Hands, Fingers, Strings, and Bows: Performance Technique and Analysis in J.S. Bach's Largo for Solo Violin

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ABSTRACT: In this article, I draw on public-facing sources and my violinistic experience to show how attention to performance technique illustrates three different relationships between performance and analysis. In the Largo from J.S. Bach's Sonata No. 3 for Solo Violin (BWV 1005), multiple-stop chords, string-based affordances, and bowings in turn correspond with, contradict, and create new analytical perspectives. I first collate definitions of interpretation and technique as they relate to performance. Interpretation is non-instrument-specific and deals with decoding and expressing musical meaning; technique *is* instrument-specific and deals with the granular mechanics of sound production. A multiple-stop intensity model shows that changes in a violinist's multiple-stop-based effort *correspond* with significant cadential markers. At the local level, the violinistic "feel" of each quadruple stop aligns with expressive aspects of harmony and form. Heinrich Schenker's performance recommendations for the Largo's cadences, by contrast, *conflict* with a violinist's experience of how the cadences intersect with instrumental affordances. Although the two perspectives may be reconcilable, actual performances support the instrument-grounded perspective. Finally, I draw on basic bowing motions to *create* an analytical technique of bowing reduction. My reduction of the Largo reveals a recurring bowing-based motive, which in turn elucidates the source of a performative tension I have experienced when playing the movement. This final example reminds us that technique and interpretation—just like performance and analysis—are inevitably entangled.

Introduction

[0.1] Open to any page of my copy of J.S. Bach's Sonatas and Partitas for Solo Violin, and you will find a nearly indecipherable mess of markings. Penciled-in bowings, scratched-out (and added-in)

slurs, dynamic indications, fingerings aplenty, and exhortations like "cry" or "dance!" pepper the pages, revealing just how much time I dedicated to these works as a violin student. I am not alone in doing so. On the public forum Violinist.com, violinists of all levels of experience enthusiastically debate bowings, fingerings, dynamics, and more in Bach's solo works. Their comments on discussion-board posts like "Authentic Bowing in Bach" (Scott 2021), "Finding Your Own Best Fingerings in Bach's Sonatas and Partitas for Solo Violin" (Niles 2019), "Making Room for Bach Chords" (Grossman 2007), and others provide a window into how modern-day violinists approach performance challenges in Bach's solo works.

[0.2] In this article, I argue that attending to performers' technical concerns—such as bowings, hand frame, and multiple stops—illuminates different kinds of relationships between performance and analysis. Scholars such as Daphne Leong (2016, [7]) have recently drawn attention to the convergences and divergences ("consonances and dissonances") between the two practices. To further investigate the multifaceted relationships between performance and analysis, I focus on multiple stops, string-based affordances, and bowings in the Largo from J.S. Bach's Sonata No. 3 in C Major for Solo Violin, BWV 1005/iii (henceforth "the Largo"). These three techniques *correspond* with, *conflict* with, and *create* new analytical approaches, respectively. My analysis of the Largo paints a broader picture of how performance technique, performance interpretation, and analytical methods can reciprocally inform one another.

[0.3] I set the stage by clarifying what I mean by performance technique. Although notions of both interpretation and technique appear frequently in performance-and-analysis scholarship, the terms themselves remain curiously underdefined. I address this definitional haziness by compiling the implied (and, occasionally, explicitly stated) meanings of the terms across English-language music-analytical literature. While interpretation tends to be non-instrument-specific and associated with musical expression, technique tends to be instrument-specific and to deal with the granular mechanics of sound production. However, interpretation and technique are not mutually opposed; performers make technical and interpretive decisions hand in hand with one another. Understanding interpretation and technique on their own terms equips performers, analysts, and listeners to better appreciate their complex interrelationships.

[0.4] I examine three aspects of performance technique in the Largo to illustrate different relationships between performance and analysis. First, I create a multiple-stop-based *intensity model* that illustrates how multiple-stop distribution aligns with significant structural markers. To complement this bird's-eye view, I show how the violinistic "feel" of each quadruple stop connects elements of technique to harmonic and formal insights. I then contrast a violinist's perspective on how three cadential textures fit on the violin with Heinrich Schenker's performance recommendations for those cadences. On the surface, the two perspectives conflict, but reconsidering the source of the conflict suggests that the incongruity may be reconcilable. Nonetheless, four specific performances of the Largo bear out the conflict. Finally, I take the simple motion of bowing as a springboard for creating an analytical technique of *bowing reduction*. The reduction reveals an embodied, bowing-based motive, which in turn clarifies questions about performance interpretation. This final example highlights how technique and interpretation reciprocally inform one another. Throughout the article, I reference public-facing sources (such as popular magazines and online discussion boards) to incorporate technique-based insights of professional and amateur musicians alike. Such sources offer music scholars an untapped wellspring of performers' perspectives, especially for repertoire so widely beloved and exhaustively discussed as solo Bach.

1. Defining "Interpretation" and "Technique"

[1.1] Music scholars frequently invoke notions of interpretation and technique. However, clear definitions of either term are surprisingly hard to find. After all, both terms apply to many contexts: a performer interprets a score, a composer articulates their interpretive vision in interviews or program notes, a music student diligently prepares for their studio technique classes, a music critic praises the pristine technique of touring recitalists, and so on. The recent turn towards technique in performance-and-analysis discourse warrants exploration of these key terms.

Although I primarily focus on performance technique in this article, interpretation and technique often appear in tandem. As Hermann Danuser (2015) shows, both terms have complicated histories. I focus here on how they are used within modern English-language music scholarship.(2)

[1.2] In general, interpretation deals with the expressive, aesthetic aspects of music and eschews instrumental specificity. Scholars invoke interpretation—explicitly or implicitly—when discussing how analysis can inform a performance (Schmalfeldt 1985; Berry 1989), how performances convey interpretations (Lester 1995; Brumbeloe 2000), how analysis constitutes an interpretive act (Guck 2006), and how the act of interpretation mediates between analysis and performance (Lowe 2003). These authors suggest that performers, analysts, listeners, and composers can all interpret a musical work. In the context of performance, additional meanings of interpretation emerge. When performers interpret music, they may "decode" a score (2020, 256) or solve "a problem" (Clarke et al. 2005, 43) in order to achieve specific "expressive aims" (Peebles 2018, [1.3]). Interpretations may also change over time (Clarke et al. 2005, 48) and involve creativity (Leong 2019, 63–66).(3) Specific musical dimensions that scholars associate with performance interpretation include tempo and timing fluctuations (Duinker 2021; Lester 1995), as well as timbre, tone, and dynamics (Lowe 2003, 71). Some scholars add further layers of analytical interpretation by showing how musical features of a performer's interpretation can convey metric, hypermetric, or voice-leading structures (Brumbeloe 2000; McCreless 2009).

[1.3] Technique deals with the granular mechanics of sound production on a specific instrument. More so than with interpretation, scholars use many synonyms for technique, such as "execution" (Danuser 2015) or "physical performance phenomena" (Bungert 2017, [7.7]). Analysts also describe performers as negotiating issues of "practicality" (Berry 2009, [2]) or "logistics" (Duinker 2021, [7.9]). In Daphne Leong's (2016, [17]) oft-cited framework of the different kinds of knowledge at play in performance and analysis, *können* ("knowing how") most closely aligns with technique. Jonathan De Souza's (2017, 23–24) description of *techne*—which builds on work by Martin Heidegger—resonates with many aspects of Leong's *können*. De Souza explains that "*techne* is a mode of knowledge. . . This active knowledge empowers a player to exploit an instrument's affordances, to bring forth a world of sonic relationships, to *make* music."

[1.4] Scholarship on performers' gestures often dovetails with components of technique. For example, Michael Berry (2009) shows how double-bass bowing gestures serve both "practical" and "expressive" purposes in Sofia Gubaidulina's music for low strings, Eugene Montague (2012) analyzes how a key hand-spanning gesture develops across one of Frédéric Chopin's piano etudes, Michèle Duguay (2019) proposes a model for measuring a pianist's physical balance, and Nicholas Shea (2022) illustrates how guitar fretboard gestures correspond with important rhetorical moments in popular music genres. As these examples suggest, specific technical elements vary depending on the instrument in question. Violinists make choices about fingering, bowing, and articulation (Peebles 2018, [1.3]); vocalists attend to diction and breathing (Kaminsky 2016, Figure 1); percussionists consider mallet type, drumhead material, and even the arrangement of the instruments themselves (Duinker 2021). Because technique is so instrument-specific, scholars discussing technique often rely on their own embodied knowledge of the instrument in question. In this vein, my own violinistic training informs my discussion of performance technique in Bach's Largo.

[1.5] Based on my survey of scholars' discussions of interpretation and technique, I propose revised definitions that reflect current usage of these terms. Interpretation encompasses these difficult-to-describe combinations of dynamics, touch, timing, tone, etc. that distinguish one performance from another and create what we colloquially call "expression." Technique entails the physical aspects of practicing and performing that are shaped by the relationship between instrumental affordances and a performer's capabilities (De Souza 2017, 12–13). On the surface, these definitions suggest a mind/body opposition between interpretation and technique. But as any performer will tell you, the process of developing reliable technique requires thoughtful repetition and consistent refinement. In other words, both the mind and the body are involved in developing technique (just as they are both involved in crafting an interpretation). Peter Kaminsky aptly describes

interpretation and technique as "porous" categories: a performer often makes technical decisions with specific interpretive goals in mind, and vice versa (2016, [11]).[4] For example, a violinist might choose to "stop" a note that could be played as an open string in order to convey a sense of warmth and richness, or they might add some rubato to a quadruple stop featuring open strings in order to revel in the sense of physical release that the open strings provide. Ultimately, clarifying what interpretation and technique entail allows us to better understand the applicability, limits, and overlaps between them.

[1.6] Bach's solo violin works appeal to performers because they offer both ample interpretive latitude and engaging technical challenges.[5] Violinist Hyeyung Julie Yoon of the Chiara String Quartet remarks, "These [Bach's solo violin] pieces challenge all facets of violin playing and help me to feel centered musically, technically, and spiritually" (qtd. in "Practice" 2014, 31). In solo Bach, common technical concerns include bowings, fingerings, multiple stops, and articulations. However, different movements of the sonatas and partitas foreground specific techniques to varying degrees.[6] In the dense fugues, a violinist might dedicate abundant time to finessing multiple stops (especially the pesky four-note chords), whereas in slow movements, they might focus on questions of fingerings or when to use open strings. In other words, the "script" of musical notation (Cook 2001, [15]) and violinistic affordances intersect to create a constellation of movement-specific technical challenges.

2. Multiple Stops and Analytical Correspondence

Multiple-Stop Intensity and Musical Form

[2.1] At first glance, the lyrical Largo appears to be more technically straightforward than many other movements of Bach's solo sonatas and partitas (see **Example 1** for my annotated score). Multiple stops, though present, appear less frequently than in the fiendish fugues, the relaxed tempo provides violinists ample opportunity to revel in the lyrical melodic lines, and the absence of intricate ornamentation figures circumvents much of the need for bowing-based sleight of hand. For these reasons, violinists—myself included—often learn the Largo years before the enigmatic Prelude and mammoth Fugue that precede it.

[2.2] The relative technical ease of the Largo sets into relief the challenges that *do* arise—multiple stops foremost among them. With each added note in a multiple stop, the violinist's physical involvement increases. In the left hand, the player must contend with the difficulties of achieving precise intonation (especially when dealing with perfect intervals). In the right arm, they must deftly navigate the sustain, break, or roll of each multiple stop. The multiple stops in the Largo do not saturate the texture (as in the fugues), nor do they appear solely at section-ending cadences (as in the single-voice movements). As such, the movement serves as a prime case study for examining how multiple-stop technique relates to analytical perspectives.

[2.3] I propose a multiple-stop-based *intensity model* to investigate the relationship between multiple-stop technique and insights from formal analysis. The intensity model shows that changes in multiple-stop intensity across the Largo strikingly correspond with form-defining cadences. In general, a violinist invests more physical effort with more notes in a multiple stop. They traverse more physical space with the bow arm and (usually) place more left-hand fingers down on the fingerboard. As Laurie Niles (2022), founder of Violinist.com, writes, "The triple or quadruple stop has its own kind of technique that is quite different than running 16th notes, melodic lines and even double-stops. You can't take it for granted—it needs special attention, and it needs special practice." I characterize this special kind of multiple-stop technique—the extra bit of effort required —as multiple-stop *intensity*.

[2.4] To create my intensity model, I begin from the premise that as the number of notes in a multiple stop increases, so does the overall intensity of a violinist's physical effort. I assign each multiple stop in the Largo an intensity value: double stops receive an intensity value of 1, triple stops a value of 2, and quadruple stops a value of 3. The sum of the individual multiple-stop intensity values in a given measure determines the overall intensity value for that measure

(**Example 2**). For example, the two double stops in m. 1 together impart an intensity value of 2 to that measure, whereas the three double stops and two triple stops in m. 7 yield an intensity value of 7. (Note that this approach determines multiple-stop intensity from the perspective of a violinist reading the score, rather than intensity as perceived by a listener.)

[2.5] The intensity model reveals a striking pattern: multiple-stop intensity increases towards each structurally significant cadence and decreases following nearly every one of these cadences (**Example 3**). Multiple-stop intensity values peak at 7 three times across the Largo: once right before the PAC in V that concludes the A section of the binary-form movement (m. 8), again just before the PAC in I that closes the B section (m. 18), and one last time with the final PAC of the movement (m. 21). Both the PAC in V and the first PAC in I precede an immediate decrease in multiple-stop intensity (from 7 to 3 and 7 to 0, respectively).[7] Similarly, multiple-stop intensity increases towards the PAC in ii (m. 13), though here it only peaks at a value of 4 and falls more gradually across the next two measures. The authentic cadence in m. 4 is the only exception to this pattern. Like with the other cadences, multiple-stop intensity increases towards the cadence, peaking at a value of 4. Rather than decrease following the cadence, however, the intensity value momentarily continues to increase—little wonder, as the thus far slow-moving bass line suddenly bursts into a short-lived rhythmic flurry in m. 5. Overall, though, the pattern of intensity peaking around cadences prevails: the technical element of multiple stops corresponds with a music-analytical insight.

[2.6] Because multiple-stop intensity closely maps to cadential deployment (and thereby increases in harmonic rhythm), listeners may experience intensity fluctuations similarly to performers, even though they themselves don't have to contend with the technical aspects of multiple stops. True, a listener (especially a listener watching a performance) might notice how a violinist invests a bit of extra effort on denser multiple stops.[8] But listeners might also experience the harmonic tension ramping up towards and falling after each PAC. Indeed, scholars and performers alike often characterize the dominant–tonic relationship—especially at cadences—as that of tension and release. Thus, intensity in the Largo manifests in two domains: the technical/physical, measured by shifts in the violinist's effort in executing multiple stops, and the harmonic/expectational, understood through enculturated norms of harmony and form in common-practice tonal music.

[2.7] Many technical and interpretive factors besides sheer note count affect performers' and listeners' experiences of multiple-stop intensity. Such factors include the specific left-hand fingers involved; the arrangement of the fingers across the strings; the prevailing dynamic and overall tempo; the chordal break, roll, or sustain; and so on. Additionally, multiple-stop intensity could be parsed across musical segments longer or shorter than a single measure. The intensity "slices" could even be shifted to cut across bar lines. Still other musical features beyond multiple stops alone—such as rhythm or bowing technique—can impact a violinist's experience of intensity. For example, when the abundant thirty-second notes appear in the codetta (mm. 18–21), the violinist significantly increases their left-hand activity towards the impending final cadence. Each additional possible intensity metric further nuances (and complicates) the connections between performance and analysis.

[2.8] Even though many musical features can affect performers' and listeners' experiences of intensity, the multiple stops in the Largo illustrate a particularly close connection between performance technique and analytical perspective. The alignment between multiple-stop distribution and formal organization may not come as a surprise; after all, Bach frequently thickens his musical textures towards significant cadences (and not just in the solo violin sonatas).[9] For string and keyboard players, such instances of textural thickening almost surely necessitate an intensification of physical effort. Performers' shifts of effort exemplify one facet of Daphne Leong's (2019, 10) expansive view of musical structure, which encompasses "structure in embodied action [and] sounding structure as created by performers." Multiple stops in the Largo, then, connect technique-based, embodied structuring processes with familiar notions of musical structure—in this case, the phrase organization of the binary form.

Quadruple Stop "Feels," Harmony, and Structure

[2.9] So far, I have focused on the global distribution of multiple stops across the Largo. But string choice, fingerboard position, bowing, dynamics, and more affect the qualitative "feel" of a given multiple stop (Hanninen 2020).[10] To illustrate connections between performance technique and analytical perspectives at the local level, I compare the four quadruple stops in the Largo. Unlike several double and triple stops in the movement, each quadruple stop has only a single viable fingering option. As such, individual violinists' performance experiences of the quadruple stops will be more similar than their experiences of moments with several fingering options. Much like the intensity model does on a global level, the violinistic feel of each quadruple stop reveals local connections between technique and analysis. In particular, the violinist's hand frame—the shape of the left hand established by fixed finger positions across brief stretches of musical time—and the presence of open strings correspond with elements of harmony and form.

[2.10] When playing the first quadruple stop (m. 13, beat 1), the violinist experiences several technique-based elements of release that correspond with a harmonic release. The quintessentially violinistic G-minor chord builds upon the open G and D strings.[11] The violinist places their first finger on B♭4 on the A string and their second finger on G5 on the E string, as indicated in **Example 4**.[12] The resulting hand frame could hardly be more relaxed. Thanks to the low open strings, the violinist easily coaxes a warm, ringing sound out of the instrument, even after the bow crosses to the upper strings. Harmonically, the quadruple stop articulates a PAC in ii—the only minor-key PAC of the Largo—which appears soon after a dramatic, registrally expansive sequence rife with seventh chords (**Example 5**). Altogether, the quadruple stop embeds a physical sense of openness and ease that aligns with the tension-releasing effect of the PAC. (Compare this sense of openness with the high intensity value of the PAC as conveyed in Examples 2 and 3.)

[2.11] The second quadruple stop (m. 16, beat 1) requires a small act of physical connection that serves as a microcosm for the large-scale structural connection that the chord instantiates. In this quadruple stop, the violinist uses two different fingers to stop three different strings (the highest note is an open E5). The violinist begins with their second finger on B♭3 on the G string, then "hops" the second finger over the third (which is playing G4 on the D string) to land on C5 on the A string (**Example 6**). Especially compared to the relaxed, open hand frame of the quadruple stop just a few measures earlier, the finger hop feels awkward and unidiomatic. The technique is especially marked in the context of the Largo, as no other multiple stop requires a finger hop. To execute the chord with clarity, the violinist must precisely coordinate the left-hand fingers with the bow arm. They risk an unclear chordal root or a squeaky E string if the two limbs are even slightly out of sync.

[2.12] Just as the violinist's hopping second finger links two physically distant chord members, the harmony of the quadruple stop links two temporally disconnected, structurally significant passages. The V^4_2 harmony itself comes as a bit of a surprise. Though the previous V^6_5 of V (m. 15, beat 3) anticipates a resolution to a root-position dominant, Bach slides the B♮ in the bass down to B♭ instead.[13] The V^4_2 opens space for the subsequent I^6 to initiate the $\hat{3}$–$\hat{4}$–$\hat{5}$ bass line that ultimately secures the structural arrival in I (**Example 7**, mm. 16–17). Atop this conventional cadential motion, familiar material returns. The sequential melody that prepared the structural PAC in V resurfaces, now transposed down by fifth (**Example 8**, mm. 6–7). Because of the violin's tuning, the down-by-fifth (rather than up-by-fourth) transposition means that the violinist's finger patterns exactly map between the two passages.[14] Just like the hopping second finger that acts as the agent of local physical connection, the V^4_2 facilitates a large-scale harmonic, structural, and physical mapping.

[2.13] The third quadruple stop (m. 20, beat 3) infuses the codetta of the Largo with both physical and harmonic tension. (This tension corresponds with the high intensity value of the measure shown in Examples 2 and 3.) Unlike in the previous two quadruple stops, the violinist uses all four fingers, creating the thorniest left-hand moment of the Largo. The second and fourth fingers pull towards one another on the lower strings to outline a diminished seventh (B3–A♭4); the third finger on the A string tucks in close to the fourth to establish an augmented fourth (A♭4–D5); and the first finger awkwardly stretches back for a "low 1" F5 on the E string (**Example 9**).[15] The resulting tension-filled hand frame physically reinforces the harmonic shock of the fully diminished seventh

chord that dramatically undercuts an expected tonic resolution (see again Example 1). Even though the violinist will likely lift the two fingers from the lower strings once the bow crosses to the upper strings, the quadruple stop experientially functions as a single unit encompassed by a single hand frame.

[2.14] Technical demands and harmonic meanings continue to reinforce one another beyond the moment of the quadruple stop itself.[16] The diminished harmony persists in single notes through the rest of m. 20. On beat 4, the violinist draws the first and third fingers towards one another to create another diminished-seventh outline (**Example 10**). Like in the previous quadruple stop, the fingers drawing towards one another creates an awkwardly cramped hand frame. When the cadential six-four chord arrives on the downbeat of the next measure, both hand frame and harmony open back up. The third and fourth (or second and third) fingers reach away from one another to outline a spacious—though not yet settled—major sixth on the D and G strings (**Example 11**). The stretching feeling of the sixth is especially pronounced on the lower strings—the violinist must internally rotate their left arm farther under the violin in order to reach the interval. [17] Even though the major sixth and diminished seventh span the same distance in pitch space, the violinist experiences the two intervals differently. The cramped, tangled fingers of the tension-filled diminished seventh chord starkly contrast the reaching, stretching fingers of the expectant cadential harmony. In each case, the violinist's hand frame sensations map onto harmonic metaphors.

[2.15] In the final measure of the Largo, the violinist undertakes one last multiple-stop-based effort intensification and release. Even in these twilight moments of the movement, technical and harmonic dimensions continue to reinforce one another. If the violinist begins the trill on the E with an appoggiatura from above—as many violinists do—the quadruple stop begins with two perfect fifths (C4–G4 and B♭4–F5). To play a single double-stop fifth, a violinist uses a left-hand technique that resembles guitarists' technique for playing barre chords; that is, they use one finger to simultaneously stop two adjacent strings. Unlike on a fretted instrument, a violinist must make further adjustments to account for intonation. To this end, the violinist might employ a combination of strategies, including flattening their typically rounded fingers, swinging their elbow a bit to the left (away from the midline of the body), and slightly increasing both finger and bow pressure.[18] For the Largo's final quadruple stop, the violinist must make technical readjustments to account for not one, but two awkward fifths (**Example 12**). These adjustments impart an intensification of physical effort that corresponds with the expectancy of the dominant-seventh harmony. Furthermore, on many violins (mine included), the violinist must address a pesky "wolf tone" on the low C4—an act that compounds the player's effort intensification.[19] To the violinist's relief, Bach offers a final moment of technical release in the concluding tonic resolution. The final triple stop includes an open A, so the violinist needs to use only two left-hand fingers. Additionally, to delicately shape the plaintive E-string F5 in the final tonic, the player will likely lighten up the bow arm from the previous weighty dominant. One final time, physical tension and release map onto harmonic tension and release.

[2.16] Together, the global and local views of multiple stops in the Largo suggest compelling alignments between performance technique and familiar analytical tools. The intensity model provides a bird's-eye view of effort fluctuations across the movement, while quadruple stop "feels" highlight subtle connections between harmonic and physical tension and release. But even within the Largo, multiple stops may not always map so closely to analytical perspectives. In fact, in the case of several cadential textures—some of which include multiple stops—performance technique and analysis conflict.

3. String-Based Affordances and Analytical Contradiction

[3.1] Many idiomatic passages in Bach's solo violin works hinge upon the presence of open strings. Examples include the zig-zagging arpeggios that plummet down to the low G in the Presto of the G minor Sonata (mm. 1–4), the acrobatic bariolage passages in the Prelude of the E major Partita (mm. 17–28; mm. 63–78), the mammoth string-crossing arpeggio sections of the D minor Chaconne (mm.

89–120; mm. 201–8), and more.[20] Both in these virtuosic passages and in more contemplative contexts—like that of the Largo—open strings offer the performer a degree of release. This feeling of open-string release is an example of a quintessentially violinistic instrumental affordance. "When I play Bach, it's a lot of fun just to listen and to experiment [with] different effects of open strings and fingered notes," Violinist.com user Yixi Zhang comments on the post "Fourth Finger or Open String" (Justice 2007). As Zhang's comment suggests, even if the option to play an open string is on the table, a violinist may choose instead to "stop" the note.[21] This example of open vs. stopped strings reminds us that the ways the notes on the page translate to the violin itself—the specific fingers used, the strings in play, possible open strings, and other technical aspects—matter greatly to violinists.

[3.2] Analytical methods concerned with harmony and structure often overlook elements of performance technique such as fingering and string choice. In his essay on the Largo in Volume I of *Das Meisterwerk in der Musik*, Heinrich Schenker (1925a, 156–59) offers performance recommendations that, at first blush, conflict with string-based violinistic affordances. Three significant PACs in the Largo intersect with violinistic affordances in radically different ways. The way each cadence sits on the violin suggests how the violinist might play that cadence—the first with effort (likely loud), the second with expansiveness (also loud), and the third with delicacy (soft). Schenker, on the other hand, recommends that the violinist play the cadences at *forte*, *mezzo forte*, and *forte* dynamics, respectively. The mismatch between a violinist's and Schenker's perspectives are rooted in the differences between technique and interpretation. Though the violin itself invites certain ways of shaping each cadence, a violinist may recruit tools in their technical arsenal to convey an interpretation that more closely resembles Schenker's dynamic suggestions. In the recorded performances of the Largo to be discussed below, however, all four violinists highlight the second cadence (the PAC in ii) much more than the other two. These real-world performance examples attest to the significance of string-based violinistic affordances in shaping violinists' interpretive choices.

Three Cadences on the Violin

[3.3] Technical dimensions of how a note, chord, or passage fits on the violin can inform how a performer shapes interpretive elements like dynamics, timbre, and timing. The three strong PACs in the Largo—the PAC in V on the downbeat of m. 8, the PAC in ii on the downbeat of m. 13, and the PAC in I on the downbeat of m. 18—are no exception (see again Example 1). Registral and textural contrasts between the three cadences invite the violinist to approach each cadence differently. The triple-stop PAC in V requires that the violinist work against the instrument's natural resonance. On this chord, the violinist places three fingers down on the lower three strings. The low, covered register, the absence of open strings, and the wolf-tone-prone Cs make it difficult for the violinist to produce a clear, ringing sound. Though they may invest a fair amount of energy into this arrival, the performer's effort may not directly translate into a robust sound.

[3.4] Unlike the effortful PAC in V, the PAC in ii (m. 13) engenders a sense of ease and expansiveness through textural, registral, and timbral features. The G-minor tonic of this cadence "carries a hint of monumentality, even within the restricted dimensions of a lone violin" (Cumming 2000, 85).[22] Not only is the chord the first quadruple stop, but it features the first open G, includes both the open D and G strings, and covers the widest simultaneous registral span of the entire movement. Especially on the heels of the harmonic and technical intensity of the previous few measures, these features impart both a physical and sonic sense of release and exhale. The G-minor quadruple stop thus invites the violinist to revel in the cadential arrival, perhaps by adding some rubato or boosting the dynamic. In this case, the violinist works with—rather than against—the resonance of the violin.

[3.5] The single-note PAC in I (m. 18) carries expressive potential that further contrasts with that of both multiple-stop PACs. Although the passage preceding the PAC in I (mm. 16–17) recalls the passage preceding the earlier PAC in V (mm. 6–7), the texture is significantly different (**Example 13**). Because Bach transposes the earlier passage's reappearance down by fifth, the F3 needed for an exact cadential mapping lies outside the violin's playable range. Could the single-note PAC in I

simply be a result of instrumental practicality? Perhaps. Nonetheless, the singular cadential texture might affect the violinist's interpretive choices. The violinist might, for instance, highlight the fragility of the single-note PAC by decreasing in dynamic and sweetening the tone. The way each PAC sits on the violin seems to ask something of the performer, whether it be how much effort to invest, how much rubato to incorporate, or how to shape dynamics around the cadential arrival. In other words, performance technique—shaped by instrumental affordances—affects performance interpretation. How do aspects of performance technique in turn play into analytical perspectives?

Three Cadences in Schenker's Voice-Leading Graph

[3.6] In his essay on the Largo, Schenker primarily focuses on explicating his voice-leading analysis (**Example 14**). He analyzes the movement as unfolding a "fundamental octave-line" that "divides into two segments" (Schenker 1925a, 141). Within this overarching structure, each of the three significant PACs serves a specific role. The PAC in V concludes the first segment with an *Urlinie* arrival on $\hat{5}$; the PAC in I concludes the second segment with an arrival on $\hat{1}$. The PAC in ii, however, is subsumed into a lengthy prolongation of $\hat{4}$. At the highest level, Schenker reads the G-minor cadence as essentially passing in nature, made consonant as the "dividing upper fifth" (*Oberquintteiler*) of C (Schenker 1925a, 143).[23] The chordal texture of Schenker's background graph matches that of Bach's score for the PACs in V and I (C4–E4–C5 and F4, respectively). The complete violinistic texture of the PAC in ii (G3–D4–B♭4–G5), on the other hand, first appears in Schenker's second diminutional level. (And even then, the D4 appears slightly before the fully-voiced G-minor chord.)

[3.7] At the end of his essay, Schenker offers performance recommendations that directly stem from the structural hierarchy of his voice-leading analysis. His performance recommendations exclusively address dynamics—the realm of performance interpretation. He outlines both "primary dynamic shadings" and several "inner shadings" (Schenker 1925a, 157). In **Example 15**, I have annotated the Largo with dynamic markings that show Schenker's primary and inner shadings. At the primary level, Schenker indicates that both segments of the movement ought to follow a *piano–crescendo–forte* progression; the violinist should play both section-concluding cadences (the PAC in V and the PAC in I) *forte* (Schenker 1925a, 157–58).[24] He only mentions the PAC in ii when he proceeds to the inner dynamic shadings. Although Schenker also suggests that the violinist *crescendo* towards the G-minor cadence, he insists that this *crescendo* lead "only to a *mezzo forte*." His reasoning: "In the second section, in terms of the fundamental structure. . . the G triad functions only as a dividing fifth of V. In other words, the events of bars 10–13 must not be equated with the two cadences of a higher order that occur in bars 6–7 and 16–17, for no other cadences have as much weight as these" (Schenker 1925a, 158). In sum, each cadence's structural significance determines the dynamic level Schenker assigns to that cadence.

[3.8] The way each cadence sits on the violin invites a very different dynamic hierarchy than the one Schenker suggests. Most notably, Schenker suggests that the PAC in ii receive the softest dynamic of the three cadences. However, the fully voiced G-minor chord invites the violinist to revel in an expansive, sonorous tone that allows the open strings to ring in their full glory. By contrast, the single-note PAC in I—for which Schenker suggests a *forte* dynamic—suggests a delicate, perhaps even intimate, cadential arrival. The PAC in V, though thicker-textured than the PAC in I, does not resonate well on the instrument, thereby potentially reducing its dynamic power in performance. It should be noted that Schenker's practice of systematizing dynamics according to structural levels appears in his writings only occasionally (Burkhart 1983, n13).[25] Nonetheless, violinistic affordances in the Largo point towards a dynamic structure that seemingly conflicts with Schenker's performance recommendations.

Three Cadences in Dialogue Between Instrument and Voice-Leading Sketch

[3.9] Where does the divergence between the violinistic and Schenkerian perspectives originate? The answer lies in the distinction between technique and interpretation. A performing violinist contends with the practical, material elements of technique, while Schenker solely focuses on performance interpretation. In other words, the performer asks, "What does the violin require of

me?," while Schenker asks, "What does the voice-leading structure require of violinists?"[(26)] True, a violinist likely shares Schenker's goal of producing a convincing interpretation. But steeped as he was in early twentieth-century ideals of the musical work, Schenker downplays the importance of the physical production of sound in favor of preserving the work's "conceptual integrity."[(27)] This is not to say that Schenker never addresses granular technical concerns. In his writings on piano music, he often discusses issues of fingering in great detail—after all, Schenker himself was a pianist (Siegel 2015, 265; Bungert 2017, [4.6]; Rothstein 1984). Nonetheless, no such technical specificity appears in Schenker's discussion of the Largo.

[3.10] Understanding what Schenker means when he discusses dynamics casts the apparent divergence between performance and analysis in a new light. A violinist's technique-based perspective may not be at odds with Schenker's analytical one as much as it initially seems. In his incomplete, posthumously published treatise *The Art of Performance* ("Die Kunst des Vortrags"), Schenker clarifies that *forte* and *piano* are not always measures of "*quantity* in a purely physical sense" (i.e., loudness), but of expressive ("psychological") "quality." He explains that "occasionally *forte* can be interpreted as having emotional resonance and *piano* as being less the low point of a physical quantity than an intimate utterance" (Schenker 2000, 39). Schenker's commentary suggests that dynamics fall within the realms of both the performer's creation and the listener's perception. In the case of the Largo, the violinist may recruit tools in their technical arsenal to affect how listeners perceive the dynamic of each cadence. They might play with the speed or distribution of chordal breaks, increase or decrease time spent on arrivals, or highlight moments through non-sound-producing physical motions. Thus, even if the volume of the PAC in ii exceeds that of the PACs in V and in I, a violinist might strategically employ multiple techniques that would ultimately downplay the G-minor cadence from a listener's perspective.

[3.11] Even if violinistic affordances invite the performer to shape the dynamics of each cadence in certain ways, the performer does not necessarily have to accept this invitation. Factors as varied as "the prevailing affect, the alternation of consonance and dissonance, tessitura. . . linear direction, [and] the use of rhetorical devices" can all affect performers' dynamic decisions (Ritchie 2016, 7). With this in mind, a violinist may end up making dynamic decisions that more closely align with Schenker's recommendations. For example, even though the open strings of the G-minor PAC afford immense instrumental resonance, they also require little prompting from the bow to activate the sound. As such, a violinist might impart a sense of transparency to the thickly textured chord by rolling through the entire quadruple stop without ever playing two notes simultaneously. To create a robust PAC in V, a violinist might break the triple stop into two parts, draw out the C in the lower register, use lots of bow, or add a few extra wiggles of vibrato. In each case, technique and interpretation go hand in hand: the violinist draws on their technical arsenal to convey the expressive effect of their desired dynamic.

Three Cadences in Performance

[3.12] Modern-day recordings of the Largo illuminate how violinists respond to the technical demands of the movement and potentially diverge from Schenker's analytical perspective. To investigate how performance and analysis speak to one another in practice, I compared recordings of the Largo by four different violinists: Augustin Hadelich (2021, video recording); Rachel Podger (1999, audio recording); Hilary Hahn (date unknown, video recording); and Jascha Heifetz (1952, audio recording).[(28)] I analyzed each recording by repeatedly listening to musical segments of various lengths, from the few seconds surrounding each of the three significant cadences to the entire movement. This listening-centric approach accounts for minute details of articulation, chordal break/roll, and affect that are difficult to visualize in audio analysis software.

[3.13] Though by no means comprehensive, my small sample of recordings represents several different stylistic and aesthetic approaches to the Largo. The recordings by Hahn and Heifetz display a "romantic" style of performing Bach, though Hahn takes a much slower tempo than Heifetz (Fabian 2017). (Hahn's Largo clocks in at around 4 minutes and 24 seconds, while Heifetz's only lasts 2 minutes and 36 seconds.) Podger takes a historically informed approach, both with her instrumental setup—gut strings, a Baroque bow, and A415 tuning—and her stylistic choices.

Hadelich strikes a middleground: he plays on a modern setup with a Baroque bow and takes a tempo nearly as slow as Hahn's. However, his stylistic choices more closely resemble Podger's. For example, Hadelich clearly articulates the beginning of each slur, then slightly lifts the bow out of the string as the slurs subside. Through this subtle bow-arm shaping, Hadelich invites a certain lightness and breath into his sound.

[3.14] **Example 16** compares how each violinist treats loudness, articulation, chordal break/roll, timing, and physical gesture at the three main cadences. Even across stylistic differences, all four performers emphasize the PAC in ii more than the other two cadences. (See **Video Examples 1–4**, which juxtapose the three cadences in the four recordings.) Each violinist allows the low open strings of the G-minor PAC to ring in their full glory, painting the moment as the expressive climax of the Largo. But each violinist uses a unique combination of techniques to achieve this interpretive effect. For example, Hadelich and Podger break the chord 1+1+2 after lingering on the low G, whereas Hahn and Heifetz break the chord 2+2 and approach the cadence with a highly continuous tone. Even though Hahn emphasizes the PAC in I more than the other performers do, the PAC in ii still functions as the dramatic high point in her performance. Despite variations between performances, each of the four violinists shapes the three cadences more in accordance with the instrumental invitations the cadences offer than in response to their structural significance (as understood by Schenker).

[3.15] In the case of the three cadences, practicing violinists' dynamic choices tend to conflict with Schenker's analytically derived performance recommendations. However, such misalignments between performance and analysis need not devalue one another. Rather, divergences between performance and analysis reveal the differing values, insights, and limitations each perspective brings to the same piece of music. Even in the Largo, violinists' choices and Schenker's suggestions might better align in other musical moments or in other performances—after all, Schenker's dynamic recommendations extend beyond the three cadences. Counterpointing the perspectives of performers and analysts prompts us to look beyond surface-level incompatibilities to nuance our definitional boundaries and analytical tools.

4. Bowing Patterns and Analytical Creation

Bowing Reduction as Analytical Technique

[4.1] Among violinists, the topic of bowing in solo Bach opens a veritable Pandora's box of questions. For example: How closely should violinists follow the slur markings in Bach's autograph manuscript? Should triple and quadruple stops always be played on down bows? When is it okay to sneak in a "hooked" bowing or two? In what might be considered a "bowing originalist" stance, eminent violinist Christian Tetzlaff suggests that performers follow Bach's markings as closely as possible: "Some of the bowings look very difficult—like when you have eight notes in one stroke with a single note against it; but this is what gives the music its shape. For decades people have changed the bowings to make it apparently easier to play, but the only way to get the shape of the phrases right is to do what Bach wrote" (qtd. in Mellor 2017, 31). Not all violinists agree with Tetzlaff. Though Laurie Niles (2019) acknowledges the importance of studying Bach's manuscript, she takes a more flexible approach to Bach's markings. In Niles's words, "You don't have to use Bach's original bowings, but seeing them can help you think about Bach's apparent intentions, and how you can reflect those intentions even when you choose different bowings" (2019). Although their specific philosophies differ, Tetzlaff and Niles share a conviction that bowings are a technical foundation upon which interpretive meaning—in this case, the composer's intention—is laid.

[4.2] Perhaps violinists debate Bachian bowings with such fervor because bowing itself is such a fundamental component of a violinist's technique. The basic "up" and "down" motions of bowing embed bodily rhythmic structures into the act of playing the violin. The binary movements of bowing make it possible to map bowing patterns through a process that resembles rhythmic reduction. In other words, performance technique generates analytical method. For example, even though the three musical gestures in **Example 17** differ melodically and rhythmically, they each

require the same bowing pattern: a down bow that lasts three times as long as the subsequent up bow. My bowing reduction of the Largo reveals a recurrent bowing-based motive that establishes bodily connections for the violinist across the movement. By uncovering this motive, the bowing reduction helps clarify questions about performance interpretation.

[4.3] Regardless of their eventual bowing decisions, performers share at least some degree of reliance on Bach's notation. With this in mind, I base my bowing reduction on notation—in this case, that of Bach's autograph manuscript (**Example 18**).[(29)] Performers and scholars alike generally understand Bach's slur markings not merely as bowing patterns, but as articulation marks ([Ritchie 2016](), 8; [Butt 1990]()). Because Bach's slurs tend to be short (unlike the long, phrase-based slurs of composers like Johannes Brahms), violinists' bowing choices tend to closely correspond to the composer's notation. To create my bowing reduction of the Largo, I understand each new articulation in the autograph to initiate a new rhythmic value (**Example 19**).[(30)] The first slur encompasses the first three sixteenth notes of the movement, so it becomes a dotted eighth note in the reduction; the paired sixteenth notes of beat 2 become eighth notes in the reduction; and so on.

[4.4] The reduction reveals a recurrent bowing-based motive that saturates the Largo in versions of three different lengths (**Example 20**). In each of the first two measures, the motive appears in its longest form: a dotted eighth + sixteenth followed by four eighth notes. (The three-sixteenth-note gesture that concludes both mm. 1 and 2 serves a connecting, rather than motivic, function.) Though the full motive only appears once more—at the beginning of the B section (m. 8), when Bach transposes the opening measure into the dominant—its immediate repetition in the first two measures highlights its importance. Following the full-length versions that open the Largo, the motive shortens across the first phrase. At the beginning of m. 3, the medium-length version surfaces; now only two eighth notes follow the dotted eighth + sixteenth. On beat 3, the motive restarts with another dotted eighth + sixteenth, but this time it shortens further, fragmenting into separate sixteenth notes that lead into m. 4. In m. 4, this shortest version of the motive reappears before the phrase gently draws to a close. Across the movement, the medium-length version of the motive occurs eight times, the short version, nine.[(31)] The bowing-based motivic thread winds its way through key changes, sequential passages, and registral contrasts, weaving an intricate web of technique-based connections across the Largo.

[4.5] As the opening phrase of the movement unfolds, the motive takes on a beginning role. The motive's initial rhythmic kernel (the dotted eighth + sixteenth) saturates the first several bars, appearing on each of the first four downbeats and on the third beat of m. 3. A violinist will likely be inclined to play a down bow on the dotted eighth note and an up bow on the sixteenth. Because classical violin pedagogy tends to associate down bows with strong beats, the drawn-out down bow of the rhythmic kernel imparts a feeling of articulating a starting point. The shorter up bow, on the other hand, suggests a continuation. The beginning-oriented dotted eighth + sixteenth imparts an initiating impetus to the motive in each of its various guises. As the movement progresses, the motive appears more frequently in its medium and short versions, which further reinforces its beginning role.

The Bowing-Based Motive and an Interpretive Challenge

[4.6] In my performance experience with the Largo, I have long faced an interpretive conundrum in m. 10: How should I shape the transition between the two sequences? Do I relax into beat 3, or do I forge ahead into the expressive upper-register sequence? These two approaches seem contradictory. The bowing-based reduction reveals the source of the tension between them. Beat 3 of m. 10 simultaneously encapsulates two contradictory impulses: the beginning impetus of the bowing-based motive and the ending sense of a local-level, quasi-cadential gesture. In the middle of the bar, the beginning-oriented motive reappears in its medium-length version after two measures of absence. The motive repeats twice more, unfolding an expressive sequence rife with crunchy seventh chords and sighing neighbor-tone figures (mm. 11–12). Simultaneously with the motive's reappearance, the first sequence of the passage briefly comes to rest on G minor. In isolation, beats 2 and 3 of m. 10 appear to outline the cadential content of an IAC. At the phrase level, however, the juxtaposed sequences and the callback to the sequence of m. 5 dissuade a

reading that characterizes this moment as projecting cadential function (Caplin 2004, 82).[32] The tension embedded in this moment, then, surfaces at the local level: the momentary sense of ending at the close of the first sequence conflicts with the initiating impulse of the bowing-based motive.

[4.7] Although the bowing reduction provides insight into the source of the tension, the violinist still must determine how to shape dynamics, timing, and emphasis through the moment of contradiction. A violinist's decision to prioritize either the ending sense of the G-minor resting point or the beginning sense of the bowing-based motive affects the shaping of each subsequent two-beat grouping (**Example 21**). To downplay the beginning impetus of the motive, the violinist might relax into the end-oriented G-minor resting point with some rubato or a slight *decrescendo*. In this case, the single sixteenth notes that lead into beats 2 and 4 reinvigorate each new grouping and shape the two-beat gestures across the bar (beats 4+1 and 2+3 group together). Alternatively, the violinist could inject the phrase with the initiatory momentum of the motive, perhaps by increasing the weight in the bow to emphasize beats 1 and 3 (beats 1+2 and 3+4 group together). In this case, the violinist downplays the ending sense of the G-minor resting point.[33]

[4.8] In practice, a violinist will likely find a middle ground between the two shaping possibilities. As can be seen in **Video Example 5**, Hahn prioritizes the G-minor resting point, but she varies the amount of time between each subsequent two-beat group. In m. 10, Hahn significantly slows down toward the B♭4 of the G-minor arrival. She then reanimates the tempo on the pickup to beat 4. In m. 11, she prolongs the last sixteenth of the slurs in beats 1 and 3, echoing the rubato she introduced on the G-minor ending gesture. In the second half of the measure, Hahn pushes ahead towards the low-register dominant (m. 12, beat 1) to prepare the impending G-minor PAC. By contrast, Hadelich spares little time for the G-minor resting point of m. 10 (**Video Example 6**). He instead highlights the beginning-oriented motive by emphasizing the seventh chords on beats 1 and 3 of m. 11. Like Hahn, Hadelich also treats each two-beat group slightly differently. He lingers on the downbeat of m. 11 with a full dynamic and a strong chordal break, but as he approaches beat 3, he slows down and softens the dynamic. On beat 3 itself, Hadelich rolls through the dissonant chord, coloring it with a hushed air of introspective melancholy. In my own playing, I prefer to slightly stretch the G-minor resting point, group the cross-bar two-beat gestures with dynamic hairpins leading towards and away from beats 1 and 3, and maintain the overall momentum of the phrase until the arrival of the expansive G-minor quadruple stop.

[4.9] Although Bach's notated articulations in the Largo suggest clear motivic connections, a performer's bowing choices need not—and likely will not—hew to these markings. Violinists take into account many factors when making bowing choices, including instrumental setup (historical or modern), stylistic preference, violinistic comfort, tempo, and so on. In making bowing choices that differ from markings in Bach's autograph, a violinist might instantiate or cut across the motivic connections embedded in Bach's notation, creating new patterns and structures in the process. Analysts could construct bowing reductions of specific performances or of different editions of the Largo, thereby creating a constellation of bowing-based structural possibilities for the movement. The bowing reduction reminds us how attending to performers' technical concerns can both enrich our analytical tools and elucidate our interpretive choices.

Conclusion

[5.1] As an accomplished violinist himself, Bach keenly understood the technical demands his solo works placed upon performers (Lester 1999, 9; De Souza 2017, 132–33). He knew how seemingly germane compositional choices—such as a movement's key—can profoundly impact the relationships between technique, instrumental affordances, structure, and harmony. For instance, had he composed the Largo in G instead of F, Bach could have added a decisive lower octave to the structural PAC on the downbeat of m. 18—but at the expense of the low open strings in the off-tonic quadruple stop in m. 13. Bach may have woven such connections between technique, structure, and harmony through the fabric of the Largo as an intimate communication with the performer (Cusick 1994, 19–20). Whether or not Bach consciously intended such connections, the undeniably violinistic sensibility of the Largo invites us to consider how performance technique might play a part in our analytical endeavors.

[5.2] In the Largo, technical elements of multiple stops, instrumental resonance, and bowing patterns reveal three different kinds of relationships between performance and analysis: correspondence, conflict, and creation. This attention to technique carries implications for musical contexts beyond the Largo. In addition to applying the multiple-stop intensity model to other solo string works, analysts might consider how intensity manifests for other instruments. The wide range of transcriptions of Bach's solo string works—for lute, organ, marimba, trombone, and so on—provide ample opportunity for investigating this question. We might also consider how voice-leading practices intersect with instrumental affordances. Could alternate ways of sketching the Largo in fact highlight the G-minor arrival? Analysts might apply the bowing reduction method to scores or performances of works with either articulation-based or phrase-based slurs. How do different performers navigate such markings, and how do different bowing choices bring out different structural possibilities? Attending to the technical concerns of performers across a wide range of instruments will further proliferate technique-sensitive methodologies and enrich the ways in which performance and analysis mutually inform one another.

[5.3] Finally, how do listeners figure into the relationships between performance and analysis? Even for non-string-playing listeners, certain aspects of technique might still profoundly shape listening experiences. For example, multiple-stop intensification towards cadences may implicitly shape listeners' understandings of form, cadential register and texture could impact listeners' impressions of musical affect, and repeated bowing patterns might invite listeners to attune to motivic material in its various guises. Furthermore, listeners watching a performance might understand a performer's interpretive decisions not only through the sound itself, but also through the performer's body language. As we continue to explore the rich reciprocal relationships between performing, analyzing, and listening, further insights into both long beloved and newly fascinating works lie at our fingertips.

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Footnotes

1. The turn towards technique is part of the well-documented shift from a unidirectional model of analyst-performer relationships to a more equitable reciprocity (McClelland 2003; Lowe 2003; Barolsky and Klorman 2016; Duinker 2022a). In the former model, the analyst conveys discursive knowledge to the performer, while in the latter, scholars actively collaborate and converse with performers (Pierce 2007; Duinker 2022b; Leong 2019) and center their own embodied performance experience (Le Guin 2006; Duinker 2021).
Return to text

2. In his discussion of the history of the term "interpretation," Danuser (2015, 187) notes the "ambiguity of the concept itself." In addition to interpretation, Danuser unpacks the histories of the terms "execution" and "performance." He draws on eighteenth-, nineteenth-, and twentieth-century writings from German, French, and English sources—Johann Gottfried Walther, Johann Georg Sulzer, Heinrich Christoph Koch, Hugo Riemann, Carl Dahlhaus, Hans Heinrich Eggebrecht, Theodor Adorno, and more—to illustrate how meanings and understandings of these terms have developed over time.
Return to text

3. Leong (2019, 63–66) writes: ". . . to interpret is to explicate (explain the meaning of, present in understandable terms), to construe from a certain point of view (shaped by particular beliefs, circumstances, and so on), or to realize via artistic performance or presentation (to sound, show, embody). Each of these aspects of interpretation is creative, supplying what is not present in the score, shaping what is there, or contradicting it."
Return to text

4. In his discussion of performers' writings on Claude Debussy's 1904 song "Colloque sentimental," Kaminsky (2016, [11]) sketches out the distinctions and overlaps between technique and interpretation. He writes, "As a listener and occasional performer, I recognize that it is the technical details—the conscious and unconscious physical choices that Bathori and Bernac [two singers/writers] make—that feed into and enable these performers' interpretations. As an analyst, I gravitate toward those portions of their accounts emphasizing expression, form, structural parameters, expressive timing, and shaping."
Return to text

5. Although he primarily addresses metric interpretation in Bach's "perpetual motion" movements, Joseph Brumbeloe (2000, 2) asserts that "violinists have long enjoyed confronting the technical challenges presented in these works." He substantiates this claim by drawing on a passage from a 1774 letter from C. P. E. Bach to Johann Nikolaus Forkel.
Return to text

6. Eminent Baroque violin pedagogue Stanley Ritchie (2016) succinctly addresses both technical and interpretive concerns in each movement of the solo sonatas and partitas. Ritchie's book—an invaluable resource for violinists interested in historical performance practice—effectively illustrates the overlaps between technique and interpretation. In his first chapter ("Principles of Interpretation"), Ritchie addresses topics of polyphony, harmony, and dynamics alongside fingering, note length, and bow direction.
Return to text

7. Notably, the two measures that begin the codetta (mm. 18–19) are the only two that do not include any multiple stops—a striking textural marker of the new formal section.
Return to text

8. The notion that listeners may experience bodily responses to performers' physical engagements has been well theorized. See especially Andrew Mead's (1999, 3) work on kinesthetic empathy, Elizabeth Margulis's (2014, 142) work on virtual participation, and Arnie Cox's (2016, 12) work on the mimetic hypothesis.
Return to text

9. Joel Lester ([1999](#), 41, 128–34) discusses Bach's frequent intensification towards cadences in the solo violin sonatas at greater length. Although "textural changes" factor into his discussion, he considers multiple elements of intensification working simultaneously, including harmony, melody, rhythm, figuration, and register.
Return to text

10. Violin setup is one particularly significant factor. For example, the flatter bridge and more flexible bow of a historical violin help the violinist roll through dense multiple stops with more ease than on a modern setup, while the synthetic core/metal-wound strings typical of a modern violin afford greater ring and starker dynamic contrasts than do the gut strings of a historical setup.
Return to text

11. Lester ([1999](#), 3) describes this chord—which also opens Bach's Sonata No. 1 for Solo Violin—as "the simplest and most characteristic chord the violin can produce." The G-minor chord voiced in this way frequently appears in the solo violin repertoire, especially as an opening gesture—and not always in strictly tonal contexts. Twentieth-century examples include the first movement of Bela Bartok's Sonata for Solo Violin (1944), Sz. 114 and the first movement of Coleridge-Taylor Perkinson's *Blue/s Forms* (1972).
Return to text

12. Violinists use a different finger numbering system than pianists do: the pointer finger is designated as "1," the middle finger as "2," the ring finger as "3," and the pinky as "4."
Return to text

13. By substituting the B♭ for the expected C♮, Bach also extends the descending bass line that began with the arrival of the G-minor quadruple stop on the downbeat of m. 13.
Return to text

14. The two passages differ in only four small ways: 1) Beat 3 of m. 6 begins with a double stop between F4 and E5, but the corresponding beat of m. 16 adds an open D between B♭3 and A4, creating a triple stop. 2) In m. 7, the third sixteenth note does not receive a trill marking, but the corresponding moment in m. 17 does. 3) The lower line in beat 3 of m. 7 descends to the local $\hat{1}$ (C4), which would be out of the range of the violin at the corresponding moment in m. 17. 4) Bach provides no slur markings from mm. 6–7 (with the exception of the first two sixteenth notes of the passage), but slurs do appear throughout mm. 16–17.
Return to text

15. The perfect-fifth tuning of the violin prevents an idiomatic hand-frame positioning for any of the three fully diminished seventh chords, regardless of how they are voiced.
Return to text

16. For discussion of the connection between the physical demands on a performer and harmonic affect in a pop-rock context, see Koozin 2011 (especially [7]).
Return to text

17. The feeling of this stretch exemplifies the qualitative distinction between "across-string" and "along-string" intervals on the violin, each of which feature in Leah Frederick's ([2022](#)) elegant transformational model of fingerboard space.
Return to text

18. These practical solutions, along with many (sometimes contradictory!) others, appear in two lengthy discussion board posts on Violinist.com: "Playing Fifths in Tune (von Rimscha 2005) and "Perfect Fifth Double Stops" (Keck 2011). A recent article in *Strings* magazine also addresses the practicalities of playing fifths in solo Bach (Flavin 2021). Many suggestions in the *Strings* article echo those in the Violinist.com posts.
Return to text

19. Several discussions about how to manage wolf tones appear on Violinist.com. On Bernardo B's discussion board post "Wolf tone?", users suggest changing strings, sanding down the nut (the small, raised piece of wood near the scroll), having a luthier adjust the soundpost, using a "wolf eliminator," or changing the shape of the bridge to help minimize wolf tones (Bernardo 2007).
Return to text

20. De Souza (2017, 133–39) compares how the violinistic affordances of the bariolage passage in the E major Prelude translate to the lute and to the organ. His discussion illustrates the principle of "idiomaticity."
Return to text

21. In present-day performance practice, violinists who prioritize historical performance values often employ open strings, while those with more "Romantic" aesthetic priorities tend to "stop" such pitches. Although she does not explicitly address open strings, Dorottya Fabian (2017) articulates—and complicates—the musical characteristics generally understood to define different performance practice styles of Bach's solo works. She frames her study through a Deleuzian lens, grounding her analysis in recordings of the Solo Sonatas and Partitas from the past several decades.
Return to text

22. Cumming is describing the chord that opens and closes the first movement of Bach's first solo sonata—a chord voiced identically to that of m. 13 of the Largo.
Return to text

23. $\hat{4}$ first arrives on the downbeat of m. 10 with the surface-level cadential gesture in G minor. Schenker writes: "This interpretation is borne out by the motion of the lower voice in bars 8–17, c1–g–c1, which can in no way be understood as V–II–V" (1925a, 143). Only when explaining his second level of diminution does Schenker acknowledge that the passage from mm. 10–12 "gives rise to a foreground impression of G minor: I–VI–IV–V–I" (147).
Return to text

24. Schenker (1925a, 157) justifies the crescendo approaching the PAC in V by explaining that "it must support the modulation to C major and the cadence."
Return to text

25. In the introduction to the final section of his essay on the Largo, Schenker writes, "In my forthcoming treatise, 'The Art of Performance,' it will be systematically shown for the first time that dynamics, like voice leading and diminution, are organized according to structural levels, genealogically, as it were" (1925a, 156–57). Though Schenker does discuss dynamic "qualities" in his incomplete performance treatise, he does not go so far as to structurally systematize them.
Return to text

26. To borrow Nicholas Cook's (2013, 37) framing—which Cook in turn borrows from theater studies (Melrose 1994, 215)—Schenker's approach to performance exhibits a "page-to-stage" paradigm. Cook (1995) explores a similar set of relationships between performance and analysis. He compares how Furtwängler's performances of the first movement of Beethoven's Symphony No. 9 exhibit striking connections with Schenker's performance recommendations for the piece. (Furtwängler and Schenker were frequent correspondents.) Cook is careful to point out, however, that "it would certainly not be adequate to consider these performances as simply illustrating what Schenker said in his Ninth Symphony monograph. There are many occasions when Furtwängler puts in rallentandos which Schenker proscribes, or omits dynamic shading[s] which Schenker insists on as indispensable. On the other hand, time and again Furtwängler shapes his phrases, balances his instrumentation or articulates formal junctures in ways which do match what Schenker says, or which at least seem to belong within the same language of performance that Schenker is talking" (109).
Return to text

27. Schenker ([2000](#), 3) writes, "Once a performance does take place, one must realize that thereby new elements are added to a complete work of art: the nature of the instrument that is being played; properties of the hall, the room, the audience; the mood of the performer, technique, et cetera. Now if the composition is to be inviolate, kept as it was prior to the performance, it must not be compromised by these elements (which after all are entirely foreign to it). In other words: those properties must not be given priority. Yet how casually will many an artist sacrifice the work of art—which should never be sacrificed!—to the hall, to the audience, to his fingers! He would do better to immerse himself in the work of art, maintaining its conceptual integrity during the performance."
[Return to text](#)

28. Each of these recordings is available on YouTube (linked in recordings cited). I encourage the reader to listen to each recording in its entirety. As of yet, I have not been able to confirm the date of Hahn's recording, but based on video quality and Hahn's age presentation, I would guess that this recording is from the late 1990s or early 2000s.
[Return to text](#)

29. Nowadays, the autograph manuscript of Bach's Sonatas and Partitas is easily accessible to performers and scholars. Among other sources, it appears in the edition produced by the International Music Company (edited by Ivan Galamian) and is downloadable from imslp.org.
[Return to text](#)

30. In the example, brackets signal the appearance of the motive in its various forms. Although Bach's manuscript does not include slur markings in mm. 6–7, the parallel passage in mm. 16–17 does, so I have provided two bowing possibilities for this measure. I have also provided two possibilities for m. 19; in the autograph, it is unclear where the slur ends. The bowing indications here are not definitive; violinists rely on many factors to determine bowings. For instance, in m. 9, I include two up bows in the fourth beat in order to return to a down bow on the downbeat of m. 10.
[Return to text](#)

31. If a performer chooses to match the bowing patterns between mm. 6–7 and mm. 16–17, the short version of the motive would additionally appear in beats 2 and 3 of m. 7 (making a total of eleven appearances).
[Return to text](#)

32. Given the sequential nature of mm. 10–12, Caplin ([2009](#), 34) would almost certainly characterize the passage as projecting medial function. While Caplin suggests that harmony-driven sequences are the main indicator of medial function, Caleb Mutch ([2018](#)) expands Caplin's characterization to encompass a wider array of sequence types. In the Largo, mm. 10–13.1 exhibit an S-O phrase ("spinning-out") type as described by Mutch: sequential material leads into an (optional) cadential-preparation phrase (the first 3 beats of m. 12), which in turn leads to a definitive cadential function (beat 4 of m. 12 and beat 1 of m. 13).
[Return to text](#)

33. Additional factors besides the bowing-based motive and the cadential gesture may affect a violinist's interpretive choices in this passage. Such factors include harmonic elements like the slowly descending tetrachord in the bass line or the seventh chords on beats 1 and 3, textural elements like triple stops versus single notes, and registral elements like the upper-voice line on the E string and the inner-voice line on the A string.
[Return to text](#)

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