Prolongational Structure in Bartók's Pitch-Centric Music: A Preliminary Study

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The question of whether or not the analytical concept we know as prolongation may be applied to music of the twentieth-century is one that has been argued by many theorists in recent years.[1] Many of these efforts have attempted to address this question by investigating music clearly from the "atonal" literature—that is, music primarily from the Second Viennese School. Such studies have yielded results that fall on both sides of the prolongational fence. Joseph Straus, for example, in his article titled "The Problem of Prolongation in Post-Tonal Music," asserts that analyses that aim to uncover middleground structures of post-tonal music using the traditional notion of prolongation as their analytic tool generally miss their mark, primarily because music of this genre lacks four necessary "stability conditions" that are present in tonal music. He proceeds to propose a "less ambitious, but theoretically more defensible" approach based on an associational model, which sheds all of the baggage that accompanies the term "prolongation" when it is applied to atonal music.[2] Fred Lerdahl, on the other hand, makes a case for prolongational structures in atonal music by focusing not on the stability conditions that are lacking, but rather on a set of

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[1] See, for example, James Baker, "Schenkerian Analysis and Post-Tonal Music," in *Aspects of Schenkerian Theory*, ed. David Beach (New Haven: Yale University Press, 1983), 153-86; Fred Lerdahl, "Atonal Prolongational Structure," *Contemporary Music Review* 4 (1989): 65-87; Charles D. Morrison, "Prolongation in the Final Movement of Bartók's String Quartet No. 4," *Music Theory Spectrum* 13, no. 2 (Fall 1991): 179-96; Joseph Straus, "The Problem of Prolongation in Post-Tonal Music," *Journal of Music Theory* 31 (1987): 1-22; Roy Travis, "Tonal Coherence in the First Movement of Bartók's Fourth String Quartet," *Music Forum* 2 (1970): 298-371; Paul Wilson, "Concepts of Prolongation and Bartók's Opus 30," *Music Theory Spectrum* 6 (1984): 79-89; as well as parts of Felix Salzer's *Structural Hearing* (New York: Dover, 1952).

[2] Straus, 1.

"salience conditions" that replace them. Indeed, with these salience conditions, Lerdahl develops "an atonal prolongational theory [that can] shed its Schenkerian origins. Such a theory can account for the important intuitions of elaboration and linear connection that atonal music evokes."[3] Lerdahl's rule-driven approach, derived from his and Ray Jackendoff's perceptually based *A Generative Theory of Tonal Music* (1983), produces prolongational tree diagrams that reveal deep structure through multilevel reductions.[4]

Lerdahl's theory, designed specifically to reveal prolongation in music from the atonal literature, has merit as far as it goes. He recognizes its limited scope and suggests some extensions of the theory for other twentieth-century music, such as music that *does* have tonal or some other element of stability at work. The pitch-centric nature of much of Bartók's music seems a perfect medium in which to test this extension of the theory. In such music, tonal and atonal elements are combined in a way that requires a coordination of stability and salience conditions. An analysis of a representative example from this literature that attempts to demonstrate prolongation using only Lerdahl's salience conditions would ignore important tonal features of the piece. In this paper I shall illustrate this point by comparing and contrasting two prolongational analyses of the coda (mm. 126-61) of the first movement of Bartók's Fourth String Quartet. The first set of analyses shows the prolongational structure of the excerpt based on salience conditions alone. As we shall see, this analysis is problematic because it fails to recognize many tonal implications that are present in the passage: a motion to the dominant, a prolongation of a pseudo-subdominant harmony as well as that of a pseudo-dominant harmony. The second set of analyses, a modification of the first, incorporates traditional stability conditions along with salience conditions to provide a more accurate picture of the prolongational structure of the excerpt. This latter analysis is then

[3] Lerdahl, 68. As a side note, it is worth mentioning that Nicola Dibben ran a perceptual study to see if listeners do indeed hear atonal music in a hierarchical fashion as Lerdahl suggests in his article. She reported her findings in an article titled "The Cognitive Reality of Hierarchic Structure in Tonal and Atonal Music," *Music Perception* 12, no. 1 (Fall 1994): 1-25. In brief, Dibben, using Lerdahl's own examples as stimuli, found no empirical support for his hypothesis. Bartók's pitch-centric music, which is under study in this article, was not tested by Dibben in her study.

[4] Fred Lerdahl and Ray Jackendoff, *A Generative Theory of Tonal Music* (Cambridge: MIT Press, 1983).

compared to Travis's quasi-Schenkerian analysis of the same passage, excerpted from his complete analysis of the first movement, to suggest problems in the Schenkerian approach to this excerpt and, more generally, to music of this genre.

In Lerdahl and Jackendoff's *A Generative Theory of Tonal Music* (hereafter referred to as *GTTM*), the authors make the claim that listeners perceive events within nested rhythmic units which they call *time-spans*. As Lerdahl summarizes:

> At local levels time-spans consist of the distances between beats; at global levels, of groups; at intermediate levels, of a combination of meter and grouping. Within these spans the listener compares events for their relative stability. Less stable events are recursively "reduced out" at each level, until one event remains for the entire piece. Such in brief is *time-span reduction*. Its essential function is to link rhythmic and pitch structure . . . [which is] needed to develop a deeper stage of analysis, *prolongational reduction*, . . . [which] evaluates the prolongational importance of events.[5]

Listeners do not take an *ad hoc* approach to determining stability, the authors claim. Indeed, Lerdahl and Jackendoff posit several "well-formedness" and "preference" rules to determine the length of each time-span, the grouping of time-spans at higher levels, and the selection of the "head" or most important event of a time-span, and claim that listeners intuitively apply these same rules when comparing events for their relative stability. These rules might collectively be referred to as *stability conditions*.

Prolongational reductions are modeled on Schenkerian reductions in that both types of reduction describe linear continuity, departure, and return of events within the context of a hierarchy. Prolongational structures are not, however, dependent upon pre-existing schema such as Schenker's *Ursatz*. Rather, they derive from the most global to the most local levels of a piece's time-span reduction. On each successive level, motion can be described in one of two ways: as a tensing motion (departure), indicated in Lerdahl and Jackendoff's analytical notation by a right branch, or as a relaxing motion (return), indicated by a left branch. Each of these types of motion may be described more specifically according to their prolongational function: as a strong prolongation, in which an event repeats, indicated by an open circle at the node (the point where the two branches merge); as a weak prolongation,

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[5] Lerdahl, "Atonal Prolongational Structure," 71.

in which an event repeats in an altered form, indicated by a closed circle at the node; or as a progression, in which an event connects to an entirely different event, indicated simply by the merging of two branches without an open or closed circle. As in time-span reduction, a set of stability conditions guides the analyst to selecting the proper type of connection.

In tonal music, it is these stability conditions, based on the grammar of tonal music, that guide the listener at every stage of the decision-making process involved in an analysis. In adapting the theory to atonal music, however, Lerdahl acknowledges that "atonal music almost by definition does not have stability conditions. Its pitch space is flat; sensory consonance and dissonance do not have any syntactic counterpart."[6] In order to develop criteria for pitch reduction in the atonal language, Lerdahl suggests a set of *salience conditions* that replace the stability conditions of tonal music. We begin with a review of these salience conditions, shown in figure 1, followed by a review of two preference rules essential for the proper construction of the prolongational trees, shown in figure 2.

Figure 1. Salience conditions (numbers in [ ] refer to relative strength of application)

Of the possible choices for head of a time span, prefer an event that is:

Local levels
- a) attacked within the region [3]
- b) in a relatively strong metrical position [1]
- c) relatively loud [2]
- d) relatively prominent timbrally [2]
- e) in an extreme (high or low) registral position [3]
- f) relatively dense [2]
- g) relatively long in duration [2]

Global levels
- h) relatively important motivically [2]
- i) next to a relatively large grouping boundary [2]
- j) parallel to a choice made elsewhere in the analysis [3]

The salience conditions interact according to their relative strength of application to select the most salient event within each time-span of a passage. Upon recursive reduction to more global levels, less salient events disappear from the analysis. The two preference rules are needed in order to

[6] Ibid., 73.

determine the most important event within a prolongational region ("time-span") and for making the most stable connection within a given time-span. These prolongational rules interact at each level, sometimes mutually supportive of each other but at other times in conflict, forcing the analyst to seek the most stable connections from the next lowest time-span level or to assign less stable connections from the more global level.

Figure 2. Preference Rules

A. Preference Rule for Prolongational Importance:
   In choosing the prolongationally most important event e_k within the prolongational region ($e_i - e_k$), prefer an event that appears in the two most important levels of the corresponding time-span reduction.

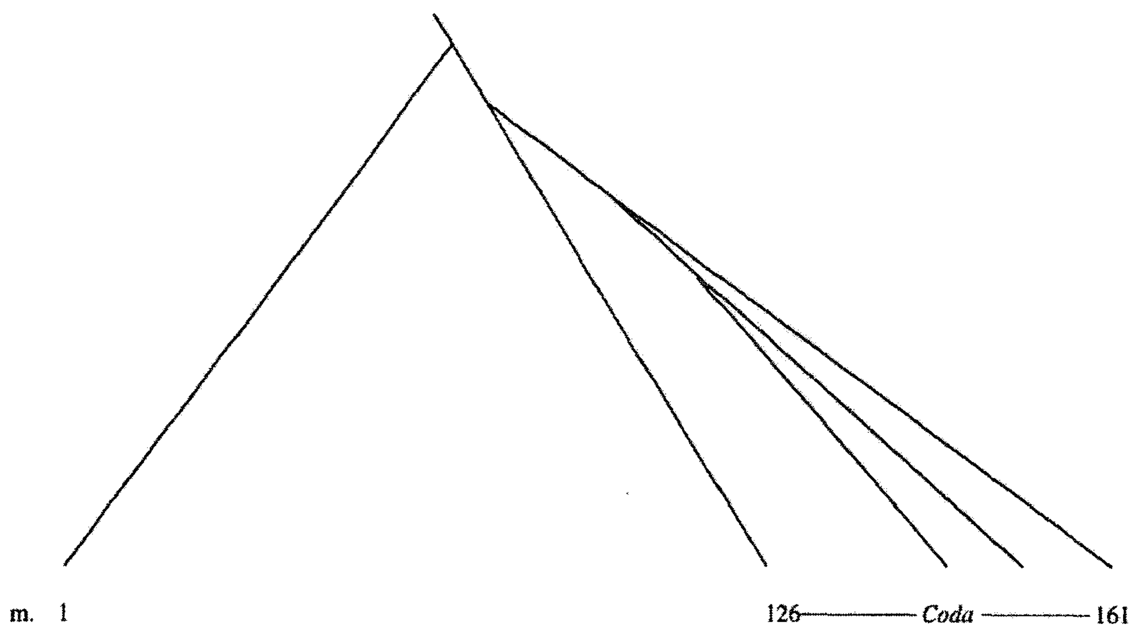
B. Preference Rule for Prolongational Connection:
   a. *Stability of Connection*: Choose a connection in the following order of preference:
      (1) e_k attaches to e_i as a strong right prolongation
      (2) e_k attaches to e_j as a left progression
      (3) e_k attaches to e_i or e_j as a weak prolongation
      (4) e_k attaches to e_i as a right progression
      (5) e_k attaches to e_j as a strong left prolongation

   b. *Time-span segmentation*: If there is a time-span that contains e_i and e_k but not e_j, choose the connection in which e_k is an elaboration of e_i; and similarly with the roles of e_i and e_j reversed.

Using these conditions and rules as a guide, we may proceed to the first analysis, found in diagrams 1a-e. In diagram 1a-1, we observe that the passage under question (the coda) is right-branching, signifying a departure from the starting point (m. 126). At first glance, this might seem counterintuitive to one's conception of the ending of a movement, where, especially in a tonal context, emphasis is often placed on a return to opening material, which would be indicated in tree notation with a left branch. It is important to keep in mind, however, that as a coda, this passage should be viewed as an extension of the piece (and hence as a departure). The branch that stems from m. 126 would connect back to the rest of the prolongational tree through a left branch stemming from m. 1, as shown in diagram 1a-2.

Diagram 1a-1. Deep structure of Coda

Diagram 1a-2. Deep structure of Bartók's Fourth String Quartet, I



Using only the salience conditions of figure 1 to select the head of each time-span, the set of graphs given in diagrams 1b-d yield many problematic results due to the relative importance they give to supposedly more salient events at the expense of clearly important tonal events, which achieve less prominence than they deserve. Two of these events in particular deserve special attention here. The first is in the opening passage of the coda, mm. 126-34, shown in diagram 1b (see foldout).[7] The motion to the dominant that frames this opening section should, it seems, play an important role in the overall structure of the coda as an initial departure away from the opening tonic. This departure would be represented graphically as a right progression, and the node would be at a fairly high level. Yet in terms of the salience conditions, this opening section is dominated by the repeated dyad D-A (Cello/Viola and Violin I, respectively), which occurs consistently throughout mm. 130-34. Hence, as the graph indicates, application of the salience conditions alone requires that the first occurrence of D-A in m. 130 become the head of the prolongational region spanning mm. 130-34, then connect to the main (left) branch at level *c*. Subsequent occurrences of the D-A dyad are subsumed at level *c*, but serve as the heads of their respective regions at level *d*. These connect to the first D-A dyad as strong right prolongations at level *d*.

The second event worthy of mention is a quasi-subdominant F-E dyad in m. 145 which, according to diagram 1a-1, connects to the tree as a left progression to the quasi-dominant of m. 152 (G♯/D). This latter event in turn connects as a left progression to the main (right) branch. This series of nested left progressions thus represents a gradual relaxation into the final octave Cs of the piece. Let us examine the F-E branch more closely, however. In diagram 1c (see foldout), we observe that the highest level branch coming off of this F-E branch connects at level *c*; tracing that branch back to its origin leads to the B♮-B♭ of m. 135. Following the level *d* reduction of the passage established by these two boundaries (mm. 135-45; see reduction beneath the score), we observe that the B♮-B♭ dyad initiates two stepwise lines in contrary motion (bottom voice: B♮-C♯-D-C♯-D-(D)-F; top voice: B♭-A-G-A♭-G-(G)-E). This line is displayed quite clearly on the tree through a series of progressions and prolongations at levels *c* and *d*, but it misses the larger point of the passage, which is the repeated departure from

[7] See my grouping analysis (brackets beneath the music, level *e*), which begins with a statement of octave Cs ("tonic") and closes on a G-D dyad ("dominant").

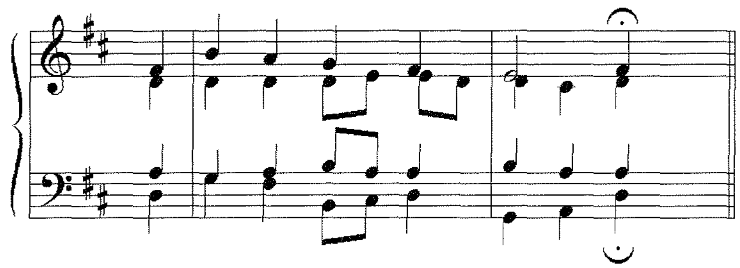
and return to (that is, prolongation of) the F-E dyad heard throughout. The two stepwise lines (salient because of their registral prominence) undermine this F-E prolongation, reducing the appearance of the dyads to mere surface level (level *e*) right progressions. Rules of tree construction do not permit branch crossing; therefore, these F-E dyads may not connect in any way, given this configuration.

Other aspects of an analysis constructed solely with salience conditions work well, however. For example, the G♯-D dyad of m. 152, shown in diagram 1d (see foldout), which serves as the penultimate quasi-dominant before the return to the octave Cs at the end of the piece, is salient due to its extreme register and dynamic. It is thus selected as the head of the prolongational region spanning mm. 152-56, connecting to the main (right) branch at level *a* as a part of the series of nested left progressions mentioned earlier. Also, most of the surface level (level *e*) decisions made based on salience conditions alone seem reasonable. In short, it is at the highest levels of structure that problems arise when stability conditions are ignored in favor of salience.

But how do we integrate these conditions? How do we move from this set of graphs to one that more accurately incorporates stability and salience in this excerpt, in which clearly both tonal and atonal elements are at work? Before we can proceed to the graphs found in diagram 2, we must discuss the issues that are engaged when salience and stability elements both play a role in a musical passage. Clarification of these issues will provide justification for the analytical decisions made in diagram 2.

A useful starting point for this discussion might be Lerdahl and Jackendoff's *GTTM*, in which the authors address the issue of surface salience versus stability in tonal music by warning against the confusion of an event's structural importance with its surface salience. To illustrate their point, they use an excerpt from a Bach chorale, shown in figure 3, which contains a IV chord at the downbeat of m. 1. This chord is salient not only because of its strong metrical position, but also because of the relative height of its soprano and bass lines (both local maxima). In terms of structural importance, however, this IV chord is subservient to the opening tonic and the immediately following I^6. As such, the authors conclude that this chord is better interpreted as an "appoggiatura" chord that is reduced out at a fairly low level. They conclude from this example an already intuitively obvious point: that the *most striking* event is not always the *most structurally significant* event:

Figure 3: Excerpt from Bach chorale



> We do not deprecate the aural or analytic importance of salient events; it is just that reductions are designed to capture other, grammatically more basic aspects of musical intuition. A salient event may or may not be reductionally important. It is within the context of the reductional hierarchy that salient events are integrated into one's hearing of a piece.[8]

Recall that it was only the complete absence of stability conditions in atonal music that led Lerdahl to *replace* them with salience conditions. If tonal implications are present in a piece of music and play a role in the structural importance of the piece, however, a reductive analysis must return to the same relationship between salience and stability conditions that Lerdahl and Jackendoff establish in *GTTM*. Simply put, what is the most striking is not necessarily the most structurally important, and when these two conditions conflict, stability conditions assume greater importance. Charles Morrison, in his analysis of the final movement of Bartók's Fourth String Quartet, emphasizes this point: "On occasion the externally defined stability conditions will be shown to support interpretations which actually contradict those founded on salience factors alone. In such instances, stability conditions will override salience conditions."[9] But he goes on to say that this does not mean that salience conditions play no role in the prolongational design of the piece. While Morrison is referring specifically to the movement *he* analyzes, I would like to extend this claim to include much of the pitch-centric literature. Salience continues to play a role at middle and lower levels of structure, and certainly continues to affect a listener's perception at these levels.

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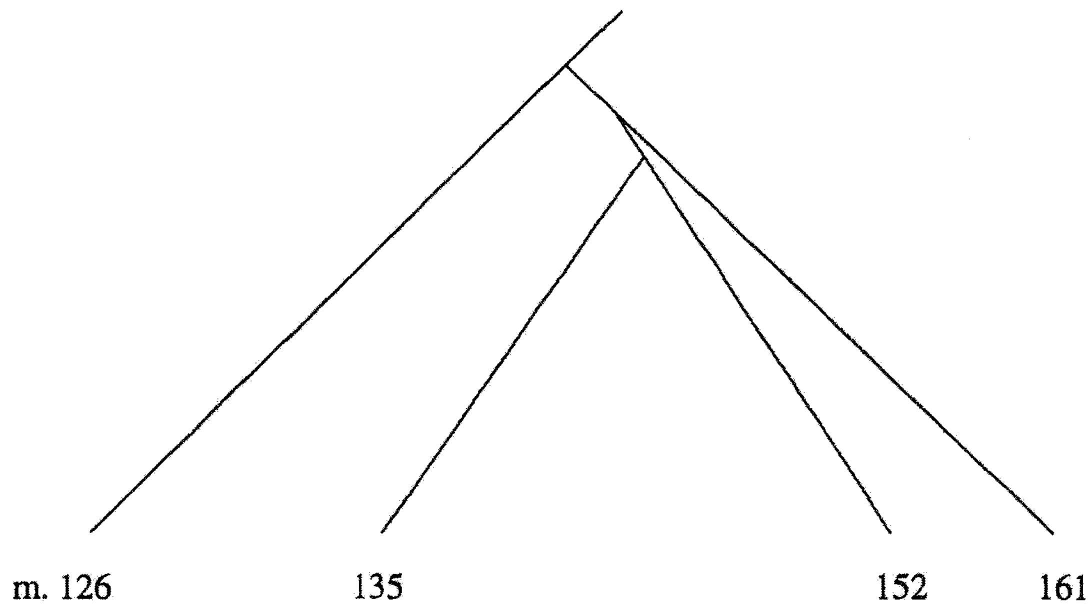
[8] Lerdahl and Jackendoff, 109.
[9] Morrison, 180.

We now turn our attention to diagrams 2a-d, which incorporate the tonal elements that were lacking in the first set of analyses of this coda passage. Notice, first of all, that in diagram 2a (facing page) the basic shape of the prolongational tree remains intact: the coda begins with a motion away (right progression) from the opening octave Cs, while the second and third large sections feature harmonies that participate in a general relaxation (series of nested left progressions) into the final closing cadence. The events that participate in these large-scale structural motions have been chosen not on the basis of salience, however, but on the basis of stability conditions. Therefore, the head of the second large section is at m. 135, not m. 145. In diagram 2b (see foldout), a graph of the opening section of the coda (mm. 126-34), it is the G-D dominant dyad of m. 134 that connects to the main (left) branch at level *c* instead of the repeated D-A dyad heard throughout mm. 130-34 (compare diagram 2b to diagram 1b). This presents a perfect example of a situation in which the more *salient* event (by virtue of its repetition) is not the more *important* event (by virtue of its harmonic function). Indeed, the G-D dyad, by comparison, is heard for just one eighth-note duration, yet because of its structural importance it is chosen as the head of this particular prolongational region. The D-A dyad of mm. 130-34 assumes a less important role in the overall structure, connecting at level *d* as a left progression to the branch originating from the G-D dyad.

In diagram 2c (see foldout), a graph of the second section (mm. 135-45), the F-E dyad of m. 135 is chosen as the head of the entire region, connecting at level *a* (not shown) to the rest of the tree. All subsequent F-E occurrences attach to this initial branch, either directly as strong right prolongations, or indirectly as nested strong right prolongations (depending on the level of the graph—*c* or *d*—at which one looks). Finally, in diagram 2d (see foldout), the pseudo-dominant G♯-D dyad from the closing section (m. 152) connects to the main (right) branch at level *b* as a left progression, but in this case it is selected as the head of its prolongational region on the basis of *both* structural importance and salience. In short, diagram 2d appears the same as diagram 1d. Here, then, is an example of an event that is simultaneously the most salient and the most structurally important, proof that the two are not necessarily always in opposition. Furthermore, in each of these diagrams salience conditions, though replaced at the highest level by stability conditions, *do* continue to play an important role in the branching decisions made at the middle and lower levels.

Diagram 2a. Deep structure of Coda (revised)



Yet for all of the improvements these graphs make over the diagram 1 graphs, there remains one troublesome aspect—namely, the graphic representation of the series of strong prolongations of the F-E dyad in the second large section of the coda (diagram 2c) fails to simultaneously represent the salience of the two stepwise lines discussed earlier. The graph is unable to reveal these relationships due to certain well-formedness rules built into the theory that forbid branch crossings of any kind at any level. As a result, musical passages that feature compound textures with many different ideas being developed simultaneously (such as this one) are shortchanged upon analysis. These events are clearly salient at this middle level of structure, and should be represented in some way on the graph. There are two ways to approach this dilemma. First, a simplistic solution to represent these stepwise lines on a prolongational tree would be to allow an additional preference rule that would permit limited branch crossing at lower levels in order to include graphic representation of compound textures such as this one. A revision of this section of the tree (mm. 135-52) to include the stepwise lines following this proposed solution appears in diagram 2c, version 2 (see foldout). One does not need to be a zealous layerist to feel sudden pangs of anxiety over this graph. It is graphically messy, and it significantly muddles the picture of what transpires in this passage.

Another, perhaps more reasonable, approach would be to explain the compound texture in a different way, thus eliminating the need for crossed branching. In this case, we might view the F-E dyad as a pedal point, initiated not at m. 135 but one measure earlier, m. 134, and "held" through reiteration—made necessary by the instrumentation—until m. 145. Thus the initial F-E dyad would still connect as a left branch to the rest of the tree at level *a*, but the subsequent F-E attacks would no longer need to be represented graphically, leaving room for graphic representation of the stepwise lines at levels *d* and *e*. A sketch of this alternative is shown in diagram 2c, version 3 (see foldout).

One final issue needs to be addressed. How is a prolongational tree structure that integrates stability and salience conditions an improvement on other prolongational attempts to describe pitch-centric music? For example, theorists such as Felix Salzer and Roy Travis have applied Schenkerian theory to music of this type in an attempt to reveal prolongational as well as voice-leading structures. Travis's analysis of the first movement of Bartók's Fourth String Quartet is excerpted in figure 4 to include just the coda; this excerpt will serve as a foil to my tree structures in diagram 2.

For conservative Schenkerians, adaptations of the theory for the purpose of analyzing any music outside of the "Bach to Brahms" historical boundaries are simply unacceptable. For those followers who are more liberal, many of these same analyses are quite simply unconvincing. As Lerdahl asserts, "on both sides the dissatisfaction provides small comfort, because the basic intuitions that Schenkerian theory addresses—the sense that musical material is elaborated, the recognition of local and global linear connections—also need to find a place in any theory of atonal music."[10] Central to the dissatisfaction on both sides is the very issue this paper addresses: prolongation. As a further problem, Schenkerian theory deals not with reductions from foreground events, but rather with elaborations of background events. This reduced emphasis on the musical surface and relationships inferred from them is especially troublesome when dealing with twentieth-century music, a musical environment in which listeners, often unable to use their knowledge of the traditional tonal system to make harmonic sense of contiguous events, struggle desperately to find coherence.

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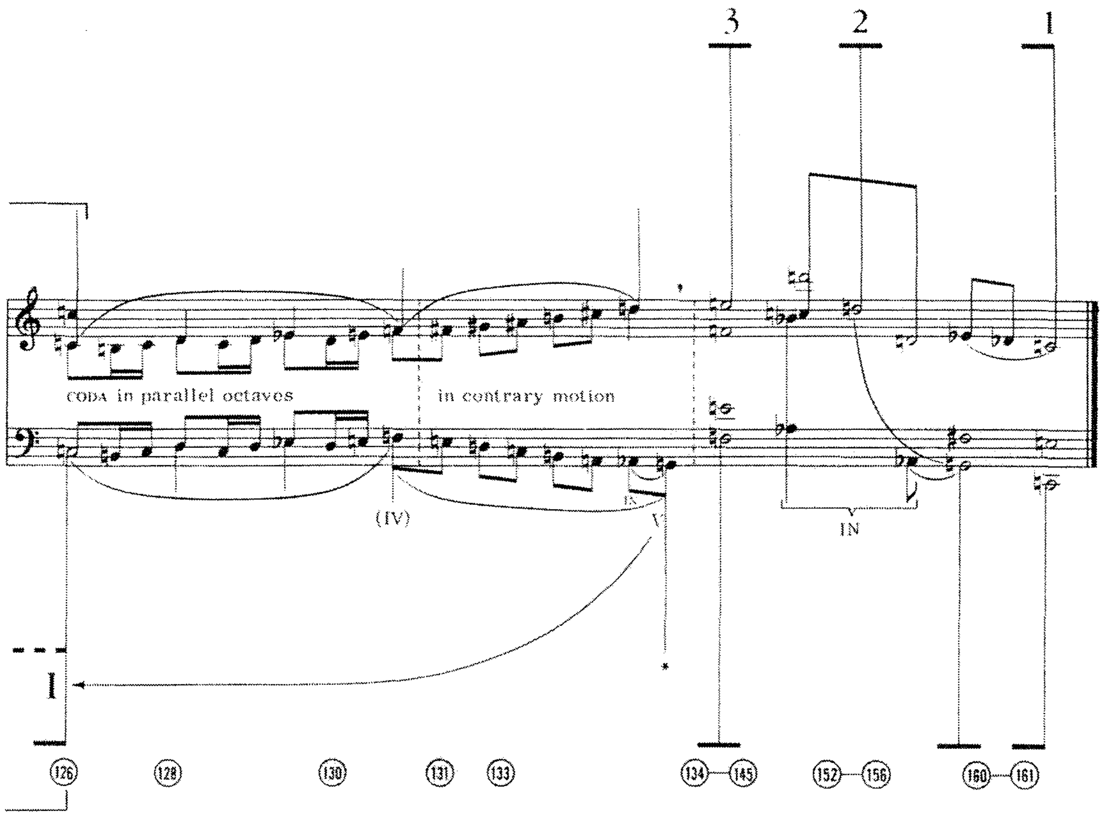
[10] Lerdahl, "Atonal Prolongational Structure," 67.

Figure 4. Travis' middleground analysis of Bartók's coda



Nevertheless, Schenkerian analyses of twentieth-century music, such as Travis's analysis of Bartók's Fourth String Quartet, do exist. His middleground reading of the coda is shown as figure 4.[11] Notice that all of the primary harmonic regions shown in the trees of my diagram 2 are present here as well: the motion to V in m. 134, the prolongation of the F-E dyad across mm. 134-45, the subsequent motion to the dominant (m. 152), and the final motion to tonic (m. 161). Viewed in strict Schenkerian terms, this analysis is problematic because the fundamental line does not receive proper harmonic support. The $\hat{3}$ is supported by subdominant harmony, while the $\hat{2}$, which first occurs in m. 152, is supported by A♭ (G♯) and only loosely receives dominant support through an alignment symbol connecting it to the G of m. 160. But even if we allow for these departures and take a more

[11] Travis gives a middleground graph of the entire movement in his article. See his example 3, pp. 302-308.

liberal view, this analysis remains problematic because it fails to incorporate salient events along with structural events into this middleground reading. Salience in Schenker's theory is a surface phenomenon, and as such is only a factor at the most local levels of structure. Hence, all of the stepwise lines that receive higher prominence in my version 3 of my diagram 2c are reduced out of Travis's analysis as he moves from the foreground to the middleground. In addition, in m. 130 Travis favors a motion to F (IV) in his middleground reading, which, though arguably a structural arrival point on the way to the G-D dominant dyad in m. 134, completely ignores the clearly salient D-A dyad reiterated throughout mm. 130-32 (see my diagram 2b graph, level *d*).

The foregoing discussion reveals that in order to best describe and uncover prolongational structure in the pitch-centric music of Bartók, one must be willing to embrace both salience and stability conditions in a new way. The potential pitfall of this duality has not gone unnoticed. Morrison, for example, anticipated criticism of his analysis with the following remarks:

> The fact that criteria for prolongation . . . at the highest level of structure are said to be syntactical and conceptual in nature, while those for prolongation at the middle level are said to be psychological and perceptual in nature, may well be problematic from a purely "structuralist" point of view.[12]

Yet it is precisely the fact that we are dealing with different types of structures and diverse organizational systems that demands a reexamination of the roles that salience and stability conditions should play in this music. We have seen what these roles *cannot* be: salience cannot completely dominate stability (as the graphs in diagram 1 showed), nor can stability completely dominate salience (as Travis's analysis showed). It is only through the responsible integration of the two in a way that prefers stability at the highest levels of structure, but salience at the middle and lower levels, that yields true analytical insight into the prolongational structure of Bartók's pitch-centric music.

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[12] Morrison, 195.