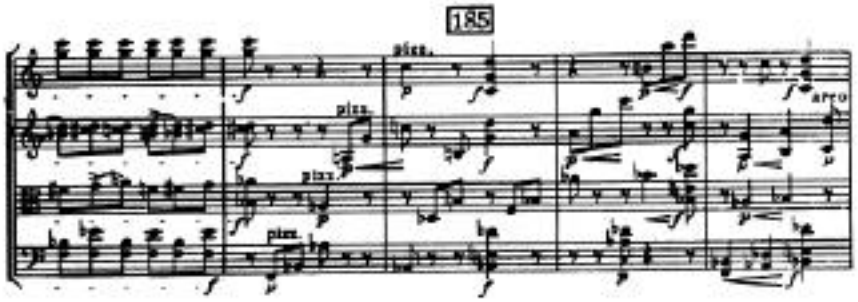

Figure 1. mm. 183–187 of the *Prestissimo*

The simultaneity on the downbeat for m. 51 is a cross between diatonic stacked fourths (in the violins) and octatonicism[32] with the addition of the viola fourth, tucked a minor-2nd below the second violin—our previous exclamation point has been "infected" with a touch of chromaticism. Bartók carefully continues this mix of pitch worlds by superimposing diatonic sets, articulated by the ascending *pizzicato* figures in the second violin and cello, on half-step trills in the viola. Furthermore, this superposition is sequenced downwards by whole-tones. Though superimposed, the diatonic and chromatic pitch worlds are separated by their textural placements; the *pizzicati* are clearly distinguishable from the bowed trills—textural and pitch functions are thus intertwined.

The second recurrence appears in mm. 184–186, shortly before what Bartók calls the "free recapitulation."[33] Here, the two pitch worlds are jumbled up and difficult to distinguish aurally. The downbeat simultaneity, though separable into two diatonic trichords (Bb-Ab-C#, D-G-C), is more of a chromatic mass than a reflection of diatonicism. The following sequences of ascending *pizzicati* no longer benefit from the clarity of textural contrasts—it is all *pizzicato*—and their diatonicism is blurred by their rapid

[32]Or better, Antokoletz's Z-9/3 set: A-D-D#-G#.

[33]See Béla Bartók, "Structure of the *Fourth String Quartet*," in *Béla Bartók Essays*, ed. Benjamin Suchoff, (New York: St. Martin's Press, 1976), 412.

transpositions—this is not a simple downward sequence in whole-tones—and occasional chromatic simultaneities (as on the fourth eighth-note of m. 185). There is still a diatonic flavor to these bars created by the *pizzicato* trichords that each instrument articulates, but it is cloudier. Unlike the first occurrence of simultaneity and ascending *pizzicato* figure (mm. 31–33) which is almost exclusively diatonic, and the second (mm. 51–53) which benefits from a simple downward sequence and textural stratification, these bars are messy, blurring the distinction between pitch-set qualities while retaining a sense of both. Tracing the function of pitch and texture through the movement to this point, we see mutual interpenetration. As the texture of diatonicism (*pizzicati*) breaks down (with the introduction of trills and simultaneities) so does the prevailing pitch-sense of diatonicism; in this way, texture plays a fundamental structural role.

Antokoletz describes in detail the interaction between octatonic, whole-tone, and diatonic elements in the 4th quartet. I extend this notion to include the interaction between pitch, motive, and texture, and argue that Bartók's pitch manipulations are inseparable from his textural articulations. Further evidence of this—evidence that includes "special effects" like *glissandi* and *ponticello*—can be found surrounding the midpoint of the 2nd movement. Beginning in m. 113, Bartók overlaps pairs of octatonic sets in the same register (in the violins):

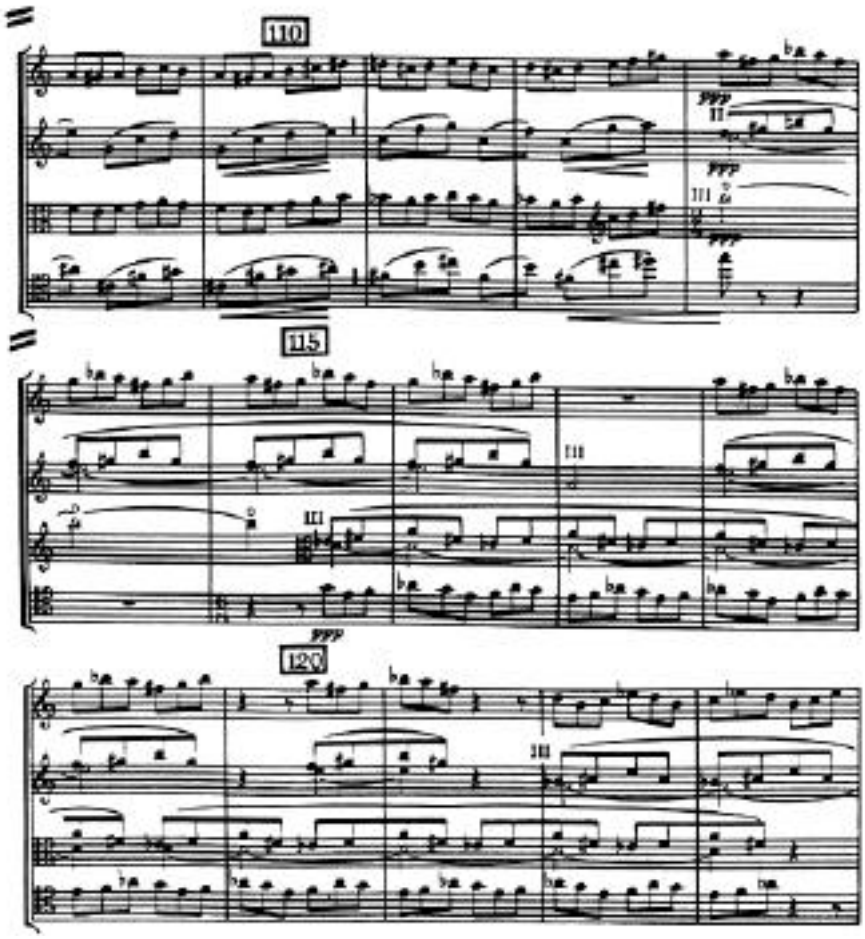

Figure 14 (1). From the *Prestissimo*

Figure 14 (2). More from the *Prestissimo*

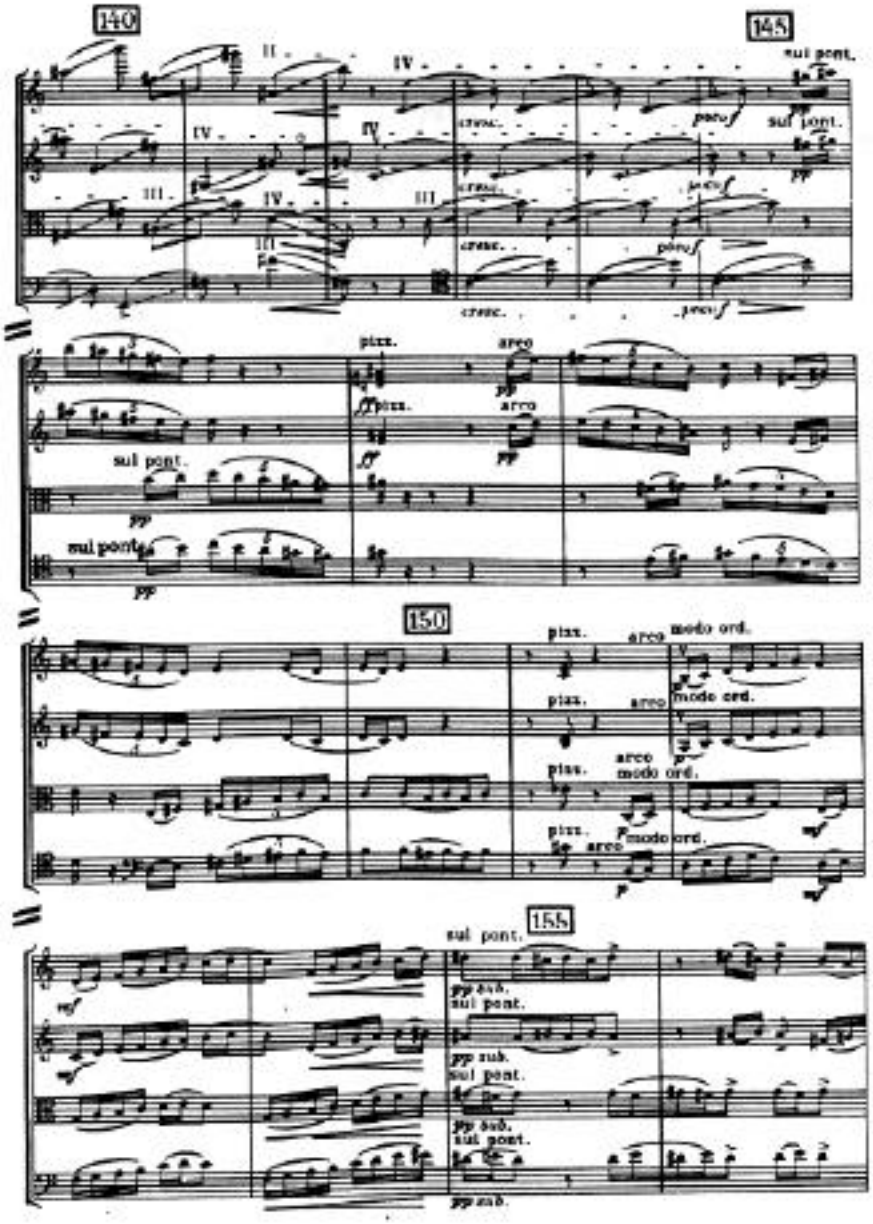

Figure 14 (3). More from the *Prestissimo*

This overlapping is extended in m. 118, including all three octatonic sets and a duplicate (the 2nd violin and cello articulate the same octatonic collection), which gradually descend into the instrument's lower registers by m. 135. This descent is facilitated by exchanges of the three octatonic collections among the instruments. Interwoven in this descent is a set of diatonic drones—E (mm. 113–116); A (m. 117, mm. 122–125); D (mm. 115–123, mm. 126–135); G (mm. 124–135)—played on open-strings (except for the final cello G). As the chromatic cluster descends, it seems to get denser[34]

[34]There is obviously an acoustical basis for this, related to the traditional voicing guideline which requires larger spacing between lower voices in order to avoid "muddy" sounding chords.

while also filling out a thin diatonic background—the peculiar "white" sound of the open strings serves as a sort of "orchestral device," highlighting a background pitch set with a distant section of the orchestra. By the time all of the instruments have cycled through the three collections and the G–D fifth is sustained in the background, the three upper voices are in their lowest registers. The cello then collapses to its C-string and all four instruments begin upward *glissandi* separated by, and spanning, a major 9th. This effectively smears out the dense chromatic cluster, obliterating both its inner and outer boundaries (the minor 2nd and major 9th, in m. 135). Having reached the limit for chromatic pitch density (and exhausting the cycles of the octatonic set), Bartók uses *glissandi* to fill the space, further increasing the density.

These *glissandi* articulate a wide-spread whole-tone collection which itself collapses down to middle-C in m. 142. This is followed by a *ponticello* passage that undulates between chromatic and whole-tone collections, suggesting diatonicism along the way. Bar 146 is ambiguous—the first violin seems diatonic, but is clustered against a whole-tone second violin while the cello and viola contain both chromatic and whole-tone elements—but is clarified in m. 147 with a *pizzicato* whole-tone cluster. All of the instruments seem to settle on a whole-tone collection in mm. 148–149, but this is immediately abandoned in favor of a chromatic cluster in m. 150; another *pizzicato* cluster, chromatic this time, offers the chromatic punch-line (m. 151). The subsequent diatonic passage frees the instruments from *ponticello*, but not for long. A "special effect"—*ponticello*—is thus raised to the level of structural agent; no longer simply a surface element, it is as essential to the form of the work as are pitch and rhythm.

This interaction between pitch and texture can be traced throughout the entire quartet. By subsuming the inventive string textures into an active dialogue between musical elements, Bartók elevates them from mere "effects" to essential articulations. In a way, Bartók's use of the violin is similar to Schubert's; textural articulative abilities are used in structurally significant ways. There are also many similarities in the qualities of their expression; weight and intensity are as important to Bartók as they were to Schubert. But, the rate and density with which the player is asked to execute these wide-ranging techniques and the tightness with which they are bound to pitch structures differentiates Bartók's violin from its predecessors.

Physically, Bartók's violin is almost identical to Schubert's; the steel E-string, which was introduced in the early 20th-century, and the general improvement in string construction are the only significant differences. Whereas Schubert had a relatively new instrument to explore, Bartók had an old instrument, one that seemed like it might not have any unrealized potentials. But Bartók managed to reinvent the violin by bringing what were previously "special effects" into the realm of standard violin techniques and by integrating them into his musical language. These effects were essentially *acoustical* reinventions; just as Schubert relied on the expanded

acoustical capabilities of the higher tension violin, Bartók relied on the wide variety of timbres available through the use of mutes, *sul ponticello*, *pizzicato*, *non-vibrato*, and *col legno*. All of these modifications radically changed the response of the instrument.

The fleetness of the second movement is in part due to the use of mutes. By diminishing the signal from bridge to resonating body, the mute reduces the coupling between the player and instrument. Drawing a rich tone from the instrument is then impossible, and no longer a goal. Instead, the player is free to play lightly. The incredibly rapid passage work of the second movement is facilitated by the mute, and the overall effect is not of effort or strain, but of frenetic flow. This would have been impossible if the weight of the entire instrument had to be engaged with every note. *Sul ponticello* pushes this to an extreme. By playing close to the bridge, the player essentially gives up any hope of driving the string at its fundamental frequency; instead, a range of upper partials and non-harmonic tones are created, and the player applies less pressure, lightly surfing the string.

By specifying when to use *vibrato* in the third movement, Bartók creates a whole new field of acoustical variation for the violin. As discussed earlier, *vibrato* on a modern instrument highlights the subtle variations in the frequency response of the body, resulting in a warm, colorful tone. *Non-vibrato*, in contrast, has a pure, "white" quality, which Bartók exploits to great effect.

Pizzicato has obvious acoustical effects, as does *col legno*—the bowed-string is irrelevant—and there is a sense as the 4th quartet develops that even Bartók is tired of the bow and would prefer to play guitar or percussion. Towards the end of the last movement, after over 300 measures of intense hammering on the instruments through extensive use of triple and quadruple stops, Bartók shows his frustration by having the players simply whack their instruments with their bows (mm. 333–338) (Sound Example 9):

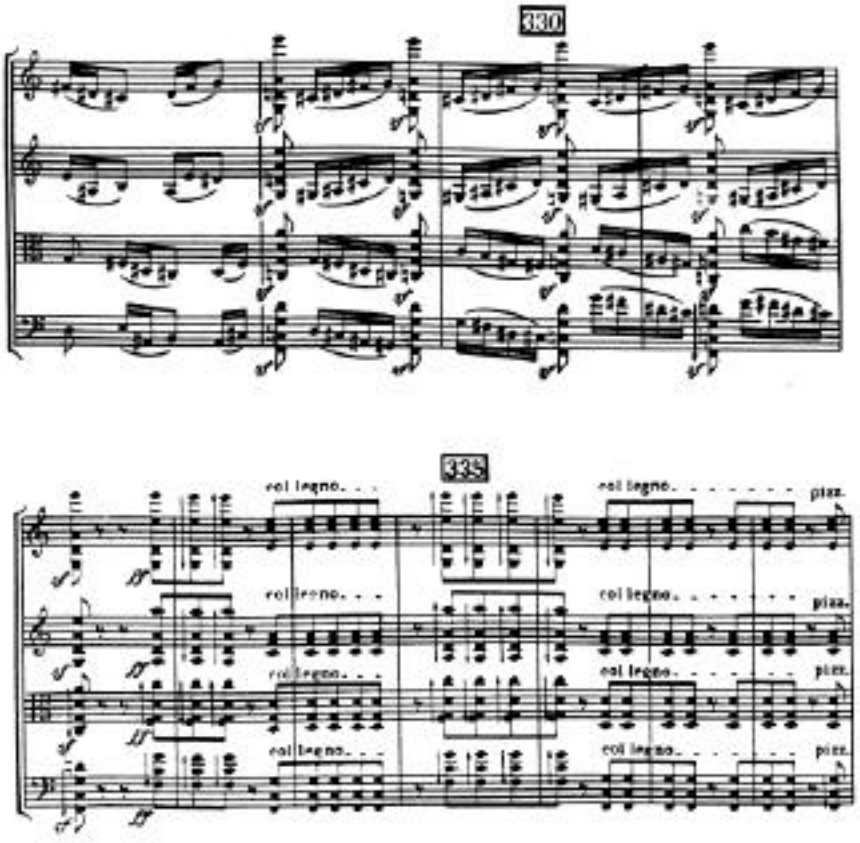

Figure 15. The end of the *Allegro Molto*

This *col legno*, which follows simultaneous up-bow and down-bow quadruple-stop sweeps on all instruments (except the cello, which only has triple-stops), is visually dramatic and is as close as the "Classical" violin repertoire comes to the electric guitar tradition of destroying your instrument in performance.

Bartók expanded the expressive realm of the violin immensely, and his modifications of the instrument revealed potentials that had not been explored. At the same time, he connected these expansions to many of the established strengths of the violin—weight, articulative variation, occasional lyricism—and in that way is similar to Corelli, who expanded the violin's traditional lyric abilities and discovered many of the violin's vocally anchored idiomatic textures. And, again like Corelli, Bartók guaranteed, at least for a time, the future of the violin, as the subsequent string music of Ligeti, Lutoslawski, Scelsi, Rochberg, and others illustrate.

The Hardanger Fiddle

The Norwegian Hardanger fiddle, nearly as old as the traditional violin,[35] is structurally most like Corelli's violin. Possessing a short neck

[35]The earliest known Hardanger fiddle dates to 1651. See O. Gurvin, A. Bjørndal, E. Groven, and T. Ørpen, eds. *Norsk Folkemusikk*, Vols. I–V (Oslo: Universitetsforlaget, 1958).

(with comparably short strings) and relatively flat bridge (flatter than Corelli's), the *hardingfele* (its Norwegian name) seems to have evolved in parallel with, but in relative isolation from, the "Classical" violin.[36] Its most distinctive acoustical feature is a set of four or five sympathetic strings that run underneath the fingerboard and through the center of the bridge:

Figure 16. A Hardanger fiddle from 1889 by Ole Evensen[37]

[36]See Pandora Hopkins, *Aural Thinking in Norway* (New York: Human Sciences Press, 1986), for a relatively full description of the instrument's history.
[37]Reproduced from Loretta Kelley, "Hardingfele," *Strings Magazine*, March/April 1990, 59.

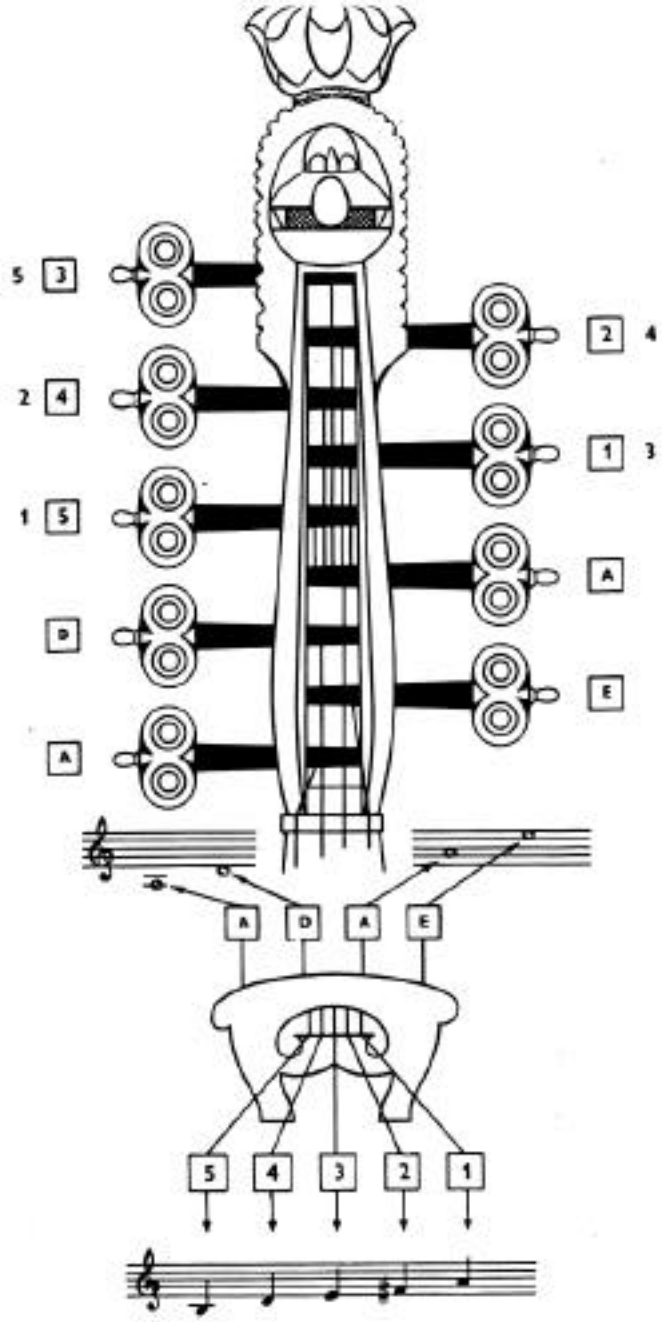

Figure 17. A diagram of the peg and string relationships, with tuning. Note how the sympathetic strings run through the middle of the bridge.[38]

[38]Reprinted from Gurvin.

It is also usually heavily decorated, and often features the head of a dragon or other beast as its "scroll."

The *hardingfele* is usually tuned quite high, its A-string tuned to B, and in its most common tuning, the lowest string is just a fourth below the D-string.[39] While this does create a higher tension instrument, the primary strings are still under significantly less tension than Schubert's violin. They are also finer, and more prone to breaking. The total string tension (including the sympathetic strings), however, is comparable to, if not more than, the modern violin.[40] Since the angle of the strings at the bridge is about the same for both instruments, the downward pressure exerted on the top of the instrument is also similar (or sometimes even higher for the *hardingfele*). The strings are usually set with very low action, just slightly above the surface of the fingerboard.

The acoustics of this complex system have not been studied thoroughly and it is difficult to establish clearly how the "coupling" between player and resonating body compares to the modern violin. As a Hardanger fiddler, I can, however, provide my sense of how the instrument responds. Like Corelli's violin, the *hardingfele* cannot sustain the weight of a heavy Schubert down-bow. This makes intuitive sense, given that the individual strings are under considerably less tension than the modern violin.[41] This puts an upper limit on how hard we can drive the resonating body, and also limits the volume of the instrument. However, given the weight that the bridge exerts on the top of the violin, there is a sense of being able to engage the body without exerting much energy; we may not be able to drive the body hard, but we can certainly feel its presence—a light touch goes a long way. Overall, the range of acceptable bow pressures is small, resulting in a narrow dynamic range; quite naturally then, dynamic contrast—deeply valued by Schubert and Bartók—plays very little role in the traditional music of the *hardingfele*.

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[39]Though notation does not play a significant role in the *hardingfele* tradition (many of the best traditional fiddlers don't read music), in the middle 20th-century a standard for notation was established in an effort to preserve the tradition. Partially to make it easier for those who learned to read "Classical" music, and also because there is no standard tuning note in the tradition (the A-string tuning commonly varies from A up to C), the notation reads similarly to "Classical" violin music; the open A-string, whatever it is tuned to, looks like an A in treble clef. In addition, with the many *scordatura* tunings of the tradition, strings that are not tuned in fifths relative to the A-string are transposed; this theoretically makes the notation easier to read for "Classically" trained violinists; by simply putting your fingers down where you normally would, you should get the right pitches. It would be nice if we could simply say the instrument is "in B," but the many *scordatura* and the variations in base pitch make this rarely accurate. Therefore, when I refer to the "D-string," I am referring to the second string from the bottom, regardless of whether it tuned higher or lower. See Gurvin, *et al.*, 1958.

[40]See David Golber, "Hardanger Fiddle String Tensions," *Hardanger Fiddle Association of America Sound Post*, 15 (Winter 1998): 27–29, for a comparison of tensions in the *hardingfele* and traditional violins.

[41]The "stick-slip" mechanism that creates the Helmholtz motion of the bowed string results from a balance between two forces: the "return-force" of the string, which is dependent on its tension, and the "stretch-force" that is a combination of the bow-speed and weight. Clearly, if one force is way out of balance with the other (*i.e.*, the weight of the bow is too heavy), the mechanism will break down. See M. E. McIntyre, R. T. Schumacher, and J. Woodhouse, "Aperiodicity in bowed string motion," *Acustica*, 49 (1981), 13–32 and H. von Helmholtz, *On the Sensations of Tone* (English Ed.), (New York: Dover, 1885, reprint 1954).

The magical sound of the *hardingfele*—a sound that is both powerful and mesmerizing—is largely due to the sympathetic strings. Combined with the bowed strings and the resonating body, the *under-strings* (as they are called) complete a kind of three-way acoustic system. The elements of this system are tightly bound together; the bowed strings drive the bridge, under-strings, and body, which in turn feeds back through the bridge to the under-strings and primary strings. More so than with any other violin I have played, the *hardingfele*, when set in motion, seems to take on a life of its own, vibrating and ringing energetically. The combination of high tension instrument with relatively low tension strings has the effect of tightly binding together the various elements of the system, each of which can vibrate relatively easily; energy is transferred back and forth between the various strings and the body efficiently, taking full advantage of all its resonances. This encourages a particular approach to playing the instrument:

> Properly played, the *hardingfele* should "ring" continuously, like a bell.... The entire instrument is caused to vibrate powerfully by the use of firm, smooth bow strokes, with unvarying intensity and speed along the entire length of the bow. There are no accents of any type made with the bow; such a sudden change in bow pressure would disturb the continuous ringing of the instrument.[42]

This couldn't contrast more sharply with the broad range of articulations so important to all the "Classical" violins described thus far. We are no longer the artist coaxing a rich variety of sounds from the instrument; instead, we are the weight that smoothly and continuously moves up and down, driving the "bell" back and forth.

The sympathetic strings are tuned in various ways, depending on the tuning of the bowed strings. With the most common tuning, the bowed strings are tuned (from top to bottom), E-A-D-A, and the under-strings tuned pentatonically: A-F#-E-D-B (the top A matching the open-A of the bowed strings). Tuning the instrument is a challenge; "they spend more time tuning than playing," is the oft-heard complaint of the impatient Scandinavian dancer. For Hauk Buen, one of the most famous living *hardingfele* masters, when the instrument is perfectly in tune, it "suddenly gets very big."[43] Indeed, as that last string is gradually tightened and coaxed into place and the entire system comes into balance, there is a sense of "size" (and relief) as it readily accepts and resonates with the energy of the player.

The degree with which the instrument resonates depends heavily on the pitches that are played. With the tuning described above, it is clear that sharp-side keys (G, D, A, E) will resonate more strongly than flat-side keys. While this is also true with the conventional violin, it is greatly reinforced by

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[42]Kelley, 60–61.
[43]Personal correspondence.

the tuning of the sympathetic strings. *Hardingfele* music has tonal centers that rely on these resonances—most tunes in the standard tuning use D and A as primary tonal centers—but the directional characteristics of functional tonality are absent; since D and A are the keys that will allow for the most resonance, they are preferred, and modulating to distant keys is avoided. Consider the opening phrase of *Nordfjorden* (Sound Example 10):

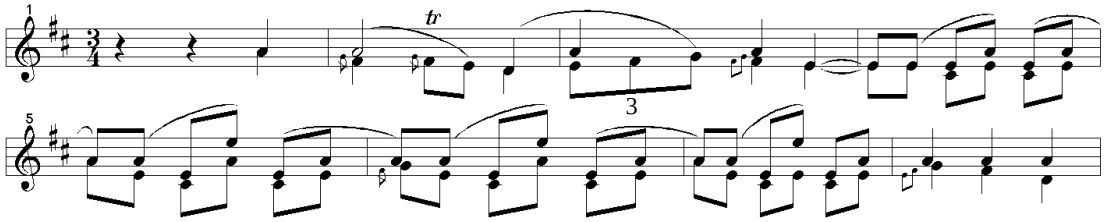

Figure 18. Opening phrase of *Nordfjorden*[44]

Beginning simply in D, we move gently to A at the end of m. 2 and stay there until m. 7 when we slide back to D. This is the harmonic background for the entire tune. The only variations come in the density of oscillations from D to A, and an occasional Lydian modal color (Sound Example 11):

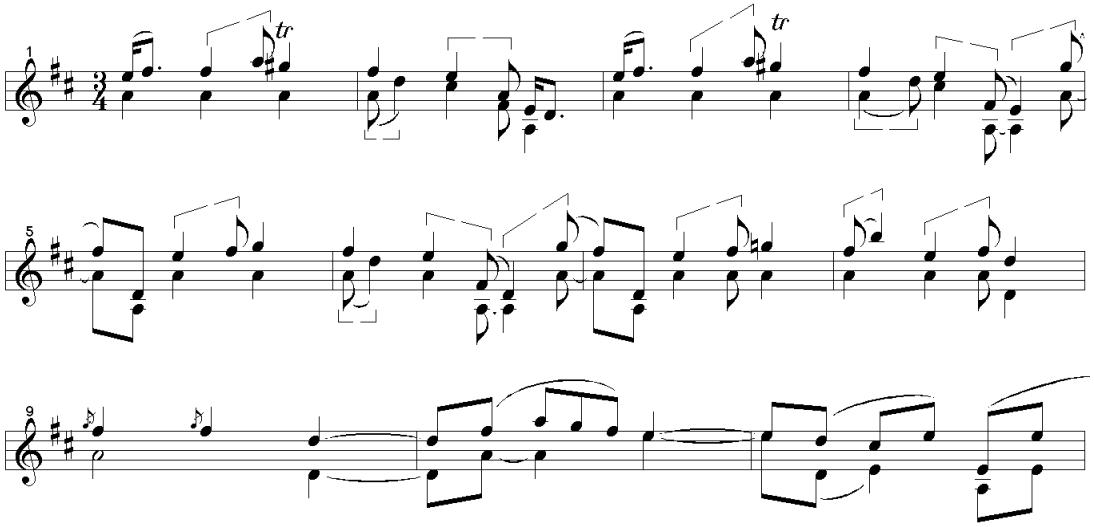

Figure 19. A later phrase from *Nordfjorden*

[44]My transcription. This is an approximate transcription, both in rhythm and pitch; the rhythms of *hardingfele* dance music are so complex that attempting to notate them accurately would obscure rather than illuminate, and microtonal inflections abound, making accurate pitch notation difficult. This transcription is meant merely to help locate parts of the music. Unlike most *hardingfele* notation, this it *not* written "as it is played." It is written as it sounds, if the A string were tuned to A. This makes it easier to see harmonic and intervallic relations (this is tricky when one of the strings is transposed differently than the others, which would be necessary to have it read as it is played).

Here we oscillate from D to A by the bar and throw in a G-sharp to offer a change in modal coloring. By m. 5, the chord changes increase to two per bar and the G-sharp gradually vanishes, becoming flatter until it is replaced by a G-natural in m. 7. These rapid oscillations create tension which is released in mm. 9–10 as the slower harmonic motion of the opening returns.

The acoustic effect of these gentle harmonic moves is to excite different combinations of the sympathetic strings, always keeping the instrument ringing as much as possible. The under-strings thus provide a sort of harmonic background that rings along and must be attended to at all times.[45] In this context, the prevalence of *scordatura*—there are hundreds of known tuning variations—is understandable. *Systerslått*, one of the most famous of the so-called *lydarslåtter* (listening tunes), features the unusual tuning, E-A-C-F (from top to bottom) with understrings tuned A-F-D-C-A the top A matching the open A-string of the bowed strings) (Sound Example 12):

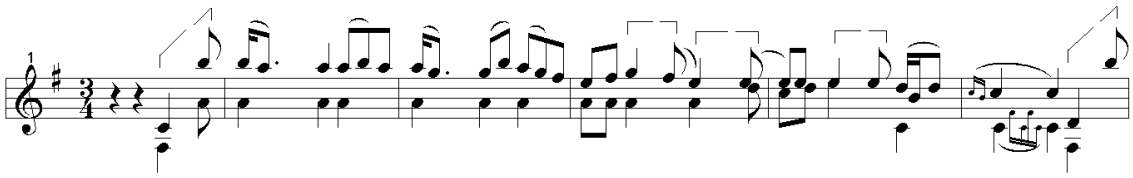

Figure 20. Opening measures of *Systerslått*

The keys of D- and A-major are now far distant. I hear most of this phrase in F. The low fifth that begins this tune (supported by two sympathetic strings) rings into the second measure. The high B is the familiar Lydian coloring of F. The F-sharp in m. 3 begins to undermine the sense of F and suggest A-Dorian which, by m. 4 replaces F. I hear m. 5 in C—the A-drone finally relents, moving up to C, and then down an octave to C again. By m. 6, we move to F, as first indicated by the F–C ornament and then by the return to the two low open strings.

Scordatura, then, is a means for setting up different keys and key relations in the hardingfele tradition. In addition, it changes the acoustic quality of the instrument significantly. The two low strings, tuned down quite far, lower the tension of the instrument. The under-strings are also tuned lower, ringing more easily and reinforcing lower frequencies. The result is a darker sounding instrument that lends itself to the sombre legend associated with *Systerslått*:

> *Systerslått* is a name applied to tunes that have a connection with the story of the Kivlemøy sisters in Seljord. According to the legend, the sisters disturbed the church service by blowing

[45]There are a few tunes that contradict this tradition. The famous *lydarslått* (listening tune) known as *The Rose* begins with a striking rise from C-sharp to F-natural. The F-natural, which receives no support from the resonating strings, is powerfully different in both timbre and harmony.

> on the *lur* (a long wooden horn), and were consequently cursed by the priest and turned to stone.[46]

Other *scordatura* include *Trollstilt*, or troll-tuning, which features a distinctive major-3rd between the top two strings and is meant to be used in the early morning hours, when the dancers are tiring and the sun is beginning to rise.[47]

No discussion of the *hardingfele* would be complete without considering ornamentation. Like the low tension Corelli violin, the hardanger fiddle encourages rapid, effortless figuration:

> The typical *hardingfele* embellishment, the *likring*, is a trill or mordent that is all but unknown today—even by performers of old European musical instruments who attempt to recreate Baroque performance practice...this kind of trill was so rapid as to make it, in actuality, a kind of vibrato produced by two fingers.[48]

> *Likring* is an effect peculiar to Hardanger fiddle music. One starts as for a trill, but the finger does not leave the string...[49]

Part of the technique of the *likring*, and other ornaments, is a result of the way the fiddler holds the instrument:

> The neck of the instrument nestles well down onto the area of the palm between the thumb and first finger, and the heel of the hand resets on the body of the instrument. One merely rests the end of the instrument against the neck or lower down on the chest, with the left hand doing almost the entire work of holding the instrument.[50]

From a "Classical" violin perspective, this qualifies as terrible technique. But, "it is virtually impossible to produce this ornament [the *likring*] with the left wrist held away from the neck."[51]

When I began to learn the Hardanger fiddle, it became apparent that I was going to have to make significant physical adjustments to get the sounds and techniques of the tradition. Unlearning my "Classical" technique and replacing it with "terrible technique" was an interesting process, and now having played the instrument for several years, I find it remarkable how different I feel playing the instrument:

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[46]Knut Buen, *Telemarkspel* (Buen Kulturverkstad, 1990), 4–5.
[47]Hopkins, 161.
[48]*Ibid*., 173.
[49]S. Osa, *Hardingfele* (Oslo: Musikk-huset, 1952); quoted in Hopkins 1986, 174.
[50]Kelley, 60.
[51]Hopkins, 174.

> Because the bridge is nearly flat, almost no motion is required for the bow to change strings, and the extremely low action means that the fingers of the left hand need not move very far either. The best players exhibit an amazing economy of movement, their left hands appearing nearly motionless as a waterfall of notes cascades out.[52]

In a very real sense, I had to reinvent myself as a player in order to make the music I wanted to make with this acoustically unfamiliar violin. As an instrument that evolved in parallel with the conventional violin, the *hardingfele* provides a fascinating example of how, given essentially the same starting point, instruments can develop acoustically and musically along radically different trajectories, and how they can come to fulfill entirely different expressive needs.

[52]Kelley, 60.

Reinventing the Violin

A good case can be made in support of Boyden's claim that "in beauty and emotional appeal [the violin's] tone rivals that of its model, the human voice." Anders Askenfelt, in his paper *Voices and strings: Close cousins or not?,*[53] bases his case on a number of acoustical facts, and shows how the violin, unlike most other instruments (including wind instruments) is acoustically quite similar to the voice. First, he points out that the source-filter model, which represents instruments by separating the sound source (*i.e.,* the bowed string, or the larynx) from the filter (*i.e.,* the sound box or vocal tract) works well for both the violin and the voice, but for few other instruments. This separation guarantees that the pitch that the string (or glottis) vibrates at will be the pitch that is heard, colored by the formant structure of the resonating body (or vocal tract). This is different in wind instruments where the partials of the driving reed (or lips) lock to the resonant frequencies of the pipe because of their close coupling. Both the violin body and the vocal tract have frequency responses with "fine structure"—subtle yet substantial variations, particularly above about 1000 Hz. The net result is that, for violin or voice, a small change in the driving frequency (from the string or larynx) may excite a strikingly different region of the resonator (the box or the tract), coloring the tone in dramatically different ways.[54] With wind instruments, since the reed (or lips) and pipe are tightly coupled, the source-filter model (where they are assumed decoupled) is not appropriate, and this kind of coloring is essentially non-existent.

Askenfelt also points out that, in contrast to most other instruments, the violin and voice can control the spectral content of their tones independently from volume. Unlike the piano, where the degree of high frequency content is directly correlated to the force with which the string is struck, the violin and voice can vary the intensity of high frequencies by moving between "flow" and "pressed" approaches of sound production. By holding the vocal folds with greater tension (pressed), a singer can emphasize higher frequencies; a more relaxed approach results in stronger lower harmonics (flow), but similar loudness levels. Similarly, by playing closer to the bridge, with slower bow speed and higher bow force, the violinist can achieve a "pressed," brighter tone quality, while playing further from the bridge, with a faster, lighter bow creates a more "flowing," darker tone. Askenfelt goes on to assert that "this ability, when used to form phrases during which the spectrum balance and vibrato continuously are given different shadings, is one very prominent similarity between strings and voices," and that while "most one-voiced instruments are capable of generating smooth amplitude contour with notes of steady quality...the

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[53]A. Askenfelt, "Voices and strings: Close cousins or not?," in *Proceedings of an International Symposium at the Wenner-Gren Center, Stockholm.*, eds. Johan Sundberg, Lennart Nord, and Rolf Carlson (England: Houndmills, 1991), 243–256.

[54]This is essentially the same issue I discussed with regards to vibrato in Corelli and Schubert, and will be further discussed in Chapter 2.

micro-variations within the phrase are a completely other matter. This is probably one of the reasons why most concert halls announce at least half a dozen violin concertos before a solo trumpet or clarinet is allowed."[55]

I think that these acoustical connections are at the root of the long-standing belief that the violin is modeled after the voice. But it is a mistake to assume then that the violin is primarily an instrument of song:

> Many a current composer...has scorned the concept that the violin, viola, and cello are essentially instruments of song. Too often they concoct compositions that employ these instruments as purveyors of percussive effects and aleatory sounds of every description, to the exclusion of lyricism as a salient ingredient. Indeed, there are some performers who spend untold hours mastering such music in order to obtain engagements through the influence of numerous composers who attempt to force string instruments in directions that are *alien to their nature.*[56]

Lyricism is one of the things that the violin does particularly well, and the voice metaphor has been invaluable in the development of violin repertoire and technique. However, in spite of the acoustical connections in tone production, the actual technique required to play the violin is utterly different than that of the voice, and this creates a realm apart from song. As we saw in the textures of Corelli, the beauty of the violin emerged when it transcended the confines of the vocal line and realized some of its own potentials. With Schubert, we heard the unique articulative subtleties of the violin take a leading role in structuring one of the pinnacles of string chamber music. And with Bartók, expressive features that are beyond metaphor, and certainly beyond the voice, were seamlessly integrated into a complex harmonic and motivic landscape. I believe that Roth confuses his own aesthetic limitations with those of the violin.

All three of these composers took *ownership* of the violin, defining an approach to the instrument that is like a fingerprint. This is least evident with Schubert, who benefitted the most from a newly redesigned instrument. Nonetheless, only Beethoven matches him in intensity and mastery of texture, and no one equals his lyricism. Corelli stands as the representative of the Italian Baroque *cantabile* violin school which was responsible for developing many of the string textures that elevated the instrument to its first peak of popularity. And Bartók, with his fearless expansion of the sonic possibilities of the violin, possesses the most unmistakable print.

So, what is it about the violin that has attracted players, composers, and listeners to it for more than 400 years? Clearly, the rich tonal and expressive qualities are of central importance, and my first answer—that the

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[55]Askenfelt, 254.

[56]Henry Roth, *Violin Virtuosos: From Paganini to the 21st Century* (Berkeley: University of California Press, 1997), 332, italics mine.

violin is a singularly successful extension of the voice and, as such, is a vital vehicle for human expression—is correct. But there is more. The violin has always offered the potential for *reinvention*; the composers described here took ownership of the violin by reinventing it to suit their needs. This in turn illustrates the instrument's flexibility; had the violin been limited to lyricism, its incredible attraction would have diminished.

It is important to point out that reinventing the violin also reinvents the violinist and that what attracts composers to the violin is not necessarily the same as what attracts players. I think that the *challenge* of the violin, one of the most difficult instruments to play, is one of its main attractions, both for the player and the listener. This, of course, is related to the phenomenon of the virtuoso, which pervades much of the instrument's history, but it is also a manifestation of the pleasure that can be derived from the sheer physical activity of playing the violin. This activity, as discussed earlier, is much different for Schubert's violinist than it is for Bartók's, and is again entirely different for the Hardanger fiddler. By requiring the player to master a variety of new techniques and execute them in rapid succession, Bartók radically alters the feedback loop between player and instrument. These alterations sometimes meet with resistance, but they are also frequently greeted with enthusiasm; it can be exciting to be reinvented.

The acoustic violin has been well explored, many of its potentials discovered, as evidenced by its rich traditions. It serves as a valuable model for exploring new instruments. While the "Classical" violin is venerable, the electric violin—subject of Chapter 2—is in its adolescence. As we will see, "plugging in" has a greater impact on the violin and violinist than any previous change in design. Remembering the patience and ingenuity of the composers and performers who contributed to the development of the acoustic violin should prove invaluable to the future of the electric "violin."