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INTERACTIONS BETWEEN METER AND OTHER MUSICAL PARAMETERS IN WORKS BY BEETHOVEN AND SCHUMANN

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SCHOOL OF MUSIC

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ABSTRACT

This document explores ways that meter cooperates with various other musical domains. I will uncover relationships among meter, harmony, and form in Schumann's *Novellette* in D major, Op. 21, No. 4, and between meter and motive in Beethoven's String Quartet in C Minor, Op. 18, No. 4, first movement. As an entrée to these case studies, my first chapter enumerates scholars who have pursued a multivalent approach. I begin, most generally, with Richard Cohn and Douglas Dempster, who view the musical surface as a "product network," as generated by multiple and basically independent domains; I also mention James Webster, who admonishes against favoring one element at the expense of others. Next, I rehearse studies that have explored how meter cooperates with various pitch domains. David Lewin, Cohn, and Harald Krebs each argue that harmony and meter can pivot on similar principles or relationships. I will not only draw on such work but also expand on it in a few key ways. (1) I will trace interactions across entire movements (something not all of the above authors do). (2) I will relate meter not only to the tonal realm but to the motivic one as well (which Temperley does only briefly). (3) Most importantly, I will both refine the above authors' categories of parametric interaction and propose new ones as well.

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I also extend very special gratitude to my husband Christopher for being a constant source of emotional support and my best friend. Thank you for being an ear to bounce ideas off of and for encouraging me to never give up.

Introduction

This document works out ways in which meter cooperates with various other musical elements; it assumes musical works to be "a composite of many perspectives, all intertwined and co-functioning."[1] In particular, I will consider metrical, motivic, harmonic, and formal "perspectives." In line with Richard Cohn and Douglas Dempster, I will investigate how they co-generate the musical surface. Following James Webster, I will not treat domains in isolation but inspect how distinct domains enact similar processes and achieve comparable goals. Others such as David Lewin, Richard Cohn, Harald Krebs, and David Temperley have contemplated the interactions of meter with harmony, pitch and motive. Lewin and Cohn each contend that harmony and meter can pivot on similar principles and concepts, and pose metric correlates of tonic, subdominant, and dominant harmonic functions. They subsequently use this analogy to compare metrical and tonal processes in certain works. Krebs illustrates that meter, like harmony, can evince consonance and dissonance, demonstrating multiple examples of interaction of meter with harmony and form. Another article by Cohn and one by David Temperley primarily focus on working out issues of hypermeter but secondarily delve into metric/tonal interactions. From the above authors, I extrapolate three types of interactions: analogous metrical and harmonic (or formal) phenomena are coextensive; a metrical phenomenon telegraphs what is about to occur harmonically; and analogous metrical and motivic phenomena are coextensive.

I will not only draw on such work but also expand on it in a few key ways. (1) I will trace interactions across entire movements (which not all of the above authors do). (2) I will relate meter not only to the tonal realm but to the motivic one as well (Temperley does so only briefly).

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1. David Epstein, *Beyond Orpheus: Studies in Musical Structure* (Cambridge, Mass.: MIT Press, 1979), 6.

(3) Most importantly, I will both refine the above authors' categories and propose two new ones: in one, a metrical process recalls a harmonic process from earlier in the piece; in another, metrical and motivic processes unfold in staggered fashion. Importantly, I do not claim to exhaustively account for and theorize all types of interactions, merely to add a few to the existing research and plant a seed for further research. I will explore the relationships between meter and other pitch parameters in two case studies. First, in Schumann's *Novellette* in D major, Op. 21, No. 4, I will examine meter and harmony (and also form, to some extent). Second, in Beethoven's String Quartet in C Minor, Op. 18, No. 4, I will examine meter and motive.

Chapter 1

A Theoretical Framework for Interrelating Meter and Other Parameters

In musical compositions, metric and tonal elements enjoy considerable intimacy, working together and affecting each other in myriad ways. As such, it can be analytically fruitful to explore their interactions. My document will examine the relationship between meter and various pitch elements in two pieces. Specifically, it will focus on meter, harmony, and form in Schumann's *Novellette* in D Major, Op. 21, No. 4, and on meter and motive in Beethoven's String Quartet in C Minor, Op. 18, No. 4, first movement. As an entrée to these case studies, let us survey a few scholars who have taken a multivalent approach. The first group of scholars we will consider are those who address more than three domains in a given piece. The second group are those who consider three or fewer domains, of which meter is one.

Richard Cohn and Douglas Dempster view the musical surface as a "product network," wherein multiple and essentially independent elements co-generate the musical surface.[2] The authors contrast this view with a hierarchical one, by which certain domains are subordinate to others. They offer the example of the first three measures of Brahms's Symphony No. 4 in E minor, Op. 98, which can potentially be analyzed in two different ways: 1) "as a set of neighbor figures prolonging scale-degree 5 over a tonic pedal," or 2) "as a series of descending thirds, with octave transfers."[3] A hierarchical perspective would entail that one of these readings is primary, the other derived from it. By contrast, a product network would entail that this passage

2. Richard Cohn and Douglas Dempster, "Hierarchical Unity, Plural Unities: Toward a Reconciliation," in *Disciplining Music*, ed. Katherine Bergeron and Phillip V. Bohlman (Chicago: University of Chicago Press, 1992), 156–181.

3. Ibid., 174.

is *equally* generated by both approaches, "a product of the two characterizations."[4] The product network model is also able to describe how other domains, such harmony, motive, and rhythm, can co-generate musical events. This model exposes the multiple sources of derivation of an event, the better to "capture the richness that we often sense in those events."[5]

James Webster also admonishes against favoring "one aspect at the expense of others."[6] He states that conducting a multivalent analysis fosters increased sensitivity to "the richness and complexity of the greatest music."[7] Webster takes a broad, multivalent approach, incorporating several domains within his analyses, including but not limited to "tonality, musical ideas, rhythm, dynamics, instrumentation, register, [and] 'narrative' design."[8] Correspondingly, he avails himself of Schenkerian analysis, formal analysis, rhythmic analysis, and so on. Like Cohn and Dempster, Webster refuses to prioritize any one element above the others. This is particularly evident in his discussion of form:

> In many German-language writings… the form is believed to be governed by the musical themes, the patterns of their occurrence and recurrence, and the nature of their development. That is, they become 'constituents' of the form, privileged over the remaining musical parameters. In English, by contrast… the tonal structure… [is] taken as more fundamental…. However, along with many other writers, I believe that to privilege the tonal structure over the musical ideas in this manner is one-sided.[9]

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4. Ibid., 174.

5. Ibid., 171–172.

6. James Webster, "*Formenlehre* in Theory and Practice," in *Musical Form, Forms and* Formenlehre: *Three Methodological Reflections*, ed. Pieter Bergé (Leuven: Leuven University Press, 2009), 123–39; Webster, *Haydn's "Farewell" Symphony and the Idea of Classical Style Through-Composition and Cyclic Integration in His Instrumental Music* (Cambridge, U.K.: Cambridge University Press, 2004), 4.

7. Webster, "*Formenlehre* in Theory and Practice," 129.

8. Ibid., 128.

9. Ibid., 127.

(Webster is equally critical of the Germanic approach.) In his analysis of the first three movements of Haydn's Symphony in F-sharp minor, No. 45 ("Farewell"), Webster observes that, at certain points, various parameters behave in parallel ways. For example, "instability is heard in almost every aspect of the music: weak and problematic articulations of keys and cadences, the violence of minor mode itself… a lack of stepwise melody, and ambiguities of form and structural voice leading."[10]

I take inspiration from Cohn and Dempster as well as Webster in treating various structural elements as equally significant, in co-generating the musical surface, and in specifying how they act in analogous ways. However, my purview is more narrow than these authors' in that I will focus on only two or three elements in a given analysis, one of which will be meter. In this respect, my study is closer in spirit to those of David Lewin, Cohn, Harald Krebs, and David Temperley.

Lewin delves into the first 16 measures of Brahms's *Capriccio* in C major, which evinces Hauptmann's contention that the parameters of harmony and meter pivot on the same principles or relations—that, in other words, they are relatively isomorphic.[11] Harmonically, the opening bars establish tonic, the subsequent ones subdominant, and the consequent phrase dominant (via its substitute of E minor); these areas correspond, respectively, with 6/4 meter (hypermeter), 3/2 (surface meter and hypermeter), and 12/8 (hypermeter). 6/4 is thus analogous to a tonic meter, 3/2 to a subdominant meter, and 12/8 to a dominant meter. Interestingly, the numerical relations between the meters (between tonic and dominant meter, and between tonic and subdominant

10. Webster, *Haydn's "Farewell" Symphony*, 30.

11. David Lewin, "On Harmony and Meter in Brahms's Op. 76, No. 8," *Nineteenth-Century Music* 4, no. 3 (1981): 261–265.

meter) correspond to the numerical relations between the harmonic (i.e., tonic and dominant, tonic and subdominant) frequencies. What is more, "the indirectness by which the tonic key of this piece is defined corresponds to an even greater indirectness, that by which its 'tonic meter' is defined."[12] In other words, meter and harmony follow a similar trajectory.

Cohn draws on Lewin's idea that meter and harmony share innate similarities but aspires to work it out more fully.[13] First, Cohn innovates what he calls a "ski-hill graph" to distinguish among "metric states." This type of graph exhibits pulses at different rhythmic levels (Figure 1.1a) and helps one identify all theoretically possible metric states for a given piece. Figure 1.1b exemplifies the available metric states for the above ski-hill graph. Additionally, Cohn devises a type of figure called a "metric space" to illustrate the proximity of various metrical states to each other (Figure 1.1c). He describes the implications of the figure: "[s]tates are directly adjacent if they are in a relationship of simple hemiola, i.e. their pulses are congruent at all but one level. Double hemiolas are characterised by next-adjacencies, complex hemiolas by more remote relationships."[14] From this model of proximity, he derives metrical correlates of tonic, subdominant, dominant, and "double dominant" (tonicized dominant) functions. Cohn takes each connecting line to be analogous to the interval of a fifth. Hence, if B is "tonic" (as is the case in Brahms's "Von ewiger Liebe," Op. 43, No. 1), metric states C and D would both be considered "dominant," E "double dominant," and A "subdominant." Using this model, Cohn demonstrates the alignment of metrical and tonal domains in the "tonic/dominant" conflict in mm. 46–50 of Brahms's "Von Ewiger Liebe" and motion from a "double dominant" to a "dominant" in mm.

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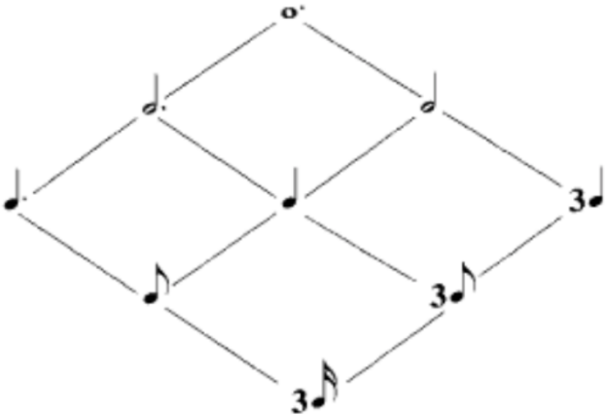
12. Lewin, "On Harmony," 263.

13. Cohn, "Complex Hemiolas, Ski-Hill Graphs and Metric Spaces," *Music Analysis* 20, no. 3 (2001): 295–326.

14. Ibid., 309.

75–78. Cohn thus provides a more precise argument for meter and harmony pivoting on similar principles.

A



B

Left outer	A		Right outer	F
Left slalom	B		Right slalom	E
S curve	C		Z curve	D

C

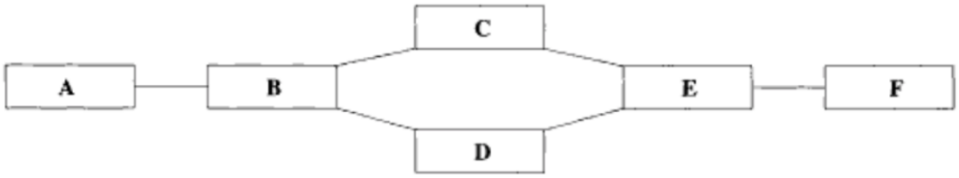


Figure 1.1. Ski-hill Graph, Metric States, and Metric Space from the Scherzo from Dvořák's Symphony No. 7, Cohn's Example 10, 11, and 12

Finally, Krebs illustrates that meter, like harmony, can evince consonance and dissonance.[15] I will provide a more detailed explanation of Krebs's definition of meter, metrical

15. Harald Krebs, *Fantasy Pieces: Metrical Dissonance in the Music of Robert Schumann* (New York: Oxford University Press, 2003), 23.

dissonance, and metrical consonance later on. Krebs then illustrates a number of ways in which meter interacts with harmony and form. First, tonal instability can run parallel to strong metrical dissonance, as occurs in mm. 9–12 of Schumann's *Papillons*, Op. 2, No. 5. Second, meter and harmony can be simultaneously intensified. In Schumann's *Kreisleriana*, Op. 16, No. 2, metrical dissonance is heightened alongside the onset of several 7^{th}- and 9^{th}-chords. Third, in Schumann's *Papillons*, Op. 2, No. 11, metrical dissonance escalates when the piece moves away from the primary tone. Fourth, metrical resolution can help delineate formal boundaries. For instance, the first phrase of Schumann's "Grillen," from *Phantasiestücke*, Op. 12, closes with the resolution of metrical dissonance that had erupted within the phrase. Finally, metrical dissonances can serve as markers that predict upcoming points of formal division. For example, in the Finale of Schumann's String Quartet in A minor, Op. 41, No. 1, the exact same metrical dissonance turns up near the end of both the exposition and the development, signaling the close of these sections. Importantly, this final type of interaction is distinguished from the others mentioned to this point, all of which entail a metrical process or state occurring *simultaneously* with a similar harmonic or formal process or state. In this final case, by contrast, the metrical state occurs just *before* the formal state it signals.

Another work by Cohn and one by Temperley primarily focus on working out issues of hypermeter, but secondarily delve into metric/tonal interactions. Cohn demonstrates how hypermeter creates drama in the Scherzo from Beethoven's Symphony No. 9 in D minor, Op. 125. [16] Figure 1.2 illustrates various levels of hypermeter. The *x*s denote the metrical pulse stream, and the *less than* symbols various levels of hypermeter. Additionally, strong beats (those

16. Cohn, "The Dramatization of Hypermetric Conflicts in the Scherzo of Beethoven's Ninth Symphony," *Nineteenth-Century Music* 15, no. 3 (1992): 188–206.

that correlate with pulses at higher levels) are underlined. The 2s and 3s on the left side of the figure denote the grouping structure of each metric/hypermetric level.[17] These levels are arranged from highest to lowest. Cohn differentiates among three types of hypermetric states (i.e. collection of hypermetric levels): pure duple, pure triple, and mixed states. These labels are particular to grouping structures above the measure. The progression of states throughout the Scherzo is demonstrated in Figure 1.3. Here, solid lines denote clear metrical distinctions, jagged lines denote metrical ambiguity. Cohn goes a step further to illustrate a connection between meter and harmony, noting the association between a pure duple state and the major mode in this movement. As evidence, he cites that "all prolongations of major triads are either in pure duple meter or move toward duple at some metrical level…. [additionally,] all pure duple passages are in major" with only one exception (in the recapitulation, duple aligns with the parallel minor)."[18] In this way, Cohn, like the others, highlights how various domains can cooperate.

Figure 1.2. Pure Duple Metrical State, Cohn's Figure 2

17. In this work, Cohn chooses to limit the grouping of levels to duple or triple.

18. Cohn, "The Dramatization," 205.

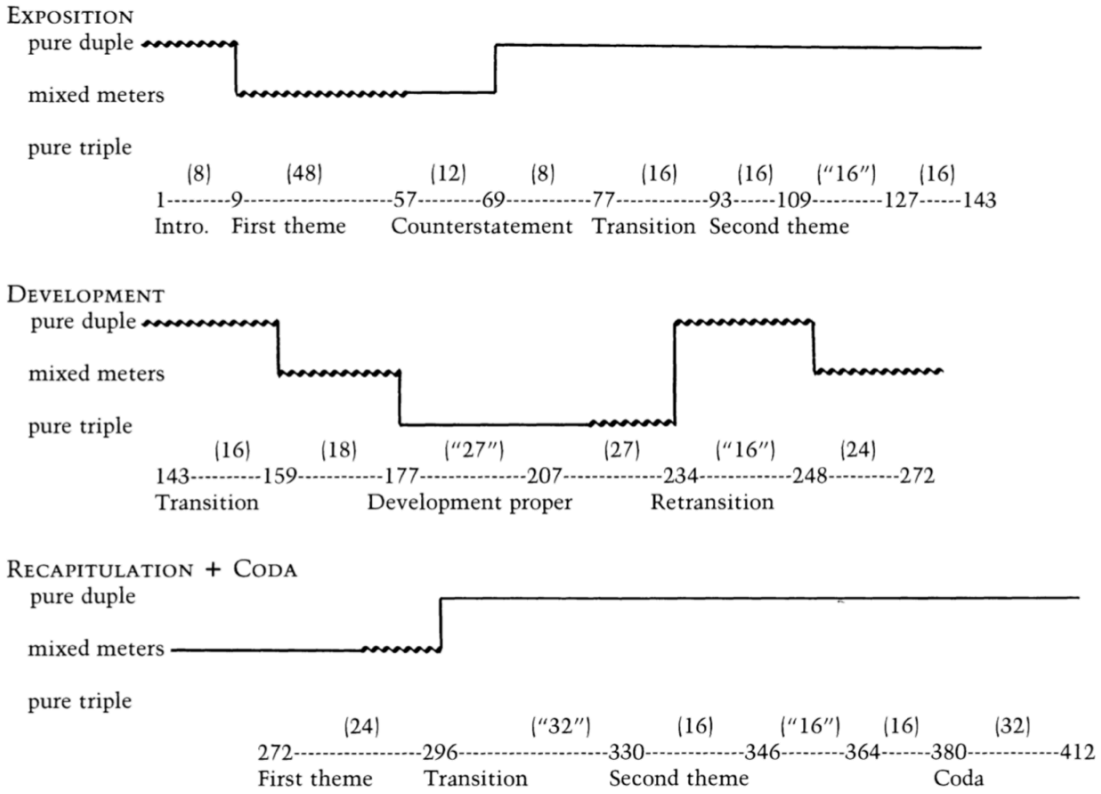


Figure 1.3. Metrical States throughout Beethoven's Symphony No. 9, Op. 135, Cohn's Figure 3

Temperley, meanwhile, coins the notion of a "hypermetrical shift."[19] To begin, he establishes that, in the common-practice era, pieces normally exhibit duple hypermeter. He uses "odd-strong" to indicate where strong hyperbeats falls on an odd-numbered measures, "even-strong" to indicate where they fall on even-numbered measures. A hypermetrical shift occurs when the hypermeter transitions from odd-strong to even-strong (or vice versa). There are two

19. Temperley, "Hypermetrical Transitions," *Music Theory Spectrum* 30, no. 2 (2008): 305–25. doi:10.1525/mts.2008.30.2.305.

types of such shifts: sudden and gradual.[20] A gradual shift arises when, say, an even-strong hypermeter is followed by an ambiguous section which has both even-strong and odd-strong elements before the odd-strong finally takes over. Hypermetrical shifts can (A) highlight (align with) formal elements and boundaries; (B) they can shadow a tonal arch of stability–instability–stability, and (C) they can form a hypermetrical analogue of motivic liquidation.[21] This third interaction points to a type of parametric interaction we have not yet discussed: analogous metrical and motivic processes happening at the same time.

As we have seen, numerous authors have contemplated ways in which meter interacts with other parameters—in particular, harmony, form, and motive. We can extrapolate from the above examples three types of interaction: (1) metrical and harmonic (or formal) phenomena are coextensive; (2) a metrical phenomenon telegraphs what is about to occur harmonically; and (3) metrical and motivic phenomena are coextensive.

In this thesis, I will not only draw on the above authors' ideas but also expand on them in a few crucial ways. First, I will trace parametric interactions across entire works (which not all of the above authors do). Second, I will relate meter not only to the tonal entities and form but to motivic entities as well. Temperley briefly addresses meter and motive but I will investigate it more thoroughly. Third, and most importantly, I will both refine the above authors' categories and propose two new types of interactions: in one, a metrical consonance/dissonance recalls a harmonic process from earlier in the piece; in another, metrical and motivic processes unfold in a staggered format.

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20. These types are distinguished according to Fred Lerdahl and Ray Jackendoff's Metrical Preference Rules (MPRs). I will provide more detail on these later on.

21. As examples of these, Temperley cites, respectively, Haydn's Symphony No. 104, Allegro, mm. 1–19, Beethoven's Sonata Op. 10, No. 2, first movement, mm. 1–23, and Beethoven's Symphony No. 5, first movement, mm. 174–218.

Before proceeding, I briefly clarify a few crucial terms, which is necessary because metrical terminology is generally unstable, that is, metrical terms are used in a variety of different ways. In the definition of meter presented here, I will draw primarily from Krebs, but will also incorporate Lerdahl and Jackendoff's MPRs.[22] Meter, simply stated, is the interaction of two or more pulse streams, as Krebs puts it: "the union of all layers of motion (i.e., series of regularly recurring pulses)."[23] A layer is defined as equidistant pulses (where a pulse is a point which marks a specific location in a piece yet is itself devoid of duration). Pulse streams can occupy multiple levels: a level below/faster than the tactus (for Krebs, the micropulse layer), a level aligned with the tactus (for Krebs, the pulse layer), and a level above/slower than the tactus (for Krebs, the interpretive or metrical layer). To break with Krebs briefly, Lerdahl and Jackendoff consider metrical accent to arise from the layering of multiple pulse streams (levels) where the coinciding of pulses from multiple levels generates a metrical accent. This is illustrated by Lerdahl and Jackendoff in my Figure 1.4 (their Figure 2.9).[24] The pulse streams are dependent on various musical cues, which Lerdahl and Jackendoff categorize as Metrical Preference Rules (MPRs). A MPR attempts to express and codify the process by which people intuitively understand meter in pieces. Figure 1.5 provides a list of Lerdahl and Jackendoff's MPRs.

In addition to MPRs, I will rely on Joel Lester's "pattern beginnings."[25] This cue is an extreme version of MPR2. I will refer to this cue as "motive onset." Hence, meter is formulated

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22. Krebs, *Fantasy Pieces;* Fred Lerdahl and Ray Jackendoff, *A Generative Theory of Tonal Music* (Cambridge, Mass.: MIT Press, 1983).

23. Krebs, *Fantasy Pieces*, 23.

24. Lerdahl and Jackendoff, *A Generative Theory*, 71.

25. Joel Lester, *The Rhythms of Tonal Music* (Carbondale: Southern Illinois University Press, 1986).

in the mind of the listener, and consists of multiple converging pulse layers as delineated by salient events.

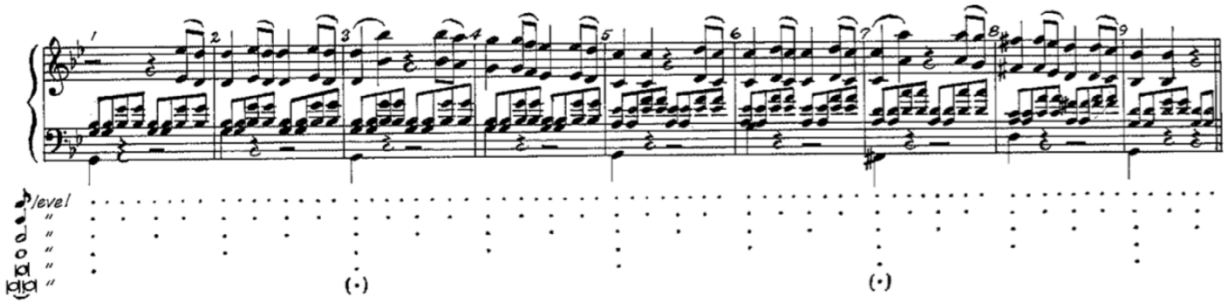


Figure 1.4. Metric Dot Diagram, Lerdahl and Jackendoff's Figure 2.10

1 (Parallelism)	Where two or more groups or parts of groups can be construed as parallel, they preferably receive parallel metrical structure
2 (Strong Beat Early)	Weakly prefer a metrical structure in which the strongest beat in a group appears relatively early in the group
3 (Event)	Prefer a metrical structure in which beats of level Li that coincide with the inception of pitch-events are strong beats of Li
4 (Stress)	Prefer a metrical structure in which beats of level Li that are stressed are strong beats of Li
5 (Length)	Prefer a metrical structure in which relatively strong beats occur at the inception of notes of relatively long duration
a)	Prefer a relatively long pitch-event
b)	Prefer a relatively long duration of a dynamic
c)	Prefer a relatively long slur
d)	Prefer a relatively long pattern of articulation
e)	Prefer a relatively long duration of a pitch in the relevant levels of the time-span reduction
f)	Prefer a relatively long duration of a harmony in the relevant levels of the time span reduction (harmonic rhythm)
6 (Bass)	Prefer a metrically stable bass
7 (Cadence)	Strongly prefer a metrical structure in which cadences are metrically stable; that is, strongly avoid violations of local preference rules within cadences
8 (Suspension)	Strongly prefer a metrical structure in which a suspension is on a stronger beat than its resolution
9 (Time-span interaction)	Prefer a metrical analysis that minimizes conflict in the time-span reduction
10 (Binary regularity)	Prefer metrical structures in which at each level every other beat is strong

Figure 1.5. Lerdahl and Jackendoff's Metrical Preference Rules, pp. 75–90

As briefly introduced above, Krebs distinguishes between metrical consonance and metrical dissonance. Metrical consonance is defined as nested pulse streams, or "when [pulse streams] *sound together.*"[26] Conversely, metrical dissonance is where multiple, misaligned

26. Krebs, *Fantasy Pieces*, 29.

interpretive layers sound simultaneously or in quick succession. Figure 1.6 illustrates metrical dissonance in mm. 28–31 of the "Préambule" from Schumann's *Carnaval*, Op. 9.[27] Here, the numbers describe the grouping of quarter notes (n=quarter note) in each interpretive layer as well as their placement within the bar. In Figure 1.6, the interpretive layers are unequal, forming a 3:2 ratio. Because the groups are of different cardinalities, they form what Krebs calls grouping dissonance. This is labeled G3/2. Figure 1.7 shows displacement dissonance, where identical timespans are misaligned throughout.[28] This dissonance is labeled D6+4 because an interpretive pulse stream of 6s has been displaced forward by four eighth notes (where n=eighth note). The two metrical dissonances just mentioned are "direct," in that multiple conflicting pulse streams occur within the same set of measures. Krebs distinguishes direct from "indirect" dissonance: when competing pulse streams occupy *successive* passages of music. For example, in Figure 1.8, mm. 17–18 exhibit a pulse stream of bar-aligned 6s, yet at the onset of m. 19, all musical cues switch to support a pulse stream of 4s (G6/4). Dissonance arises due to the "tendency as listeners to maintain an established pulse for a short time after it is discontinued in actuality."

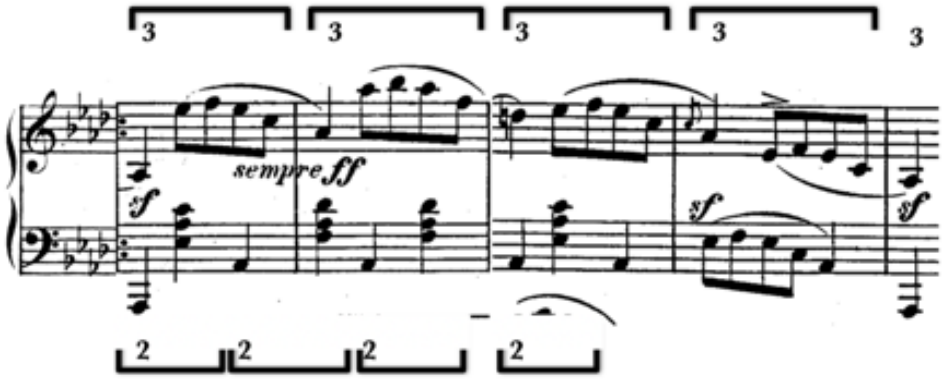


Figure 1.6. Schumann "Preambule" from Carnaval, mm. 28–31, Krebs's Example 2.7.

27. Ibid., 33.

28. Ibid., 35.

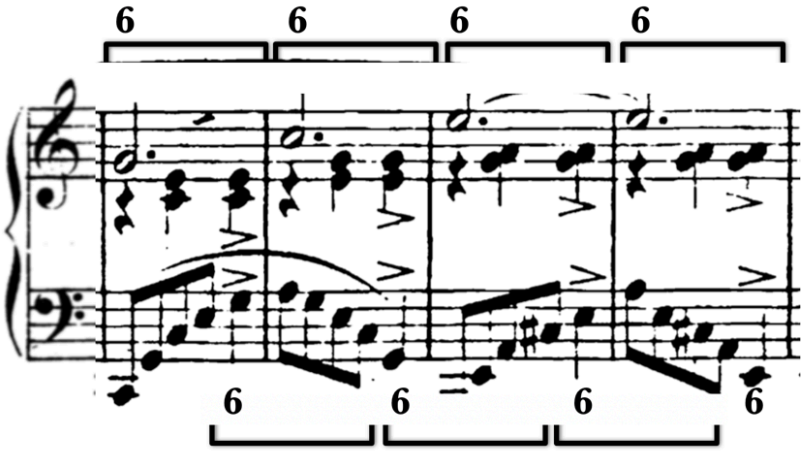


Figure 1.7. Schumann *Papillons*, Op. 2, No. 10, mm. 24–28, Krebs's Example 2.8

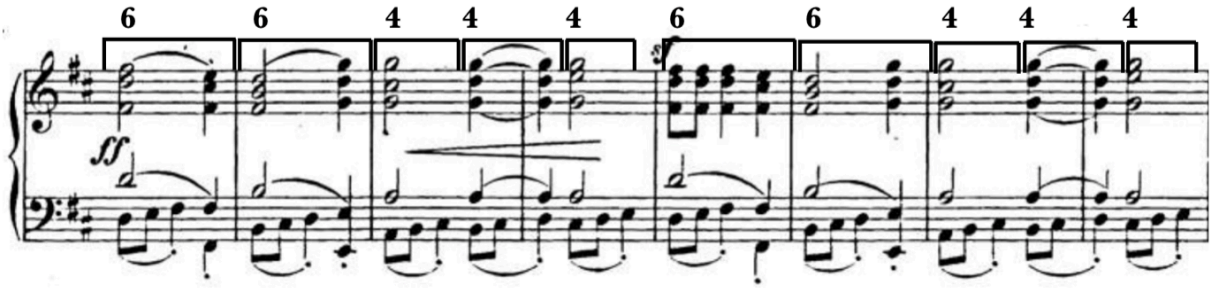


Figure 1.8. Schumann *Novellette* Op. 21, No. 4, mm. 17–24

Having reviewed some literature that establishes my basic approach, the next two chapters can move on to case studies. The next chapter looks at Schumann's *Novellette* in D major, Op. 21, No. 4, which coordinates a harmonic and formal analysis with a metrical analysis. Within this chapter, I detect three types of interactions: 1) a metrical process/state runs parallel to a similar harmonic or formal process/state; 2) metrical consonance/dissonance recalls a harmonic process from earlier in the piece; and 3) a metrical process gives cues as to what is about to occur in the harmonic realm. Finally, the third chapter presents an analysis of Beethoven's String Quartet, Op. 18, No, 4, first movement and the interaction between motivic and metrical

domains. Two additional interaction types transpire in this piece: 4) analogous tonal and metrical pitch processes unfold in a staggered way, and 5) analogous tonal and metrical processes unfold simultaneously.

Chapter 2

Interaction of Meter and Harmony in Schumann's *Novellette* Op. 21, No. 4

I. Introduction

Schumann's *Novellette* op. 21, no. 4 is a harmonically robust and metrically diverse piece. It exemplifies three fascinating interactions between meter and harmony/form: 1) analogous metrical and harmonic processes or states run simultaneously; 2) a metrical process recalls a harmonic process from earlier in the piece; 3) a metrical phenomenon telegraphs what is about to happen harmonically.

I will begin with a brief outline of this piece's basic formal and tonal structure. (The reader might care to refer to the complete score.) The formal design of the piece is ternary. The first section, A_1 is a binary form, whose **a** section is a 16-measure sentence replete with a compound basic idea, repetition, and continuation. This theme, rather idiosyncratically, features an expansive auxiliary cadence in the key of D major: the first chord, V^7, is essentially composed-out across the entirety of mm. 1–16, with the tonic finally arriving at m. 17. This is followed by a new section, mm. 17–32, the second half of which has tumultuous, dissonant sonorities outlining a whole-tone scale and, in mm. 29–32 a lament bass; all these undermine the tonal center, leading to V^7 of C major in m. 32.

This section, mm. 17–32, is formally ambiguous: initially it seems to have a closing function due to the extension of the cadential tonic via short cadential affirmations. However, mm. 25–32 begin to morph into a transition due to the sequences, unstable sonorities, and modulatory trajectory. The opening theme returns in m. 33, signaling the onset of the **a′** section,

albeit initially in C major. D major is finally restored in m. 41. The **a′** section also demonstrates formal ambiguity, because the return of the main theme is out of sync with the arrival of the home key.

The B section shifts to the dominant key, A major. This is more typical of the secondary key-area of a major-key sonata form than of the middle section of a ternary form, which is often in the parallel mode of the home key. This section normalizes the A major that, in the A section, had functioned as a dominant, one that conspicuously delayed the tonic. Now, in the B section, it is dignified as a local tonic. The B section occupies mm. 50–99, with two subsections (mm. 50–65, mm. 66–99). The first subsection is characterized by slow harmonic rhythm: whereas in A_1 the harmonies generally change each measure, in B they change basically every other measure. The section concludes with a half cadence in A major. The opening of the section expands the tonic (mm. 50–55) before devolving into more dissonant, chromatic, and ambiguous sonorities.

Measures 56–57 set up two tonal problems to be resolved. The first is the B-flat dominant 7^{th} chord introduced in m. 56, implying resolution to Eb which never transpires. The second, in m. 57, is the Gr^{+6} in the key of D, which also does not resolve; instead, it is transformed into a vii^{o7} of A minor. However, that expected key is replaced by F major, by virtue of the leading-tone-exchange transformation (L). That F major chord, which is VI in A minor, is quickly transformed into a Gr^{+6}, which again points to the key of A minor that had just been foiled by F. In this sense, this F Gr^{+6} can be seen to "correct" the B-flat Gr^{+6} of m. 57, which never resolves. The F Gr^{+6} resolves to E major as one would expect but E major in the $^6_4$ inversion, which strongly implies a cadential $^6_4$ (resolving to a B^7, which is the V/V in A)!

The harmonic ambiguity continues into the next subsection. Modulation to F major is implied in mm. 68–71, which houses a ii^6_5–V^7 in that key. The I in F does not arrive until m. 77,

and rather inauspiciously. In m. 82, the ii pivots as a iv in D major, and the section half-cadences in D major in m. 86, eliding with the start of the A_2 section.

In A_2 only one deviation occurs: the final measure (what was m. 49) is abruptly elided; in its place comes the first measure of the coda. This chaotic, Chopinesque coda is characterized by *moto perpetuo* and erratic figuration. In mm. 134–61 the piece wavers between D major and B minor with 4–8 measure progressions in each key before culminating in D major. A perfect authentic cadence occurs in m. 162, eliding with the ensuing phrase which affirms D major (mm. 162–69). The opening theme recurs in mm. 170–89, somewhat lyrically transformed and underpinned by a descending-5^{th} sequence. The theme is curtailed by a premature entrance of the codetta material from mm. 17ff. The final section is announced by motivic liquidation and a dissolving of tempo regularity. The codetta of the coda (m. 190 to the end) tonicizes IV, and the final measures see yet more liquidation. In summary, the coda has four distinct modules: 1) an alternation between D major and B minor; 2) an affirmation of D major; 3) a transformed return of the opening theme; and 4) a codetta.

A few brief Schenkerian remarks are in order. In A_1, directly after the initial ascent to scale-degree 5, the upper line completes a fifth-progression, a parallelism of the *Urlinie* (Figure 2.1). The A, scale-degree 5, persists throughout the A_1 section. The B section also composes out A, now employing an ascending fifth-progression across mm. 50–62 (Figure 2.2). Throughout the return of A_2, the line fails to progress beyond a composed-out *Kopfton* (Figure 2.3). This section, in replicating the first section almost verbatim, studiously avoids making the structural changes necessary for the *Urlinie* to complete its descent. That structural descent finally occurs near the end of the coda, in mm. 180–190 (Figure 2.4). Schumann thus delays the descent until the very end of the piece, maintaining tension until the very end.

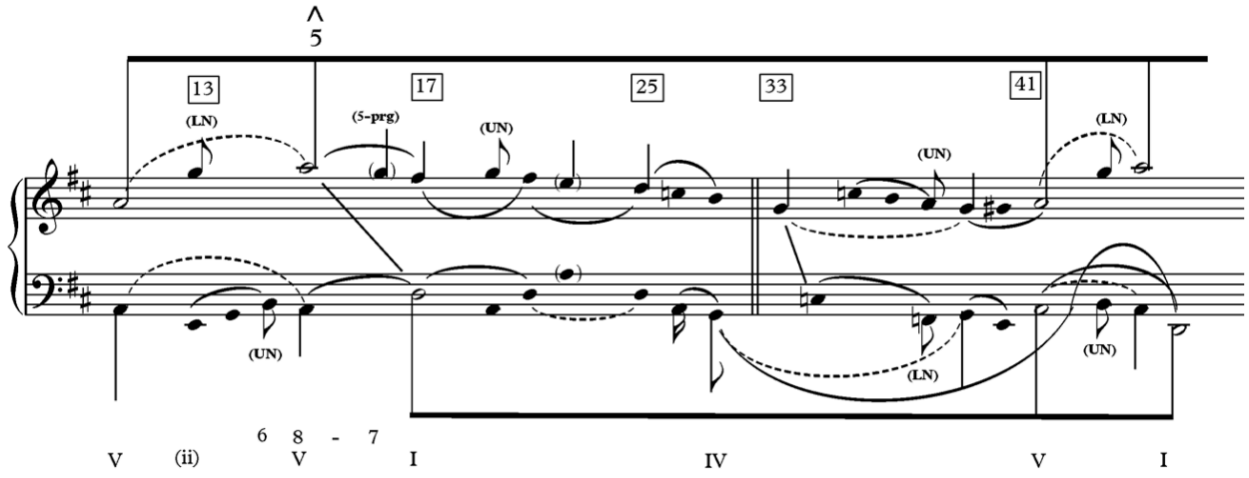


Figure 2.1. A_1 Section Middleground Graph, Schumann *Novellette*, Op. 21, No. 4

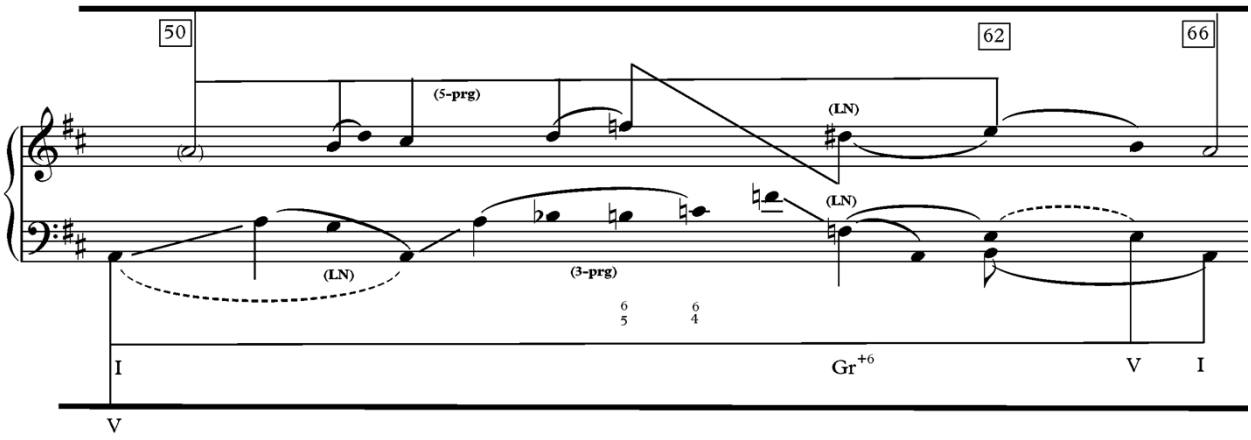


Figure 2.2. B Section Middleground Graph, Schumann *Novellette*

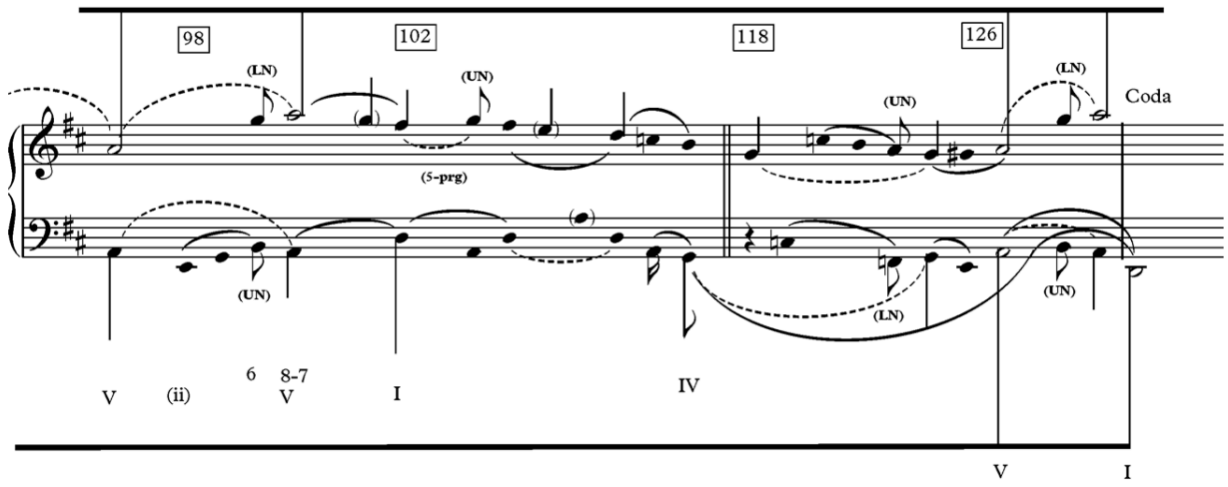


Figure 2.3. A_2 Section Middleground Graph, Schumann *Novellette*

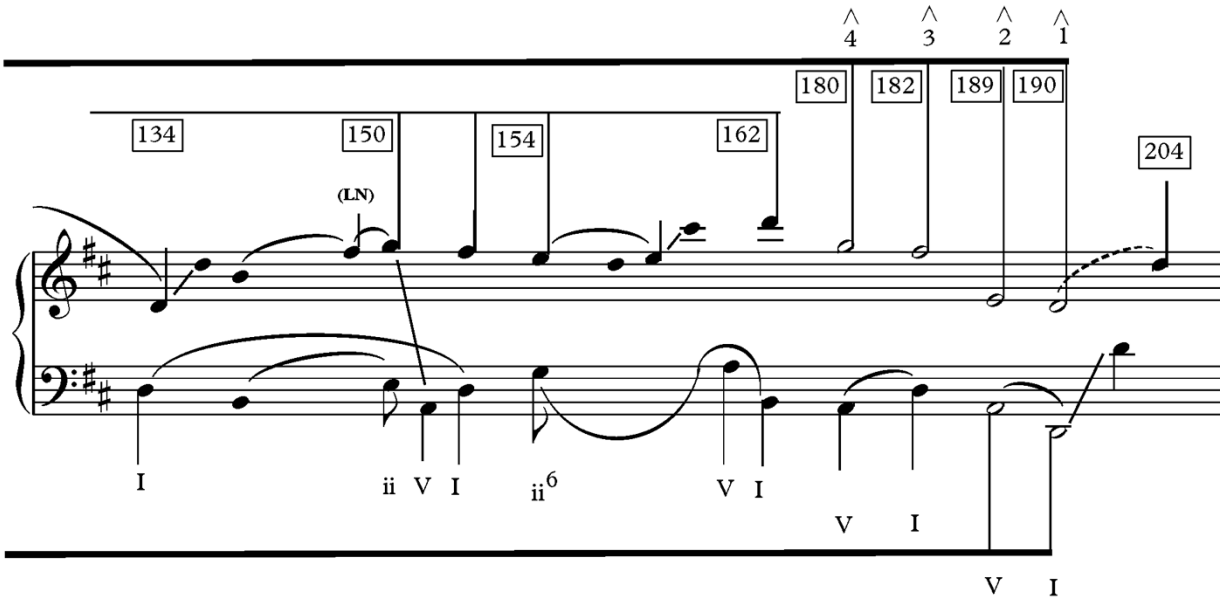


Figure 2.4. Coda Middleground Graph, Schumann *Novellette*

II. The A_1 section

D Major and D6+2 Undercut by C Major and D6+4

Within this section, a metrical process runs parallel to a similar harmonic/formal process. This parallel-process relationship I refer to as *Interaction Type 1*. These concurrent processes traverse three stages: 1) The home key and D6+2 dissonance are introduced at the beginning, alongside the original theme. 2) The original theme returns in the "wrong" key (C major) in m. 33 and the meter simultaneously undercuts the D6+2 from the opening section with a strong D6+4 dissonance. 3) D6+2 is reinstated when the opening theme returns in the home key in m. 41. I will address each of these stages in detail.

The initial stage spans mm. 1–16 (Figure 2.5). Within these measures, as described above, a V^7 chord in D major is prolonged. Additionally, D6+2 dissonance (n=eighth note) is introduced and normalized both through extensive reiteration and its association with the main theme; D6+2 thus adopts a somewhat stable function through habituation. Here, bar-aligned 6s, the metrical layer, are substantiated by motivic-onset in the bass (that is, Lester's "pattern beginning"), slur-onsets in mm. 1, 5, etc., and agogic accents in the right hand. A displaced pulse stream also occurs, supported by textural density and accented chromatic passing tones in the bass on beat 2 of each bar. These displacements are substantiated in the melody by registral emphasis and scale-degree 5 to scale-degree 1 motions in mm. 1–2, 5–6, and 9–10. Hence, within the **a** section, the theme is paired with the home key and a somewhat stable metrical dissonance. In the final measures of the **a** section (mm. 13–16) a brief D6+4 is introduced, induced by dynamics, staccato markings in the right hand, and textural density.

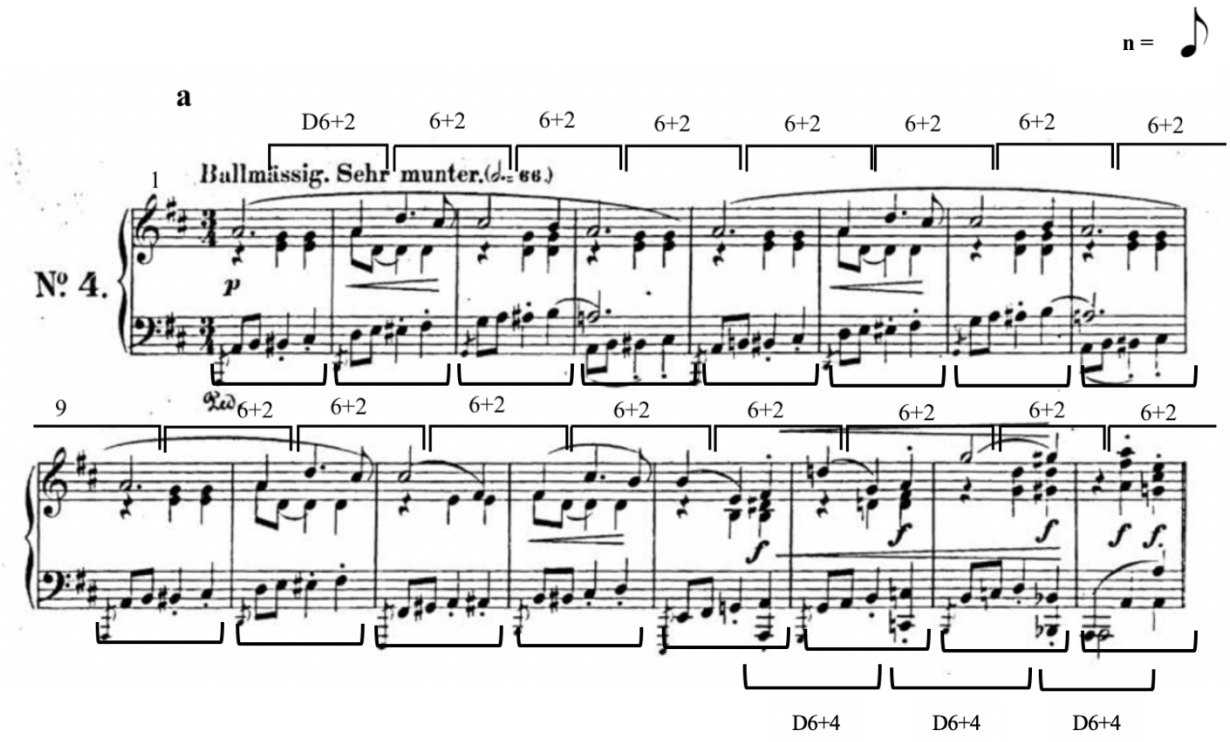


Figure 2.5. Mm. 1–16, D6+2 Dissonance, Schumann *Novellette*

The second stage, mm. 33–40, marks the return of the theme in C major, a key rather removed from D major. D6+2 is overshadowed by D6+4 (Figure 2.6). This accentuated dissonance, D6+4, is triggered by notated accents and the *sf* in m. 40. Here, Schumann incorporates the dissonance from the end of the opening phrase (mm. 13–16) into the phrase in C major. Hence, this dissonance introduces metrical imbalance that is a counterpart of the tonal imbalance created by C major.

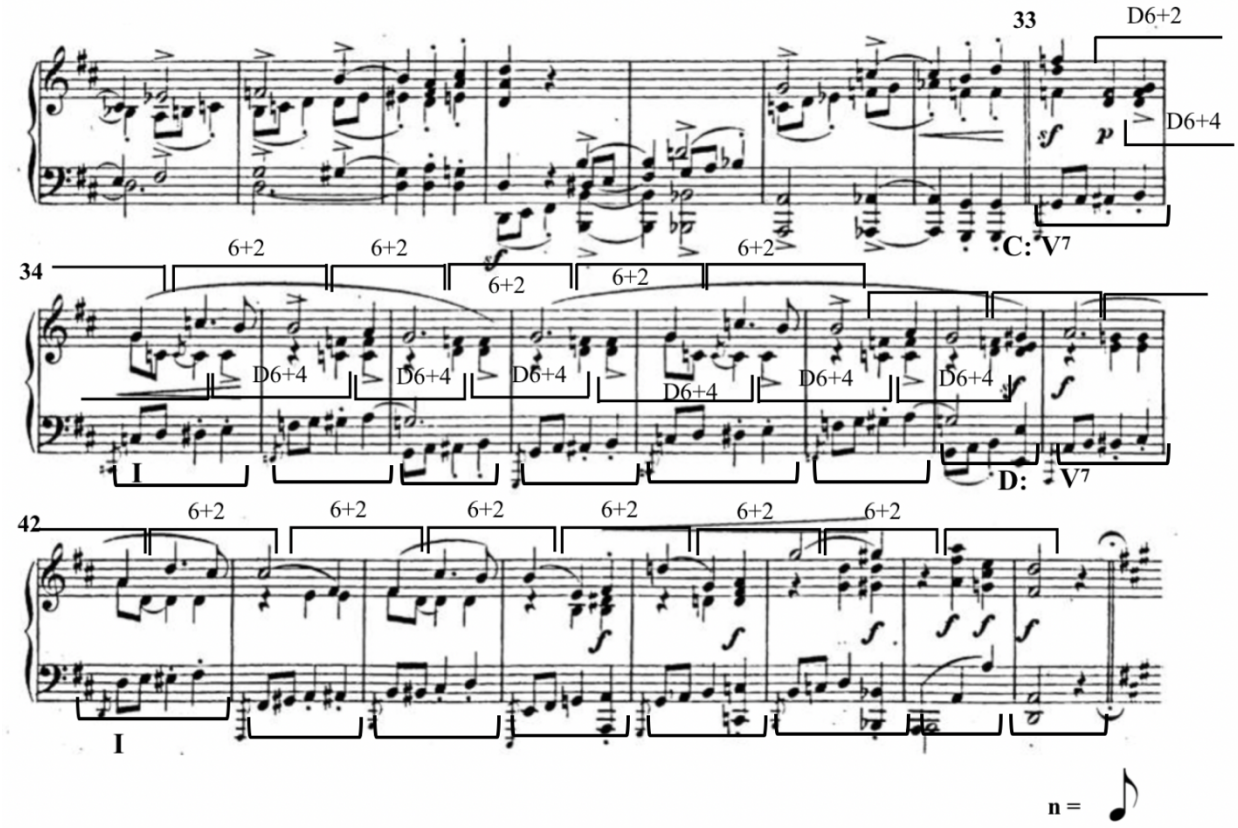


Figure 2.6. Mm. 33–49, D6+2 Dissonance and D6+4 Dissonance, Schumann *Novellette*

Finally, in the third stage, relative stability infuses the harmonic and metrical domains. The piece restores D major in m. 41 and reaches a perfect authentic cadence in m. 49. At the very moment where the home key returns, D6+4 vanishes and D6+2 regains prominence. Hence, harmonic and metrical domains work in tandem and trace an arch of stability–instability–stability.

Metrical Dissonance Reenacts Harmonic Phenomenon

In *Interaction Type 2*, a metrical phenomenon recalls an analogous harmonic phenomenon from earlier in the piece. To review, the opening defers the tonic with a dominant

expansion. The V of m. 1 is prolonged by a lower-neighbor G in m. 3 and then upper-neighbor motion in m. 15. The tonic is delayed, generating tension, or longing. In m. 17, a bona fide tonic finally arrives. At long last, the (relative) instability of the first 16 measures is partially alleviated. Earlier, I had spoken of this section as stable relative to mm. 33–40 since overall it is in the home key. More locally, however, this section is unstable due to the expansion of the dominant. That is, because these measures delineate the dominant of an auxiliary cadence, they are less stable than the subsequent tonic of that cadence (arriving in m. 17).[1]

At m. 17, at the same moment where the tonic chord arrives, metrical consonance also arrives and spans two measures; hence, we seem to reach both metrical and tonal resolution. However, metrically, the resolution is very brief and is itself tainted by being indirectly metrically dissonant in relation to the preceding measures. In mm. 17–24, the meter quickly alternates between bar-aligned 6s and 4s, thus generating indirect G6/4 dissonance. Bar-aligned 6s in mm. 17–18 and 21–22 are supported by slur-onsets, agogic accents, and motivic-onsets. In mm. 19–20 and 23–24, 4s are sustained by (accelerated) motivic onsets in the bass, slurs in the bass, change of pitch in the alto voice (moving in parallel tenths with the bass), and inter-onset intervals in both the right hand and the top voice of the left hand. Hence, no sooner is harmonic

1. Additionally, harmony differs from meter in that it is not able to be normalized quite as easily by association with the main theme.

resolution reached than some instability returns; the tonal tension of the first 16 measures now takes the form of metrical tension (Figure 2.7).

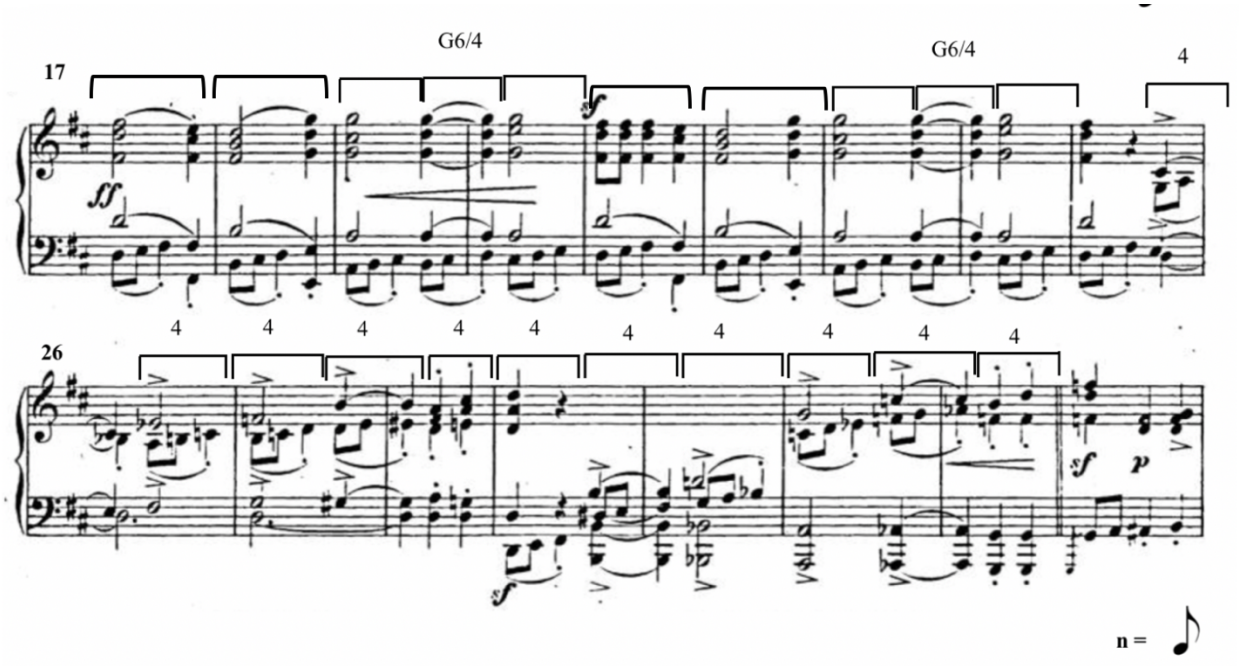


Figure 2.7. Mm. 17–32, Schumann *Novellette*

Metrical resolution is gradually established within mm. 25–32 where 4s commandeer the meter. Although this metrical state does not accord with the time signature, it is corroborated by motivic-onsets, slur-onsets, agogic accents, inter-onset intervals, and notated accents. This section, then, demonstrates how metrical processes reenact harmonic processes (Figure 2.8).

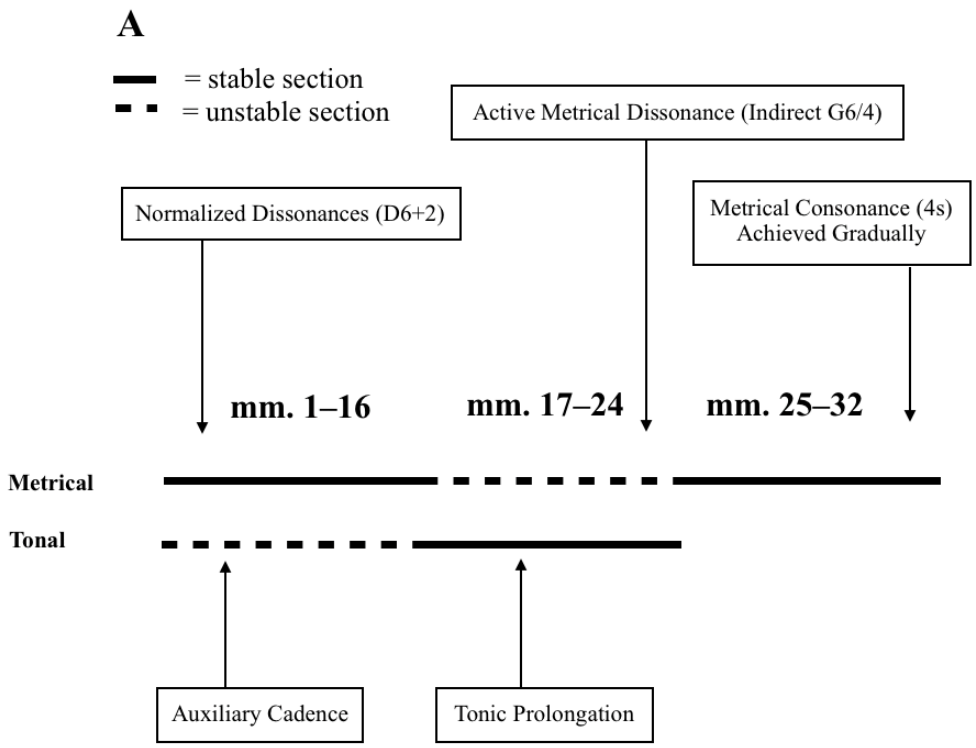


Figure 2.8. Stability and Instability in the A_1 Section, Schumann *Novellette*

Metrical and Harmonic Clarification Coincide

The most striking interaction of harmony and meter within the B section falls under *Interaction Type 3*, by which a metrical process gives cues to what is about to happen harmonically. This section is generally characterized by D2-1 dissonances occurring between the quarter-note bass and the repetitive dyads (Figure 2.9) and an unswervingly duple hypermeter, an ever-dependable backdrop for the metrical dissonances and ambiguities of the surface.[2]

However, there is ambiguity at the sub-hypermetric level as to whether each two-measure unit is split into 6s or 4s. 6s would be substantiated by registral accentuation and agogic accents

2. The offset pulse does impact the hypermeter slightly, implying D12-1 dissonance. However, both the bar-aligned and offset hypermeters are decidedly in 12, as clarified by harmonic change.

in the left hand. Conversely, 4s have the support of agogic accents in the right hand. Yet, the music does not offer a strong motive that would favor one or the other (Figure 2.10). However, the ambiguity is resolved in favor of bar-aligned 6s at two telling moments (Figure 2.9). First, just before the cadence concludes with the V in mm. 64–65, the metrical ambiguity dissipates. The meter indicates that harmonic resolution is imminent. In the second subsection (mm. 66–85) the ambiguity becomes more elaborate as the melody (the line which communicates either 6s or 4s) is offset from the barline. Additionally, brief snippets of clarification occur throughout the subsection, in mm. 68–70, 72–73, and 76–77 (substantiated by agogic accents in the bass and melody). Yet, the most extensive clarification spans mm. 80–85 (supported by pitch-onset in the right hand), indicating impending harmonic resolution. Sure enough, this section cadences in D major in m. 86. In two cases within this section, metrical clarification thus signals harmonic resolution.

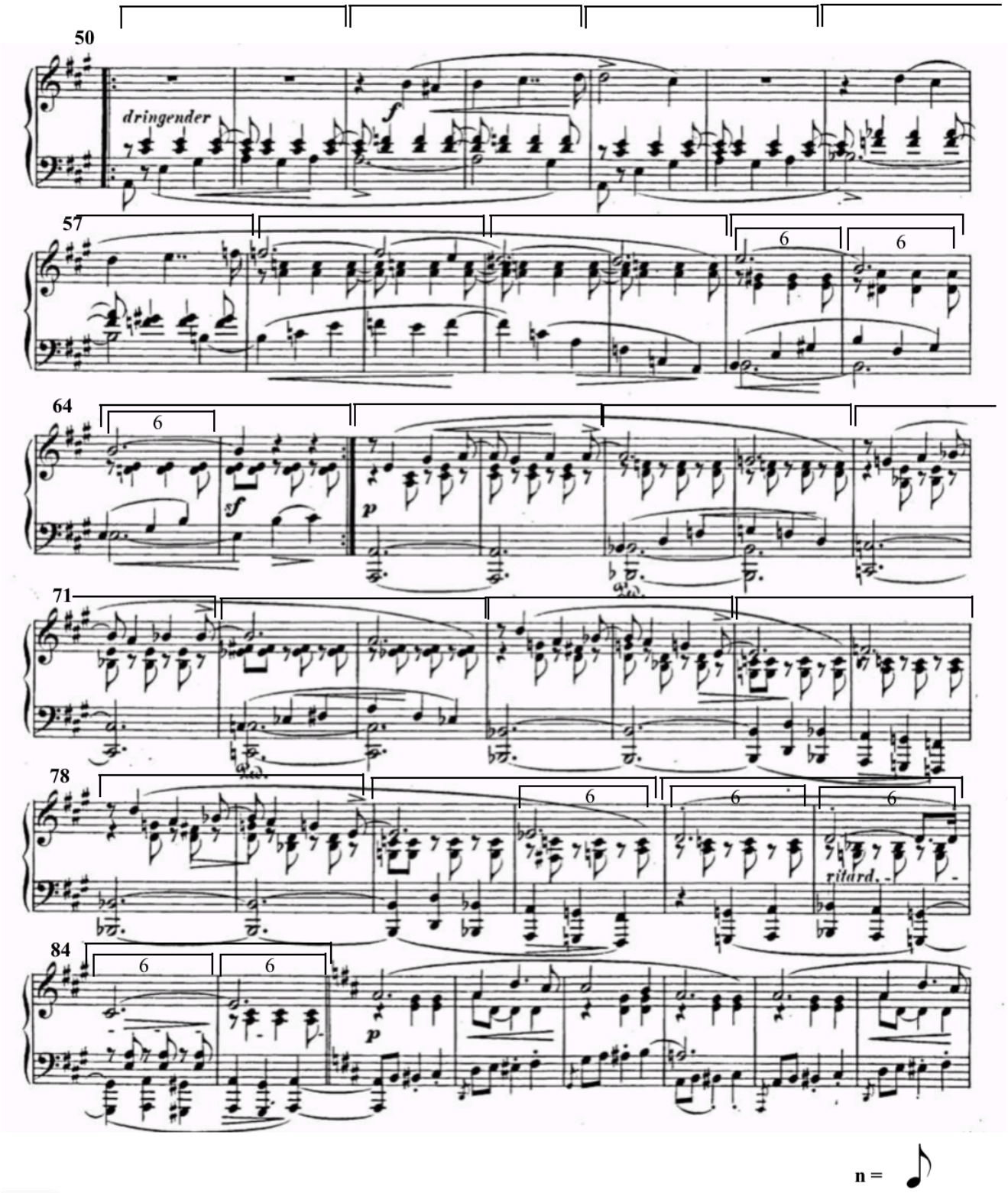


Figure 2.9. Metrical Clarification and Unswerving Hypermeter in the B Section, Schumann *Novellette*

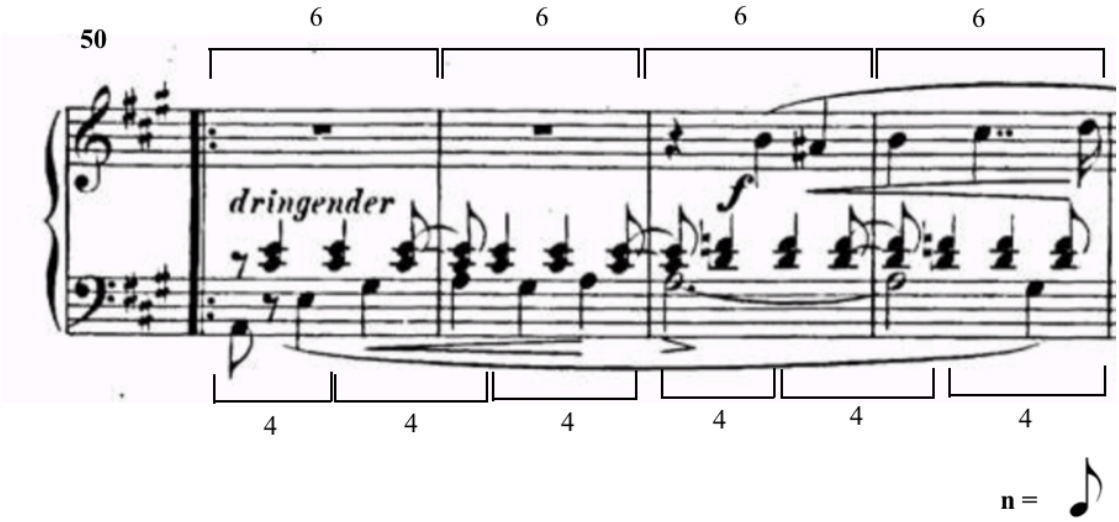


Figure 2.10. Metrical Ambiguity in the B Section, Schumann *Novellette*

IV. The Coda

Metrical Dissonance Contributing to Forward Momentum

As noted above, the initial phrase begins with an alternation between D major and its relative minor, B minor (Figure 2.11). In this phrase, metrical processes work to indicate what is about to take place harmonically (interaction-type 3). Measures 134–61 begin with metrical consonance and are soon joined by a normalized D6+2 dissonance in mm. 138–41. The anti-metrical 6s here are supported by agogic accents in the tenor and slur-onsets in the bass.[3] The metrical layer arising from harmonic rhythm and registral accent is constant throughout this section. Notably, at the very instant where the tonicized B-minor chord is introduced (m. 142), the metrical dissonance mutates into D12+4. This offset layer is established by the onset of a

3. By anti-metrical, I mean that these interpretive layers are not aligned with the bar.

string of four notated accents, which calls to mind m. 135 where four notated accents align with the metrical layer. Although the dissonance fades and is replaced by the normalized D6+2 in m. 146, D12+4 lasts long enough to support the tonicized key. In mm. 150–61, which varies the previous module, the meter adopts a new strategy: predicting the impending deterioration of the D major/B minor interchange. Throughout mm. 150–57, the only dissonance present is the normalized D6+2 dissonance. That is, the meter no longer alternates in conjunction with the shift to B minor in mm. 154–58. Here, the offset 6s are supported by registral accentuation, and a thickened texture on beat 2 of each measure. Metrical dissonance resists aligning itself with B minor, intimating the latter's ultimate insignificance. Sure enough, the piece returns to D major in m. 158. As occurs here, metrical processes occasionally plant cues about upcoming harmonic events.

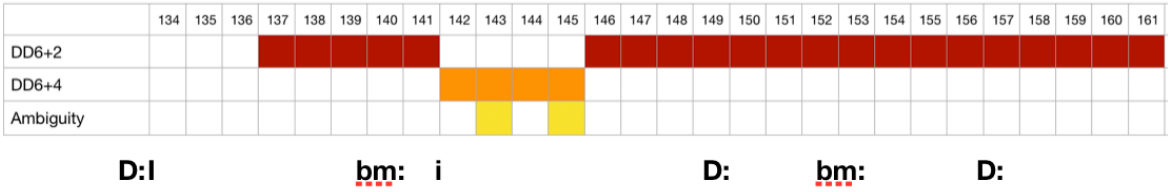


Figure 2.11. Coda, mm. 134–61, Schumann *Novellette*

Alignment of Harmonic and Metrical Consonance

During mm. 158–69, harmony and meter work in conjunction to escalate tension before the cadence in m. 162 and then to dissolve it (interaction-type 1). In mm. 158–59, as D major/B minor interchange subsides, ii–V in D major start to concretize that key; however, V does not resolve to I but instead the ii–V material is repeated an octave higher. The cadence is thus in a sense declined or deferred (Example 2.12). That tactic increases anticipation for the upcoming

cadential arrival. In addition, metrical dissonance is intensified just prior to that tonic arrival: at m. 158, D6+2 is fortified by agogic accents and slur-onsets. After that cadence ensues a long period of metrical consonance. We see, then, tension is generated jointly by harmonic syntax and metrical dissonance, tension that builds anticipation for cadential resolution; that resolution is then supported by metrical consonance.

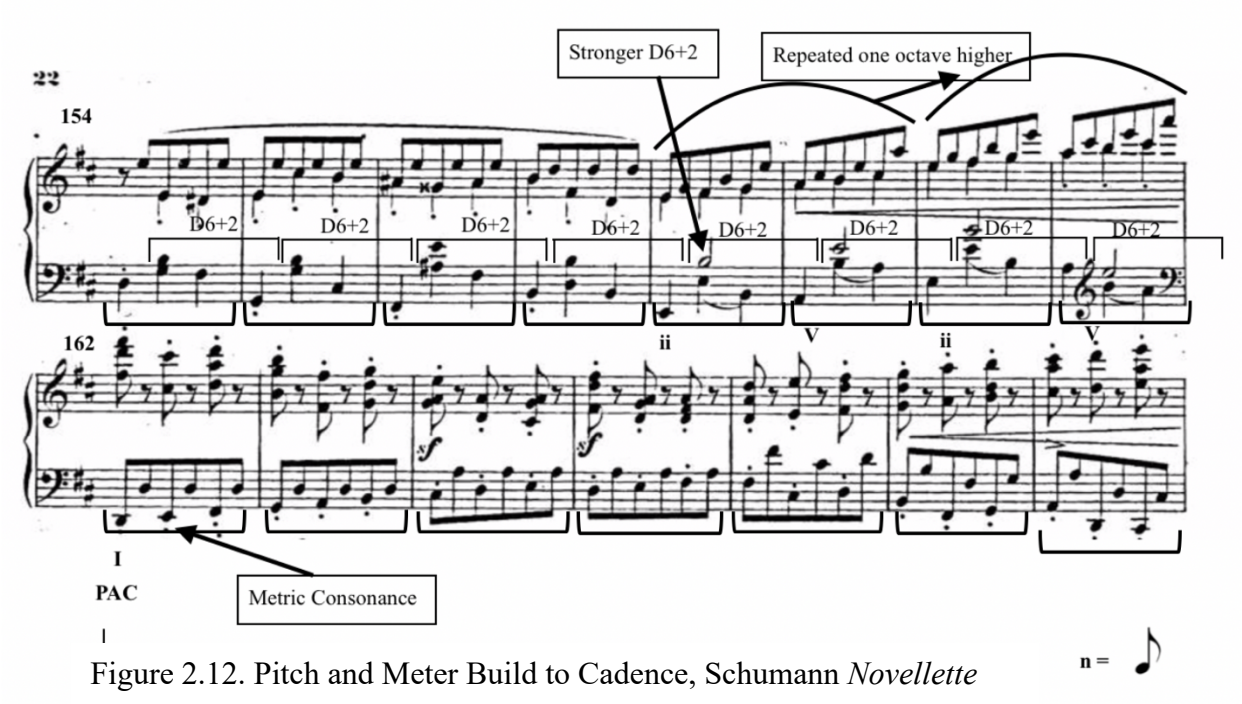


Figure 2.12. Pitch and Meter Build to Cadence, Schumann *Novellette*

V. Conclusion

In conclusion, one can discern three kinds of interaction between harmony and meter in Schumann's *Novellette*. First, a metrical process or state and an analogous harmonic or formal processor state occur simultaneously. Second, metrical consonance/dissonance recalls a harmonic process from earlier in the piece. Third, a metrical process anticipates a harmonic event.

Chapter 3

Meter and Motive: Beethoven's String Quartet Op. 18, No. 4, First Movement

I. Introduction

The previous chapter demonstrated three possible interactions between meter and harmony/form within Schumann's *Novellette* in D major, Op. 21, No. 4. Here I will consider interactions between meter and motive. In Beethoven's String Quartet in C minor, Op. 18, No. 4, first movement, [1] I have identified two types of such interaction (the numeration continues that begun in the previous chapter): 4) analogous motivic and metrical processes unfold in a staggered format; 5) analogous motivic and metrical processes unfold simultaneously.

Before addressing these interactions, here is a bird's-eye view of the tonal and formal scheme of the movement (Figures 3.1 and 3.2). This piece is in sonata form. The exposition (Figure 3.3) modulates from the home key of C minor to the relative major, E-flat in m. 34, a third divider between C minor and G minor (which is introduced at the beginning of the development). One primary theme (P) and three secondary themes are used within the exposition (S^1, S^2, and S^3). Here, a few distinctive elements deserve mention.

First, the continuation in the primary theme is repeated. Second, mm. 13–16 evince formal becoming. These measures initially appear to be a codetta, due to the tonic/dominant swing, the cadential affirmation. In mm. 17–25, however, motives from the primary theme reappear and the halted harmonic motion begins to flow again by means of progressive

1. My advisor, Jeffrey Swinkin, devotes a chapter to this piece in his *Performative Analysis: Reimagining Music Theory for Performance* (Rochester, NY: University of Rochester Press, 2016). While I take some formal observations from that chapter, I use it mainly as a launching pad for my own ideas.

animation (quarter notes in m. 17 to eighth notes m. 20 to sixteenth notes in m. 24). This section concludes by standing on the dominant in mm. 20–25. Hence, retrospectively, mm. 13–25 act as a transition to the secondary thematic zone: codetta => TR.

Third, the secondary theme processes are dispersed across the three secondary themes (S^1, S^2, and S^3). Mark Richards cites multiple factors responsible for signaling the start of a secondary theme, and outlines seven processes accomplished by a successful secondary theme, with the first two processes as the requisite signals and the latter five as "reinforcing" (optional) signals.[2] He further suggests that these processes, if they do not all occur within the first secondary theme, may be pushed forward to subsequent secondary themes in a secondary theme group. I will refer to Richards' secondary-theme signals as I discuss the ambiguity of secondary themes within this piece. The first secondary theme is preceded by a medial caesura (signal #5) and demonstrates a change in texture (#4), two reinforcing signals. S^2 compensates for a number of the absent processes: this theme displays a tonic key in the new key in root position (#1) (m. 26 in in S^1 immediately converts the presumed I into a V^7/IV); it is preceded by a preparatory V chord (#3) (m. 26 followed a V of the home key, not of the relative major); and it begins with a *piano* dynamic (#6). However, this theme elides with S^3, and so fails to supply the requisite signal #2 (a phrase structure with beginning and end functions). This signal occurs starkly in the final theme: S^3. Richards would thus encourage the listener to "hear these multiple themes as a broad unit."[3]

2. Mark Richards, "Sonata Form and the Problem of Second-Theme Beginnings," *Music Analysis* 32, no. 1 (2013): 26.

3. Ibid., 21.

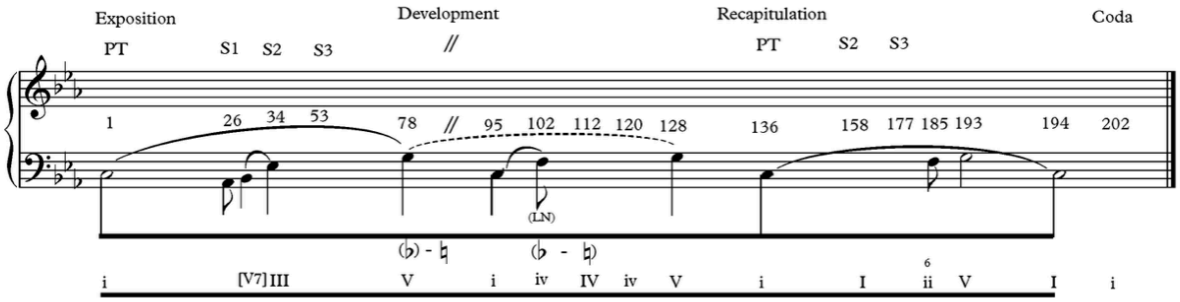


Figure 3.1. Tonal Structure, Beethoven's String Quartet, Op. 18, No. 4, First Movement

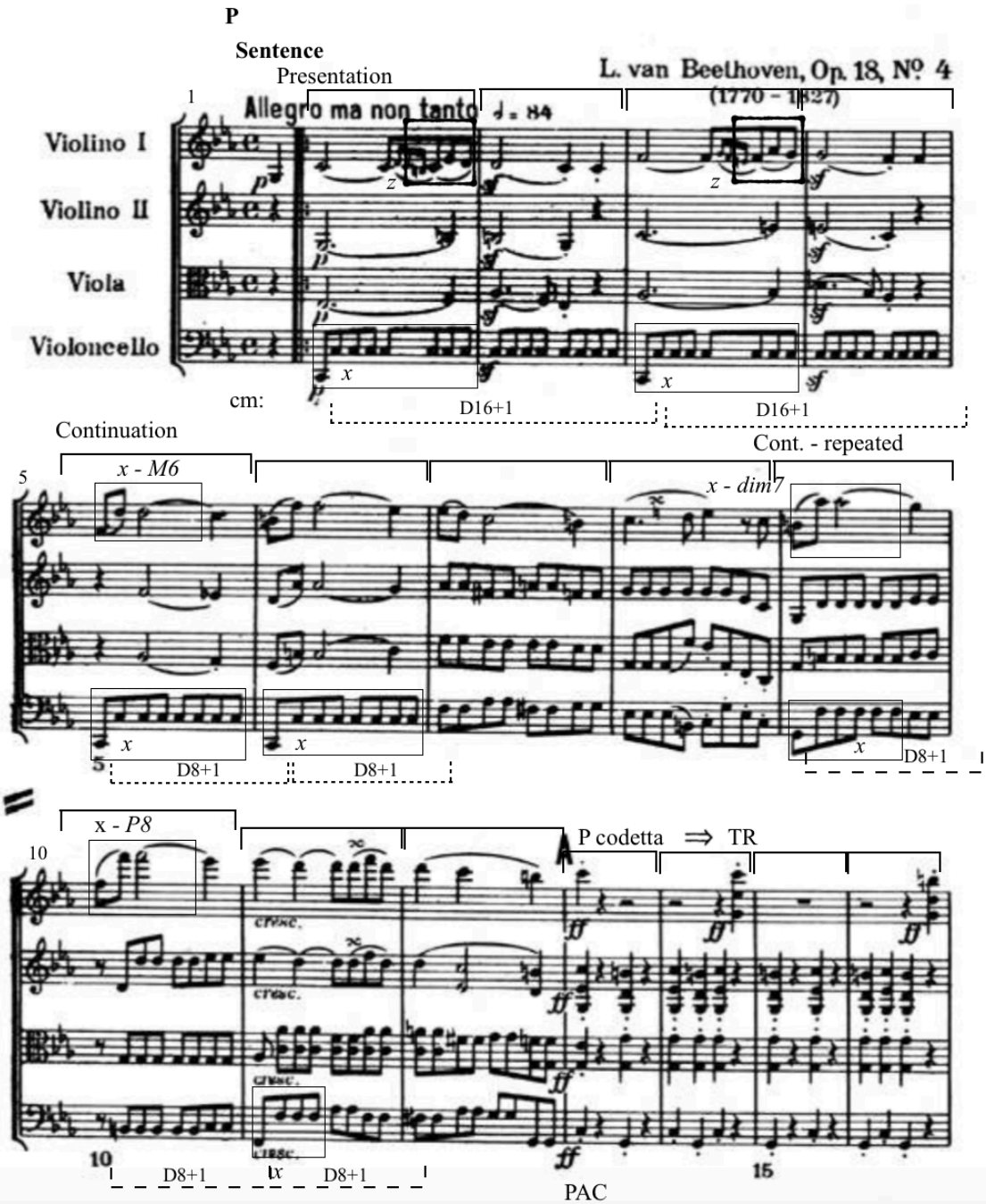


Figure 3.2. Motive *x* and *z* and D8+1 Dissonance, Beethoven's String Quartet

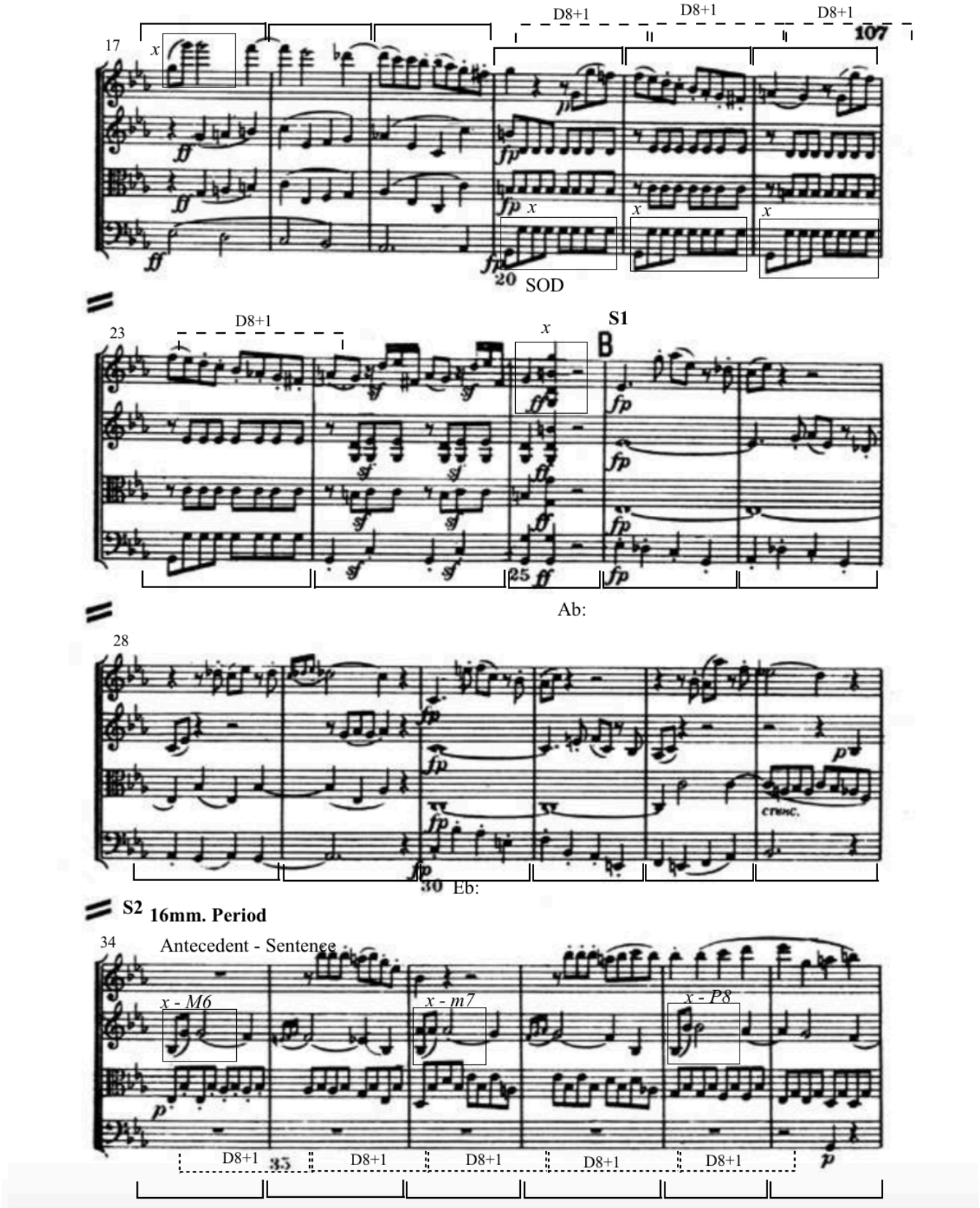
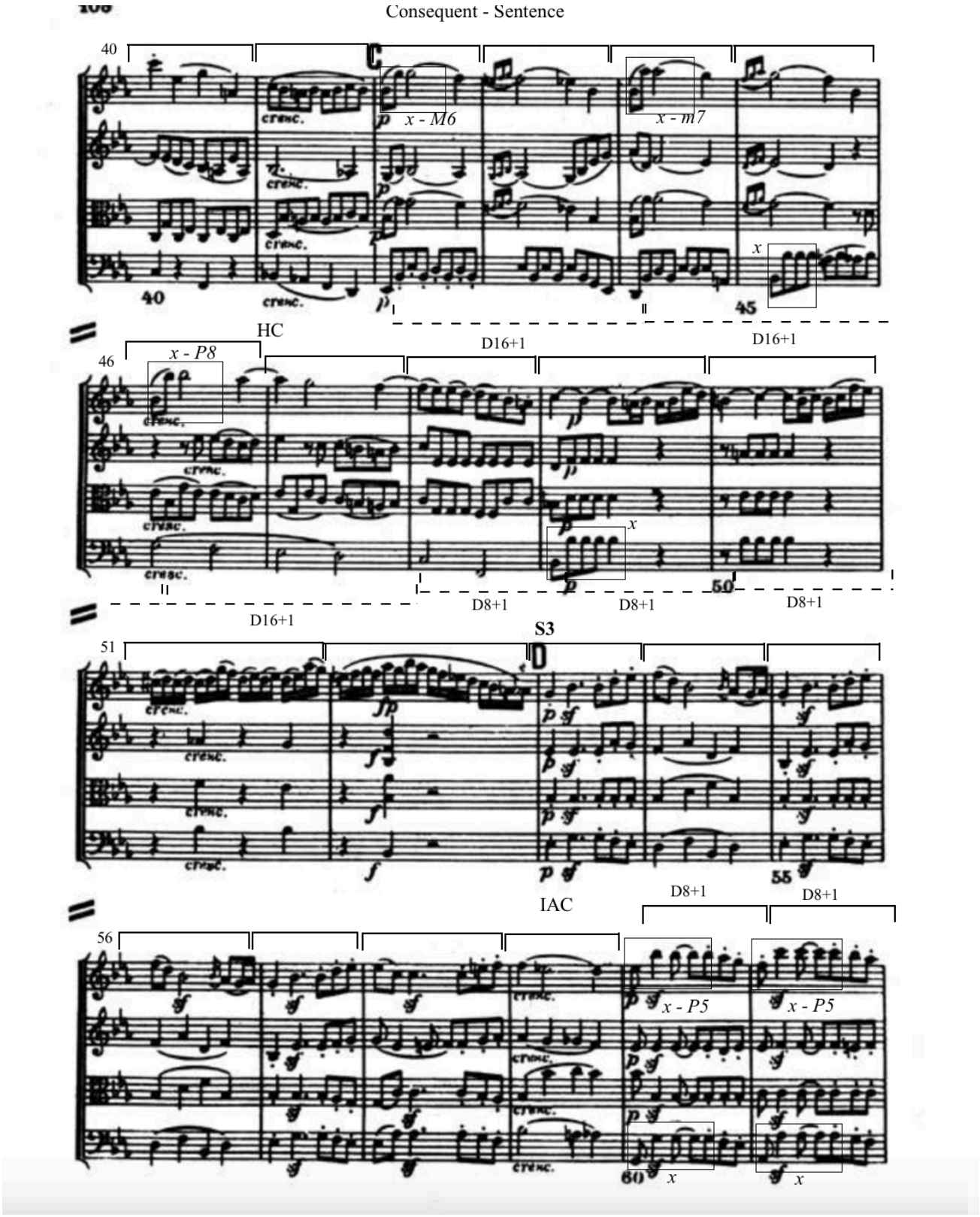


Figure 3.2 continued



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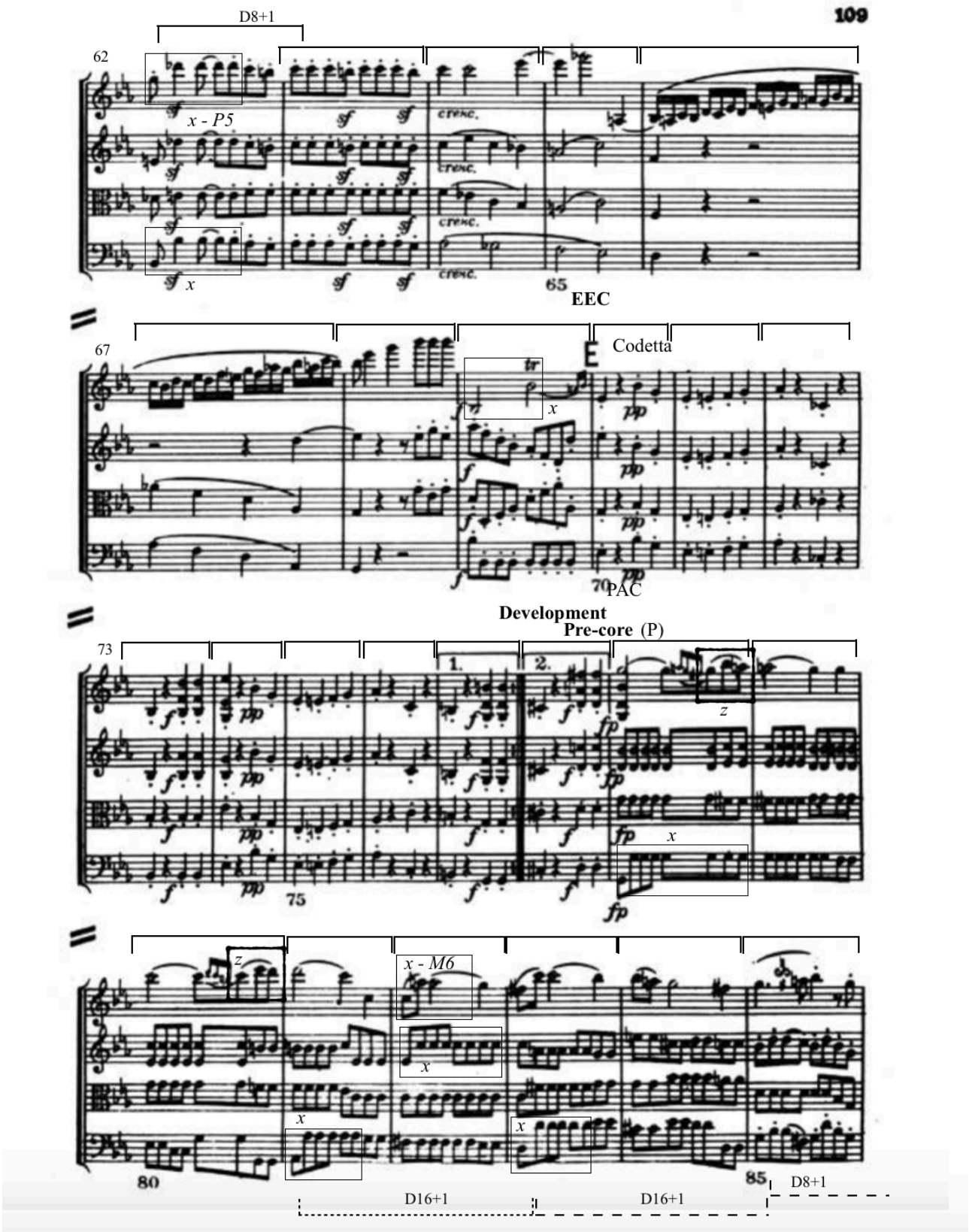

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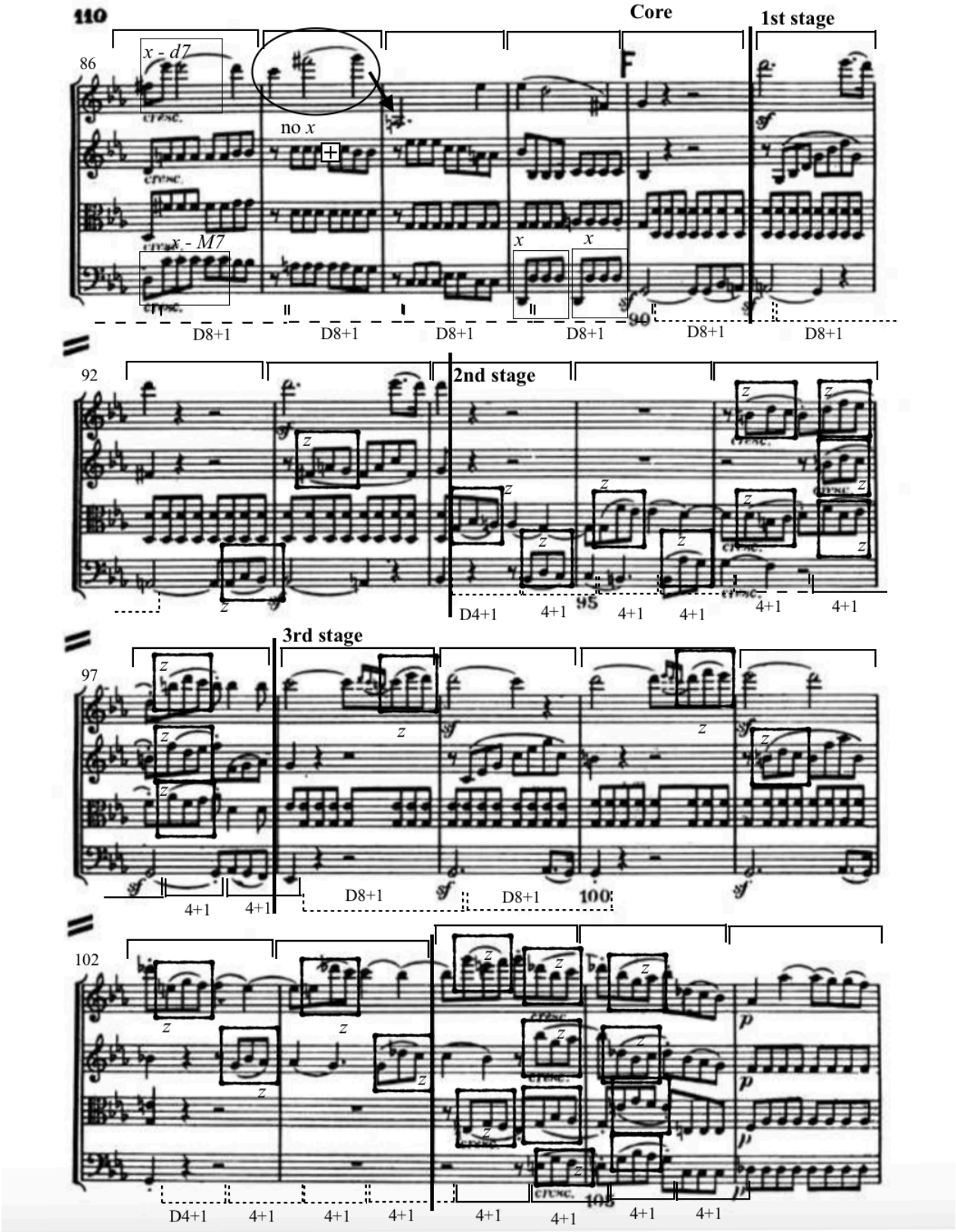

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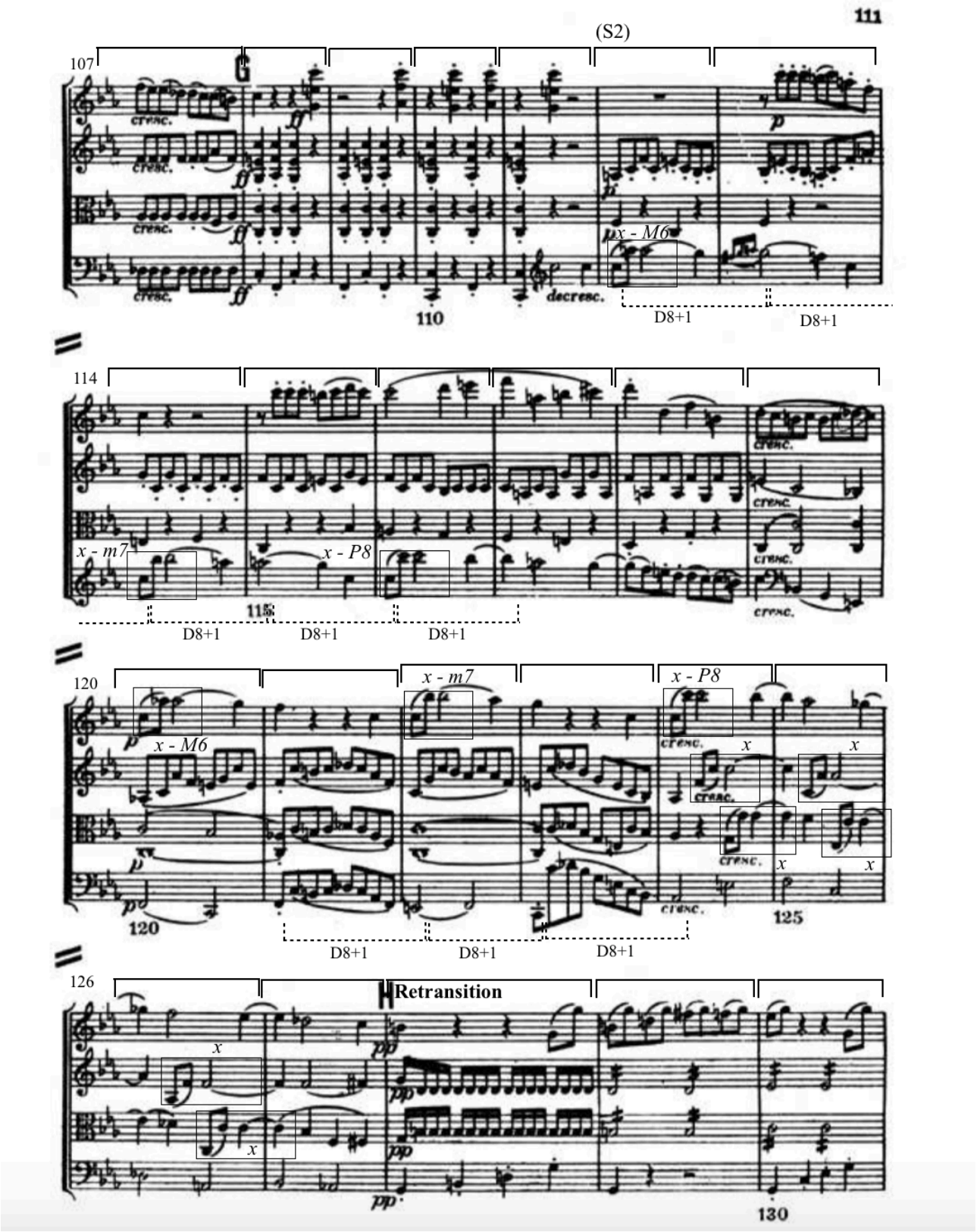

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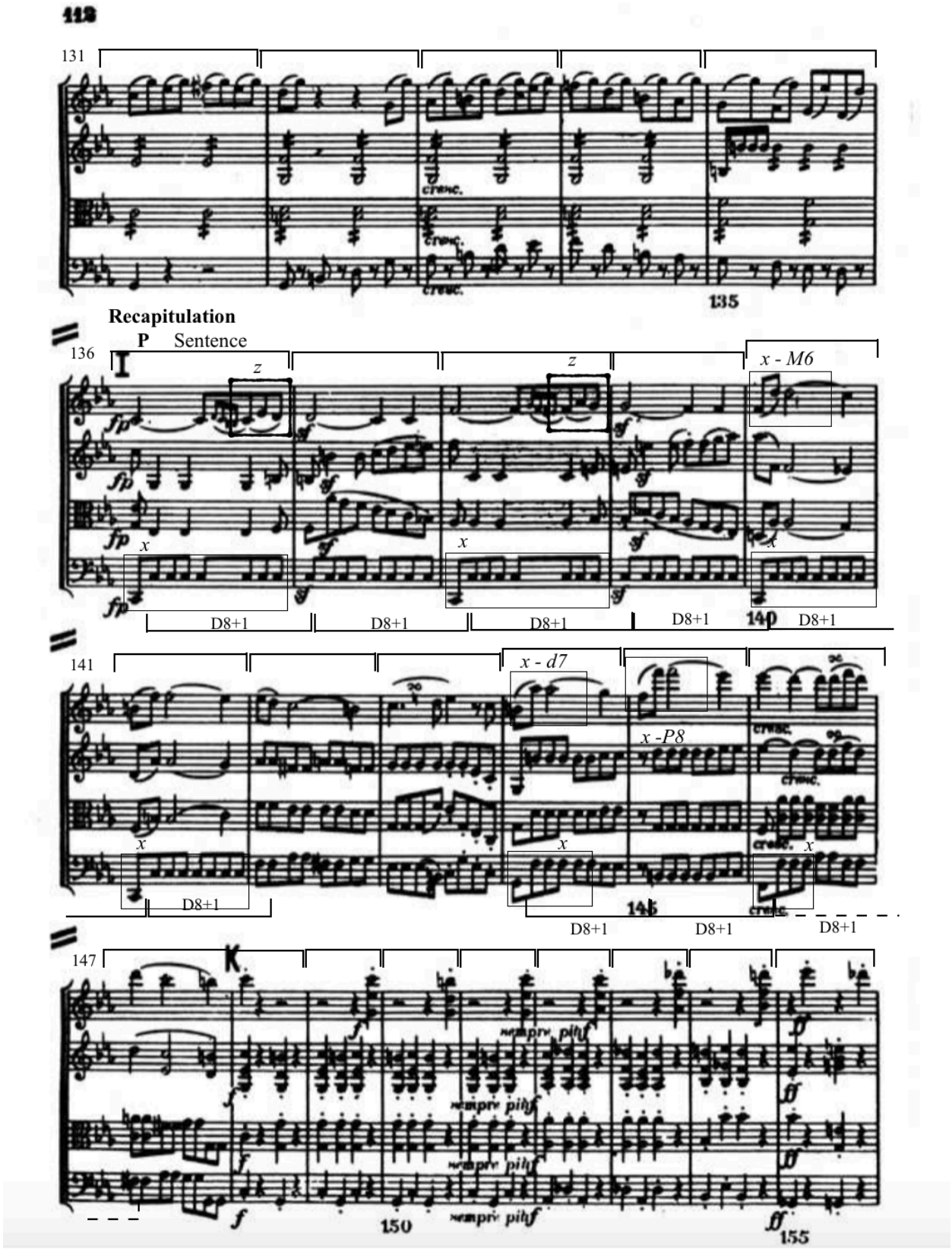
113
131
cresc.
135
Recapitulation
P Sentence
136
I
z
x - M6
D8+1
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x - d7
x -P8
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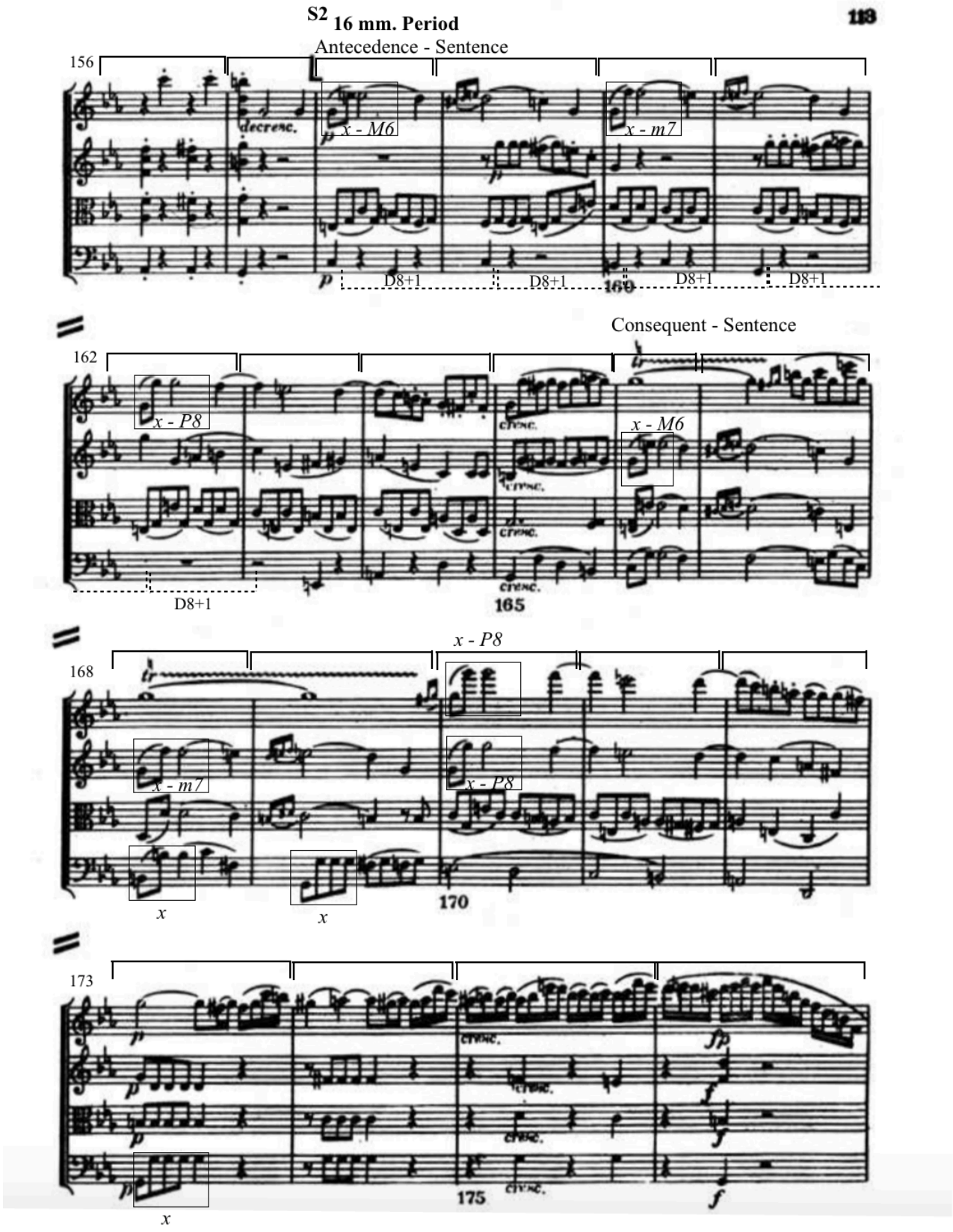

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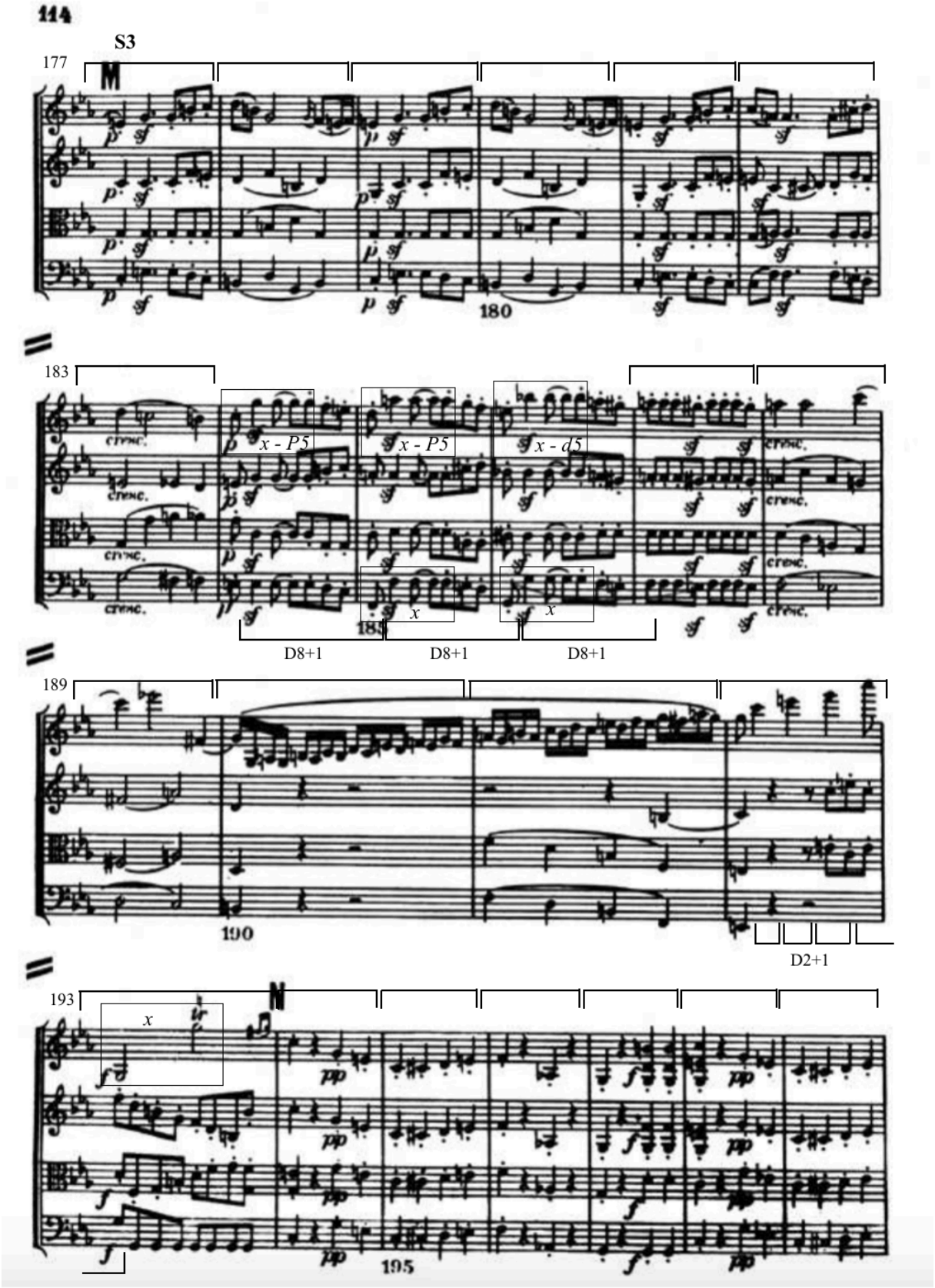

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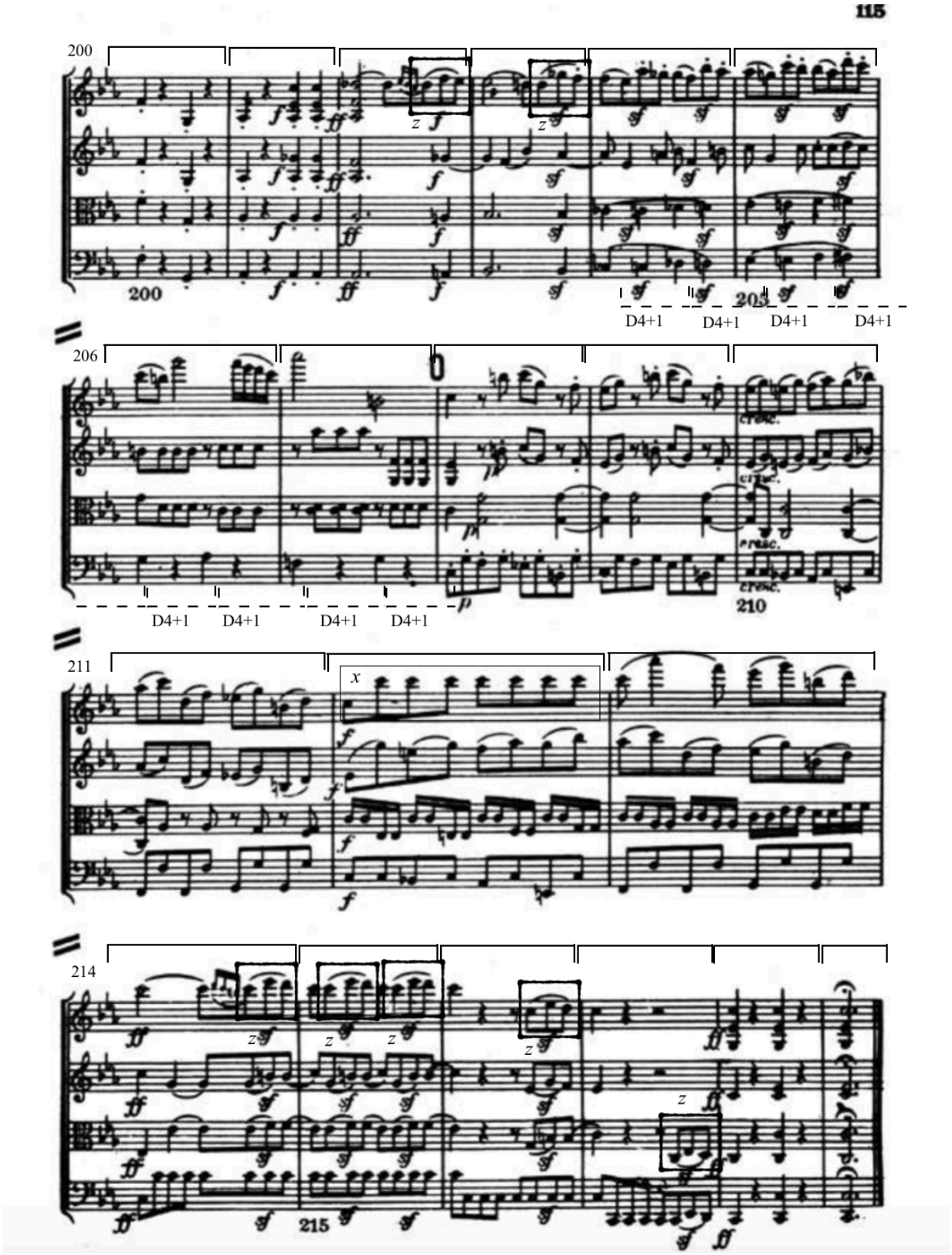

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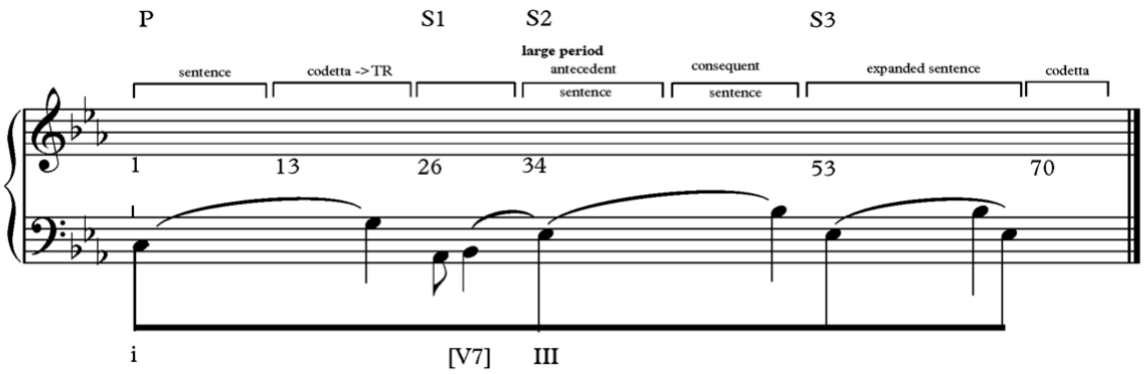


Figure 3.3. Exposition Formal and Tonal Structure, Beethoven's String Quartet

At the beginning of m. 78, all four instruments charge into the development (Figure 3.4). In contrast to the hushed onset of the exposition, the development begins with a strident *fp.* Additionally, both violins play multiple notes on the first chord, with the first violin covering all four strings. The development moves counterclockwise along the circle-of-fifths, from G minor to C minor to F minor. The development can be divided into two principal subsections, each of which begins with a quotation of a theme from the exposition (P, then S^2) and proceeds to alter each theme. Modal mixture also occurs first in the development and then prominently in the recapitulation. Throughout the majority of the section, Beethoven uses complete themes and fragments thereof to weave an ever-changing, motivically diversified tapestry.

P re-enters in m. 136, initiating the recapitulation (Figure 3.5). This section begins by modifying the P codetta => TR. Measures 148–57 begin and end in a similar fashion to mm. 13–25, with alternating tonic and dominant chords at the onset, and a HC in m. 157. However, the homorhythmic chordal motion is extended across the entirety of these measures. Hence, the transitional qualities within this section are minimized by the omission of thematic material. These measures are also sequential (enacting an ascending 5–6 R+ sequence). The recapitulation

is further modified by omitting S^1 so as not to modulate to E-flat major, such that it arrives on C major at the beginning of S^2. Indeed, the recapitulation concludes in C major, before the coda restores C minor. The coda is made up of 8 two-measure fragments, which are an assemblage of thematic elements from across the piece (Figure 3.6). This includes the secondary theme, S^1, that was missing from the development, see mm. 207–8.

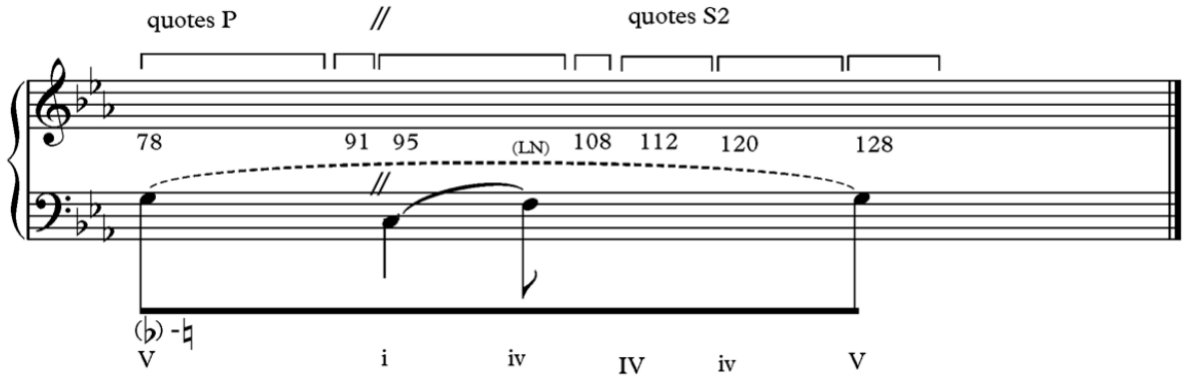


Figure 3.4. Development Formal and Tonal Structure

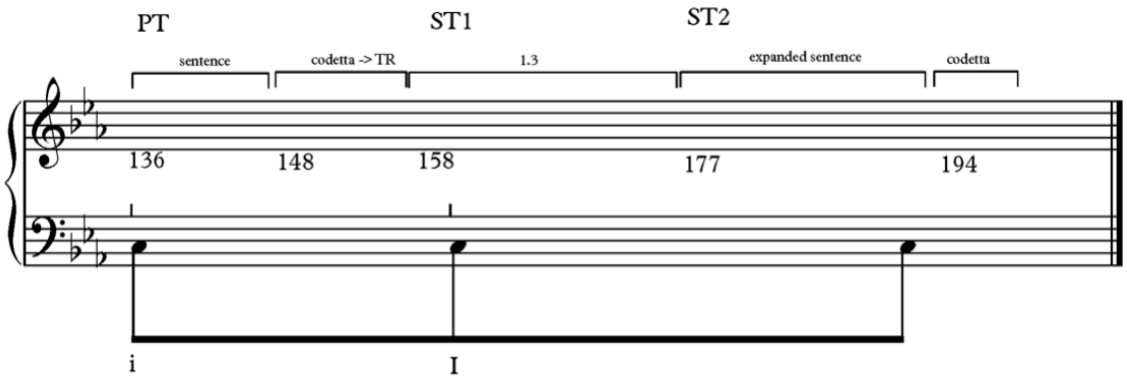


Figure 3.5. Recapitulation Formal and Tonal Structure

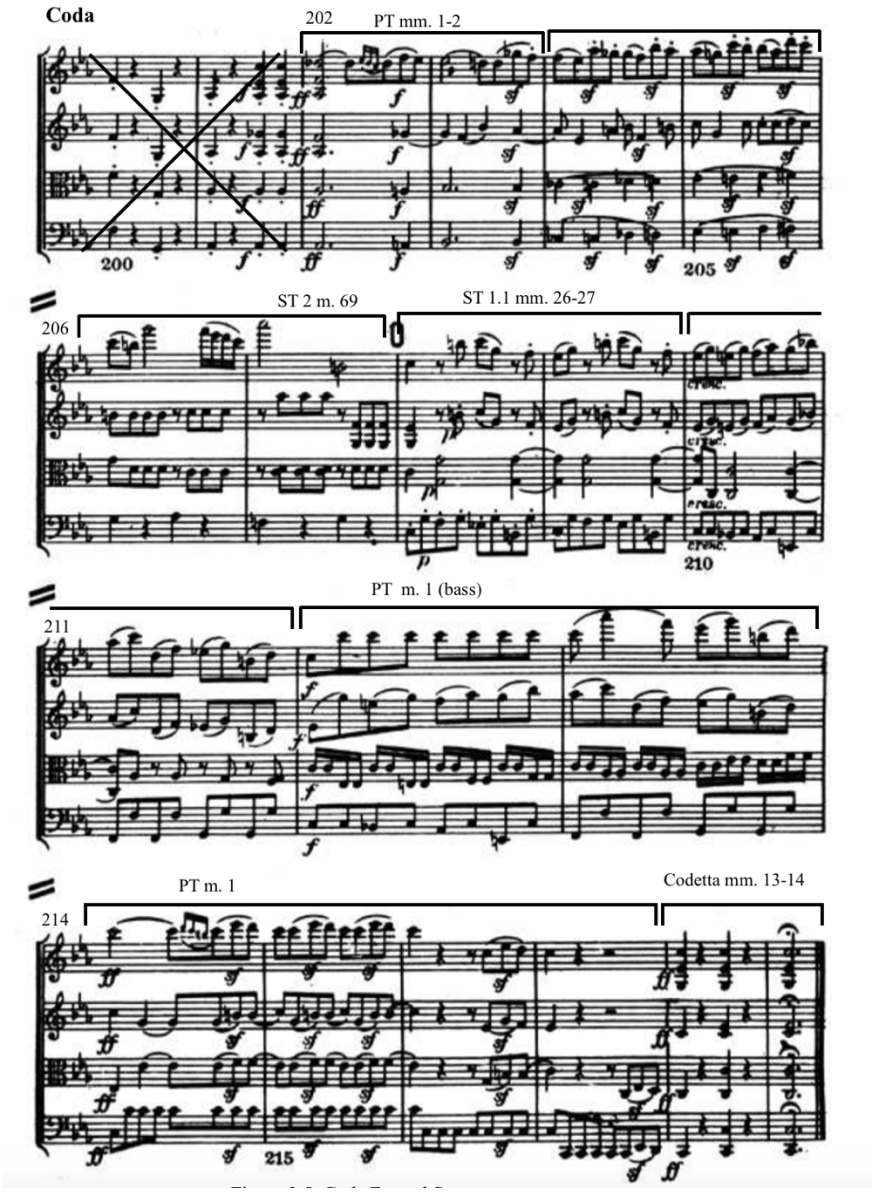


Figure 3.6. Coda Formal Structure

II. The Exposition

Motive x and D8+1

Here, I consider how pitch motives and metrical motives unfold in staggered fashion within the exposition, exemplifying *Interaction Type 4*. This interaction is defined by pitch

motives and metrical motives which undergo similar operations (actualization, variation, etc.) at different rates. These motives may overlap (occur in the same measures) or not; they may be similar or dissimilar. What is essential is that they accomplish similar goals, and that they progress at different rates with separate points of development/arrival.

The first two motives I will consider are motive *x* and D8+1 (Figure 3.2). Motive *x* is defined as an ascending leap of an octave where the higher pitch is maintained for at least one and half beats by a long pitch, repetition of the pitch, or a rest following the pitch. This motive is first introduced in the bass line of m. 1. Motive *x* usually appears on the downbeat of the measure, and recurs regularly across the exposition in the cello, found within 16 measures. Yet, an octave leap, especially in the bass line, is hardly uncommon. Hence, motive *x* initially resides at a subsurface level: it is more a potential motive than an actual motive at this point. Throughout the exposition, it is gradually actualized. Actualization is a process whereby a musical entity slowly rises from the perceptual subsurface to the surface. As Carl Dahlhaus puts it: "themes often do not reside at a determinate point but rather come into being gradually as the piece unfolds."[4] To become a real motive, motive *x* must find a way to highlight itself, such as relocating to a more prominent line. This motive attempts to do just this, for a similar leap occurs in m. 5 in violin 1. Here, the violin leaps up a major 6th on the second eighth note of the measure, and the pitch is extended over two beats with a syncopated half note. (This is a slight variation of the motive from m. 1, where eighth-note iterations prolong the higher pitch). However, the leap falls short of the octave. In m. 9, during the repetition of the continuation, this leap is widened to a diminished 7th. Immediately following this leap, the normative version of

4. Cited in Swinkin, "Variation as Thematic Actualisation: The Case of Brahms's Op. 9," *Music Analysis* 31, no. 1 (2012): 39.

motive *x* occurs clearly in m. 10, thus completing the process of intervallic extension. Following this actualization, the octave leap motive is filled in across mm. 17–20, as observed by Swinkin.[5] The filling in of the motive somewhat "resets" the music following the process which just occurred by replacing leaps with stepwise motion, thus preparing the way for the widening process to begin again. This widening process begins again in S^2 and is reiterated twice, first in mm. 34–38 in the violin 2 and again in mm. 42–46 in the violin 1. In these points, the process becomes even more overt by preserving a singular pitch, Bb, as the low point across every leap, leaping up to a G, an Ab, and finally a Bb. And so, motive *x* is gradually actualized, becoming more and more salient throughout repeated intervallic widening first in mm. 5–10, and then in mm. 34–38 and 42–46. What was generic and subdued in the cello in m. 1 is realized by being worked up to/arrived at arduously and by being placed in the more conspicuous melody.

Within the exposition, D8+1 dissonance also slowly rises to prominence. The actualization of this metrical motive must be distinguished from Christopher Hasty's concept of projection. In *Meter as Rhythm*, Hasty scrutinizes how pulse streams are perceived, contending that projection is a part of the process. Once a single event has ended and the durational value has been set, the listener then projects (predicts) the duration of the subsequent event, basing the length on the event which has already occurred. He uses dotted lines to show projected time spans and thick lines for actual time spans. Although I also discuss events which are initially potential rather than actual and use similar notational style (dotted and thick lines), my work contrasts with Hasty's in that I address multiple pulses (which come together to form metrical dissonance) where the points of accentuation are already present, but quite weak.

5. Swinkin, *Performative Analysis,* 100–104.

The clearest instance of D8+1 is in mm. 60–62, where the offset pulse is supported by motivic onset, *sforzando* markings, agogic accents, pitch onset, and registral accentuation. A bar-aligned pulse in these measures is supported by registral accents and change of harmony. This metrical dissonance, however, does not come out of thin air. Just as motive *x* underwent a process of realization, so D8+1 is progressively actualized over the course of the exposition. I recognize three stages in this process. First, in mm. 1–6, the bass octave leap suggests the presence of a displaced pulse stream. The displaced pulse stream is only faintly emphasized because of the generic nature of the octave leap. Additionally, these accents only occur every two measures (D16+1), and, even then, only in the bass. Thus, initially, D8+1 dissonance is merely latent. In the score I have decided to differentiate between various strengths of pulses with small dotted lines, dotted lines, and solid lines. These act as an approximation to visually demonstrate the progression by which D8+1 is strengthened. The second stage is mm. 9–11 and is repeated in the transition. Here, all voices join the bass, leaping upwards at different intervals to bring out the anti-metrical layer once per each measure. Additionally, in m. 10 and m. 21, the lower three voices drop out on the downbeat, reentering on the second eighth note. The support provided by the pitch onset here provides even greater salience to the offset pulse, as this pulse begins to gain momentum in its rise to the surface. During these initial two stages, the bar-aligned pulse stream underneath these measures is supported by harmonic rhythm, registral accents in the bass, and, in the first stage, agogic accents in the middle voices. The motive unmistakably emerges in the aforementioned mm. 60–62, completing the final step of the process, noted with solid lines. Here, this dissonance is confirmed as a distinctive element.

Thus, motive *x* and the D8+1 dissonance are actualized during the exposition. The pitch motive is actualized more quickly, taking 9 measures, and the process of intervallic widening is

repeated twice. In contrast, the metrical process is slower (filling 62 measures) and occurs through the gradual marshaling of features to support the dissonance. The specific stages of actualization between these two associated but distinct features are non-isomorphic. Figure 3.5 demonstrates the developmental processes, with the x axis denoting measures and y axis perceptibility. The y axis data points are roughly drawn from the musical evidence, which is described in the previous paragraphs.

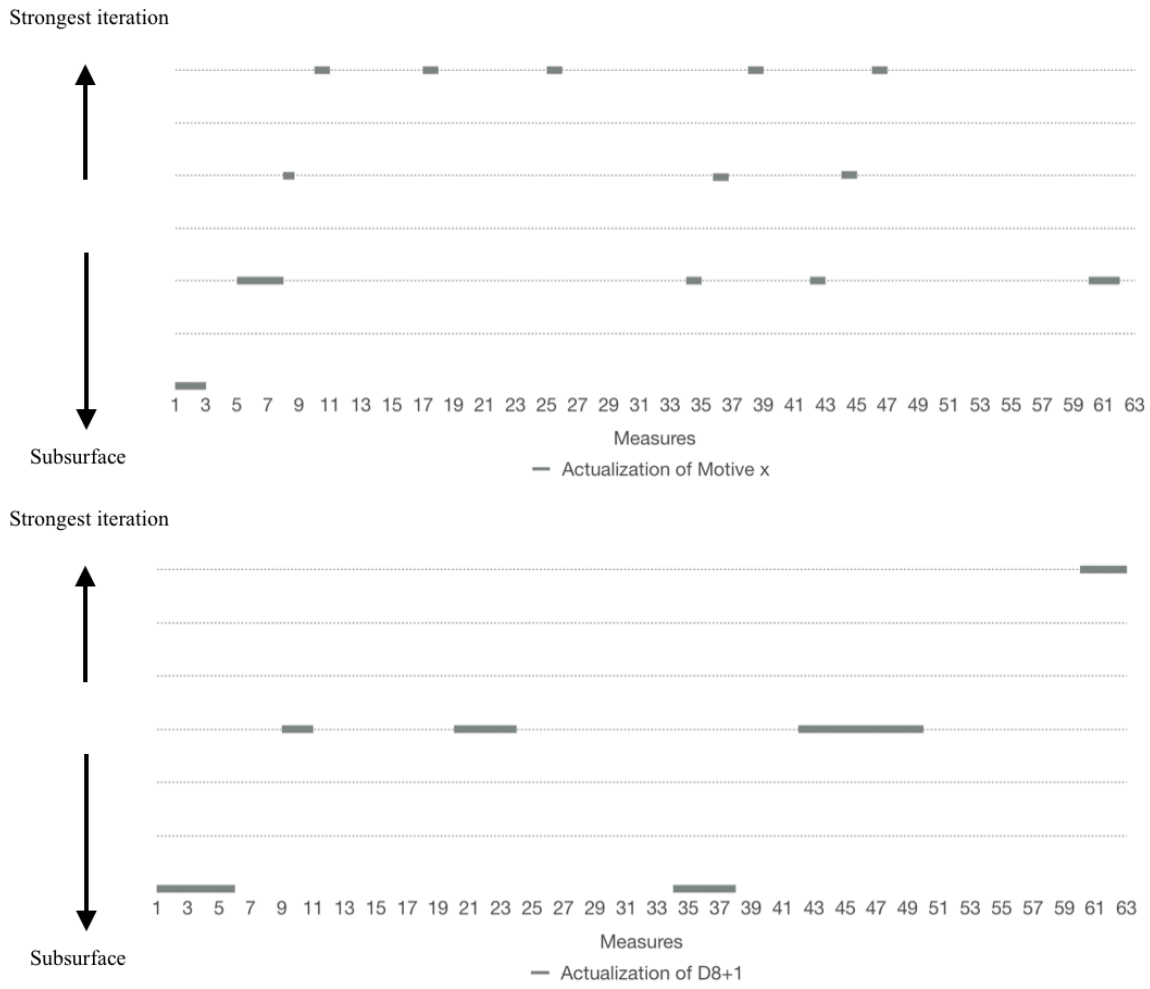


Figure 3.7. Motive *x* and D8+1 Processes of Actualization, Beethoven's String Quartet

Motive y and D8+2 dissonance

Another instance of staggered similar processes is found in the exposition between motive *y* and D8+2 (Figure 3.8). Both undergo fragmentation and expansion albeit at different times. Motive *y* is defined as a descending stepwise motive, a sigh-like gesture with strong-weak motion between two pitches generally enacted by a slur, and downward pull. I am not the only one to have noticed this motive: Swinkin picked out this motive as well and labeled it in mm. 2, 4, 5, and beyond.[6] In mm. 2 and 4, motive *y* appears in its prototypical form. However, throughout the exposition, it undergoes a series of variations. First in mm. 5–12, the motive is offset from the barline, deferred by two eighth notes. Measure 5 re-uses the same pitches (D–C), confirming that this is motive *y* in varied form. During the first variation, the strong-weak motion is rendered contrametric. Second, mm. 17–18 extend the displaced motive *y* over two measures. The strong-weak motion is suspended in this instance because the slur is removed and because every pitch is the same duration. Yet, even as the strong-weak motion is impaired, the downward pull is bolstered by the syncopes in the first violin. In the third transformation, in mm. 19–24, the gesture returns to its original placement within the bar and recovers the slur. However, the pitches here are shortened, alternating between eighth notes (in mm. 21, 23–24) and quarter notes (in mm. 22). Beethoven brings back the first three transformations through developing variation in the S^2. All transformations (metrical displacement, extension across multiple measures, and shortening of rhythmic values) have undergone alteration. This is similar to motive *x*, which brings back the processual widening in the first violin in a different form.

6. Swinkin, *Performative Analysis*, 100–104.

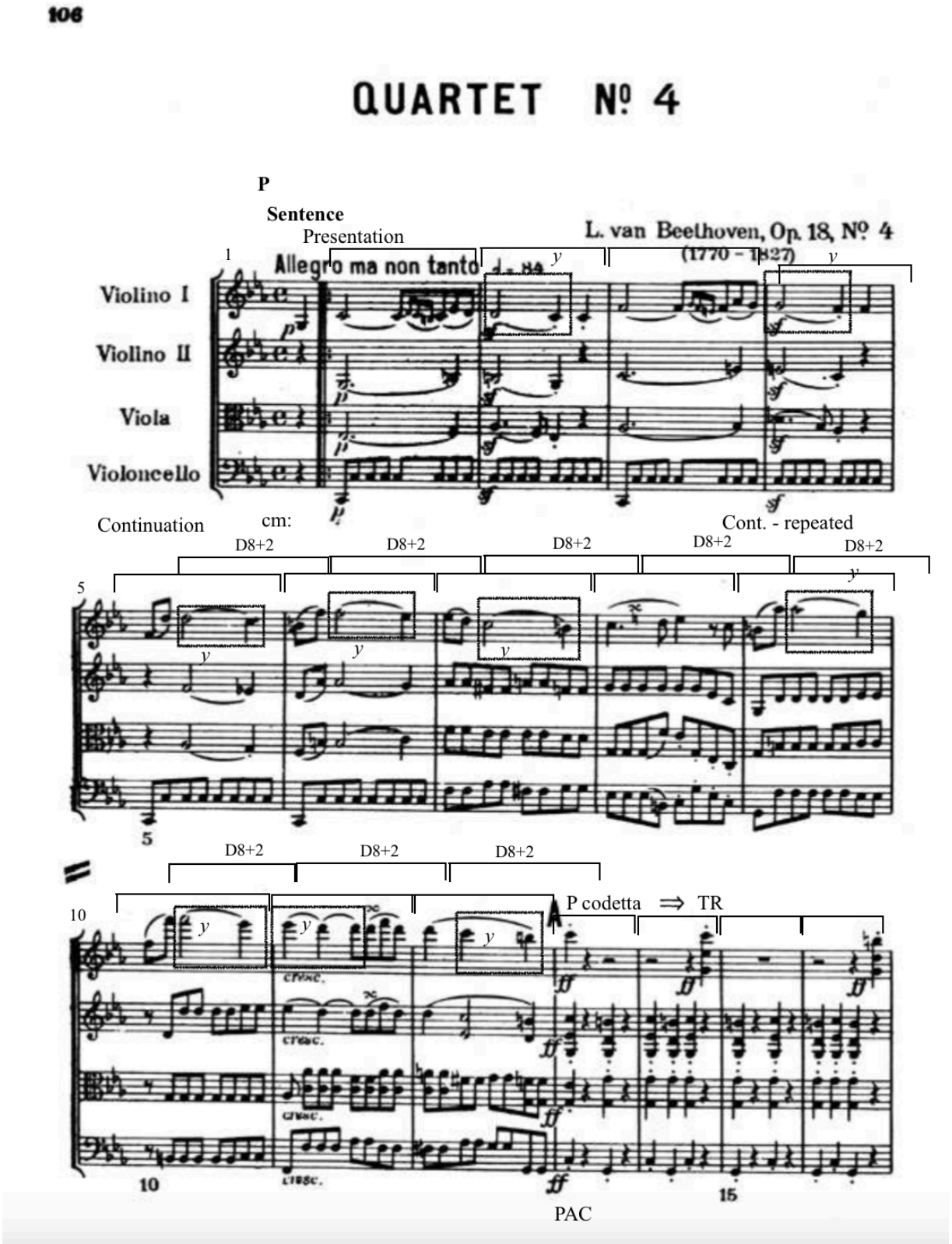
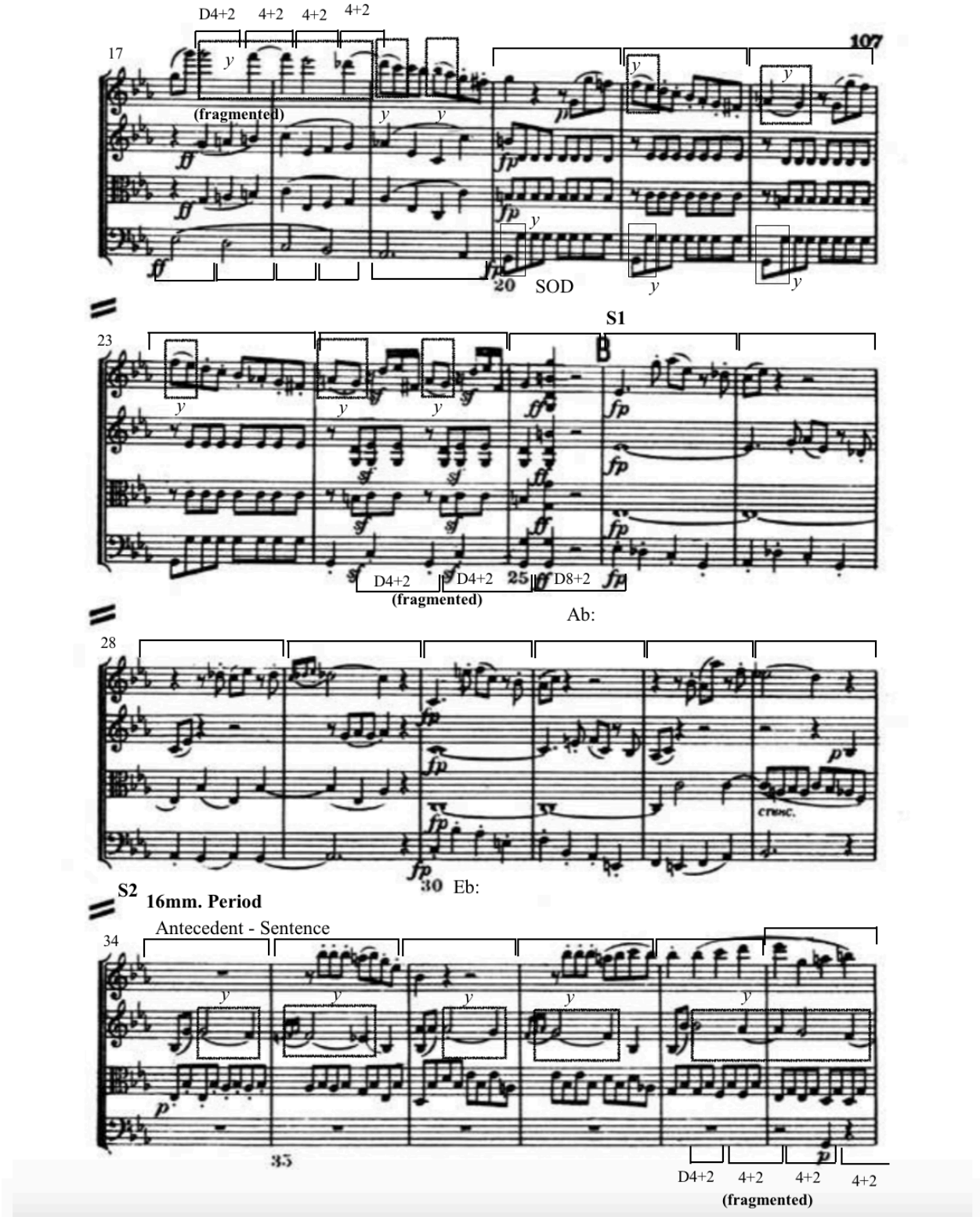


Figure 3.8. Motive *y* and D8+2 Dissonance in Beethoven's String Quartet



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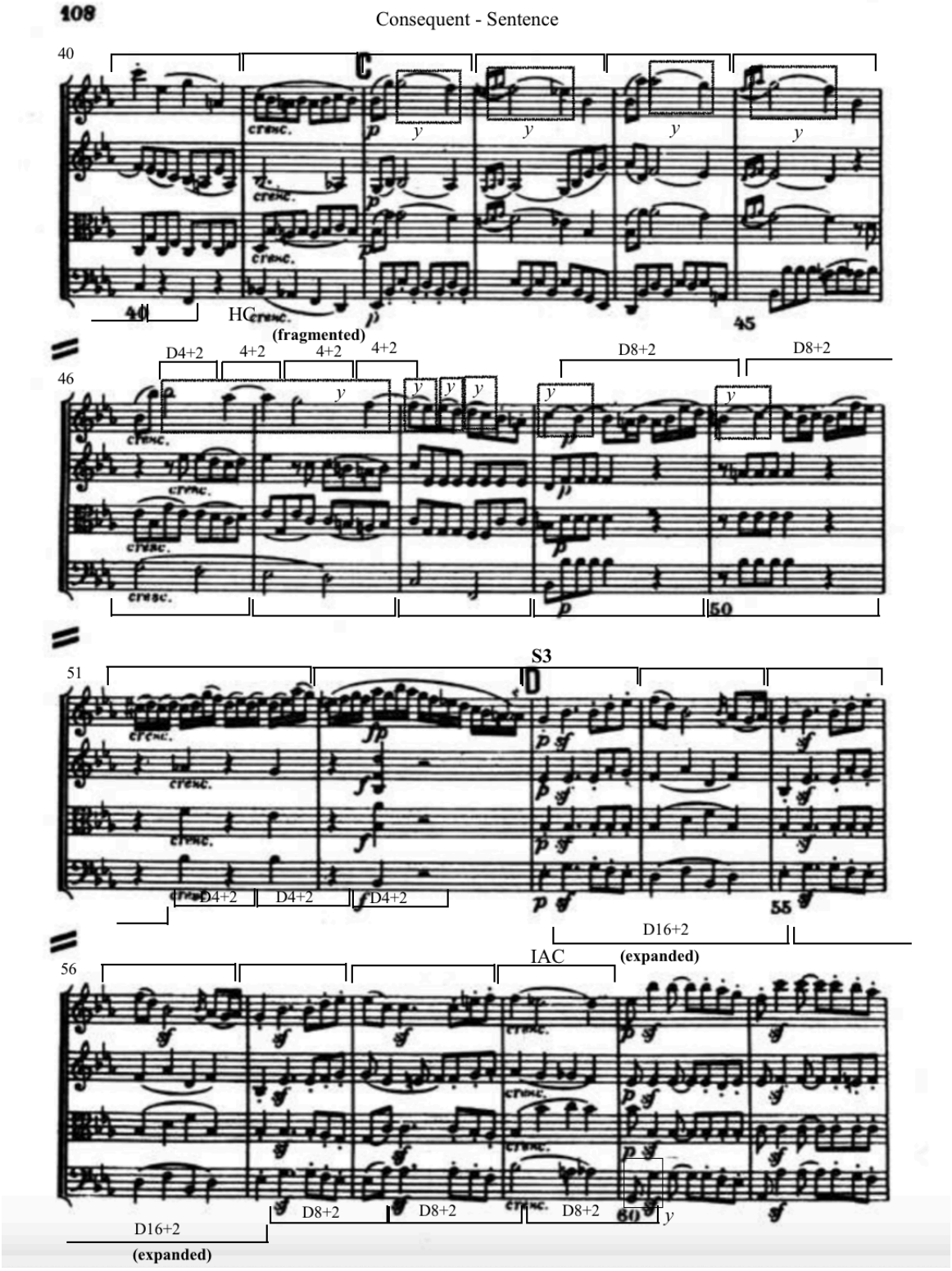

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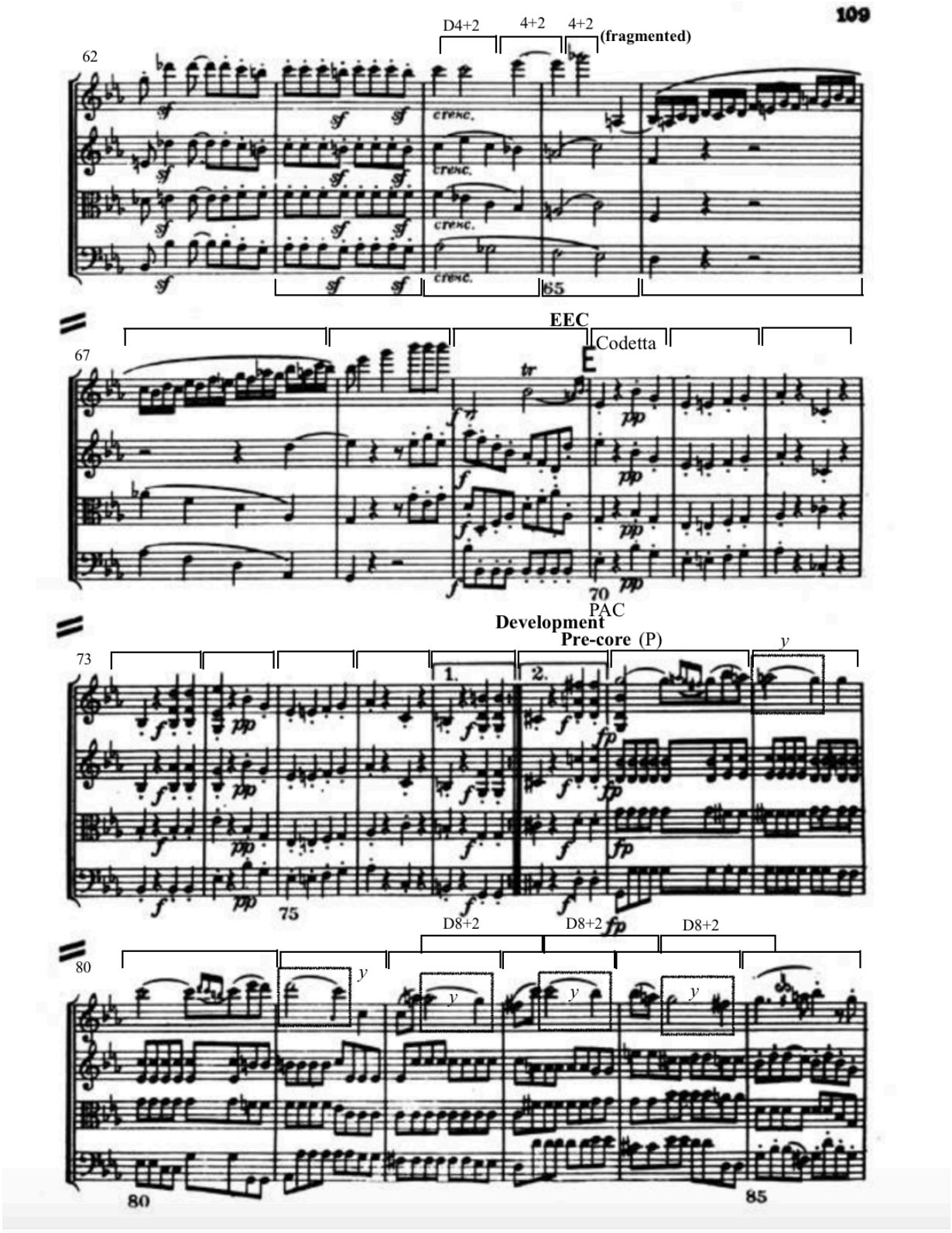

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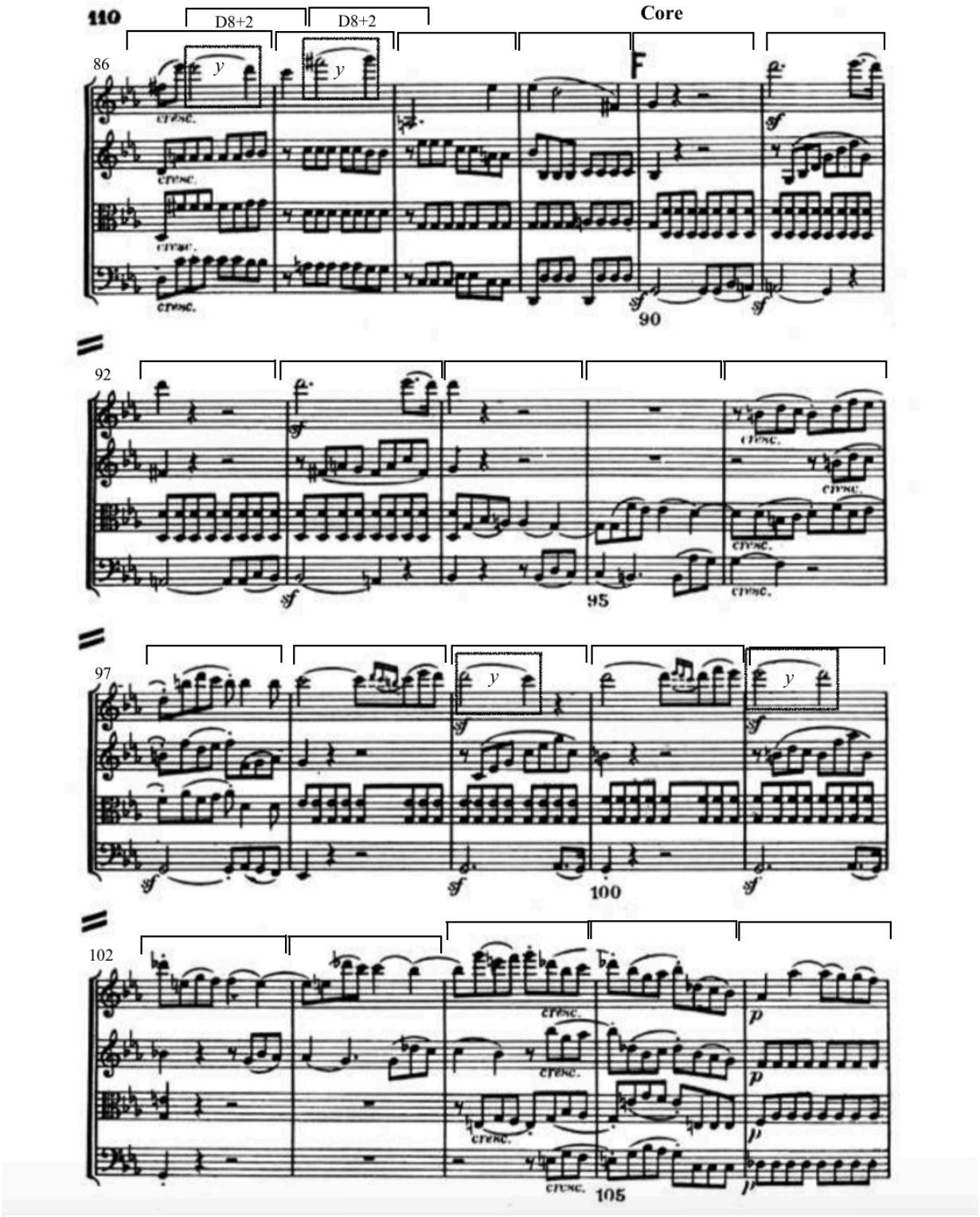

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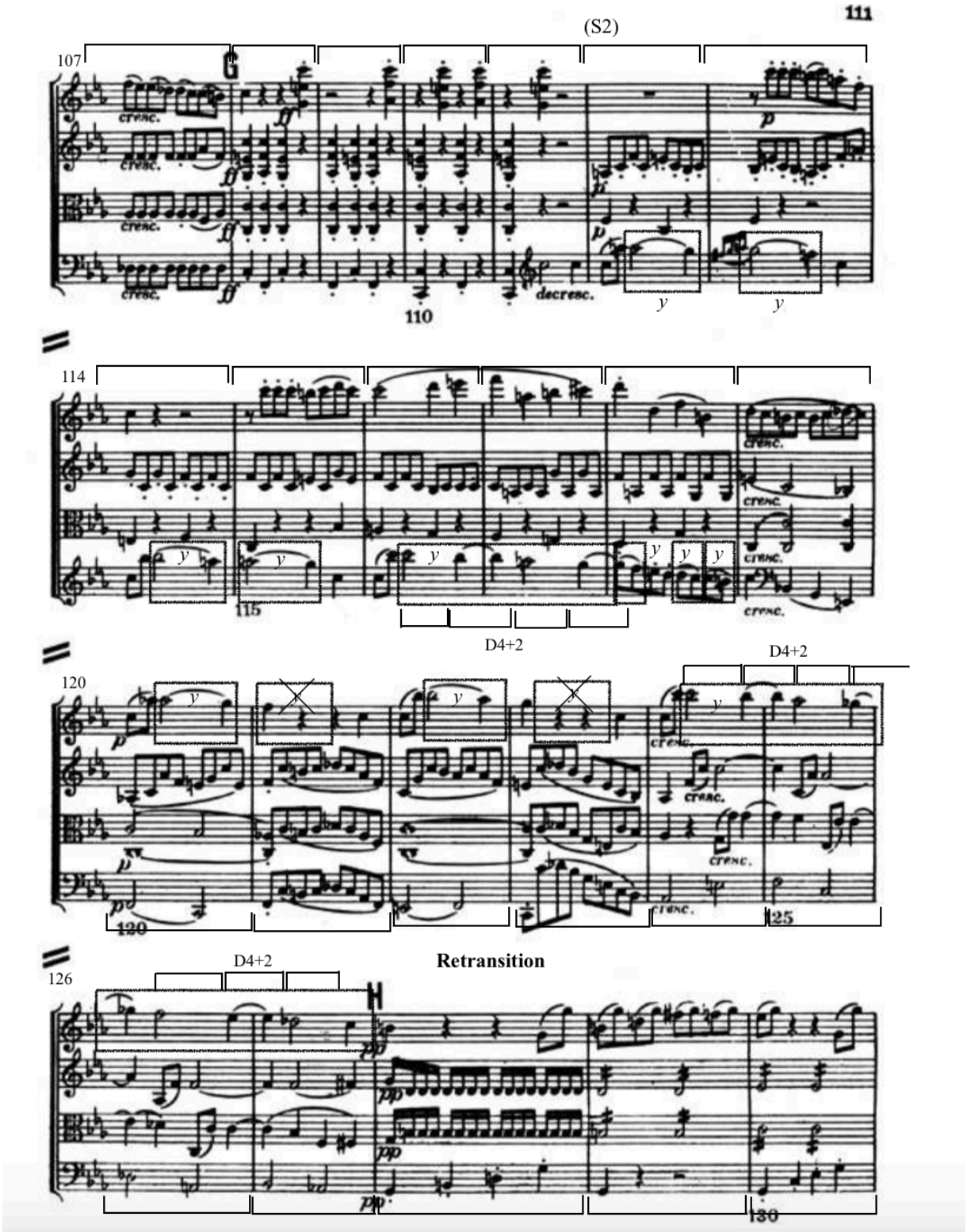

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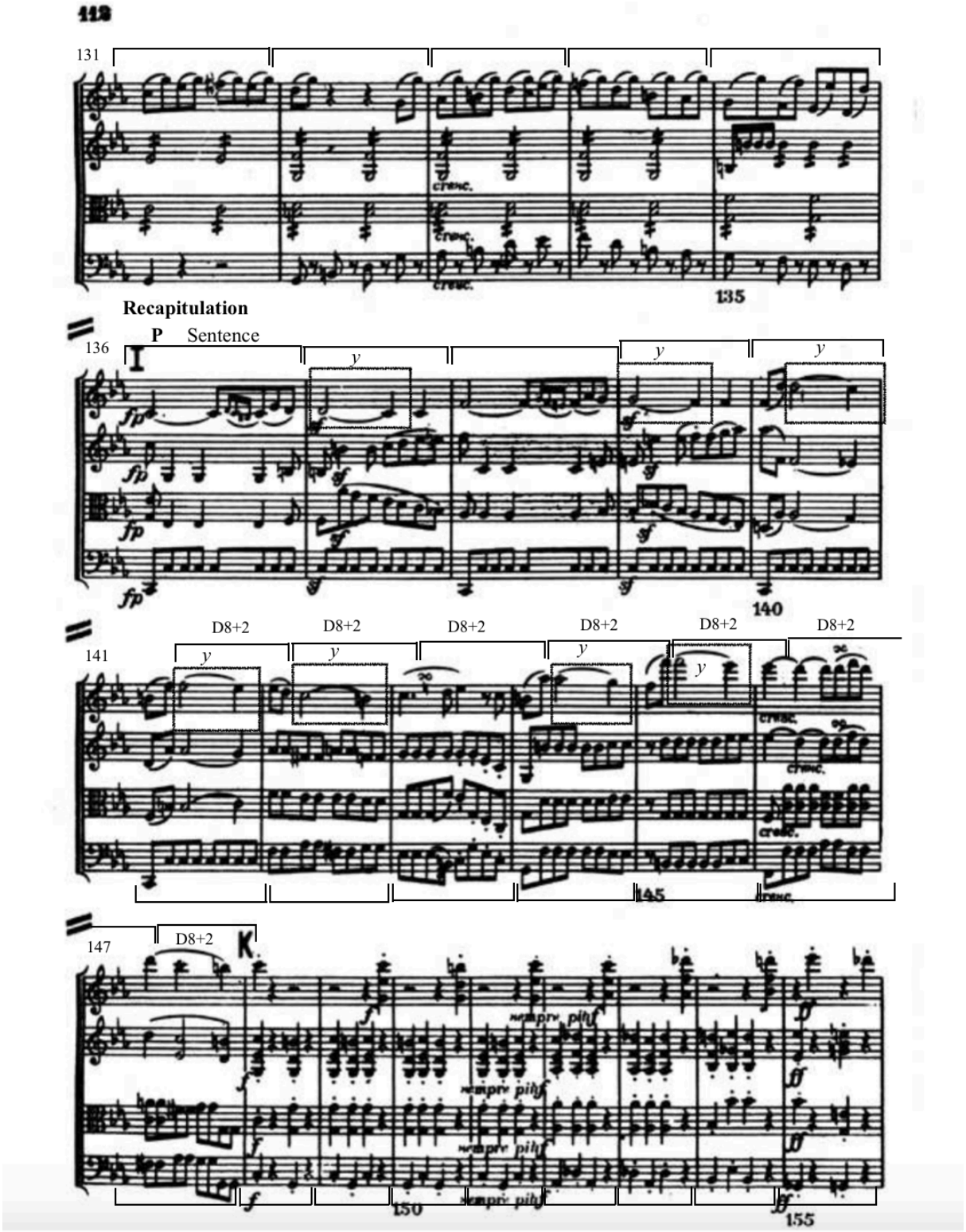

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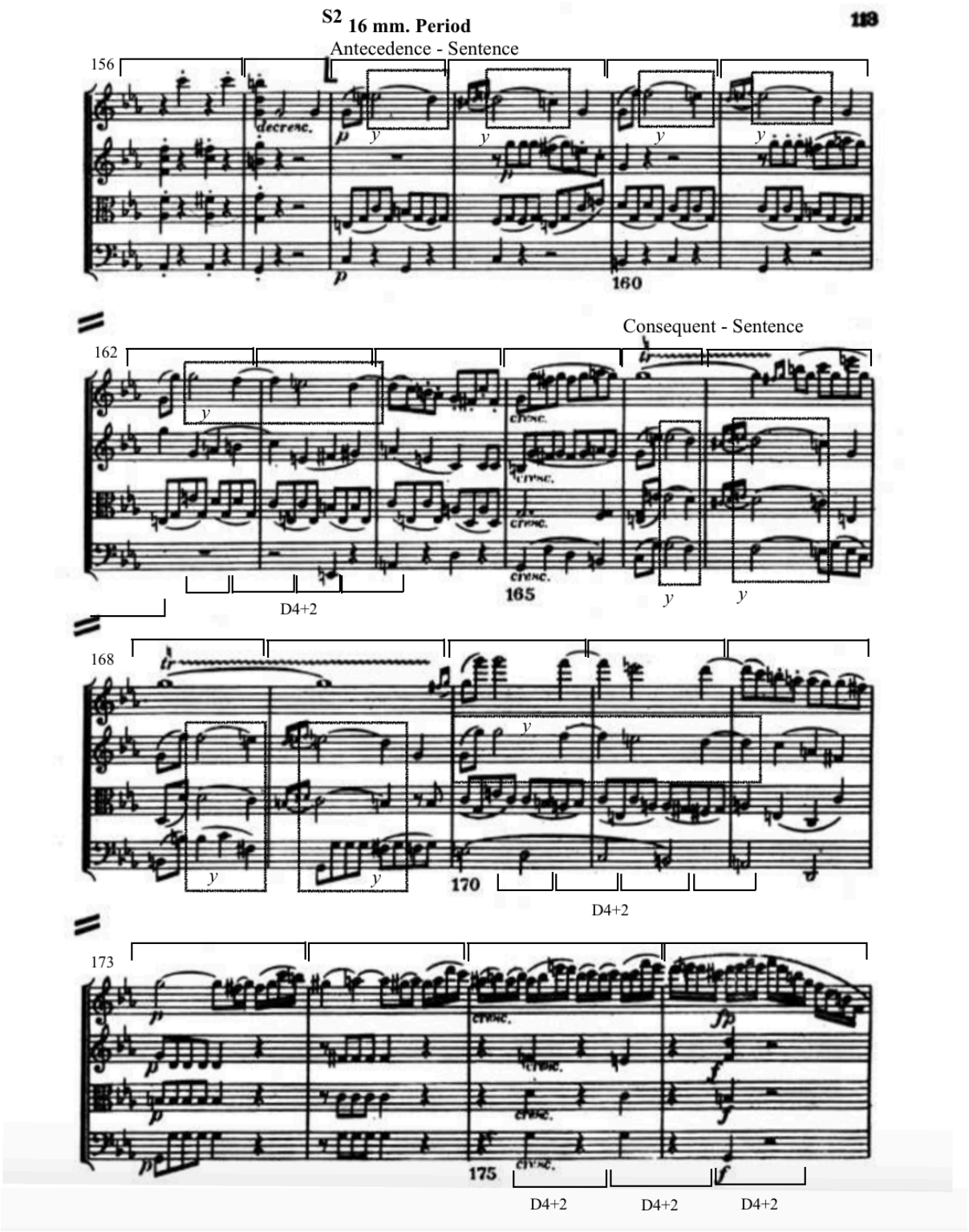

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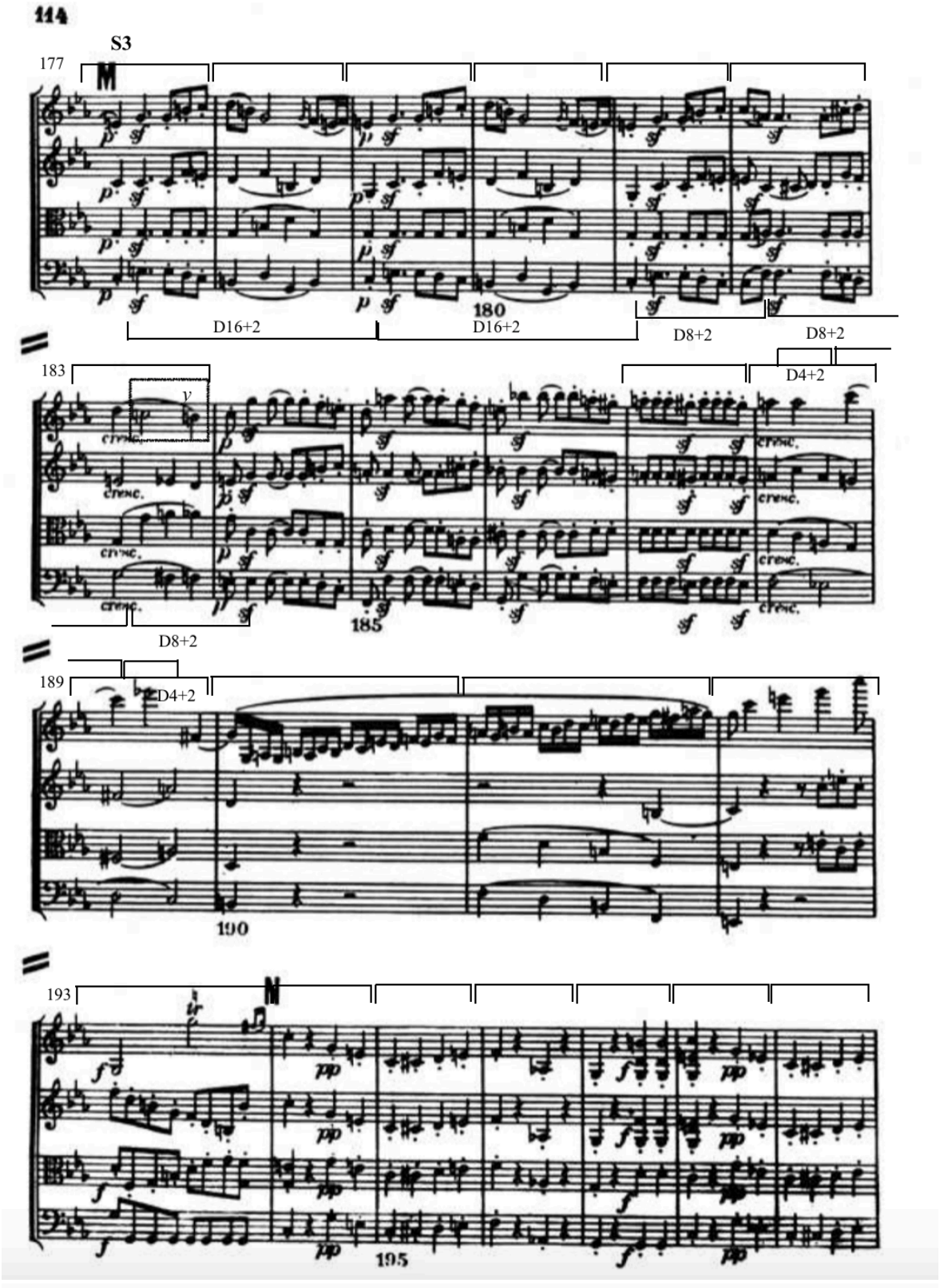

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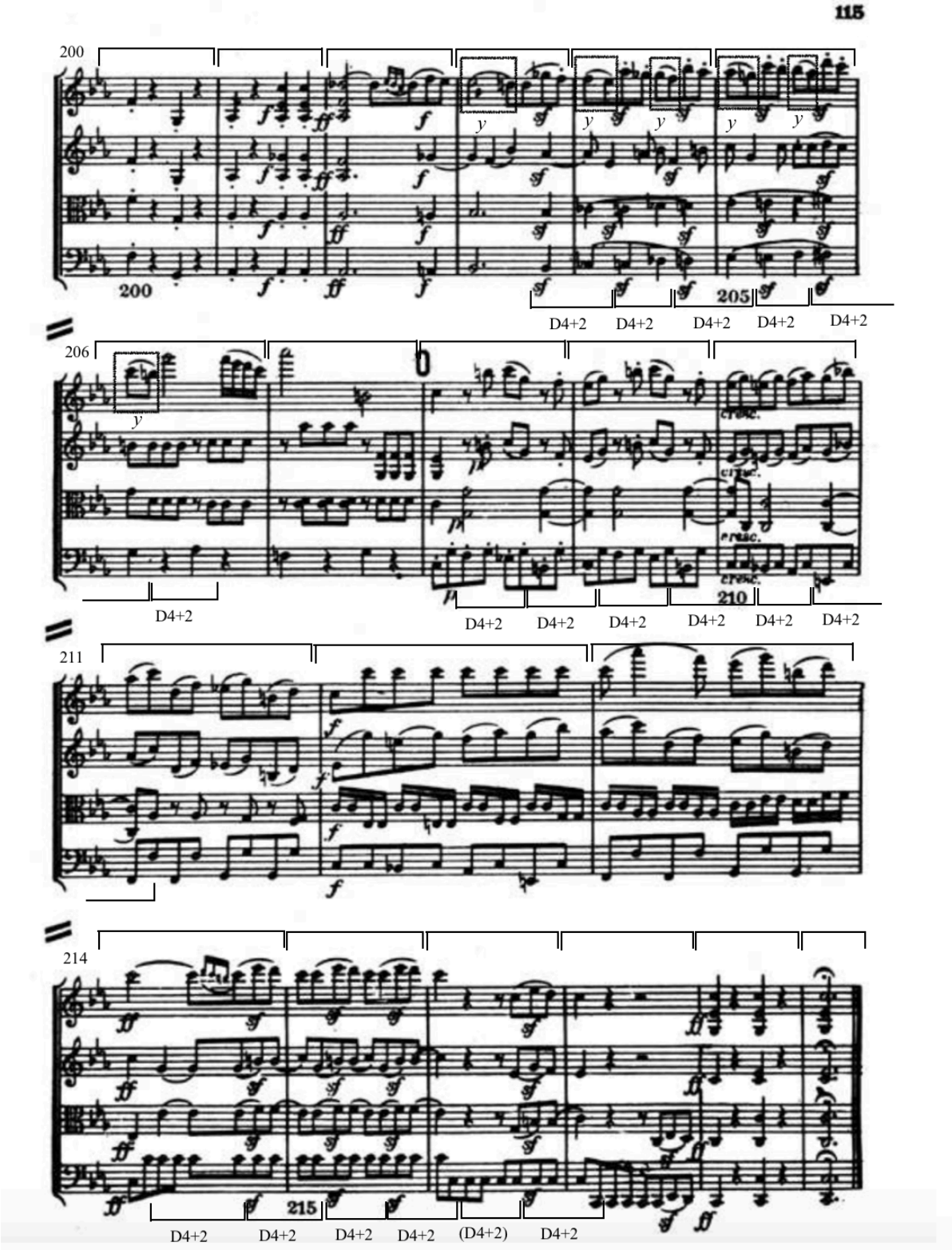

Figure 3.8 continued

The D8+2 motive is similarly altered across the exposition. D8+2 is first introduced in mm. 5–12, where the offset pulse stream is supported by repetition of motive *y,* agogic accents in the upper three voices, slur onset, pitch onset (thickening of texture) in the violin 2 and cello, and chord change in mm. 7 and 11–12. Bar-aligned pulses under these measures are established by slur onset, registral accents in the bass, and harmony change. Two variations of this motive occur throughout the exposition: a fragmentation of the motive (D4+2) in mm. 24, 38–40, 46–58, 51–52, and 64–65 and a stretched version of the motive (D16+2) in mm. 42–45 and 53–56. Metrical motives are able to undergo both fragmentation and expansion just like pitch motives. Krebs would consider D4+2 to be a "tight" version of D8+2, and D16+2 to be a "loose" version of D8+2.[7] First, in mm. 17–18, D4+2 overlaps with the second transformation of motive *y*. Here, the quick-moving pulse stream is supported by the syncopes played by the first violin. The cello directly opposes the violin, maintaining a bar-aligned pulse stream (to treat the instruments as interacting in conversation, a strategy advanced by Edward Klorman).[8] The second violin also asserts a D8+2 simultaneously, faithfully maintaining the original metrical motive. Fragmented D4+2 recurs in mm. 24–25, this time asserted by the lower three instruments with *sforzando* markings. Harmony change and slur onset in the violin 1 maintain the bar-aligned pulse stream. S^3 introduces the second modification to D8+2: D16+2, in mm. 53–56. The offset pulse is substantiated by *sf* markings in all voices, and is opposed by the bar-aligned pulse supported by harmony change, registral accents in the bass, and slur onset in the violin 1.This version of the metrical dissonance could be considered slightly weaker, due to the added time between

7. Krebs, *Fantasy Pieces,* 44.

8. Edward Klorman, *Mozart's Music of Friends: Social Interplay in the Chamber Works* (Cambridge, U.K.: Cambridge University Press, 2016).

accentuations. However, the fragments which precede it in mm. 46–47, and 51–52 might also paradoxically be considered to weaken the original D8+2, by liquidating the motive in a similar fashion to pitch motive fragments. Here, both pulses (bar-aligned and offset) are backed by agogic accents.

In sum, motive *y* and D8+2 undergo variation throughout the exposition, as shown by Figure 3.9. Motive *y* has three variations from the standard motive, each denoted on the figure, while D8+2 dissonance has only two. Just as the initial pitch motive / metrical motive pair was staggered, so these motives are staggered.

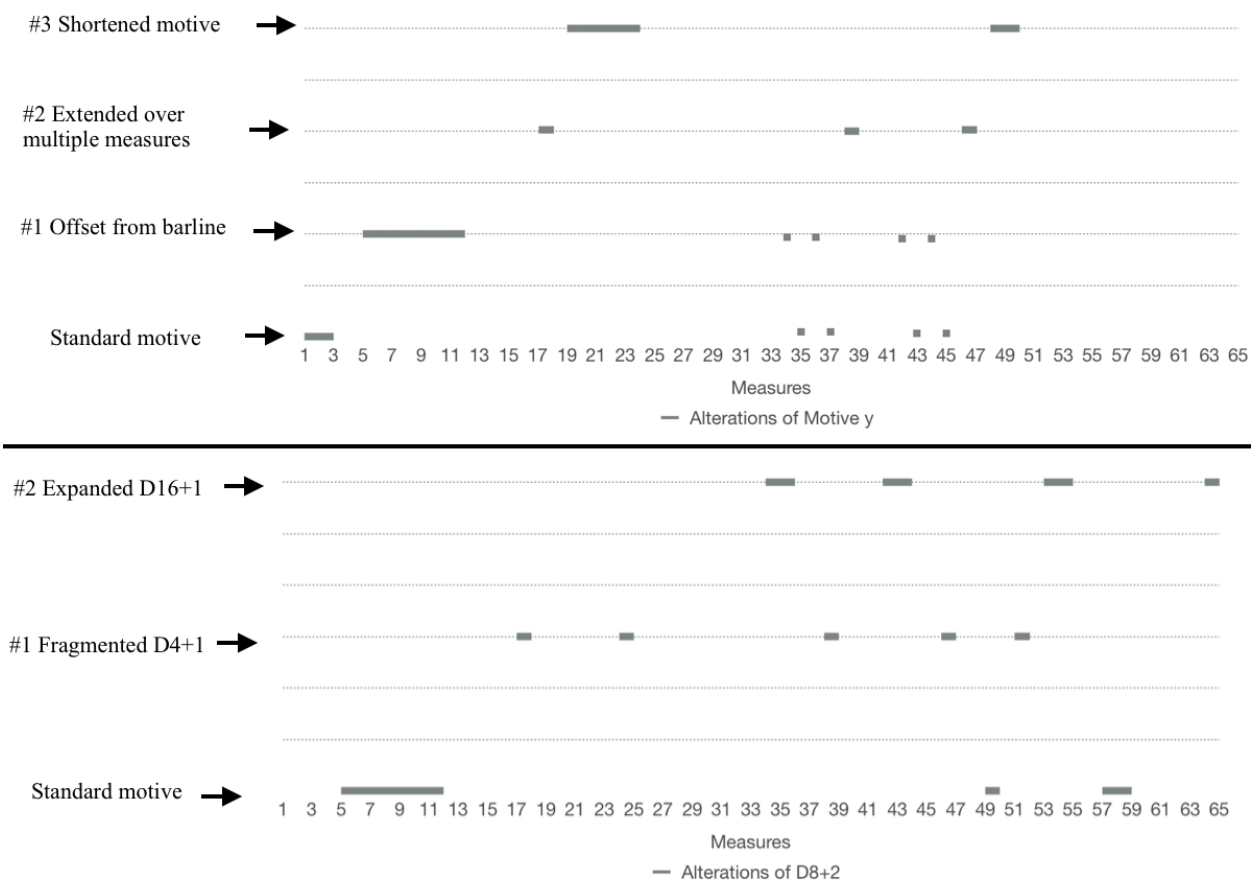

Figure 3.9. Motive *y* and D8+2 Staggered Similar Processes (Alterations)

III. The Development

Motive z and D8+1 Dissonance

Interaction Type 5, defined as pitch motives and metrical motives which unfold at the same time, materializes in the first subsection of the development. With this interaction, not only do pitch motives and metrical motives engage similar processes, but the meaningful points of arrival align throughout, as though the two entities have joined hands and walk a bit together, stepping perfectly (or nearly perfectly) in time with one another.

The first subsection, mm. 78–111, opens with the primary theme in G minor. The entire thirteen-measure theme is retained here in the development, with one key detail absent: the actualization of motive *x*. The first violin begins as expected, with a major sixth leap in m. 82 followed by a leap of a diminished seventh in m. 86. However, the final widening of the interval to an octave in the first violin fails to occur. The harmonic progression is unaltered, but the motivic structure in m. 87 is modified to eliminate the actualization of this motive (compare to m. 10). In the following measure, m. 88, the rebellious first violin then plummets to an A^4, breaking all the rules with a downward leap which is greater than an octave. For these reasons, this leap is not an instance of motive *x*; it also lacks the rhythmic characteristics and metrical placement. This drop, together with the stifling of the actualization of motive *x*, signals impending mutation of the primary theme. Sure enough, beginning in m. 91, pitch and metrical motives from the primary theme recur and undergo simultaneous transformations.

But first, which two motives take the center stage mm. 91–105? The pitch motive which rises to prominence in the core can be traced back to the start of the piece: this motive will be denoted motive *z*. Motive *z* is included with motive *x* on Figure 3.2. Motive *z* first appears in m. 1 and consists of slurred eighth-note movement which skips up a third and then descends by step,

and usually follows a weak-strong-weak pattern, see m. 1. Within the exposition, motive *z* was restricted to a brief but significant placement at the beginning of the primary theme, and on every occasion followed a half-note tied to an eighth note. In the quotation of P in the development, motive *z* crops up in m. 78 and 80, following an extended half-note + eighth note. The critical metrical dissonance in this section is D8+1. In the exposition, this dissonance was linked to motive *x*, overlapping with this motive in every occurrence. During mm. 78–81, the dissonance maintains this connection. During each iteration, as expected, this motive coincides with a variation of motive *x*.

In mm. 91–105, Motive *z* and D8+1 dissonance journey together through three stages. First, in m. 91 to the downbeat of measure 94, the motives risk being destroyed as they are highly weakened. Motive *z* does not enter until m. 92, where it appears hidden in lower voices (the cello in m. 92 and the violin 2 in 93), no longer prominently featured in the violin 1. D8+1 dissonance, also, fades into the subsurface. The viola, who was the last to assert D8+1 dissonance in m. 90, maintains constant eighth note octaves in this section but avoids the leap needed to signal D8+1 dissonance or motive *x*. Hence, this dissonance is broken off from motive *x* and transported to a slurred motive in the second violin. As demonstrated in Figure 3.2, in mm. 91–94 the second violin suggests a slight D16+1 dissonance with slur onset, although this dissonance is so slight it would be likely considered subsurface. A bar-aligned pulse stream endures here, supported most prominently by long pitches or pitches followed by long rests and harmonic change. The dissonance is suddenly quickened to what seems like a D8+1 in m. 93, as the slurred pattern evolves into motive *z*. So, both motives are weakened and undergo a subtle alteration: motive *z* does away with the initial pitch which preceded it in the primary theme;

D8+1 dissonance is transferred from motive *x* to a slurred pattern (which becomes motive *z* in m. 93), establishing that it is not dependent on a particular pitch motive.

The second stage where the pitch and metrical motive act in tandem fills mm. 94–97. Within this fugal section, both motives gain strength and momentum. Motive *z* is first passed back and forth between the viola and cello, with a variation of the motive in m. 95. Although the initial leap in each voice is a seventh as opposed to a third, the slur and the weak-strong-weak pattern are retained. Additionally, the pattern runs parallel to the measures which precede and follow it, and these measures clearly convey motive *z*. In mm. 97, all voices join in, and each take turns with the motive (or an inverted variation of the motive) in quick succession excluding only the cello. Here, motive *z* takes the full center stage, leaving no room for any motives but himself. D8+1 dissonance accomplishes something similar. The metrical motive shoots up from below the subsurface to become suddenly both strong and quick as a D4+1 dissonance. The offset pulse is established by slur onset, pitch onset (in the first violin and second violin in m. 96), thickening of texture, and motivic parallelism (with motive *z*). The cello plugs along with bar-aligned pulses during these measures, supported by slurs, and relatively long pitches. In sum, motive *z* and D8+1 dissonance together undergo sudden intensification and experience increased iterations in mm. 94–97.

In the final and third stage, 98–103, both motives relax and undergo a slowing process. Motive *z* reverts to its original form from the primary theme, replacing the half-note tied to eighth-note rhythmic scheme, and recurring only every other measure. Motive *z* is still slightly more active than within the primary theme. For, the second violin cannot resist interjecting with motive *y* first in m. 101 and again in m. 102. Subsequently, in m. 103, the first violin and second violin each play variations of the motive with an expanded initial leap. The metrical motive also

slows. Beginning in m. 99, a D16+1 offset pulse stream enters but is not confirmed (it only has two pulse iterations). Following this is another unconfirmed pulse stream: D8+1. As my analysis demonstrates, there is likely an implied intermediary pulse in m. 100. Finally, in mm. 102–3, the offset pulse stream picks back up for a bit with D4+1 dissonance. Thus, having already been established, both motives kick up their feet during this third section. In the final measures (mm. 104–5), motives *z* and D8+1 dissonance return for a last hurrah. As in second stage, these measures are fugal, with quick and constant iterations of both motives.

To review, motive *z* and D8+1 dissonance undergo similar processes simultaneously within the first subsection of the development. Both motives are reintroduced in their normative form in mm. 78–90, are severely weakened and undergo transformation in mm. 91–94, quickly rise to the surface and exhibit quick iterations in mm. 94–97, and slow in mm. 98–103 (followed by a section similar to stage 2 in mm. 4–105).

All Motives Break Down during the Quotation of the Secondary Theme

The second subsection of the development, mm. 112–28 further demonstrates interaction-type 5: pitch motives and metrical motives accomplish similar goals in tandem. Whereas in previous sections, one pitch motive interacted with one metrical motive, in this subsection two pitch motives (motive *x* and *y*) interact with two metrical motives (D8+1 and D8+2). Here, the motives work in tandem to alter the formal structure of the subsection in a three-stage process. Initially, in mm. 112–119, the subsection quotes S^2 in F major. At this point, the motives act exactly as they did in the exposition.[9]

9. Motive *x* undergoes actualization in the melody line, and motive *y* recaps all three stages of transformation from the exposition. Similarly, D8+1 dissonance is supported alternatively by motive x in the cello and pitch onset in the first violin, and D8+2 dissonance only occurs in mm. 116–117.

During the first stage of transformation, mm. 120–23, the theme begins to break down and is motivated by pitch and metrical motives. Motive *y* slows its rate of occurrence, only appearing every other measure rather than every measure. This leaves gaping holes in the first violin's melody (mm. 121 and 123 in Figure 3.10). Additionally, D8+1 dissonance fades out of mm. 120 and 122 (the octave has been normalized in the viola and completely removed from the other parts). This dissonance instead pops up in mm. 121 and 123, with a slurred motive similar to the motive almost reminiscent of that presented in the first subsection of the development (mm. 91–93). D16+1 is strongly emphasized, although not confirmed, supported by slur onset and registral accentuation in the lower three voices.

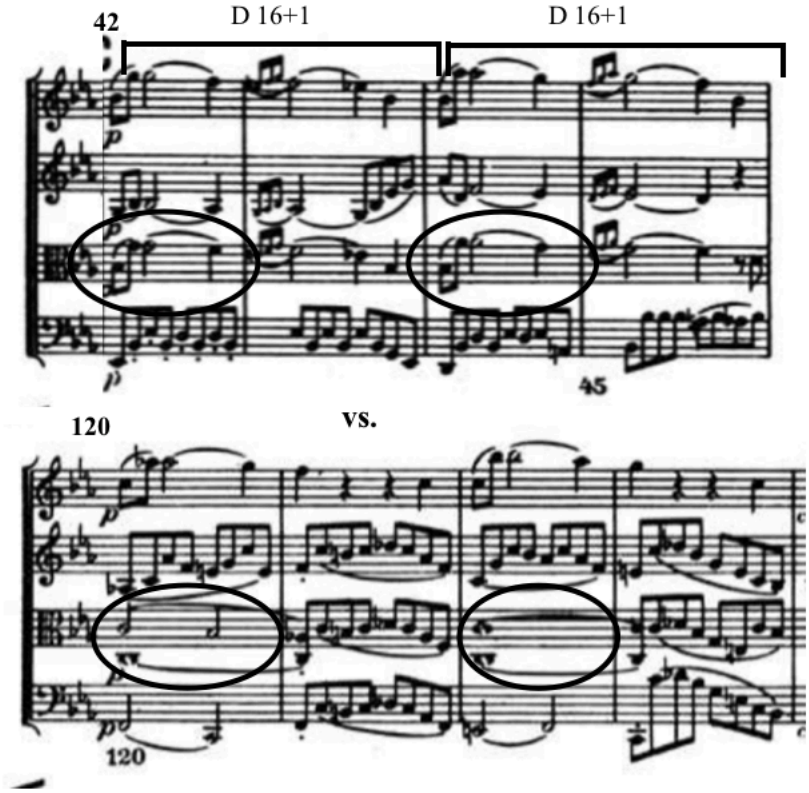

Figure 3.10. Mm. 42–45, 120–23, D16+1 Dissonance Shifted in Development

In the second stage, three out of the four motives successfully dismantle the theme in mm. 124–27. Here, in similar style to motive *z* in mm. 94–97, the motives completely saturate the space. Motive *x* (or a variation of it) sounds almost constantly, passed between the upper three voices; motive *y* is expressed in its extended form in the first violin across its lengthiest period yet: 4 measures; and D8+2 dissonance is strongly drawn out in the syncopations between the first violin and cello.

Hence, in the second subsection of the development, motive *x*, motive *y*, D8+1 dissonance, and D8+2 dissonance break down S^2. First, in mm. 120–23, motive *x* slows its rate, and then D8+1 dissonance brings in a slurred motive from the first subsection of the development. Then, all motives enter and completely fill mm. 124–27, which is basically a fugal compilation of these motives in quick occurrence, thus completing the disintegration.[10]

IV. The Recapitulation

The primary theme re-enters in m. 136, signaling the beginning of the recapitulation. Within the recapitulation, the interaction of motive and meter is slightly varied. In the exposition, motive *x* and D8+1 dissonance underwent similar processes of actualization, although each occurred at a different rate. Motive *x* materialized quickly across 10 measures, while D8+1 took 62 measures before it reached its strongest manifestation in the exposition. In the recapitulation, the process of *x*'s actualization is unchanged, and spans the initial 10 measures of the section, and is repeated in mm. 158–62 and 166–70. D8+1 dissonance, on the other hand is strong from the very onset of the recapitulation. In mm. 136–40, the offset pulse is strongly established by

10. In the retransition, mm. 128–35, as in the transition, the metrical dissonance is again momentarily quelled. This brief metrical consonance signifies the conclusion of the development.

registral accentuation, pitch change, and *sf* markings in the violin 2, viola, and cello, as well as converging *y* motives between the middle voices and the cello. After this strong insertion of the dissonance, D8+1 regresses to slightly weaker iterations resembling those in the exposition, with all voices moving in mm. 144–146, and *sf* marking substantiating the offset pulse in mm. 184–185. The bar-aligned pulses throughout these sections are supported by identical musical evidence to their respective sections in the exposition. And so, although motive *x* maintains its process of actualization in the recapitulation, D8+1 dissonance no longer goes through such a process. This befits the recapitulation, for the objective of the section is to recall significant motives from the exposition. Hence, it is fitting that D8+1 is brought back at the onset of the recapitulation.

Motive *y* and D8+2 dissonance undergo minor adjustments as well. Just as in the exposition, motive *y* is introduced right away (mm. 137–39) and soon undergoes its first transformation (mm. 140–47) by which it is displaced from the bar line. However, due to the alteration of the codetta => transition and the deletion of S^1, the second and third transformations are held off until they are rehearsed in the S^2 theme, mm. 158–72. The fourth transformation of motive *y* is also slightly weakened in the recapitulation. In mm. 173–74, the initial gesture is replaced with a static half note, and so the ascending motive is no longer directly preceded by an obvious occurrence of motive *y*. Similarly, D8+2 dissonance initially occurs in mm. 140–47 but does not demonstrate faster iterations until during the summary in S^2. The recapitulation maintains the ascending leaps supporting the D8+2 offset pulse in mm. 188–89. Motivic consonance also recurs at the codetta=>TR as well as the final codetta in mm. 194–201.

V. The Coda

As demonstrated by Example 3.2 this concluding section is rather fragmented, comprised of eight two-measure fragments. Additionally, many fragments allude to part of a thematic passage from earlier within the piece, with the primary theme quoted the most. Strikingly, these themes follow a different pattern than they do within the body of the work, moving from the primary theme, to a segment from the S^3, to S^1 (thus restoring a them absent from the recapitulation), and back to the P. These fragments reference the beginning of the themes (mm. 1–2 of P, and mm. 26–27 of S^1), and closing measures from themes (m. 69 from S^3, mm, 13–14 from codetta). In nearly every case, the first violin quotes the melody, but in m. 212, the octave-leap bass line from m. 1 is played by the first violin.

The first violin also does most of the quotation, while the lower voices incorporate metrical dissonances underneath passages where they did not originally exist, as shown on Example 2. D4+2 dissonance occurs in mm. 208–9 where the viola consistently iterates relatively lengthy (half-note) octaves and again in 214–17, where the middle voices converge inwards and then all voices play with *sf* markings. In these cases, the original measures (26–27, 1–2) did not include this dissonance.

VI. Conclusion

In summary, this movement demonstrates two interactions between motive and meter. First, pitch motives and metrical motives unfold in a staggered format (interaction-type 4) during the exposition. Motives *x* and D8+1 are both actualized during this section, but at different rates. Another instance of interaction-type 4 in the exposition is between motive *y* and D8+2 dissonance. Here, these motives each undergo variation. Interaction-type 5 crops up in the development. This interaction is defined as pitch motives and metrical motives which unfold at

the same time. During the first half of the development, motive *z* and D8+1 dissonance undergo concurrent processes. These motives are initially weakened and almost disappear; they both rebound with constant, almost overbearing repetition; and finally, they relax. Motive *x* and *y* along with D8+1 and D8+2 in the second half of the development begin to breakdown S^2 (which is quoted here) before making a comeback just before the retransition.

Conclusion

In this thesis, I have examined various ways that meter interacts with harmony, form, and motive. My aim was to consider how these parameters cooperate, drawing from robust analyses of each parameter, and defining specific categories of interaction. Lewin, Cohn, Krebs, and Temperley provide various instances of collaborations between meter and pitch domains. I have classified these interactions as three types: 1) a metrical process runs parallel to a similar harmonic/formal process (my interaction-type 1); 2) a metrical phenomenon anticipates what will happen harmonically (my interaction-type 3); and 3) metrical and motivic phenomenon enact similar processes simultaneously (my interaction-type 5). Additionally, I have refined these authors' categories and have proposed two new types of interactions: in one a metrical consonance/dissonance recalls a harmonic process from earlier in the piece (my interaction-type 2); in another, metrical and motivic processes unfold in a staggered format (my interaction-type 4). Although this list is hardly comprehensive, if offers a real start.

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