Explosions of Diversity: Béla Bartók's Evolutionary Model of Folk Music

by

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For my dad

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Abstract

In his ethnomusicological writings and lectures, Béla Bartók describes folk music as "a natural product, just like the various forms of animal and vegetable life" and elaborates this view, going on to describe a collection of developmental processes modeled explicitly on *biological* evolution. In the first chapter of this dissertation, I characterize Bartók's evolutionary model by isolating his core claims; I determine to what extent he understood this evolution as continuing into art music; and finally, by examining both Bartók's relationship to other evolutionary historiographies of music and the writings of his close contemporaries, I place his model within its cultural and intellectual context. In the next two chapters, I develop a method for interpreting and analyzing Bartók's music engendered from this evolutionary model, a method that involves the elaboration of two ideas: (1) a conceptual shift from a relatively historically static major/minor tonality to a multivalent, "evolving" tonality, and (2) the reconception of motives or themes as having no single original forms, but rather as being related genetically, as somehow evolving in their own right. Through analyses of The Wooden Prince and the Second String Quartet (both composed between 1914 and 1917), the last two chapters serve as extended demonstrations of my interpretive/analytical method. This dissertation, overall, is a hybrid of the history of music theory, historical aesthetics, and music analysis. In terms of the latter, it has strong roots in both transformation theory and interval-cycle theory, both of which it seeks to historicize. My ultimate goal, however, is to show how Bartók's evolutionary model can function as an account of historical change capable of accommodating the apparent contradiction between his music being truly radical yet also maintaining a deep connection to tradition.

Chapter 1

Bartók's Evolutionary Model

Personal recollections of Béla Bartók almost invariably mention his passionate interest in nature, describing his fondness for identifying plants and trees, his tendency to deliver impromptu lectures on soil erosion or the behavior of woodpeckers, and his constant quest to add to his insect collection.[1] While this interest certainly overflows into the mimesis of natural imagery in music, such as the calls of the Fire-Bellied Toad in the fourth movement of *Out of Doors* (1926) or the song of the Eastern Towhee in the second movement of the Third Piano Concerto (1945), I believe that there is a deeper and more intimate relation to nature in Bartók's music. Bence Szabolcsi suggests that "organic unfolding through change, the process of creation, is undoubtedly Bartók's characteristic means of organization" and believes — even though "a direct connection between experience and work can be established only extremely rarely" — that Bartók incorporated his personal understanding of nature into his music in the "deepest sense" (*tiefste Sinne*).[2] He further supports this idea with a passage from Bartók's often-quoted 1907

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[1] See Peter Bartók, *My Father* (Homosassa: Bartók Records, 2002), pp. 28, 70-72, and 213; Agatha Fassett, *Béla Bartók's American Years* (Cambridge: The Riverside Press, 1958), pp. 97-110 and 151-167; Béla Bartók, Jr., "The Private Man," in *The Bartók Companion*, ed. Malcolm Gillies (Portland: Amadeus Press, 1994), pp. 19 and 25-26; Halsey Stevens, *The Life and Music of Béla Bartók* (1953), 2nd ed. (Oxford: Clarendon Press, 1993), p. 7. From its beginnings, Bartók criticism has dwelled on the connection between the composer's music and his interest in nature. Most famous are Ernő Lendvai's analyses based on the Fibonacci sequence and the Golden Mean, which he derives from various natural sources (pine cones, flowers, and the like). For Lendvai, the intermediary between Bartók's music and nature is folk music, which is directly connected to nature through these mathematical relationships. See Ernő Lendvai, *The Workshop of Bartók and Kodály* (Budapest: Editio Musica, 1983), pp. 33-69.

[2] Bence Szabolcsi, "Mensch und Natur in Bartóks Geisteswelt," *Studia Musicologica Academiae Scientiarum Hungaricae* 5 (1963), pp. 528 and 536. Translation mine.

letter to Stefi Geyer: "If I were to cross myself, it would be in the name of nature, art, and science." For Bartók, nature, art, and science were thus comparable to the Christian trinity: separate but united, each sharing the attributes of the others. Szabolcsi writes that "this basic position, this three-fold unity, determines not only Bartók's musical lifework, but also his scientific activity and his human, ethical attitude."[3]

Indeed, when Bartók's son Peter, commenting on his father's insect collection, notes that "specimens were carefully arranged," and that "there were examples from each part of the world he visited," he could almost as easily be describing the composer's collections of folk tunes.[4] This is no coincidence, for as he explains in *A Magyar Népdal* [*The Hungarian Folk Song*] (1924), Bartók did in fact view peasant music "as much a natural phenomenon as the various forms of animal and vegetable life."[5] He elaborates, going on to describe a set of processes he calls "evolution," by which he does not mean development in an everyday sense. Rather, the mechanisms Bartók proposes to explain the creation of new folk songs seem to be modeled specifically on *biological* evolution. In the introduction to an edition of Bartók's *Hungarian Folksongs*, Sándor Kovács interprets him in just this way, writing that Bartók "tried to explain history on the basis of the theory of evolution," attempting "to fill the gap between historically

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[3] *Ibid.*, p. 529. See also Béla Bartók, *Bartók Béla Levelei*, ed. János Demény (Budapest: Művelt Nép Könyvkiadó, 1951), p. 77.

[4] Peter Bartók, *My Father*, p. 213.

[5] Béla Bartók, "A Magyar Népdal" (1924), in *Bartók Béla Összegyűjtött Írásai*, ed. András Szőllősy (Budapest: Zeneműkiado Vállalat, 1966), p. 104; this and all other translations from "A Magyar Népdal" modified from *The Hungarian Folk Song* (1924), trans. M.D. Calvocoressi, ed. Peter Bartók (Homosassa: Bartók Records, 2002), p. iii.

proven (or seemingly proven) facts with an evolutionistic logical construction."[6] Kovács is most likely responding to the way in which Bartók described folk tunes as having older or newer forms, as being constantly and endlessly varied, and as capable of changing gradually over time. In "The Sources of Folk Music" (1925), Bartók formulated his most explicit statement of this idea: "Folk music is a phenomenon of nature," a creation that "evolves with the organic freedom of other living organisms in nature: flowers, animals, *etc*."[7] The "organic unfolding through change" Szabolcsi hears in Bartók's music, then, registers the resonance of the composer's evolutionary model of folk music. When Bartók states in a 1937 interview with Denijs Dille that he "never repeats [an idea] unvaried," an impulse "connected to his love of variation, of thematic transformation," I believe the source of this continuous variability is Bartók's elaborate evolutionary analogy.[8]

1. Folk Music

The Biological Analogy

But if Bartók's evolutionary conception of folk music forms the basis for a deep connection between his interest in nature and his own compositions, this immediately raises a

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[6] Sándor Kovács, "The Bartók System of Hungarian Folk Music," in Béla Bartók, *Hungarian Folk Songs: Complete Collection*, Vol. 1, trans. Ria Julian and Hajnalka Csatorday, ed. Sándor Kovács and Ferenc Sebő (Budapest: Akadémiai Kiadó, 1993), p. 25.

[7] Béla Bartók, "U źródeł muzyki ludowej," *Muzyka* 2.6 (1925), p. 230; trans. János Sipos in *In the Wake of Bartók in Anatolia* (Budapest: European Folklore Institute, 2000), p. 5 (modified).

[8] Denijs Dille, "A Béla Bartók Interview," *Bulletin of the International Kodály Society* 31.1 (2006), p. 46.

problem of individual agency: how does folk music evolve apparently independently of the wills and creative capacities of the musicians who made it and handed it down from one generation to the next? Bartók addresses this problem by asserting that "old-style" folk music results from the "transformative work of a *natural* force operating unconsciously in peoples not influenced by urban culture." This force "spreads" throughout an entire peasant class, serving as an "instinctive expression of the peasants' musical feeling."[9] The musical sentiment, that is, is not that of an individual peasant, but a collective impulse that individuals must instinctively channel. Following this logic, Bartók asserts that individual peasants do not compose entirely new tunes, but only naively and unselfconsciously improvise variations on existing ones: they achieve individual expression only through the process of variation.[10] Yet Bartók didn't view peasants as unintelligent or uncreative; on the contrary, for him their naive creativity is uniquely capable of approaching musical "perfection." It simply wouldn't occur to peasants to compose entirely new tunes.

In an essay on "Hungarian Peasant Music" (1933), Bartók addresses the way folk music evolves in considerably more detail:

> Peasant melody is a very elastic material; its external form, being without an essential basis, is unstable even in the case of one and the same individual. When one hears any given melody sung several times in succession by the same person, one will generally notice certain slight alterations in the rhythm, sometimes even differences in pitch. It is a fair assumption that some of these unessential changes have become established in the course of time, or even that alterations of an essential

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[9] Béla Bartók, "Mi a Népzene?" (1931), in *Bartók Béla Összegyűjtött Írásai*, pp. 672-673; trans. as "What is Folk Music?" in *Béla Bartók Essays*, ed. Benjamin Suchoff (Lincoln: University of Nebraska Press, 1993), p. 6 (modified, italics added). All translations in *Béla Bartók Essays* are attributed (without individual attributions) to Richard Tóseghy, Elma Laurvik, Marianne Kethly, Ida Kohler, Colin Mason, and Eleanor Suchoff.

[10] See Béla Bartók, "The Relation of Folk Song to the Development of the Art Music of Our Time" (1931), in *Béla Bartók Essays*, pp. 321-322.

> character have been standardized by use. To these are later added, by other individuals, further essential or unessential variations of a similar nature, and so on and on, so that the last link in this chain-like evolution possesses a form far different from the original one.[11]

Here the composer speculates that series of variations, in the form of quantitative changes, accumulate over time, resulting ultimately in qualitative change. And he seems more interested in these accruing changes or alterations than in comparing each variation to a supposed original. Given that he defines peasant melody as “elastic,” which — since it is also “without an essential basis” — I take to mean “flexible” or “pliable” rather than “tending to regain an original shape,” such an original version *cannot* exist. Each performance is instead unique, and individual variations have the potential to sediment and accrue in the musical material until an entirely new folk song is born. The alterations that survive apparently do so by being better equipped to express some particular facet of the peasants’ feeling or experience: they are retained because of a selection that is neither natural (as in biology) nor artificial (as in selective breeding) but *communal*.

Such a communal force forms a precise analog to Darwin’s revolutionary interpretation of natural selection. Bartók claims that new folk songs are created by the accumulation of “minute, instinctive alterations,” none of them powerful enough on their own to create such change. So just as Darwin argued that variation is itself not a creative force, Bartók argued that peasants do not individually compose new songs, an idea that would be equivalent to “saltation” in biology, the theory that new species are created by giant leaps in variation. While biological tradition had viewed natural selection as a force for stasis, Darwin insisted on the opposite, that natural selection itself was the creative force, the engine of evolution. Bartók follows a similar

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[11] Béla Bartók, “Hungarian Peasant Music” (1933), in *Béla Bartók Essays*, p. 82.

tactic: rather than suggesting that his communal force acts to fix and retain folk songs, to keep them from changing too much from their original forms (the traditional view), he writes that "when the psychic disposition of the individual peasants in a given district … shows a typical affinity, it is quite natural that an evolutionary transformation should result."[12]

Bartók qualifies this view, however, by applying it only to a melody's "external form," which implies that melodies also have an "*internal* form." Evidently, when determining whether a change is "essential" or "unessential," or when comparing one folk tune to another, one must focus attention on such internal forms, which for this reason would seem to be communal ideas of particular folk songs that exist more abstractly than external forms do. The obvious biological analogy is to species, which are classified at a higher taxonomical level than individual organisms (external forms), making them more stable and less subject to variation. Since internal forms are susceptible to the constant and endless variation that characterizes Bartok's entire conception, however, they cannot be absolutely stable: after all, qualitative change in an internal form would herald the creation of a new folk song. What seems to differentiate internal forms for Bartók is not that they are stable originals, but rather that — unlike surface variations in external forms, which are intuitively created by their peasant performers — the transformations of internal forms are the consequences of the communal, natural force Bartók proposes.[13]

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[12] *Ibid.*, pp. 81-82. For an excellent exegesis of Darwin's *On the Origin of Species* (1859), see Steven Jay Gould, *The Structure of Evolutionary Theory* (Cambridge: Harvard University Press, 2002), pp. 93-169.

[13] One point of reference for "internal forms" is perhaps Adorno's concept of *Einfall*, or "creative idea," such ideas being distinct from the "material" of a composition and over which the composer "has hardly any control." Rather, he or she, like the individual peasant, controls the surface variations an *Einfall* undergoes. Theodor Adorno, "Criteria of New Music" (1957), in *Sound Figures* (1959), trans. Rodney Livingstone (Stanford: Stanford University Press, 1999), pp. 173-174.

Such surface variations are not incidental, however, but rather crucial, for they form the basis of an extended organic analogy. In *Serbo-Croatian Folk Songs* (1941-1942) Bartók writes: “Everyone will agree that each individual of every living species of animals or plants is a unique phenomenon. The same is true concerning folk melodies — a given performance of a folk melody has never occurred before and will never occur again in exactly the same way.”[14] Here he makes explicit the parallels between (1) individual organisms and musical performances and (2) species and what we may assume to be the “internal form” of a folk melody — that which is performed as distinct from individual performances. These parallels can be summarized in tabular form:

	folk music	biology
external	single performance	individual organism
internal	communal “idea” or comparable form	species

Just as in biological evolution, quantitative changes accumulate to create qualitative change, which is registered by a change in internal form: the creation of a new species or melody. This analogy with biological species, however, brings with it all of the difficulties associated with the so-called “species problem,” such as the debate over whether species actually exist or the confusion created by the dozens of ways scientists have devised to determine how to best define them. An example of one such difficulty can already be seen in the problem that Bartók’s denial of stable forms creates for his classification of folk tunes:

> In such a long [evolutionary] chain of melodies, in which … neighboring melodies can be considered beyond any doubt and at first sight as a variant of the other, and the first one in the row is so entirely different from the last one that it should not be

[14] Béla Bartók, *Serbo-Croatian Folk Songs* (1951), trans. Albert B. Lord (New York: Columbia University Press, 1951), p. 19.

> called a variant, one has to break up these melodies into two or more separate groups. Where shall one group end, where shall the new group begin? Which of the more or less similar melodies shall be considered variants; which not?[15]

Lifting terminology from the table above, Bartók's question becomes: As the external form of a folk song changes, at what point does its internal form undergo change? Or are internal forms also unstable, constantly changing? Part of Bartók's consternation seems to arise because he *does* view internal forms as also constantly changing. It's consistent with his model, that is, to understand internal forms like biological species: not static, but constantly changing, only at a slower rate. When he categorically states that "I cannot say that a certain melody *is* as I notated [it] on the spot, but only that it *was* such at the moment I notated it," we should thus apply this to both its external and internal forms.[16]

Taxonomy

Bartók's solution to such problems was to create a genetic system of classification modeled after those in comparative linguistics, which aims to discover genealogical relations between languages through the comparison of their grammatical features. He explicitly likens "comparative music folklore" to comparative linguistics by describing how the aim of the former is also to reveal "kinships" or "relations," only between folk musics — within and between

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[15] *Ibid.*, p. 17.

[16] Béla Bartók, "Miért és Hogyan Gyűjtsünk Népzenét?" (1936), in *Bartók Béla Összegyűjtött Írásai*, p. 582; "Why and How Do We Collect Folk Music?," in *Béla Bartók Essays*, p. 10.

cultural traditions — rather than languages.[17] Example 1.1 reproduces a page from *A Magyar Népdal* (1924). The page gives transcriptions of six folk tunes, three of which are familiar from Bartók's own compositions.[18] Since he always aims to group "all melodies belonging to the same family, or being of similar structure and representing the same style, as near each other as possible, and presents all members of the variant groups together," we can conclude that these six melodies are very closely related.[19] In terms of Bartók's evolutionary analogy, they would be closely related species, genealogically related internal forms varied in individual performances. Yet, importantly, these numerically labeled forms are not ideal representatives created by Bartók, but rather the most typical or characteristic of the many variants he and others collected. This is consistent with the view that internal forms are constantly changing and therefore cannot be represented by some abstract, ideal form.[20]

One can investigate the genealogy of these six tunes by beginning at the most general level — Hungarian folk music as a whole — and working toward the particular. While Bartók

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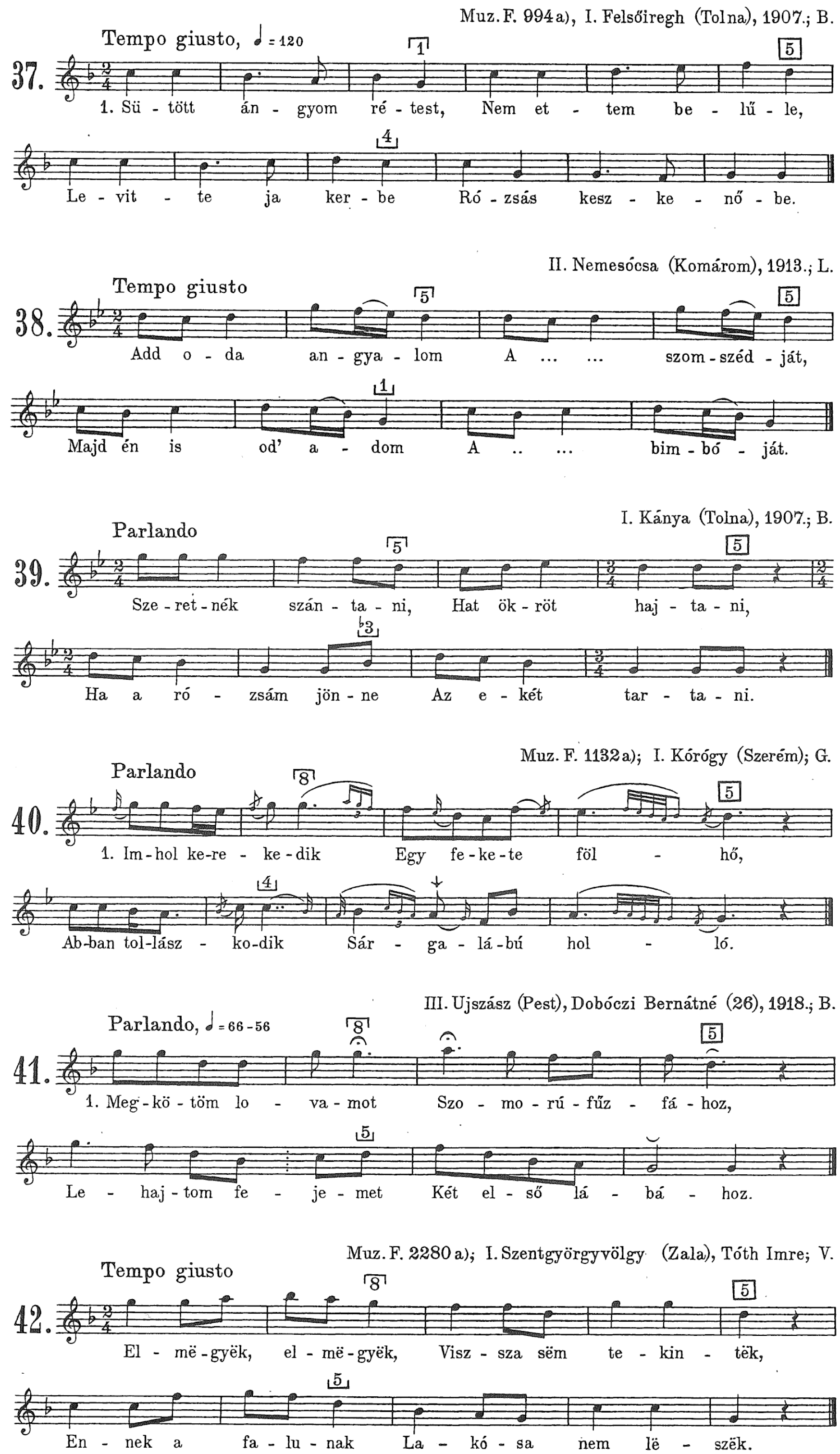
[17] Béla Bartók, "Az Összehasonlító Zenefolklór" (1912), in *Bartók Béla Összegyűjtött Írásai*, p. 567; "Comparative Music Folklore," in *Béla Bartók Essays*, p. 155. See also *Serbo-Croatian Folk Songs*, p. 15, "A Magyar Népdal," p. 170, and *The Hungarian Folk Song*, p. vi.

[18] Nos. 37 and 40 provide the thematic material for the first and third of Bartók's *Eight Improvisations on Hungarian Peasant Songs*, Op. 20 (1920); no. 41 forms the basis of the first of the *Fifteen Hungarian Peasant Songs* (1914-1918). All examples from *A Magyar Népdal* reproduced with the permission of Peter Bartók and Bartók Records.

[19] Béla Bartók, *Serbo-Croatian Folk Songs*, p. 15.

[20] Some species are represented by multiple variants; "variant group" no. 33, for example, contains three different "subspecies": nos. 33a, 33b, and 33c. Bartók reports that variant no. 33a was sung by man of about 35, no. 33b by a woman of about 70, and that there were seven additional variants from different regions. Nos. 37-42, more typically, are each represented by a single variant. *The Hungarian Folk Song*, p. 90.



Example 1.1. Nos. 37-42 from *A Magyar Népdal* (1924), pp. 190-191;
The Hungarian Folk Song, pp. 10-11.

speculates about which features of Hungarian folk music are probably the oldest — "parlando-rubato" meter, pentatonicism, *etc*. — the only real criteria he gives for whether a folk tune is Hungarian are that it must be sung by Hungarian peasants and that it must be an expression of that group free from outside influence.

More specific criteria come to the fore only when he divides Hungarian folk music into groups. He begins, for example, by dividing Hungarian folk music into three "classes": A, B, and C.[21] Class A, to which nos. 37-42 belong, is made up of old-style Hungarian folk tunes, Class B is made up of new-style tunes, while Class C is a miscellaneous class, containing tunes that do not fall easily into either of the other two.[22] More specifically, Class A tunes are distinguished by having (1) "four isometric [metrically regular] text lines," (2) either $\hat{1}$, $\flat\hat{3}$, or $\hat{5}$ as the final pitch of the second text line, what Bartók calls the "main caesura," and (3) forms lacking a reprise of the first text line's music.[23] A glance at Example 1.1 confirms that each of these tunes does indeed have four text lines in equal (or "isometric") meter and $\hat{5}$ at its main caesura, which Bartók designates $\boxed{5}$. And the form of each, which Bartók indicates with letters, lacks a reprise. As shown in Example 1.2, Bartók's label for no. 39's form is ABCC: the first three text lines are musically different, while the last two are the same. Following his stated steps of classification — (1) divide tunes based on the number of lines, (2) divide tunes based on the main caesura

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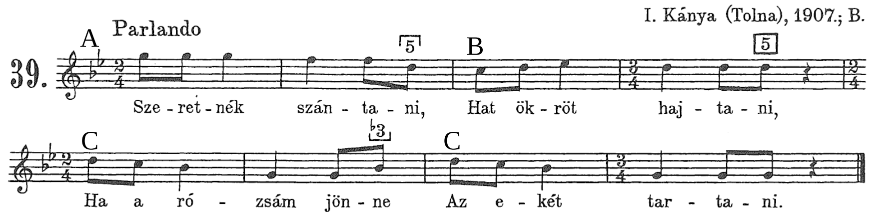
[21] Rather than the term *csoport*, which he uses elsewhere to describe "groups" in general, here Bartók specifically uses the term *osztály*, which is also the Hungarian term for a "class" in biological taxonomy. "A Magyar Népdal," p. 111; *The Hungarian Folk Song*, p. x.

[22] Bartók later revised his system, redefining Class C as containing melodies having a foreign origin or displaying foreign influence. See Sándor Kovács, "The Bartók System of Hungarian Folk Music," pp. 29-31.

[23] *The Hungarian Folk Song*, p. 37. Since Bartók transposes all tunes to end on G, $\hat{5}$ is always D.



Example 1.2. No. 39's ABCC form.

pitch, (3) divide tunes based on the number of syllables in each line — Bartók then further divides Class A into six *sub*classes by classifying the tunes according to the number of syllables in each line of text. He labels these subclasses with roman numerals: A.I through A.VI.[24] Since every tune in class A has the same number of lines (four) and the same main caesura pitches (either $\hat{1}$, ♭$\hat{3}$, or $\hat{5}$), syllable count becomes the next lower level of classification.[25] Nos. 37-42 in Example 1.1 (p. 10) thus all belong to A.II, which contains the eleven tunes in Class A with six syllables per line.[26] Continuing on, he further classifies tunes according to the pitches at the end of each text line, beginning with the main caesura (the end of the second). A.II, for instance, is divided into four subclasses defined by [1], [♭3], [5], and [8], nos. 37-42 making up the group sharing [5]. Bartók then divides those groups into subgroups based on the pitches at the end of the first line, marked by the symbol ⌜ ⌝. (⌜1⌝ thus indicates that the pitch at the end of the first line is $\hat{1}$). Nos. 37-42 — the subclass of Class A defined by [5] — divide into three groups: no. 37 (defined by ⌜1⌝), nos. 38-39 (defined by ⌜5⌝), and nos. 40-42 (defined by ⌜8⌝). Finally, he makes

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[24] *Ibid.*, pp. 6-7.

[25] See "A Magyar Népdal," p. 107; *The Hungarian Folk Song*, p. 6. It is curious that Bartók calls the result of applying this system an "ordering" (*rendezés*), which corresponds to the next lower level of biological taxonomy in both English and Hungarian: order (*rend*).

[26] Along with tunes in A.I, which have eight or twelve syllables per line, these tunes, according to Bartók, are the most characteristic and oldest of Class A.

even further divisions by comparing the pitches at the end of the third line, marked by the symbol ⌊ ⌋. Nos. 38 and 39 are distinct because the former has ⌊1⌋ and the latter has ⌊♭3⌋.

In short, once tunes have been placed into subclasses based on the number of syllables in each line of text, Bartók further divides them based on a weighted or hierarchical consideration of the pitches at the end of the second, the first, and the third lines, in that order. The pitches at the ends of these three lines make up what Bartók calls a "fixed formula," a framework on which tunes are improvised; ⌈♭3⌉ [5] ⌊4⌋, for example, is the fixed formula for a tune having ♭$\hat{3}$ at the end of the first line, $\hat{5}$ at the end of the second, and $\hat{4}$ at the end of the third. Since nos. 41 and 42 in Example 1.1 (p. 10) have exactly the same fixed formula, Bartók compares their overall compass (the distance between their lowest and highest notes): no. 41's is slightly smaller, so given that "tunes whose compass is small may be considered as more primitive than tunes with a bigger compass," it must (according to Bartók) be older than no. 42.[27] Similarly, he believes the oldest fixed formula for Hungarian folk music be ⌈5⌉ [♭3] ⌊♭3⌋, which would make no. 39 the oldest tune in the group. Still another metric that Bartók employs within each subclass is the distinction between parlando-rubato and tempo-giusto meters, suggesting that parlando-rubato tunes are probably older than tempo-giusto tunes, which would make nos. 39-41 older than nos. 37, 38 and 42.

Of course, such determinations of relative age have no particular taxonomic consequences, and Bartók provides no clear means of determining which of these metrics to

[27] Bartók, *The Hungarian Folk Song*, p. ix. The assumption that tunes with smaller compasses are older is taken to its logical conclusion by Lajos Vargyas, who suggests that Hungarian folk music is ultimately derived from communicative "cries called *hüdintés*" and "speech-like patterns of narrow compass in children's rhymes." Lajos Vargyas, *Folk Music of the Hungarians* (2002), trans. Judit Pokoly (Budapest: Akadémiai Kiadó, 2005), p. 15.

privilege: meter, fixed formula, compass, or some other attribute. He even concedes that some of the tempo-giusto tunes may actually be older than the parlando-rubato tunes, for their rhythms could possibly derive from the measured rhythms of labor, the ultimate source, he believes, of all melodic rhythm.[28] According to Bartók, the "various stages of the evolution of rhythm" are (1) simple tempo-giusto rhythms derived from labor and dancing, (2) parlando-rubato rhythms that have become disconnected from the body and are therefore more relaxed, and (3) more complex tempo-giusto rhythms formed from the solidification of earlier parlando-rubato rhythms. The oldest tunes in *The Hungarian Folk Song*, however, belong to the second category, for the original tempo-giusto tunes have apparently been lost to history.

What becomes clear from this exercise is that particular metrics allow for only relative determinations of age to be made and that none of them allow Bartók to exactly determine descent, to place tunes within a precise lineage. One could not, that is, construct a detailed family tree including all tunes, but one could construct a taxonomical classification for a single tune, such as the following one for no. 39:

biological classification	melodic group	distinguishing feature(s)
"phylum"	Hungarian folk music	sung by Hungarian peasants, pentatonic basis, *etc*.
"class"	A	four lines, non-architectural form, [1] [♭3] or [5]
"order"	II	six-syllable lines
"family"	nos. 37-42	[5]
"genus"	nos. 38-39	⌜5⌝
"species"	no. 39	⌞♭3⌟

[28] His connection of labor and rhythm can perhaps be traced to Karl Bücher's widely read *Arbeit und Rhythmus* (Leipzig: S. Hirzel, 1896). In *Hungarian Folk Songs*, Bartók divides Class A into only two subclasses based on metrical characteristics. This solves the problem of having tunes with different metrical characters juxtaposed in each subclass. See Sándor Kovács, "The Bartók System of Hungarian Folk Music," pp. 29-31.

It belongs to Class A because it has four lines, a non-architectural form (ABCC, which lacks a reprise of A), and has a pentatonic basis (G–B♭–C–D–F). It belongs to “Order” A.II because it has six-syllable lines: “Sze–ret–nék szán–tan–i,” and so on.[29] Despite being as closely related as possible, nos. 38 and 39 are actually quite different in their surface appearances: no. 38’s characteristic lower-neighbor and eighth/two-sixteenth motives, for example, do not occur at all in no. 39. They are closely related, rather, because they share the same number of syllables and, more importantly, have nearly identical fixed formulas. Furthermore, given $\flat\hat{3}$ and its parlando-rubato meter, no. 39 appears to be older. Yet one cannot deduce that no. 38 is descended from no. 39, for there’s simply no way to make that determination based on the metrics at hand. Such separation of species is an inevitable consequence of the incompleteness of the collection; only a complete series of transitional forms could prove such determinations, but of course Bartók only had access to those tunes existing in his own historical present — tunes no longer sung are lost forever. Since very little of this music was ever written down, there are no “fossil” tunes.

Bartók thus created categories based on genetic, internal similarities (fixed formulas and so on) that relate tunes quite different in their external forms, seemingly creating a system of classification more genealogical than morphological.[30] Much like the fact that both birds and bats

[29] The only term Bartók clearly borrows from biological taxonomy is “species.” As noted elsewhere, he uses the terms “class” (*osztály*) and “order” (*rend*), but such terms do not necessarily suggest a biological analogy.

[30] For another overview, see Edward Gollin, “On Bartók’s Comparative Musicology as a Resource for Bartókian Analysis,” *Integral* 22 (2008), pp. 59-79. Stephen Erdely argues that, while both folklorist/composers shared Ilmari Krohn’s method as a model, Kodály took a more “lexicographical” approach as compared to Bartók’s “grammatical” one. The most observable consequence of this difference is that melodies are easier to locate in Kodály’s collections. See Stephen Erdely, “Complementary Aspects of Bartók’s and Kodály’s Folk Song Researches,” in *Bartók and Kodály Revisited*, ed. György Ránki (Budapest: Akadémiai Kiadó, 1987), pp. 79-98. Bartók based his system of classification on an earlier one, developed by Krohn, that was explicitly inspired by evolutionary theory. Krohn had been heavily influenced by his father

have wings is of no use in biological classification, motivic or textual similarities, which concern a tune's outward appearance, are of little use here. One problem, however, is that Bartók's fixed formulas *are* based on observable external qualities: unlike DNA, internal qualities are internal only because they belong to what Bartók considers a deeper, more stable, and older level of a hierarchical organization and thus undergo less variation and a slower rate of change. Since he represents internal forms as "classical" categories — categories defined, that is, by a particular list of observable properties — Bartók's system of classification might appear to resemble the essentialist or *phenetic* species concept that compares organisms based on morphological similarity irrespective of the organisms' places in a historical lineage. But his insistence on genealogy and constant variation suggest that this systemization is merely a concession to the needs of a "scientific" study of folk music.[31] In any case, since he does postulate evolutionary relationships between the elements of his observable properties — parlando-rubato rhythm being older than tempo-giusto rhythm, the pitch level of a tune's second caesura being older and thus more stable than its first, and so on — Bartók is able to use these observations to create a taxonomy, if not a fully-formed family tree of tunes.

Julius's system of classifying folklore, and Julius Krohn had been, in turn, "strongly influenced by the currents of evolutionary and positivistic thought moving into his country [Finland] from England and from the continent. As a result, he viewed the changes produced by transmission of folklore through time and space from an evolutionary point of view." Erkki Pekkilä, "History, Geography, and Diffusion: Ilmari Krohn's Early Influence on the Study of European Folk Music," *Ethnomusicology* 50.2 (2006), pp. 353-359.

[31] Béla Bartók, "A Magyar Népdal," p. 105; *The Hungarian Folk Song*, p. 4. For an overview of biological species concepts in a musical context see Dora Hanninen, "Species Concepts in Biology and Perspectives on Association in Music Analysis," *Perspectives of New Music* 47.1 (2009), pp. 5-68.

Tendencies and Stages

Despite the impossibility of attributing direct relations of descent between tunes, Bartók, as we have already seen, felt perfectly comfortable making conjectures about the specific mechanisms that influence the way folk tunes evolve: the general sequences they follow and the forces or goals that guide their evolution. Beginning with the overarching forces that create national folk musics, he notes:

> We have to attribute the origin of homogenous stylistic forms … to the impulse for variation by a human mass set in the same direction and working unconsciously: a human mass … in close contact with each other and yet more or less isolated from the outside world.[32]

Bartók believes that a collective, unconscious force (an "impulse") can create a distinct musical style — defined by traits such as fixed formulas of phrase endings — if the class of people within which it works is immune to external influence. This belief is nearly identical to the idea of "geographic speciation" in the theory of biological evolution, in which geographic isolation prompts the formation of distinct groups of organisms. In this case, the geographical isolation of indigenous communities leads to the formation of national musical styles. But if these are the conditions for the genesis of a unique style, how does such a style actually evolve? In *A Magyar Népdal*, Bartók lays out what he calls the "distinct evolutionary steps" that determine the historical development of Hungarian folk music: (1) "short, one or two-bar motives" evolve toward periodic forms; (2) these more periodic forms evolve into longer "three-line or four-line closed-form tunes without a more definite architecture" (as in Class A); (3) these tunes finally evolve into "four-line tunes with clearly recognizable architectural structure" (as in Class B). He

[32] Béla Bartók, "Hungarian Folk Music" (1933), in *Béla Bartók Essays*, p. 71.

also delineates similar tendencies for individual musical parameters: short text lines evolve into longer text lines, symmetrically divided lines evolve into asymmetrical lines, smaller melodic compasses evolve into larger compasses (as we saw in relation to nos. 41 and 42 in Example 1.1, p. 10), pentatonic tunes evolve into diatonic tunes, which then evolve into chromatic ones. Each course of development moves overall from simple to complex forms, though Bartók seems to have been wedded to this principle only on more global levels of evolution, where complexity can only be explained as having arisen from simplicity. But even at the most global level he qualifies the idea, noting that in some cases “the primitive *may* have come into being earlier than the less primitive.”[33]

At more local levels, Bartók describes the operation of evolution as being more open-ended. Example 1.3, for instance, reproduces his summary of rhythmic features in Class B melodies. He begins by presenting the three most basic rhythmic schemata they inherited from Class A: β1, β2, and β3, shown on the left in Example 1.3 under the headings “with feminine ending,” “with strong masculine ending,” and “with weak masculine ending.”[34] β1 is the form made up of two $\frac{4}{4}$ measures of quarter notes. These three forms already have a supposed evolutionary relationship, for in his original discussion of Class A, Bartók asserts that β2 evolved from β1 and that β3 evolved from β2, but also admits the possibility, in connection with β2 and β3, that “perhaps the evolution took place in the opposite order,” in the other direction.[35]

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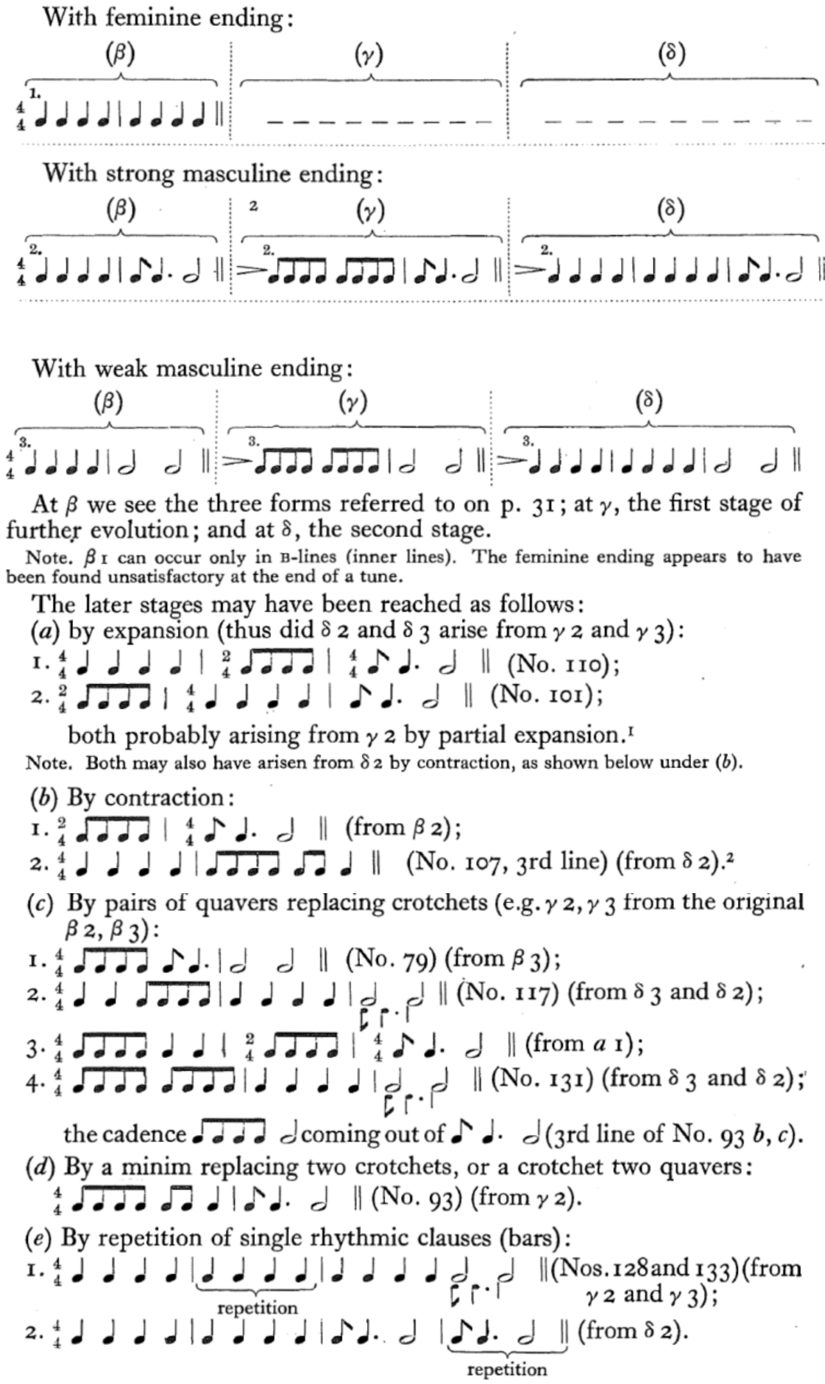
[33] Bartók, “A Magyar Népdal,” pp. 109-110; *The Hungarian Folk Song*, pp. viii-ix.

[34] Bartók uses these gendered terms with no comment or explanation, but we can take “feminine ending” to mean schemata with final syllables landing on beat four and “masculine ending” to mean schemata with final syllables landing on beat three. “Strong masculine endings” are apparently “masculine endings” with a syncopated figure at the beginning of the final measure.

[35] *Ibid.*, p. 130; p. xxix.



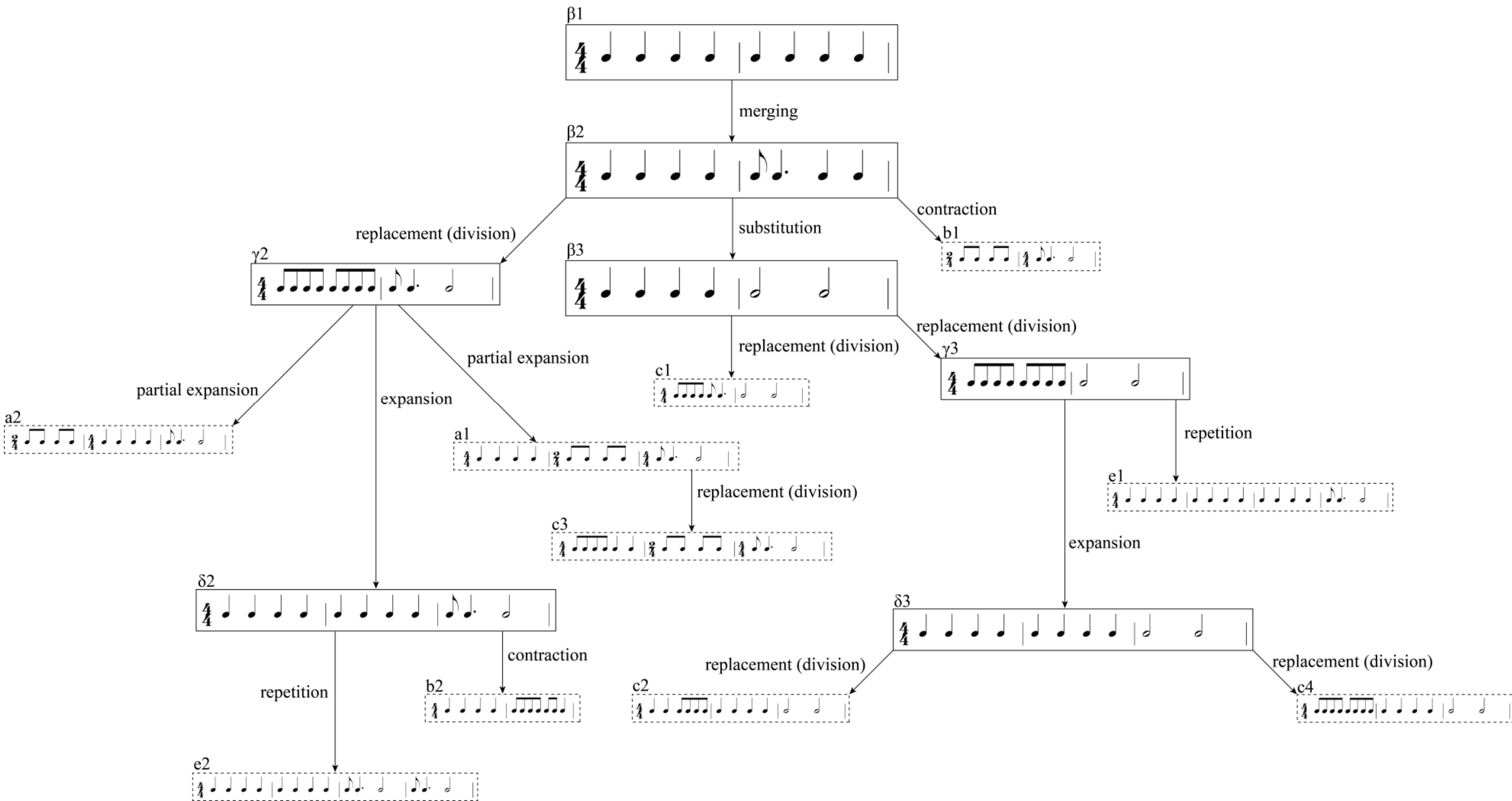
Example 1.3. Developmental tendencies in the rhythms of Class B tunes.

Whatever the chronology of derivation, β2 and β3 have each evolved into γ (*gamma*) forms, which then evolved into δ (*delta*) forms; Bartók indicates such derivations by the symbol ≻. Following this exposition, Bartók lists the forces controlling how these seven forms may have “evolved further,” including (a) expansion, (b) contraction/replacement — either by (c) division into smaller parts (*felaprózása*) or by (d) “concentration” (*összevonás*) — and (e) repetition.[36] He presents examples of such further-evolved forms for each impulse and labels them based on which force created them rather than on which of the seven basic forms they are derived. b1 and b2 (listed under the heading “by contraction” in Example 1.3) are thus grouped together not because they descend from the same basic form — Bartók in fact believes that b1 is descended from β2 and b2 from δ2 — but because they both result from contraction. Inherent to this constellation of tendencies is the possibility of moving contrary to Bartók’s stated global courses.

Example 1.4 visualizes Bartók’s conjectures in the form of a genealogical tree. While it would not be possible to create similar trees for the tunes themselves, such a tree is implicit in Bartók’s description of the derivational relations between rhythmic schemas — all I have done is arrange them on the page. β1, β2, and β3 are represented as the main vertical trunk and are connected by solid arrows labeled with Bartók’s derivational descriptions. β2 derives from β1 through “merging,” the final two quarter notes of β1 being “drawn together” (*vonták össze*) into a single half note. β2 and β3 are related through “substitution,” the eighth and dotted quarter notes being “exchanged” (*váltotta*) for a half note.[37] Both of these descriptions are equivalent to force

[36] *Ibid.*, pp. 141-142; p. xlii.

[37] *Ibid.*, p. 130; p. xxix. These descriptions are not in Example 1.3, but from Bartók’s original discussion of these schemata in his description of Class A tunes.



Example 1.4. A genealogical tree of Class B rhythms.

d — concentration — from Bartók's overview of Class B tendencies.[38] The other four of the seven basic schemata are offshoots from β2 and β3: the γ forms derive from the β forms through division, and the δ forms derive from the γ forms through expansion. Finally, the further-derived forms (a1 through e2) are shown within dashed boxes connected by labeled arrows. The rhythm of a particular line from a Class B tune may thus be placed within this diagram of durational tendencies, but since such a diagram is only a vastly more detailed version of the individual tendencies described above, it cannot also be used to determine relations of descent between tunes. The implication that the global trajectory toward complexity may be contradicted at more local levels, however, is crucial, for the main quality toward which folk music aims, according to Bartók, is in fact simplicity. Complexity, that is, is not a goal of the evolution of folk music, for Bartók views "genuine" folk music as aiming — free from corrupting urban or foreign influences — toward "artistic perfection." They are models "of the way in which a musical idea can be expressed with utmost perfection in terms of brevity of form and simplicity of means" and "of how to express an idea musically in the most concise form … briefly yet completely and properly proportioned."[39] Unlike the universal evolutionary tendency of progressing from simple to complex, Bartók understands individual folk tunes as driven toward an efficiency of means in expressing a single specific musical idea.

Given that it strives only toward a general state — "artistic perfection" — rather than a specific preconceived form, such a drive toward perfection is *plastic*, pliable. Thus, artistic

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[38] If β2 is actually derived from β3, then the description of this derivation would be concentration's inverse, division.

[39] Bartók, "What is Folk Music," p. 6, and "The Relation of Folk Song to the Development of the Art Music of Our Time," p. 321.

perfection seems to be, for Bartók, akin to reproductive fitness in biological evolution, and for this reason varies from people to people and from style to style; the notion of fitness, after all, varies according to environmental conditions, so artistic perfection must vary according to cultural conditions, even within a single national or geographical locale. Bartók thus supposes that folk music evolves in multiple streams rather than in a single line:

> The rise of a new style does not immediately eclipse the old style, which can continue to exist alongside the new one. Thus it may happen that in peasant melodies still existing among any nation a whole series of layers, representing different styles, is to be found.[40]

His use of the word "layers" evokes the idea of geological strata containing sedimented musical material, but unlike some of his contemporaries Bartók did not view older layers as being necessarily more primitive, seemingly existing solely to explain the origins of more recent, more advanced, and in the end better forms. Rather, newer styles are for Bartók often degraded, not only by the sullying influence of unassimilated foreign elements, alienating modernity, or corrupting capitalism, but by the intentions of individuals who nearly always fail at achieving the naïve perfection of nature. Example 1.4 may thus be taken as a microcosm of Bartók's larger view: different lineages of folk music coexist, but rather than being the most highly evolved and therefore "best" examples, each is one among many particular adaptations that achieve some local goal.

At this point, we can summarize Bartók's evolutionary model of folk music by listing the following tendencies: (1) folk tunes undergo variation at every level, and as these small differences accrue, qualitatively new forms (or "species") arise; (2) as a result, there are no original versions of tunes; (3) the evolution of folk music is guided by an unconscious,

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[40] Bartók, "Hungarian Folk Music," pp. 82-83.

communal force that works through an entire class of people, (4) folk tunes branch like a bush or tree rather evolve than in a single line, thus making later forms not necessarily better or more advanced than earlier ones; (5) while there is an overall statistical movement from simple to complex, individual tunes or groups of variants are free or more indeterminate in their development, sometimes even evolving from complex to the more simple; (6) the evolution of folk music has no goal, except for the localized and plastic quality of "artistic perfection"; and (7) whereas complete novelty can only be the result of individual, subjective decision, the evolution of folk music is continuous and gradual.[41]

2. Art Music

Complexity and the Individual Genius

Bartók wrote considerably less about evolutionary processes in art music than he did about the evolution of folk music, likely because the influence of conscious, individual intent creates a seemingly fatal problem for his model. He did, however, clearly believe that art music evolved in some sense: evolution did not simply cease as soon as a people entered the modern world. Rather, it changed in kind, becoming, like consciousness itself, too complex to resolve into individual forces or laws. When, in a 1932 interview with Magda Vámos, he was asked to discuss new trends in music, Bartók replied: "What we actually see is chaos: there are various trends, explorations, efforts, experimentations, mere fumbling .… Modern simplicity is just a

[41] He writes in the Harvard lectures that "complete revolution in art … is impossible or, at least, is not a desirable means to an end." Bartók, "Harvard Lectures" (1943), in *Béla Bartók Essays*, p. 355. Bartók opposes "revolution" — which implies a complete or catastrophic break — to the gradualism or uniformitarianism he envisions. In terms of his evolutionary model of folk music, the individual composition of a folk song "from scratch" would be such a complete break.

moment of condensation within a complex evolution."[42] In order to be able to write about evolutionary processes within western art music, Bartók had to change his model considerably, introducing an outlet for artistic perfection far different from the unconscious, communal force of folk music: the "individual genius," which forms the counterpart to folk music's collective genius.

> Artistic perfection can only be achieved by one of the two extremes: on the one hand by peasant folk in the mass, completely devoid of the culture of the town-dweller, [or] on the other by the creative power of the individual genius. The creative impulse of anyone who has the misfortune to be born somewhere between these two extremes leads only to barren, pointless, and misshapen works.[43]

Based on views stated elsewhere, it is likely that Bartók is here targeting the music he believes lies between genuine folk and art musics: "popular art music" (*népies műzene*)."[44] This evaluation is most evident in his infamous excoriations of urban "gypsy" music, which Bartók viewed as being essentially mercenary, its goals always tainted by an inability or lack of desire to assimilate the material of the their "host" nation because they are motivated by monetary gain. He writes that this popular art music is "a creation of Hungarian music amateurs who belong to the ruling class," and that its purpose is "to furnish entertainment and to satisfy the musical needs

[42] Magda Vámos, "A 1932 Interview with Bartók," in *Bartók Studies*, ed. Todd Crow (Detroit: Information Coordinators, 1976), p. 18. I have tried to be sparing and selective in quoting from interviews, which are less authoritative as Bartók's own writings; Vámos thus writes that "it is I alone who remains to vouch for the authenticity of our conversation."

[43] Bartók, "The Relation of Folk Song to the Development of the Art Music of Our Time," p. 322.

[44] See, for example, Bartók, "Cigányzene? Magyar Zene?" (1931), in *Bartók Béla Összegyűjtött Írásai*, p. 623.

of those whose artistic sensibilities are of a low order."[45] Such commercial music cannot possibly evolve toward artistic perfection because it is dominated by its performer's subjective goals (money) and limited by its creator's questionable creative ability: members of the "ruling class," after all, rarely cultivate the ability to reconnect with the natural forces of "genuine" folk music. Overall, the impression one gets from Bartok's observations is similar to that seemingly contradictory mix of social or political radicalism with comparatively reactionary views on aesthetics or culture that were pervasive at this time. Bartok's then-controversial views about the overlapping of national styles or his insistence on the equality of folk music with art music were radically tolerant stances that seem to conflict with his unpleasant views on "gypsy" and other popular musics.[46]

Importantly, the very historical self-consciousness that allows Bartók to make such evolutionary observations and social conjectures turns the work of the individual modern artist, such as himself, into a struggle toward genius. Genius, for Bartók, lies in self-overcoming, in the ability of an individual to synthesize (in this case) the objectivity of folk music — which despite its great expressive power can only exist "in miniature" — with his or her own subjectivity, which is capable of combining many ideas into "masterpieces of the largest proportions."[47] This is accomplished, apparently, not by the hyperrationalization and control of musical materials, as

[45] Bartók, "Hungarian Folk Music," p. 71, and Bartók, "Cigányzene? Magyar Zene?," p. 624, trans. as "Gipsy or Hungarian Music?," *Béla Bartók Essays*, p. 206.

[46] For more on Bartók's views on "gypsy" or Romani peoples, see Katie Trumpener, "Béla Bartók and the Rise of Comparative Ethnomusicology: Nationalism, Race Purity, and the Legacy of the Austro-Hungarian Empire," in *Music and the Racial Imagination*, ed. Ronald Radano and Philip V. Bohlman (Chicago: University of Chicago Press, 2000), pp. 403-434.

[47] Bartók, "The Relation of Folk Song to the Development of the Art Music of Our Time," p. 321.

in the music of Wagner, Brahms, and Schoenberg, but by *relinquishing* a certain amount of control, by allowing the forces of nature to flow through oneself in the act of improvisation. This is likely what he had in mind when, in 1938, he commented on the current state of composition:

> All efforts ought to be directed at the present time to the search for that which we will call 'inspired simplicity.' … The reason why we have in the last twenty-five years attained the greatest confusion from the creative point of view is that very few composers concentrated their efforts toward this goal, and also because musical creation has relied too much on the unique value of the most unexpected and sometimes least appropriate means of expression to convey the inventive idea.[48]

Composers, according to Bartók, should focus on being "inspired" toward "simplicity" and "appropriateness," not in being "inventive" solely for the sake of standing out. Since simplicity is the goal toward which folk music strives, and "inspired" shares something of the "instinctive" or "intuitive," the composer's goal and his or her method for achieving it mirrors those of folk music's collective genius. In his interview with Denijs Dille (1938) Bartók expands on the idea:

> In spite of the fact that I carried out my harmonic research in a reasonable and well-thought-out manner, intuition enters into it in a larger way than one might think. I feel compelled to state that all of my music, and certainly that this question of harmony we are discussing, is a question of instinct and feeling.[49]

By using terms like "instinct" and "intuition," Bartók more directly invokes his conception of folk music's evolution, but his addition of "feeling" adds new valences. One might interpret "feeling" as being opposed to "thinking," which reinterprets a composer's relinquishing of control as a limitation on conscious or intentional thought. It is not, apparently, a complete

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[48] Bartók, "Béla Bartók's Opinion on the Technical, Aesthetic, and Spiritual Orientation of Contemporary Music" (1938), in *Béla Bartók Essays*, pp. 516-517. This interview was first published in the Belgian journal *La Revue Internationale de Musique* 1.3 (1938), pp. 452-453. "Inspired simplicity" is a translation of "*géniale simplicité*," which resonates with Bartók's earlier discussion in the interview of a "spontaneous idea" or "expression" of "genius," which he contrasts with "mechanical creation."

[49] Denijs Dille, "A Béla Bartók Interview," p. 45.

suppression of thought, but rather a tempering of rationality; after all, Bartók approaches his "harmonic research" in a "reasonable and well-thought-out manner."[50]

Bartók, in fact, explicitly claims that it was the lessons he learned from folk music that allowed him to move beyond the excesses of romanticism, basing his musical modernism on folk music's qualities of conciseness, terseness, and efficiency, which in the end limits the lengths of his works. Simplicity, simply put, is a quality that Bartók appropriates from folk music. The individual genius — which Bartók himself never claims to be, always instead championing Kodály as the greatest living Hungarian composer — is able to channel the same forces folk music does, yet he or she is not, for Bartók, the ultimate expression of an evolutionary process, but rather an anomaly, an excrescence in music history. In the first of his Harvard lectures, while arguing for an evolution rather than a revolution of musical resources, he discusses likely candidates for early twentieth-century musical genius:

> If we turn our attention toward Schoenberg and Stravinsky, the two leading composers of the past decades, we will see that their works are decidedly the outcome of evolution .…What we will see is a gradual change, leading from the patterns and means of their predecessors, to a style and means of expression of their own.[51]

As noted above, it seems as though, for Bartók, only the evolution of folk music can be resolved into an intelligible and layered system of forces; due to the influence of conscious individual wills, the evolution of art music is too complex to resolve into specific trajectories. Yet the individual genius is in his view uniquely capable of tapping into these veins of musical change, capable of foreseeing where music will go. Given that he offers Schoenberg and Stravinsky —

[50] Bartók, "Béla Bartók's Opinion on the Technical, Aesthetic, and Spiritual Orientation of Contemporary Music," p. 516.

[51] Bartók, "Harvard Lectures," p. 358.

who Adorno considered to be polar opposites — as exemplars of evolution, he clearly sees the evolution of art music not as necessary or inevitable, but rather as open-ended or indeterminate, at least at the level of individual compositional choices.[52]

At more global levels, on the other hand, his view is not so clear. Much like the overall movement from simplicity to complexity he describes in folk music, Bartók sees an analogous movement from tonality toward atonality in western art music: this "striving" toward atonality is "the consequence of a gradual development, originating from tonality."[53] So, while Stravinsky and Schoenberg were free to follow their own paths, creating very different music in the process, they both composed music that, because of this gradual historical striving toward atonality, is closer to the latter than the music preceding it. But a word of caution is needed here; "atonality," for Bartók, is only an attractor toward which music tends: "atonality" does not actually exist, but only describes a "limit case." As is well known, he claimed, that none of his music was atonal and in his Harvard lectures argues that *no* music using the twelve chromatic pitches can be atonal, not even serial music.[54] Bartók does not view the paths that art music follows as absolute inevitabilities, at least for the most part: moving toward atonality is the outcome of a historical evolution, but not a necessary one. He would sometimes change his mind on the specifics: in

[52] Theodor W. Adorno, *Philosophy of New Music* (1949), trans. Robert Hullot-Kentor (Minneapolis: University of Minnesota Press, 2006), pp. 7-8.

[53] Bartók, "The Problem of the New Music" (1920), in *Béla Bartók Essays*, p. 455.

[54] "Real or 'perfect' atonality does not exist," he writes, "even in Schoenberg's works, because of that unchangeable physical law concerning the interrelation of harmonics and, in turn, the relation of the harmonics to their fundamental tone. When we hear a single tone, we will interpret it subconsciously as a fundamental tone. When we hear a following, different tone, we will — again subconsciously — project it against the first tone, which has been felt as the fundamental, and interpret it according to its relation to the latter." Bartók, "Harvard Lectures," p. 365.

1920, he writes that "the time for a further splitting of the semitone will ultimately come," but in 1943 says that the resultant quarter-tone system has "no future."[55] While the former view seems to be a momentary deviation from the general trend of his thought, he is less consistent here than when he is discussing folk music.

His views on the individual are similarly inconsistent. At times, divining the course of music seems necessary to Bartók. Composers, after all, must "search" for simplicity, finding — not creating — works that are merely the "outcome" of evolution. In the interview with Vámos, he states that at a certain point "folk music will flow through the veins of the composer and the idiom of peasant music will have become his own musical language which he will use spontaneously, involuntarily, and naturally."[56] For the composer of new music, however, folk music must be actively sought out and learned; it takes considerable conscious effort to achieve unconscious spontaneity, just as it apparently takes considerable reason and thought in order to properly follow one's "feeling." In the same way, a composer's music will remain an individual expression of his or her personal "style" and "creative power." Bartók seems to have understood this conflict himself, which may be the reason that, other than proposing instinct or intuition as a possible means of resolving it and uniting folk music with art music, he says so little on the matter. It may also have been the root cause for his view that the evolution of art music is unintelligible when compared to that of folk music: the addition of personal subjectivity creates too much complexity. Artistic perfection, then, remains the only explanatory goal Bartók posits at either the level of the individual composition or folk tune: folk music achieves this perfection

[55] Bartók, "The Problem of the New Music" (1920), p. 459 and "Harvard Lectures," p. 356.

[56] Vámos, "A 1932 Interview with Bartók," p. 186.

naturally and unconsciously, while individual geniuses achieve perfection through intuition by creating an "expression of their own" that at the same time follows from the examples of their predecessors.

Placing Bartók

While Bartók envisions a place for the individual genius in enacting musical evolution, his version of genius seems to me rather different from the notion of genius cultivated in the nineteenth century. In terms of Peter Kivy's dichotomy between the "Platonic" genius, who is passively inspired or possessed, and the "Longinian" genius, who actively creates through the god-like power of his or her will, Bartók's "individual genius," given his insistence and intuition or instinct, would seem at first to fall clearly on the Platonic side.[57] Yet according to Matthew Gelbart, Bartók, in carrying on the German Romantic tradition, emphasizes individual power in a way that suggests a more Longinian version of genius:

> Though he railed against the "romantic conception which values originality above all," Bartók too seemed guided by these values. He sounds just like [A.B.] Marx when he speaks of the "creative power of an individual genius." … Bartók's writing is an example of just how embedded the German Romantic ideals of art had become in international discourse by the twentieth century .… The music that stood at the very pinnacle was music that had sucked up the folk and completely distilled it through the individual genius.[58]

It is true that Bartók's attempted synthesis between the genius of the "primitive folk" and of the "great artist" has a long history in Romanticism. As Gelbart points out, Herder spoke of

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[57] Peter Kivy, *The Possessor and the Possessed* (New Haven: Yale University Press, 2001).

[58] Matthew Gelbart, *The Invention of 'Folk Music' and 'Art Music'* (Cambridge: Cambridge University Press, 2007), pp. 220-221.

Volkslied as “material for art,” and Schiller suggested that the naïve and the sentimental could be united through “nature.”[59] But Bartók’s use of the term deserves closer examination. First of all, he only ever uses the term twice in this connection: in “The Relation of Folk Song to the Development of the Art Music of Our Time” (1944) and in “Hungarian Music” (1944), where he repeats — only with slightly different wording from the quote above — the idea that artistic perfection is attainable only by the peasant class or the individual genius.[60]

Both essays were originally published in English, and while the relevant portion of the 1921 essay was never translated into Hungarian, the Hungarian translation of the 1944 essay renders “genius” as *lángelm* — derived from *láng* (flame) — rather than *zseni*, the more usual Hungarian cognate.[61] Since it follows the composer’s usage when he refers to the “lángelm” of Bach in the notes to his 1907 edition of the *Well-Tempered Clavier,* this retranslation seems reasonable.[62] I believe there is significance to Bartók’s apparent preference for *lángelm* over *zseni*, for while they are certainly synonyms, *lángelm* connotes an exceptional intellectual or creative “brilliance” that is perhaps divested of the supernatural or god-like valences of “genius.” And Bartók certainly used the more conventional term *zseni* elsewhere; he uses it, for example, to describe Liszt’s *Hungarian Rhapsodies*, which he believes contain “much genius” (*sok*

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[59] *Ibid.*, pp. 197-203.

[60] Bartók, “Hungarian Music,” in *Béla Bartók Essays*, p. 395.

[61] Bartók, “Magyar Zene,” in *Bartók Béla Összegyűjtött Írásai*, p. 760.

[62] J.S. Bach, *Das Wohltemperierte Klavier II*, ed. Béla Bartók (1907) (Budapest: Editio Musica Budapest, 1950), p. 145. This is rendered as “Bach’s genius” in the English translation. See “Preface and Notes to Bach’s Well-Tempered Clavier,” in *Béla Bartók Essays*, p. 447.

zsenialitás) in spite of being otherwise conventional and banal.[63] It is noteworthy that one of the few times Bartók uses *zseni* is while *critiquing* Liszt — the very model of nineteenth-century musical genius — and his inability to recognize "genuine" Hungarian folk music. I believe that his preference for *lángelm* reflects the fact that, while Bartók certainly follows in the tradition of romantic aesthetics, his conception of genius differs. Rather than existing outside history, deciphering or "distilling" it — as Gelbart describes the role of the romantic genius — genius for Bartók is intimately connected to or immersed within history. Rather than synthesizing the collective with the individual, nature with civilization — as Herder, Schiller, *et al*., propose — Bartók wants to mediate such distinctions by suggesting a genetic thread that the genius can follow: nature may be qualitatively different from civilization, but through intuition the genius can trace some evolutionary process that nevertheless unites them.

At this juncture I believe a wider perspective is required, and so I will turn to Alain Badiou, whose preoccupation with the creation of the new mirrors Bartók's interest in musical change (whether in folk or art music). In fact, because of this affinity — and because I find his ideas extraordinarily helpful in clarifying many of the issues I will be addressing — Badiou will form the main contemporary interlocutor in this dissertation. Badiou has recently defined the romantic genius as a medium for the "descent of the infinity of the Ideal into the finitude of the work" and describes this process as a "transposition of the Christian schema of the incarnation."[64] Through an act of "disembodiment" (as opposed to incarnation), the genius of nineteenth-century idealism is able to assume a divine power in order to reveal the infinite that

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[63] Bartók, "Liszt Zenéje és a Mai Közönség" (1911), in *Bartók Béla Összegyűjtött Írásai*, p. 688.

[64] Alain Badiou, *The Century* (2005), trans. Alberto Toscano (Cambridge: Polity Press, 2007), pp. 153-154.

resides in everyone. Man becomes God rather than God becoming man: “Genius is crucifixion and resurrection.”[65] But Bartók’s idea of instinct or intuition — his peculiar version of disembodiment wherein one loses conscious rationality so as to connect with something external — is a thoroughly materialistic one: rather than passively listening to the voice of divine inspiration or attaining a messianic creative power, the genius, for Bartók, is able to reconnect with a long-lost human faculty by immersing himself in folk music, which because of its perpetual variation, serves as a secular source of the infinite.

Badiou also suggests that the attempt by twentieth-century artists to “be done with romanticism” — a project in which Bartók certainly took part — involved both “deconsecrating the work” and “divesting the artist.” Artists questioned the very idea of a “work” because they viewed the “primacy of the act” as “the only thing capable of measuring up to the real present.”[66] They believed that the artist must be stripped of the role of acting as a subjective mediator between “reality and the Ideal.”[67] But for Bartók, it is not the artist but rather folk music that achieves these anti-romantic tasks. It is folk music that deconsecrates the work: since even the internal form of a folk song undergoes constant change, there is no stable “work” at all in folk music. And since individual peasants do not compose new songs, there is no “artist,” in the romantic sense, in folk music. The infinity of folk music lies in improvisation, which draws on endless evolutionary possibilities. In this way, Bartók transposes the “infinity of the Ideal” to the

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[65] Alain Badiou, *Handbook of Inaesthetics* (1998), trans. Alberto Toscano (Stanford: Stanford University Press, 2005), p. 3.

[66] If the work is no longer a vessel for the infinite, that is, it becomes an inert, finite, and empty shell that always exists in the past. In this view, if one desires the infinite, it can only be found in the improvisatory or aleatory act.

[67] Badiou, *The Century*, pp. 152-160.

infinity of the commonplace, which "ascends," so to speak, from the basest origins up to the "finitude of the work." Bartók thus breaks with romanticism while retaining romantic ideas of the work and of the artist-creator for both himself and his music.

But what ultimately distinguishes Bartók's synthesis between the genius of "the primitive folk" and of the "great artist" from romanticism is his particular view of nature and of evolution. While many of his contemporaries aimed to expunge the natural from their music, Bartók instead wanted to completely redefine the idea of the "natural." Many nineteenth-century writers, for example, following a particular concept of the natural, theorized an overall evolutionary course for music that progressed from simple to complex. Bartók also describes such a course, but only at the most global level; his more bush or coral-like model of evolution, in which folk music is not the ancestor of art music, but lies, rather, on a separate branch, is in direct conflict with this more linear one.[68] Bartók is teleological only in the sense of moving toward particular states, not in envisioning a progressive course toward constantly more perfect music. Folk music conforms not to the Toveyan musical "main stream," but rather evolves in *multiple* streams, no one of which is more "main" than any other.[69] In his view, music is constantly branching, so much so that the age of a particular national music can be determined by counting the number of divergent styles or categories it has spawned. Bartók's view of nature — not static, but also not

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[68] For examples of such linear evolutionary historiographies of music see C. Hubert H. Parry, *The Evolution of the Art of Music* (1893) (New York: D. Appleton, 1910); or D.G. Mason, *From Song to Symphony* (Boston: Oliver Ditson Company, 1924).

[69] Tovey famously theorized a "main stream" of music, understanding "music history from Monteverdi to Beethoven as a Spencerian process of increasing differentiation and integration." Michael Spitzer, "Tovey's Evolutionary Metaphors," *Music Analysis* 24.3 (2005), p. 446. See Donald Francis Tovey, "The Main Stream of Music" (1938), in *The Main Stream of Music and Other Essays* (New York: Meridian Books, 1959), pp. 330-352.

teleological — is in part a strong reaction to the progressive, linear versions of evolution that necessarily posit a disconnect between modern, "civilized" man and his natural past, which can still be found in non-urban indigenous societies.

To more adequately see this difference requires us to examine not just general histories of music, but changing attitudes toward "primitive" peoples and the origins of folk music. Bartók may be advancing aspects of certain intellectual traditions, but his attitudes toward "primitive" peoples and folk music contrast significantly with those of his predecessors. While many other writers described folk music as the "spontaneous" or "unconscious" expression of indigenous populations, they did not regard those attributes as being essentially positive, as Bartók did. For some writers, folk music was naïve, unsophisticated, and often backward. Fétis was typical: for him, folk music was "the fruit of collective inspiration" and "seems to have had no other author than the people themselves," but he also believed that, "by degrees, the powers of the spontaneous production of poetry and song weaken within the masses."[70] This weakening is apparently a consequence of urban civilization, which is ultimately what, for the nineteenth century, separates us from the rural peasant, who remains at an earlier point of development. It also prepares for the arrival of the individual genius, who restores or enlivens a people's true creative power and allows it to reach its next, greater, stage. Daniel Gregory Mason, writing in 1924, not only uses the term "savage," which by that time had all but completely fallen out of use, but views folk music, which serves as "an invaluable index to qualities harder to disentangle in music of greater art," as being still "communal and therefore primitive."[71]

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[70] F.J. Fétis, *Biographie universelle des musiciens et bibliographie générale de la musique* (1835-1844), 2nd ed. (Paris: Librairie de Firmin-Didot et Cie, 1877), Vol. 1, p. ii.

[71] Mason, *From Song to Symphony*, p. 9.

Set against these more typical views is Bartók's claim that peasant music has a "perfection in miniature … equal to the perfection of a musical masterpiece of the largest proportions."[72] Peasants may not be able to create large-scale works, but folk tunes are no less perfect for this limitation. They are, rather, completely equal in their perfection to the masterpieces of individual geniuses. Bartók may seem to be resurrecting some kind of naïve or primitive genius, trying to reconcile it with a nineteenth-century idea of individual genius, but perhaps a better explanation of his idealization of peasant music lies with the largely leftist, counter-cultural, intellectual group with which he associated and by whom he was taken as a musical representative: the Budapest "Sunday Circle" group centered around György Lukács and Béla Balázs and attended by (among others) Karl Mannheim, Lajos Fülep, Arnold Hauser, Béla Fogarasi, and Anna Lesznai. While various intellectual and political factions have claimed Bartók as their own — even though he was largely non-political in personal life — there is ample evidence to suggest that his view of peasants, and indeed his entire evolutionary model, was highly influenced by the intellectual milieu of the Sunday Circle and its "romantic anti-capitalism." I believe it will prove necessary to turn to writers connected more by various philosophical commitments than by shared profession or intellectual endeavors (such as the writing of music history), for much of the vocabulary Bartók used — "teleology," "drives," "flow," "intuition" — arises more naturally from their intellectual concerns than those of a still nascent academic musicology. While Bartók's writings present a remarkably complete evolutionary model for folk music, ideas such as "driving toward perfection" raise more questions than they answer. Unfortunately, Bartók did not develop a comprehensive underlying

[72] Bartók, "The Relation of Folk Song to the Development of the Art Music of Our Time," pp. 321-322.

philosophy that would resolve such conceptual ambiguities, at least not in writing. Along with Badiou, I will thus turn to those members of the Sunday Circle who, along with their intellectual antecedents, form the other interlocutors of this dissertation: Lukács and Mannheim, Nietzsche and Bergson.

3. Bartók's Music

Tonal Resources: Strands of Thought

Kovács writes that Bartók's system for classifying folk music "reveals the most, more than any document, about the scientific — and, indirectly, artistic — views and thinking of the composer."[73] To this we might add Edward Gollin's more recent assertion that, in addition to shedding light on his style and aesthetics, Bartók's ethnomusicological work can offer "specific *analytical* insights."[74] This dissertation aims to trace the particular music-analytical insights that Bartók's evolutionary model has to offer by developing an interpretative method that can shed light on evolutionary processes working both *within* and *through* Bartók's own music. This will therefore involve the elaboration of two ideas: (1) a conceptual shift from a relatively historically static major/minor tonality to a more multivalent, evolving one, and (2) the reconceptualization of motives or themes as having no single or original forms, but rather as being related genetically, as somehow evolving in their own right. The latter, perhaps more intuitive idea of a "musical evolution" will be the topic of Chapters 3 and 5. The first of these ideas, on the other

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[73] Kovács, "The Bartók System of Hungarian Folk Music," p. 20.

[74] Edward Gollin, "On Bartók's Comparative Musicology as a Resource for Bartókian Analysis," *Intégral* 22 (2008), pp. 59-79.

hand, concerns the overall evolution of Bartók's *tonal resources,* and will be the topic of Chapters 2 and 4. In some ways, this will be a departure from standard, "harmonic" approaches to Bartók, but in others it will be a return to certain aspects of the earliest attempts to deal with his music.

For instance: Edwin von der Nüll's *Béla Bartók: Ein Beitrag zur Morphologie der neuen Musik* (1930) was the first major analytical study of Bartók's music and the only one to have benefited from the composer's personal input.[75] Despite such high recommendations, it is generally overlooked today, most probably because von der Nüll's analyses are often less than convincing musically. I nevertheless believe that aspects of his approach are worth reviving, so I will attempt to extricate core ideas von der Nüll might well have taken directly from Bartók. After all, some passages do sound very much like Bartók's own statements: "Bartók's creative tendency is distinctly evolutionary. He always draws on what already exists and further develops what exists."[76] Von der Nüll is particularly interested in Bartók's "reformulation" (*Neuformulierung*) of tonal relationships.[77] Example 1.5 reproduces his roman-numeral analysis of the opening five measures of the Tenth Bagatelle (1908). Note how von der Nüll sets ups his analysis in two rows, each of which interprets the harmonies within a particular key, beginning with F major (or "F") and B♭ minor (which he designates with a lower-case "b"). Since he understands the highest pitches — which are always thirteen or fourteen semitones above the left hand melody — as non-chord tones he calls *Wechselnoten*, he labels each chord

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[75] This is the text Dille asks Bartók about in the 1937 interview.

[76] Edwin von der Nüll, *Béla Bartók: Ein Beitrag zur Morphologie der neuen Musik* (Halle: Mitteldeutsche Verlags, 1930), p. 71.

[77] *Ibid.*, p. 70.

Example 1.5. Edwin von der Nüll, *Béla Bartók: Ein Beitrag zur Morphologie der neuen Musik* (1930), Example 5, p. 6.

according to only the lower three pitches. Thus, since he understands the first chord as not including the right hand G♭, von der Nüll labels the remaining triad, F–A–C, as both I in F major and V in B♭ minor. There is a vertical arrow connecting the former and the latter, one of three vertical arrows on the downbeats of the first three measures. Von der Nüll never explains these arrows, but does note that “chord formations rise to much greater importance when their components include so-called ‘non-harmonic’ tones.”

> In particular the chromatic *Wechselnote* and the chromatic suspension (less so the passing tone) undergo a treatment that achieves crucial results for the development of Bartók’s harmony. The drastic transformation in the use of the *Wechselnote* lies in its failure to resolve. The occasional application of an unresolved *Wechselnote* on alternating strong and weak beats is well-known, but the consistent formation of chords with ongoing unresolved *Wechselnotes* — in such a way that a *Wechselnote* is immediately followed by another without intermediary — moves this chord formation into another realm of possibilities .… Because of the upper *Wechselnote* of the octave, the Tenth Bagatelle (in C major and beginning in the subdominant) features a hazy image of its key (*verschleiertes Tonartenbild*). The harmonic progression is, in general, simple, yet the three-part freely sequenced repetition of the motive (designated by ⌐¬) brings somewhat more intricate chromatic modulations (*Rükungen*).[78]

[78] *Ibid.*, p. 6-7.

Since both Bartók and von der Nüll consider the Bagatelle to be in some kind of "C major," von der Nüll understands the passage as beginning "in the subdominant," F major.[79]

As shown in Example 1.6, the left hand arpeggiates downward, from F through D and B to G, each note in the arpeggiation preceded by a chromatic ascent following a leap down by a fourth in the outer voices, requiring the left hand to also shift position. F at ms. 3.2, for example, leaps down to C and then passes chromatically through C♯ to D — the next note in the arpeggiation — at ms. 4.1. Von der Nüll acknowledges these "sequenced repetitions" not only by analyzing the passage as modulating at each stage, but also by interpreting each stage (except for the B) according to the same progression: (I)–VII–I–V. At the initial stage in F major, I (F–A–C) alternates with VII (E♮–B♭–D♭) until ms. 3.2, where it is followed by V (C–G–B♭). At the second stage in D major, VII (C♯–G–B♭) resolves to I (D–F♯–A in ms. 4.1), which is followed by V (A). And at the fourth stage in G major, I (G–B–D) is tonicized by a lower-neighbor VII (F♯–C–E♭), yet since it ends the passage G–B–D is reinterpreted as V in C major.

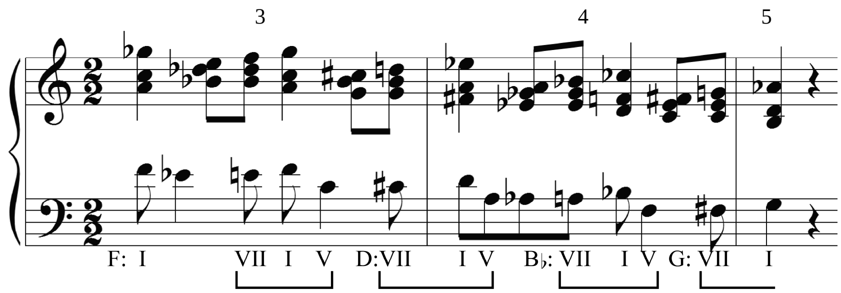
Only the third step of the arpeggiation breaks the pattern, for the left hand B in ms. 4.2 is *not* harmonized as I in B major. Just as in a tonal sequence, in which the leading tone introduces a diminished interval into the circle of otherwise perfect fifths, B — which can be understood as the leading tone of the Bagatelle's "C major" — disrupts von der Nüll's sequence. Rather than continuing the (I)–VII–I–V pattern of the other three stages, he unconvincingly labels the chords as V in E♭ major (B♭–F–A♭), II in D major (E–G–B, with the chord third in the bass), and V in B♭ major (F–C–E♭). This final chord, of course, *would* adhere to the (I)–VII–I–V pattern if the third pitch of the arpeggiation were B♭ rather than B♮. If this were the case, the sequence would then

[79] Bartók's own key designations for the *Fourteen Bagatelles* can be found in "Introduction to *Béla Bartók Masterpieces for the Piano*," in *Béla Bartók Essays*, pp. 432-433.

Example 1.6. The arpeggiation of F–D–B–G in the left hand.

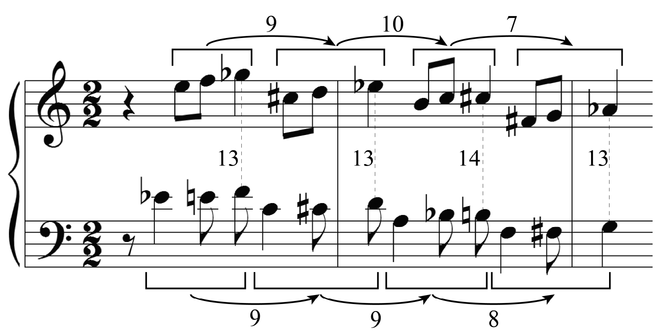
be intervallically regular (alternating descending minor and major thirds) and symmetrical, as shown in Example 1.7. As shown in brackets, we could then also label the third step as VII–I–V, only in B♭, which would make an overall "C major" interpretation more tenuous. Example 1.8 presents another option. Here the left-hand B in ms. 4.2 *is* harmonized as I in B major, but in order to continue its pattern the passage must continue on to G♯ rather than G♮, arpeggiating through F–D–B–G♯ and again attenuating any "C major" interpretation. The difference between Bartók's arpeggiation and these hypothetical versions is the difference between a tonal and a chromatic sequence: a tonal sequence — by remaining within the diatonic frame — will inevitably break its intervallic pattern, while a chromatic sequence can perpetuate its pattern indefinitely, whether that pattern is an alteration of descending minor and major thirds, as in Example 1.7, or a series of descending minor thirds, as in Example 1.8.

For von der Nüll however, Bartók's sequence is not "tonal" but "*free*," created by the motive he brackets: three pitches that ascend chromatically. Example 1.9 reproduces von der Nüll's right-hand brackets, as well as brackets showing the motive as it appears in the left hand; it also outlines the sequential structure of the sequence. Note how the right hand does not precisely follow the left: the former's 9–10–7 intervallic sequence (shown above the staff) does not match the latter's 9–9–8 sequence (shown *below* the staff), even though the overall distance



Example 1.7. A hypothetical, symmetrical reconstruction of the sequence in ms. 3-5.

Example 1.8. A hypothetical, symmetrical reconstruction of the sequence in ms. 3-5.



Example 1.9. The “chromatic syncopations” of Von der Nüll’s motive.

traversed is the same for both (a descending minor seventh). This discrepancy is created when the right hand descends by only two semitones between the second and third transpositions of the motive (one fewer than the left) and is corrected by the same hand descending by five semitones (one *more* than the left) between the third and the fourth. This kink can be seen in the harmonic intervals shown on each beat in Example 1.9: the voices are perfectly parallel (in terms of exact interval size) until ms. 4.2, where the increase in intervallic size from 13 to 14 results in E–G–B rather than B–D♯–F♯, as in Example 1.8 (p. 43). In several ways, then, von der Nüll's traditionally tonal analytical system seems, paradoxically, to break down under Bartók's "tonal" sequence, for his roman-numeral analysis becomes most absurd precisely at the kink in ms. 4. This is perhaps the first of many instances where an analyst struggles to accommodate Bartók's near (but not complete) symmetry.

But there is another wrinkle in the analysis: as noted above, in addition to labeling the first chord I in F major, von der Nüll also labels it V in B♭ minor. Are we to hear these two interpretations simultaneously or successively? By placing the label for B♭ minor to the right of the one for F major and by adding the downward arrow connecting them, von der Nüll seems to imply that a *process* of some kind takes us *from* I in F major *to* V in B♭ minor. It would appear that, for von der Nüll, the B♭ minor interpretation is *subsequent* to the F major interpretation, as though he reinterpreted the chord while it was still ringing. In this view, the B♭ minor progression — V to I (D♭) to IV (E♭–B♭–D♭) — is embedded within a larger I–VII–I progression in F major, and the single chord in ms. 4 he analyzes in E♭ major is likewise embedded within D major. Since he describes the passage as "beginning in the subdominant" (F major), we can perhaps conclude that this is his intention. His description of the passage as "simple," however, suggests a different interpretation, for modulating at such a breakneck speed begs all sorts of questions about musical and perceptional salience. Perhaps he understands the passage as two juxtaposed and overlapping "simple" progressions: I–VII–I in F major and I–IV–V–I in B♭ minor (beginning, evidently, *in media res*). The process the arrows imply would seem to indicate on which key one's attention should be focused at any particular moment: E♭ major in ms. 4 would not disrupt D major, but would only appear momentarily beside it.

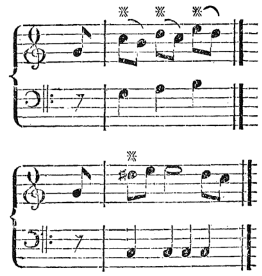
In any case, von der Nüll's entire argument, including his discussion of bitonality, turns around the idea of "unresolved *Wechselnoten*." He never actually defines the term, but seems rather to assume the reader will be familiar with it. Indeed, the reader could have looked it up in a contemporaneous edition of the *Hugo Riemanns Musik Lexikon*:

> "*Wechselnote*" signifies a note lying a major or minor second above or below a chord member and set in that chord member's place. *Wechselnotes* are least noticeable when they follow the chord member on a weak beat and then return to it (a basic *Wechselnote*) or when they continue on to a new chord member (a passing note). If it is held over from the previous harmony, it becomes a suspension. If it occurs freely on a strong beat, it is actually the *cambiata* of older theory. If it follows on the weak beat, without returning or continuing stepwise — resolving by a leap, in other words — then it is the so-called "Fuxian" *Wechselnote* (the abandoned *Wechselnote*).[80]

"*Wechselnote*," then, is a broad category comparable to the notion of a "non-harmonic tone" in English. Schenker, for example, used the term for both accented "passing and neighboring notes that fall on the beat."[81] Since von der Nüll contrasts *Wechselnoten* with both suspensions and passing notes, however, we can safely conclude that he only means some kind of neighbor note, such as the *Lexikon*'s "basic" *Wechselnote*. In the Bagatelle, the *Wechselnoten* — the pitches a ninth above the bass — occur not on weak beats, but on strong ones, and thus appear to be what the *Lexikon* calls the "*cambiata* of older theory." So perhaps turning to some "older theory" may help clear up the matter. Example 1.10 presents Heinrich Koch's demonstration of *Wechselnoten* (marked with asterisks) from his own *Musikalisches Lexikon* (1802), which seems to show

[80] "Wechselnote," in *Hugo Riemanns Musik Lexikon*, 11th ed., ed. Alfred Einstein (Berlin: Max Hesses Verlag, 1929), p. 1998. This entry is carried over from Riemann's own earlier editions of the lexicon.

[81] See Allen Cadwallader and William Pastille, "Schenker's Unpublished Work with the Music of Johannes Brahms," in *Schenker Studies 2*, ed. Carl Schachter and Heidi Siegel (Cambridge: Cambridge University Press, 1999), p. 30.



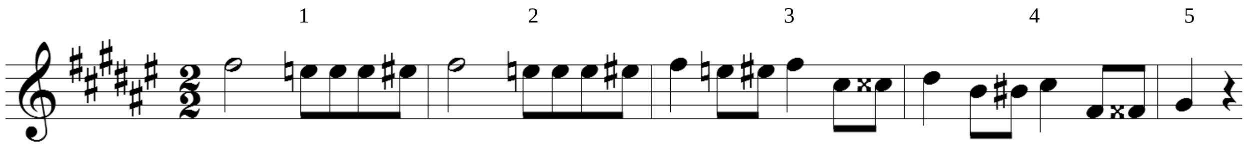
Example 1.10**.** Koch, *Musikalisches Lexikon* (1802), p. 1736.

precisely what von der Nüll had in mind. *Wechselnoten*, according to Koch, are "melodic neighbor notes not contained in the harmony lying over the fundamental (*der zum Grunde liegenden Harmonie*) and which displace the harmonic notes from the strong to the weak part of the beat."[82] The notes marked with asterisks are the *Wechselnoten.* In the first example, the upper pitches of the passage's parallel tenths are consistently displaced on the strong beat by upper neighbor notes that move stepwise to "harmonic" notes; according to Koch, *Wechselnoten* must in fact always resolve by stepwise motion.[83] In the second example, the *Wechselnote* D♯ resolves up to E; since it is a passing rather than a neighbor note, D♮ on the fourth beat is evidently not a *Wechselnote*.

The resolutions that von der Nüll expects, then, would need to occur subsequently to the harmonic attacks and on the "weak part of the beat"; G♭ at ms. 1.1 of the bagatelle would need to descend stepwise to F (the chord member it has displaced), E♭ at ms. 4.1 would need to descend to D, and so on. For von der Nüll, the fact that none of the *Wechselnoten* resolve "creates the

[82] Heinrich Christoph Koch, *Musikalisches Lexikon* (1802) (repr. Hildesheim: Georg Olms, 1964), p. 1736.

[83] *Ibid.*, p. 1737.



Example 1.11. Von der Nüll's F♯ major reinterpretation of ms. 1-5.

impression of an F♯ major melody supported by F major harmony."[84] As shown in Example 1.11, he evidently reinterprets the upper-voice melody enharmonically — G♭–E–F–G♭, and so on — in F♯ major. While it is unclear why he chooses F♯ major rather than G♭ major — perhaps so both keys will be some kind of "F key" — von der Nüll believes that the *Wechselnoten* "give birth to the juxtaposition" of F major and F♯ major.[85] Bartók, however, explicitly rejected *any* kind of poly or bitonal interpretation of his music; he says in his Harvard lectures that "polytonality exists only for the eye .… Our mental hearing … will select one key as a fundamental key" and that "our hearing cannot perceive two or more different keys."[86] He specifically dismisses the type of configuration von der Nüll suggests, writing that "some composers invented a diatonic hackneyed-sounding melody in, let us say, C, and added a very hackneyed accompaniment in F♯ .… Such artificial procedures have no value at all."[87] For Bartók, then, this passage from the Bagatelle — like all his music — should be understood as being in a single key. By suggesting two simultaneous keys and by giving certain pitches an entirely melodic role, von der Nüll completely divorces those pitches from the harmony. For him, a *Wechselnote* seems to be a tone that is not merely "non-harmonic," but one whose origins and function are more positively

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[84] Von der Nüll, *Béla Bartók*, p. 7.

[85] *Ibid.*, p. 7.

[86] Bartók, "Harvard Lectures," pp. 365-366.

[87] *Ibid.*, p. 366.

melodic. By differentiating harmonies into triads (such as F–A–C) plus juxtaposed, melodically derived “other notes” (such as G♭), he creates two old things from one new one, stripping Bartók’s sonorities of their status as independent reformulations (*Neuformulierungen*), to use Von der Nüll’s own terms.

This differentiation of harmonies into traditional triadic formations and added alterations is an example of one particular strand of thought in early twentieth-century music-theoretical descriptions of harmony: the so-called “stacking of thirds” (ninths, elevenths, *etc*.) and the “altering” of these harmonies, which are ultimately reducible (by eliminating “non-chord” tones) to triads and seventh chords. Another strand is represented by the realization that new harmonies are independent and not reducible to other harmonies — the “absolute” progressions of Kurth, for example, or Schoenberg’s declaration in *Harmonielehre* that there are no such thing as “non-chord tones.” While the second strand of thought is exemplified (or taken to the extreme, perhaps) by pitch-class set theory, the impetus to find a more neutral way to describe such harmonies reaches back to the beginning of the century. Ernst Bacon thus writes in 1917 that

> “unresolved suspensions,” *etc*., are continually met with in modern music. If harmony is “that which sounds together,” we should be able to define any combination of simultaneously sounding tones, whether this combination is surrounded by others or not …. A harmony is a harmony whether dissonant or consonant. Yet of the vast majority of dissonant harmonies few can be adequately named and classified in themselves.[88]

Responding to such things as Von der Nüll’s “unresolved *Wechselnoten,*” Bacon is suggesting that harmonies containing those pitches can perhaps be “classified” and are so common as to deserve being understood as new and independent chord formations. Example 1.12 thus

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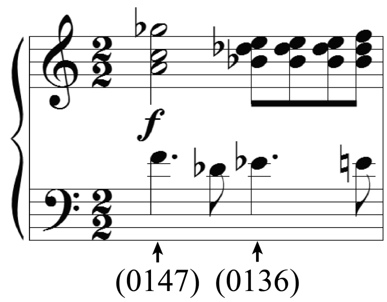
[88] Ernst Bacon, “Our Musical Idiom,” in *The Monist* 27.4 (1917), p. 578. Also see Jonathan Bernard, “Chord, Collection, and Set in Twentieth-Century Theory,” in *Music Theory in Concept and Practice* (Rochester: University of Rochester, 1997), pp. 11-51.



Example 1.12. A pitch-class set interpretation.

classifies the sonorities of ms. 1 “in themselves” as members of (pitch-class) set classes (0147) and (0136). One could note that with the exception of F, all of these pitch classes belong to the same octatonic collection, a description that does describe the overall sound of the passage, especially considering that each harmony consists of an (036) in the right hand and a fourth pitch in the left, a derivation which always results in a harmony that belongs to some octatonic collection. While such an approach emphasizes the status of theses sonorities as independent harmonies, I believe it takes this tendency too far, effectively severing sonorities from any kind of evolutionary continuity with tonal tradition or, indeed, from any connection with history at all.

This approach, then, is just as inadequate as von der Nüll’s, perhaps even more so, for it takes away the possibility of understanding the music in terms of an *evolution* of tonal resources. It assumes that Bartók’s music is either “absolutely tonal” and given enough pressure must yield to traditional tonal analysis (as with von der Nüll’s roman numerals and altered harmonies) or that it is “absolutely atonal” and must be described by some other, more “neutral” means, such as pitch-class set theory. Regarding Bartók’s Ninth Bagatelle, for example, one analyst writes that the “examination of this monophonic piece reveals the difficulty in application of traditional tonal theory .… However, this author has found that substantial insight is gained into the internal structure of the piece when it is considered atonal."[89] Underlying this view is a narrative positing an absolute break or historical rupture in which Bartók did not believe. He rejected atonality as a category because he believed that we always hear individual pitches and relations between them in tonal terms. While for Bartók there may be historical discontinuities in early twentieth-century music, continuities nevertheless remain at some level — the break is not absolute.

Inherent to a view that posits an irreparable rupture in music history is a strict dualism between composers who realized the necessity of this break and those who did not. It is an object case of what Badiou has called the "antagonistic scissions" that characterize the twentieth century.[90] Bartók's music, however, traditionally occupies an ambivalent position within this narrative. Adorno described Bartók as seeking to "reconcile Schoenberg and Stravinsky," but falling neatly into neither camp.[91] This led him to some rather paradoxical descriptions of Bartók's music: while Bartók was one of the "most progressive composers," certain of his pieces sounding as "heralds of the threateningly eruptive," he was also "under the compulsion of origin and tradition" and therefore "unable to get away from tonality."[92] Adorno thus had to interpret Bartók as a composer who, while he initially took radical steps, retreated to conservative tradition in the end. This led Adorno — seemingly to avoid the task of having to label some of

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[89] James Woodward, "Understanding Bartók's Bagatelle op. 6/9," *Indiana Theory Review* 4.2 (1981), pp. 11-32.

[90] Badiou, *The Century*, p. 59.

[91] Adorno, *Philosophy of New Music*, p. 8.

[92] *Ibid.*, p. 176; Theodor Adorno, "The Aging of the New Music" (1955), trans. Robert Hullot-Kentor and Frederic Will in *Essays on Music*, ed. Richard Leppert (Berkeley: University of California Press, 2002), p. 184; Theodor Adorno, "Difficulties" (1966), trans. Susan H. Gillespie in *Essays on Music*, p. 649.

Bartók's pieces "progressive" and others not — to retroactively denounce the very works he had previously praised. But what if Bartók's music were both truly radical (participating in this "eruption" of the new) but also connected to tradition? What if, in Badiou's terms, Bartók's music belies such a "nondialectical juxtaposition" between tonal and atonal music?[93] I will in fact interpret such seeming paradoxes as compelling evidence that the foregoing narrative's dualism is false, for I believe Bartók's evolutionary model of historical change is able to accommodate such paradoxes. In terms of the composer's harmony, what I seek is a way to acknowledge the individuality or independence of Bartók's sonorities without nüllifying their genetic connection to other sonorities or groups of sonorities. This notion also extends to the idea of "key," to the harmonic interrelationships of individual compositions or movements, the ultimate goal being to uncover the underlying drives or forces that perpetually create different sonorities or keys, a process outside of the individual composition.

A passage from Bergson's *Creative Evolution* (1907) will give us both some useful terminology and a place to start:

> Life is an evolution. We concentrate a period of this evolution in a stable view which we shall call a *form*, and, when the change has become considerable enough to overcome the fortunate inertia of our perception, we say that the body has changed its form. But in reality the body is changing form at every moment; or rather, there is no form, since form is immobile and the reality is movement .… When the successive images do not differ from each other too much, we consider them all as the *waxing* and *waning* of a single *mean* image, or as the deformation of this image in different directions. And to this mean we really allude when we speak of the *essence* of a thing, or of the thing itself.[94]

In these terms, major/minor tonality constituted a "form" defined as the quasi-statistical "mean"

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[93] Badiou, *The Century*, p. 59.

[94] Henri Bergson, *Creative Evolution* (1907), trans. Arthur Mitchell (New York: Henry Holt and Company, 1911), p. 302.

of a constantly changing collection of many slightly different individual tone systems. In the nineteenth century this "waxing and waning" moved ever further from the mean until at some point tonal systems became unstable and began to fluctuate wildly. In biological evolution, the analogy would be Stephen Jay Gould and Niles Eldredge's "punctuated equilibrium," in which stable forms (species) maintain a relative equilibrium until some external force causes a huge increase in variation, leading to a qualitative change in form.[95] Bartók's music is one of these punctuations, a moment of tonal turbulence far from equilibrium. His compositions cannot be represented by a single mean and cannot be collected together into a stable "form." Rather, like Bartók's conception of folk music, each composition (or even section of a composition) defines its own individual expression or variation of "key" that may be represented by its own "mean." I will explore this idea further in Chapter 2.

Tracing a Harmonic Evolution

Example 1.13 presents the score for the fifth of Bartók's *Eight Improvisations on Hungarian Folk Songs* (1920). The Improvisation begins with a statement of a pentatonic tune contrasted with a syncopated ostinato: the dyad C♯–D. Such minimal accompaniments are, of course, typical for Bartók. He discusses this technique in multiple places, most succinctly in the second of his Harvard lectures: "Pentatonic melodies are very well imaginable with a most simple harmonization, that is, with a single chord as a harmonic background."[96] The

[95] Stephen Jay Gould and Niles Eldredge, "Punctuated Equilibria: The Tempo and Mode of Evolution Reconsidered," in *Paleobiology* 3.2 (1977), pp. 115-151.

[96] Bartók, "Harvard Lectures," p. 373.

V.

allargando - - - - al Allegro.
Allegro molto.
sf mf
f giocoso
8
(Ped)
15
21
stringendo - - - - - - - -
sempre f
rallentando
a tempo
sf
ff
29
marcatissimo il tema
37
poco ritardando
mf
p

Example 1.13. The Fifth Improvisation (1920).

Improvisation's syncopated ostinatos, however, are hardly "simple harmonizations." At first, they may seem to contrast with the tune: rather than complementing it, emphasizing the "background" quality of such repeated sonorities, they appear to be a chromatic canvas on which the tune is painted. Adding to this contrast is the strumming accompanying the second statement (beginning in ms. 25). Yet perhaps there is a different way to understand these chromatic ostinatos. Perhaps they derive instead from sonorities that are in some way *genetically* related to a more traditional triadic accompaniment. Any such explanation of the dyad's relationship to a more conventional harmonization would have to begin by tracing its history or genealogy, and according to Bartók the most natural chord for harmonizing a pentatonic melody is the seventh chord containing four of the melody's five pentatonic pitches: G–B♭–D–F, in the case of this piece.

This chord functions as a kind of "ancestor" chord from which variations issue.[97] But how do we arrive at C♯–D from G–B♭–D–F? "The Folk Songs of Hungary" (1928) — in which Bartók actually describes several derivations of harmonies from folk tunes — provides an example:

> A principal motive in my [Second Suite (1905)] is as follows:
>
> 
>
> The final chord of the movement is , which is a simultaneous resonance of all four (or five) tones of the motive: a condensed form of the same, to a certain extent, a vertical projection of the previous horizontal form. This result is obtained by a logical process .… The incentive to do this was given by these pentatonic melodies. When the consonant form of the seventh was established, the ice was broken: from that moment the seventh could be applied as a consonance even without a necessarily logical preparation .… There are many … harmonic inspirations we owe to the latent harmonies contained in the peasant songs of ours .… Rumanian and Slovak folk songs show a highly interesting treatment of the tritone … as may be seen in the following examples:
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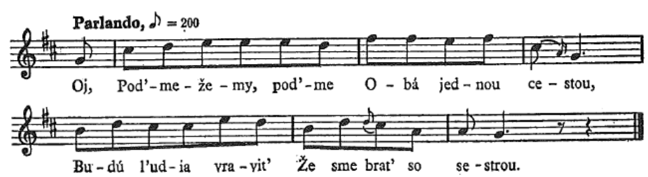
> 
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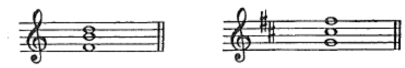
> These forms [are] brought about by the free use of the augmented fourth, the diminished fifth, and of chords such as:

[97] See Bartók, "Harvard Lectures," pp. 371-373.



> Through inversion and by placing these chords in juxtaposition one above the other, many different chords are obtained and with them the freest melodic as well as harmonic treatment of the twelve tones of our present-day harmonic system. Of course, many other (foreign) composers have met with similar results at about the same time .… The difference is that we created through Nature, for the peasant's art is a phenomenon of Nature.[98]

The minor seventh chord is not only the most "natural" chord with which to harmonize a pentatonic melody, but apparently also one of the first Bartók derived from folk music. Since it forms the final chord of the third movement of his Second Suite (1905), he understandably connects it to one of the piece's motives, but he also comments on how pentatonic folk tunes were his initial "incentive" for doing so. Arpeggiations of minor seventh chords (minor triads with minor sevenths), moreover, are to be found everywhere in Class A Hungarian folk tunes. More interesting is Bartók's derivation of chords containing augmented fourths or diminished fifths. The first chord he presents (after two sample folk tunes) — the diminished triad B–D–F — may not seem particularly unusual, but we must remember that what Bartók is suggesting is that this chord, like minor seventh chords, can stand alone as an independent harmony, and may even be able to function in some circumstances as a kind of "tonic" or end a piece. He suggests that by juxtaposing such chords, "many different chords are obtained." Juxtaposing diminished triads creates what Lendvai called "alpha" harmonies, such as the one shown in Example 1.14.[99] The second chord Bartók presents opens up even more possibilities, for, as shown in Example

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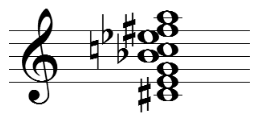
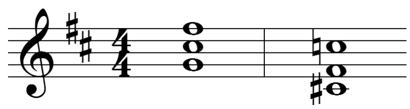
[98] Bartók, "The Folk Songs of Hungary," pp. 331-339.

[99] Lendvai, *The Workshop of Bartók and Kodály*, p. 60. Again, I am hesitant to reduce this idea to a generalized octatonicism even though Example 1.14 "is" an octatonic collection.



Example 1.14. One of Lendvai's "alpha" harmonies.



Example 1.15. Bartók's second chord and its "inversion."

1.15, it has a distinct inversional form — in the same way that major and minor triads, while inversionally related, nevertheless constitute distinct forms. One can characterize such harmonies as a perfect fifth (F♯–C♯) with a third pitch (G or C♮) lying a tritone from either of its other constituent pitches.

Both versions of this trichord could be labeled (016), but since this label severs such harmonies from their origins (and fails to represent these chords as juxtaposition of two nearly-same sized intervals) I hesitate to do so. Bartók, after all, considered both of his folk-tune examples in "The Folk Songs of Hungary" (1928) to be in a "Lydian mode" with a G final. In the first tune, C♯ lies an augmented (or lydian) fourth above G, which, combined with the seventh F♯, creates Bartók's verticalized harmony. But while C♯ originates here as $\hat{4}$ in G Lydian, once verticalized it begins to take on a new, harmonic valence. In the second tune, by the time C♯ appears in the penultimate measure, C♮ has already been established as $\hat{4}$. In this case, C♯ could either be heard as an alternative prime to C♮ — the caesura pitch of the first half of the tune — or as an alternative fifth to D, the fifth of the final G. Thus, depending on context, C♯ can be interpreted as a melodic ♯$\hat{4}$, as a harmonic alternative fifth to D (especially if spelled D♭), or as an alternative prime to C. This tendency toward simultaneous alternative primes and fifths is, of course, analogous to Bartók’s famous use of simultaneous major and minor thirds in triads. Lendvai labeled a chord containing the prime, fifth, and an alternative prime (such as C–C♯–G) as a “beta” chord and a chord containing the prime, fifth, and an alternative fifth (such as G–D♭–D) as a “delta” chord.[100] These chords — both of which belong to set class (016) — are found so frequently in Bartók’s music that he felt they deserved their own names.

The idea of alternative pitches is also very close to János Kárpáti’s idea of “mistuning,” though I find the term “mistuned” somewhat unsatisfactory: the fact that Bartók always rationalizes the use of such pitches through folk-music practices leads one to assume he felt the sonorities containing them to be perfectly “in tune,” to be equally valid and independent.[101] Describing them as “mistuned” acknowledges their relationship to triadic sonorities, but adds an unneeded hierarchy: in tune *vs*. mistuned. Von der Nüll described these pitches as “altered,” yet as we have seen such a view also relates chords hierarchically back to a traditional triadic harmony, in his case to *Stufen* labeled with roman numerals. To regard these sonorities as “altered” chords is to regard them as secondary — and lesser — versions of diatonic/triadic harmonies. In the genetic view I am advancing here, such an ancestor harmony is merely one among many harmonies — not a final cause or origin, but rather something just as transient and susceptible to having its own genealogy somehow exposed in the music in which they occur.

Returning to the Fifth Improvisation, then, Example 1.16 presents a possible genealogy for the C♯–D dyad based both on Bartók’s second chord from “The Folk Songs of Hungary” and on the “expected” minor seventh ancestor chord described above. First of all, we must

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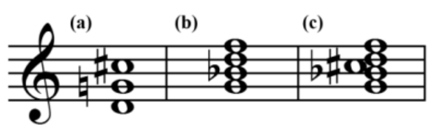
[100] *Ibid.*, p. 60.

[101] János Kárpáti, “Perfect and Mistuned Structures in Bartók's Music,” *Studia Musicologica* 36.3 (1995), pp. 365-380.

understand the second chord from “The Folk Songs of Hungary” as a demonstration of a certain tendency, not simply as a particular isolated harmony. This tendency may then be applied in various musical contexts. Example 1.16a presents the particular inversion of the chord found in the Fifth Improvisation. It is the G final combined with the dyad C♯–D (as in ms. 12, the final measure of the first statement): prime G, perfect fifth D, alternative fifth C♯. Applying the tendency described above to Example 1.16b — the expected or “most natural” G minor seventh chord G–B♭–D–F — is simple: one adds C♯, and the resultant “new” harmony, shown in Example 1.16c, becomes a harmony from which the dyad C♯–D might be derived: G–B♭–C♯/D–F, a textbook example of one of Lendvai’s “delta” chords. Crucially, G–B♭–C♯/D–F is not “just” a G minor seventh chord with an added C♯; it is an entirely “new” harmony genetically related to a G minor seventh chord by a particular tendency Bartók discovered in folk music — a subtle but vital distinction. And this view is satisfyingly validated by the final sonority of the piece: the chromatic trichord F♮–F♯–G in ms. 68 rests atop this very chord.



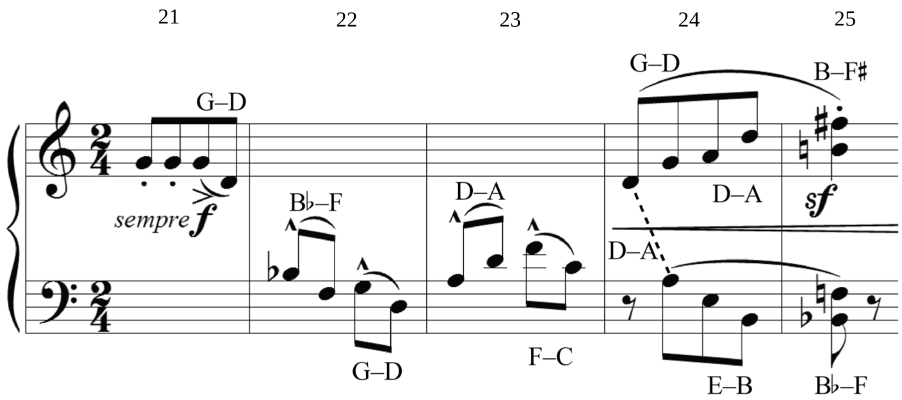
Example 1.16. A possible genealogy for the C♯-D dyad: (a) as an “inversion” of Bartók’s second chord; (b) as Bartók’s “ancestor” minor seventh chord; (c) as a new “tonic” harmony.

This allows us to understand von der Nüll’s *Wechselnoten* as alternative primes: the same tendency — represented by the trichord F–G♭–C in the first chord — creates F–G♭–A–C when applied to F–A–C. F–G♭–A–C, too, is a “new” harmony, not simply an altered F major triad. The difficulty in describing or labeling this harmony or the G–B♭–C♯/D–F “tonic” of the Fifth Improvisation arises precisely from the problems described above: “(01469)” and “altered G minor seventh chord" are equally unacceptable descriptions, for the first severs the sonority from its genealogy and the second denies its status as an independent, new harmony. And G–B♭–C♯/D–F could also function here analogously as a kind of "tonic," an idea Chapter 2 will explore: the "key" of the Fifth Improvisation is not merely G minor with some added or altered pitches, but a new, independent expression of key, a "key variation" belonging to the G minor "species." Chapter 4 will expand on this idea by exploring several key variations within a single work, *The Wooden Prince* (1917).

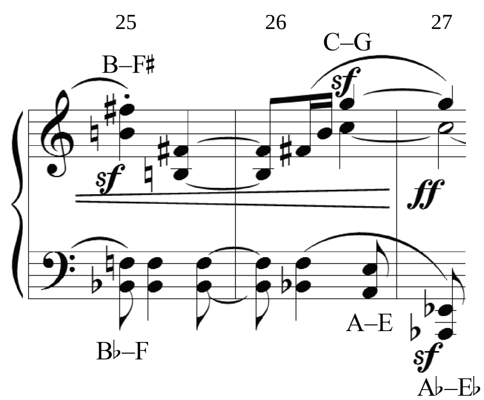
Evolving Motives: Differing Approaches

When one thinks of evolutionary processes in music, an evolution specifically of tonal resources is probably not what first comes to mind. One usually imagines, rather, some kind of internal motivic process that develops and evolves over the course of a piece. We can hear the Fifth Improvisation as an exemplar of such a process. After the first statement of its tune (beginning at ms. 5 of Example 1.13, p. 54), the Improvisation presents three more complete (if variously accompanied) statements of this tune, after which it scatters, sequences, and juxtaposes the tune's motivic material. Two passages, however, are not occupied by statements of the tune: the first four measures, which introduce the C♯–D dyad, and ms. 21-27, which act as a transition between the second and third statements. This latter brief episode is remarkable, for it foreshadows the motivic isolation and manipulation that follows. First of all, the final two pitches of the tune (G and D) are isolated: in ms. 21 the accompaniment abruptly ceases, and rather than repeating the tune a third time repeats its final G–D perfect fourth alone an octave higher. As shown in Example 1.17, this perfect fourth, not enough to be called a motive, is then transposed: in ms. 22 the repeated G–D in the right hand moves to B♭–F and G–D in the left and then to D–A (shifted so that the emphasis is on A, the lower pitch) and F–C in ms. 23. In ms. 24, this single succession bifurcates: each hand continues to break perfect fourths but follows a different path. The right hand begins an ascending series of ascending perfect fourths while the left hand begins a descending series of *descending* perfect fourths. D on the downbeat of ms. 24 could be said to be the final pitch of the single succession or, given that it's shared by two statements of the perfect fourth motive (D–A and G–D), the first pitch of the bifurcation. The hands then expand chromatically — even ineluctably — toward the beginning of the third statement of the tune at ms. 27. Example 1.18 presents ms. 25-27, where B–F♯ in the right hand ascends to C–G while B♭–F in the left hand passes through A♮–E♮ to A♭–E♭. As shown in Example 1.19, the left hand's syncopated perfect fifths (on A♭–E♭) in ms. 27 become an ostinato accompaniment, while the right hand, in addition to stating the tune, harmonizes the pitches of the tune on the downbeat of every other measure with pitches lying a perfect fifth below: C below G on the downbeat of ms. 27, F below C in ms. 29, and so on. The isolated perfect fourth from the tune thus turns — or *evolves* — into its own accompaniment.

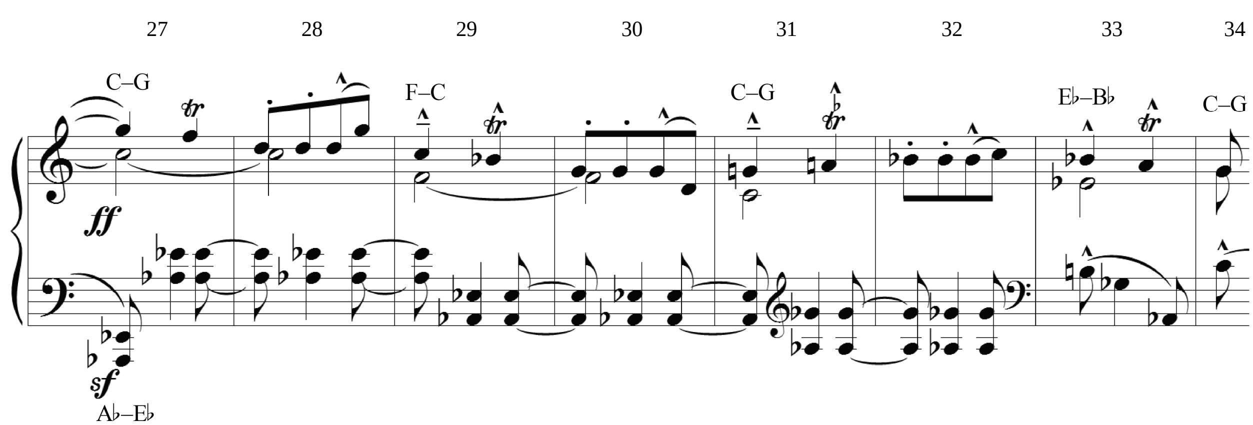
The significance of this passage, however, only really becomes clear in context, by observing how it is framed within the rest of the Improvisation. The first twenty measures are expository, providing a baseline measure on which we can form expectations or make judgments about what follows. In the first two statements, the tune is contrasted with a syncopated ostinato: our C♯–D dyad in the first statement (ms. 5-12), to which C♮ is added in the second (ms. 13-20). After this exposition, the episode in ms. 21-27 seems even more remarkable. Coming after the sharp contrast between tune and ostinato in the first twenty measures, the subsequent transmutation of a segment of the tune into a version of the ostinato is shocking: the boundaries



Example 1.17. The succession of the perfect-fourth motive and its bifurcation.



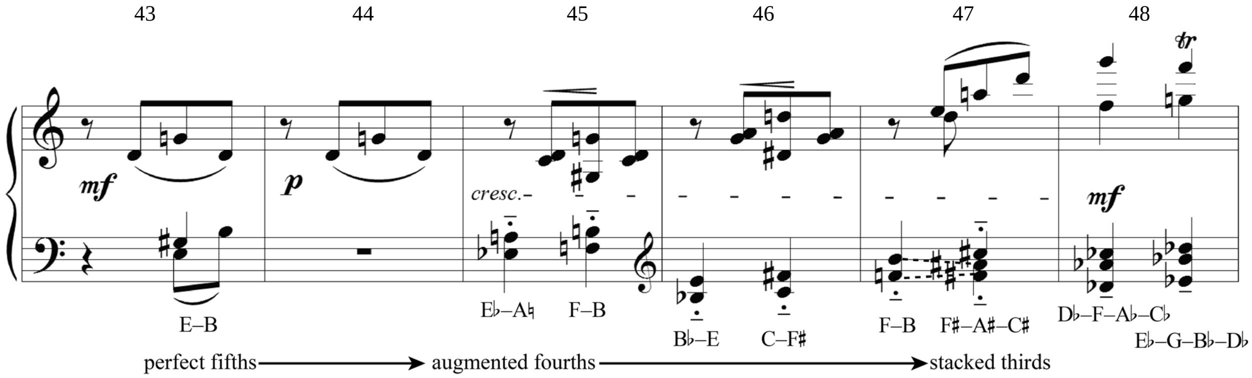
Example 1.18. The chromatic expansion of the perfect fourth motive.



Example 1.19. The third statement of the tune and its perfect-fifth accompaniment.

between two seemingly self-contained, polarized categories are effaced. Yet an interval-size gap remains between this new perfect-fifth ostinato and the earlier chromatic ones. The process is not yet complete, but rather continues, at least in the left hand: the harmonic perfect fifths that begin in ms. 27 carry on the transpositional process, moving from A♭–E♭ in ms. 27 to F–C in ms. 35 and then on to E–B at ms. 42.2. In ms. 45, however, a *meta*-process begins: rather than just continuing to transpose an unchanging model (perfect fifths), the model itself begins to change. As shown in Example 1.20, the parallel perfect fifths now contract to become parallel augmented fourths, beginning with E♭–A♮ at ms. 45.1. In ms. 47.2, this process of contraction continues, the augmented fourth F–B becoming the major third F♯–A♯ (shown with dashed lines in Example 1.20), which launches a passage of parallel chords made up of stacked thirds: D♭–F–A♭–C♭ in ms. 48, and so on.

Importantly, this new meta-process also reveals the possibility that the chromatic ostinatos of the first two statements and the ostinato on perfect fifths (beginning in ms. 27) could be related by a continued contraction, by minor thirds contracting into minor seconds. The major thirds over the bass — F–D♭ and G–E♭ in ms. 48, A♯–F♯ and B♯–G♯ in ms. 52, and so on — contract to minor thirds in ms. 55 as E♭–G moves to F♯–A in the outer voices, setting off a long passage (ms. 56-67) that elaborates the fully diminished seventh chord G–B♭–D♭/C♯–E, made up entirely, of course, of minor thirds. While minor thirds never directly contract into minor seconds in the Improvisation, the final harmony (G–B♭–C♯/D–F) is topped by the trichord F♮–F♯–G. The chromatic ostinatos from the opening, then, can be heard as the ultimate contraction of the perfect fifths into minor seconds so that we can hear the episode beginning in ms. 21 as the launching of an evolutionary process whereby a segment of the pentatonic tune (melodic perfect



Example 1.20. The new process of contraction in ms. 43-48.

fourths) becomes not only its own accompaniment (the perfect fourths inverted to perfect fifths and verticalized), but also its own unlikely chromatic accompaniment (perfect fifths ultimately contracted into minor seconds), revealing a genetic connection between objects that were ostensibly opposed.

The best way to describe such processes is not immediately clear. The most obvious way would be to adopt a transformational approach, and there are several recent precedents — analyses by David Lewin, Edward Gollin, and John Roeder in particular — that demonstrate its usefulness for Bartók's music.[102] These analyses focus on short, largely pedagogical works or etudes that do not treat motivic material in the same way as, for example, a large-scale sonata or dramatic work. Edward T. Cone describes this as a distinction between (1) "textural" motives that are "global and stable," permeate a piece, and undergo "varied reiteration," and (2) "thematic" motives that are "local and transient" and undergo true transformational

[102] See David Lewin's analysis of "Szinkópák" from book five of *Mikrokosmos* (1932-1939) in *Generalized Musical Intervals and Transformations* (New Haven: Yale University Press, 1987), pp. 225-227; Edward Gollin, "Multi-Aggregate Cycles and Multi-Aggregate Serial Techniques in the Music of Béla Bartók," *Music Theory Spectrum* 29.2 (2007), pp. 143-176; and John Roeder, "Constructing Transformational Signification: Gesture and Agency in Bartók's Scherzo, Op. 14, No. 2, measures 1-32," *Music Theory Online* 15.1 (2009).

development.[103] The Scherzo from Bartók's *Suite* Op. 14 (1916) (discussed by both Gollin and Roeder) and the second of his *Études* Op. 18 (1918) (discussed by Gollin), for example, present surfaces very similar to the C major Prelude from the first book of the *Well-Tempered Clavier*, Cone's exemplar of "textural" motives.[104] These pieces repeat and transmute the same basic arpeggiated figure over large sections, a perfect substrate for investigating transformations on a reiterated, stable object.[105]

For the most part, however, my interests lie elsewhere, in those motivic relationships Cone calls "thematic," for these kinds of relationships can better be understood as being "genetic."[106] I in fact believe that the opportunities for applying standard transformational theory to Bartók's works are relatively rare, due in large part to the self-consciously evolutionary nature of his motivic technique. The construction of a generalized interval system, after all, involves equivalence (and equivalence classes), but the concepts of perpetual variability and the concomitant interpenetration of categories preclude any strict application.[107] Dora Hanninen has recently addressed precisely this issue in terms of biological concepts of species: the phenetic concept (discussed earlier in relation to Bartók's classification system) has been abandoned in biology for biological or phylogenetic concepts of species which, importantly, presuppose (and

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[103] Edward T. Cone, "On Derivation: Syntax and Rhetoric," *Music Analysis* 6.3 (1987), pp. 237-240.

[104] *Ibid.*, p. 239.

[105] Lewin, on the other hand, investigates another device that is often textural: harmony.

[106] Cone's term for these relationships is "derivational."

[107] The space or set of a GIS, that is, is usually defined as a set of like elements, such as major triads or members of a set class.

are in fact the consequence of) an evolutionary viewpoint.[108] In musical terms, one needs to search no further than Bartók's classification of folk songs for an example of how phenetic systems — which classify based on observable characteristics rather than on a supposed genealogy — make way for more evolutionary ones: Bartók's evolutionary assumptions mold a classification system that differs from earlier morphological systems in the same away. In terms of Bartók's music, other analysts have confronted just this issue, reaching similar conclusions. Wayne Alpern writes that "the continuous motivic variation in [Bartók's] scores often frustrates conventional analysis predicated upon set-class equivalency .… Extension in range is a compositional device unifying nonequivalent pitch structures through contour relationships in an evolving web of dynamic growth or progressive transformation."[109] Of course, there are other criteria besides pitch by which motives can be said to be equivalent, but these prove equally unsuitable for determining equivalency between Bartók's thematic motives in a strictly formal sense; for, as Hanninen notes, motives "do not just *have* properties" but "also *acquire* them."[110] What defines a motive as belonging to a category, that is, is determined by its relationships with other motives, just as what defines an organism as part of a species is its relationships to other

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[108] Dora Hanninen, "Species Concepts in Biology and Perspectives on Association in Music Analysis," pp. 5-68.

[109] Wayne Alpern, "Bartók's Compositional Process: 'Extension in Range' as a Progressive Contour Transformation," presented at the annual meeting of Music Theory Midwest, Louisville, 1998, abstract. "Extension in range" is a device Bartók discusses in his Harvard lectures and which I will consider in some detail in Chapters 3 and 5. Analysts also frequently turn to Bartók when looking for examples of "cross-domain mapping" or other kinds of processes that seem to cross boundaries. See Julian Hook, "Cross-Type Transformations and the Path Consistency Condition," *Music Theory Spectrum* 29.1 (2007), pp. 1-40, and Matthew Santa, "Defining Modular Transformations," *Music Theory Spectrum* 21.2 (1999), pp. 200-229.

[110] Dora Hanninen, "Associative Sets, Categories, and Music Analysis," *Journal of Music Theory* 48.2 (2004), p. 179.

organisms living and dead — not its individual, isolated attributes or properties.

As in our discussion of the evolution of tonal resources, the best place to begin reviewing differing approaches is with the earliest attempts at coming to terms with the composer's evolutionary motivic practice. In this case, I will turn to several writers who were influential in subsequent considerations of motivic/thematic organization in Bartók's music. In "Symmetrical Formations in the String Quartets of Béla Bartók" (1955), George Perle dwells on the motivic material of the Fourth Quartet:

> Nowhere in Bartók is there a more complex interrelation of symmetrical and non-symmetrical formations than in the first movement of the fourth Quartet. In the course of the first six bars two symmetrical four-note chords are evolved, which thereafter function as primary focal points and generators of subsequent musical events. Since, as in the twelve-tone system, these two elements are equally significant in both the linear and vertical dimension, let us borrow a term from twelve-tone theory and refer to them as "sets." The set marked Y is invariably employed in some kind of conjunction with that marked X.

> A linear derivation of Set X is the principal melodic figure of the entire Quartet.[111]

Example 1.21 reproduces the initial six measures to which Perle refers. X and Y can be found in ms. 6: X (C–C♯–D–D♯) is carried over from ms. 5 and moves to Y (B♭–C–D–E) on the

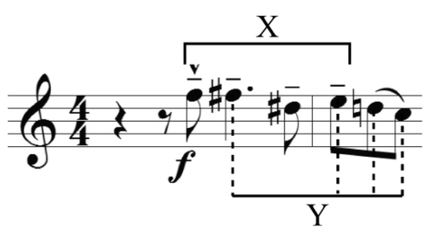
[111] George Perle, "Symmetrical Formations in the String Quartets of Béla Bartók," *Music Review* 16 (1955), pp. 300-312.

offbeat of ms. 6.1. While Perle states that these two chords "are evolved" without specifying *from what* they have evolved, there are clear melodic precedents for both. As demonstrated in Example 1.22, a transposition of X (F–F♯–D♯–E) is presented by the first violin in its opening melodic statement, followed by a transposition of Y (F♯–E–D–C) if we include F♯ from ms. 1, which I believe is reasonable given its relative salience: F♯ is the first violin's highest and longest pitch in ms. 1 and the only one attacked on the beat. Perle, however, is more likely referencing the way in which X is progressively built up harmonically by successive entrances in ms. 5, for this reflects his general procedure: defining "formations" by the single parameter of their total intervallic content, of which chords — despite his statement that such formations are "equally significant in both the linear and vertical dimension" — seem to be the purest expression. For him, melodic/thematic statements (motivic or otherwise) seem merely to be horizontal manifestations of chords. He describes the "principal melodic figure," for example, as "derived" from the set X. Presumably, he would understand the first violin's opening figure in the same way.

In fact, earlier in the same article, Perle defines the opening melodic motives from the Second String Quartet in terms of two "sets," his reasoning being that they appear in a vertical form later in the movement: "Two linear segments of the first subject are isolated from their original context [ms. 2-3] by subsequent musical events [ms. 103].[112] The wording here is crucial: somehow, the chords in ms. 103 "act" on the motives in ms. 2-3. Perle does not write something like "the opening motives are presented in vertical form later in the development," but rather specifically states that the vertical forms in the development "isolate" melodic figures

[112] *Ibid.*, p. 307.

Example 1.21. Bartók’s String Quartet No. 4 (1928), I, ms. 1-6.



Example 1.22. X and Y in ms. 1-2.

from the opening. This apparently entails always hearing the opening with foreknowledge of what happens later in the piece. “Formations,” for Perle, always appear to be harmonic, vertical. A linear segment defined solely by its harmonic intervals is a linearized chord; contour, rhythm, and so on are not taken into consideration. Given Perle’s serial orientation, he likely viewed such sets as lying completely outside of the composition’s temporality, as abstract material able to be realized linearly or harmonically, even though he consistently gives priority to harmonic realizations.

Perle never says that what he is doing is "motivic analysis," but merely seems to be describing Bartók's clear use of identifiable intervallic collections, which sometimes appear in linear, melodic forms and sometimes in vertical, harmonic ones. But Perle is alone in ascribing a generative role to the harmonic versions, such as the chords in ms. 6 of the first movement of the Fourth Quartet. Most commentators assign that role to the melodic figure in Perle's second example: Kárpáti calls it the "proto-motive," Mátyás Seiber the "germ-cell," Stephen Walsh the "most representative form of the work's motivic material."[113] Of the same figure, Milton Babbitt writes:

> In Bartók's case, to consider thematic structure … is a means of entering the total composition .… By alterations of relative durations, metrical placement, and dynamic emphases, [this motive can] serve as the elaboration of almost any one of its component elements, without sacrificing its initial character. Then, rather than functioning as a fixed unit that is acted upon, such a theme can itself act as a generator, avoiding redundancy through continual variation, but creating, at the same time, continuous phases of association.[114]

As shown in Example 1.23, Babbitt then goes on to give several examples, which he considers to be "expansions" and "extensions" of the motive, labels that recall the forces that Bartók suggests control rhythmic schemas (as in Example 1.3, p. 19). Further examples are shown in Example 1.24, ones that, importantly, maintain the rhythmic pattern of the original but completely change

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[113] János Kárpáti, *Bartók's String Quartets* (1967), trans. Fred Macnicol (Budapest: Franklin Printing House, 1975), p. 211; Mátyás Seiber, *The String Quartets of Béla Bartók* (London: Boosey & Hawkes, 1945), p. 12; Stephen Walsh, *Bartók Chamber Music* (London: BBC, 1982), p. 52.

[114] Milton Babbitt, "The String Quartets of Bartók," *The Musical Quarterly* 35.3 (1949), pp. 377-385.

Example 1.23. Milton Babbitt's forms of the proto-motive in the String Quartet No. 4.

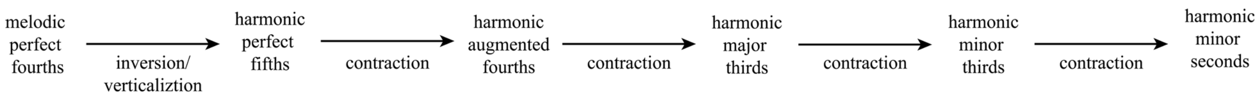
Example 1.24. Further examples of the proto-motive (ms. 55-56 and ms. 159).

its intervallic content. Babbitt thus fixes onto a problem with an approach like Perle's: it's not simply a matter of deriving linear motives from chords, which is of course is all backwards according to Bartók's derivation of chords from folk melodies, but of determining some "fixed unit." But there are no "fixed units" in Bartók's evolutionary conception of motivic/thematic development. Just as every performance of a folk song is different from every other, every instance of a motive is different. Perle's sets, in contrast, are closed categories; a "formation" either is or is not an example of "Set X," which thus makes for a poor "generator," to use Babbitt's term.

Babbitt's notion of "continual variation" has an analogue in Bartók's evolutionary model of folk music, and his "continuous phases of association" seems to be a description of a listener's response to something like Alpern's "evolving web" of motives and their derivations. In other words, all of the thematic material in the Quartet may be related in some way, but the only way to determine the nature and degree of their relatedness would be to actually demonstrate that the "proto-motive" of the quartet indeed acts as a generator by constructing (just as we did with Bartók's "Class B" rhythms) some kind of genealogical tree in which the generator is the common ancestor of all subsequent motive-forms. It is also just as likely that we would discover that this motive is *not* a generator — that there is no generator, but that it is only one form among many and gains prominence through repetition and by its contextual articulation. Chapters 3 and 5 will consider this idea — the construction of motivic trees and the relations between such trees — in greater detail.

Tracing a Motivic Evolution

To preview this method, let us return for the last time (in this chapter) to the Fifth Improvisation. The evolutionary process described above reveals, first of all, that in Bartók's music Cone's textural and thematic relationships are not necessarily distinct categories in the course of this piece: a thematic motive of a melodic perfect fourth becomes a textural motive of chromatic accompaniment through a process of inversion, verticalization, and contraction. But while this process is linear, it is, as we'll see, also part of a larger, blossoming tree of motivic forms, albeit a rather small one. Example 1.25 presents this linear process as a series of nodes representing motivic forms connected by generic transformational descriptions. This conception closely resembles Edward Pearsall's ideas of "transformational streams" and "communities": each square node constitutes a transformational community, while the process overall forms a transformational stream. Pearsall describes the distinction the following way: "Transformational streams differ from transformational communities in that they demarcate the step-by-step



Example 1.25. The linear process in the Fifth Improvisation.

evolution of a motive toward new motivic constructions that may differ quite radically from the source motive."[115] The members of each transformational community are equivalent in some sense and — in contrast to the overall stream — are more amenable to traditional transformational descriptions. Pearsall in fact distinguishes between "transformations," which occur between members of a community (within a node), and "transmutations," which occur between communities (between nodes). All of the transformations within the nodes of Example 1.25 can be understood simply as transpositions: all of the melodic perfect fourths are related by transposition, all of the harmonic perfect fifths are related by transposition, and so on. In evolutionary terms, each transformational community would be a species (each element equivalent by being a member of that species) and the stream itself an evolutionary process of transmutations by which new species are formed.

Most interesting is the transpositional pattern within the initial "melodic perfect fourths" node and its sudden transmutation into the "harmonic perfect fifths" node in ms. 21-25. The

[115] Edward Pearsall, "Transformational Streams: Unraveling Melodic Processes in Twentieth-Century Motivic Music," *Journal of Music Theory* 48.1 (2004), p. 77.

transpositions of the perfect fourth motive initially seem to outline a minor seventh chord, G–B♭–D–F, following an alternating minor-third/major-third pattern. After this succession bifurcates in ms. 24, the left hand continues this pattern.[116] So rather than thinking of this process as outlining a particular chord, it might be more fruitful to view it as simply cycling through minor and major thirds. Such cycles recall the key representations first devised by Moritz Hauptmann in *Die Natur der Harmonik und der Metrik* (1853) and later picked up and expanded by countless others.[117] In modeling major and minor keys as a series of interleaved fifths and thirds, Hauptmann wraps these cycles around on themselves, creating circles. This comes up in his discussion of diminished triads, for diminished triads are only possible in a series of minor and major thirds if one views the series as wrapping around on itself: "We can picture the idea of something passing into itself by thinking of a finite straight line bent into a circle with its beginning and end united."[118] In Example 1.26, Hauptmann thus models C major in terms of a cycle of alternating major and minor thirds. The brackets group the tones into tonic, dominant, and subdominant triads. Example 1.27, now, portrays the G "dorian" of the Fifth Improvisation in similar terms. Given its appearance in ms. 21-25, I have chosen E♮ rather than E♭ to fill out the figure. The tune itself only has six pitch classes: the G minor pentatonic scale and A (G, A, B♭, C, D, F).

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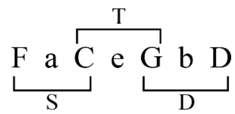
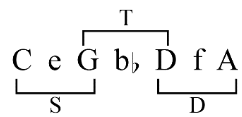
[116] A–E, that is, follows F–C as the next step, A being the "ninth" of the "G minor seventh chord."

[117] Mortiz Hauptmann, *Die Natur der Harmonik und der Metrik* (Leipzig: Breitkopf & Härtel, 1853). The full German text is available online.

[118] *Ibid.*, p. 24.

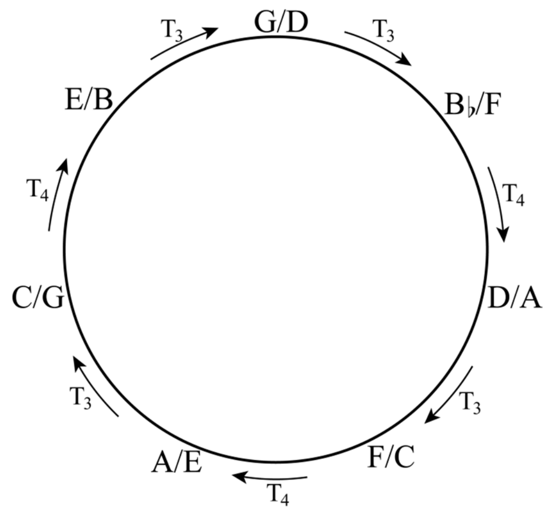


Example 1.26. C major.

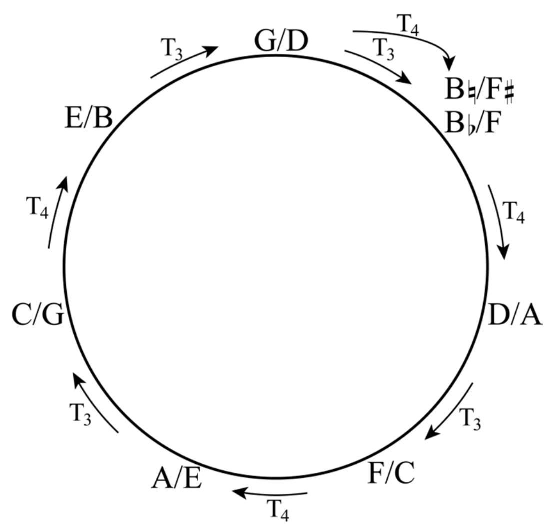


Example 1.27. G dorian.

Example 1.28 organizes the series of major and minor thirds in Example 1.27 as a circle with each pitch accompanied by its perfect fifth. The initial transpositions in the Improvisation (ms. 21-23) are shown as beginning at the top and progressing clockwise. In ms. 24, when the hands part ways, the left hand continues clockwise, stating A–E and then an overlapping E–B: the gravitational pull toward the downbeat of ms. 25 seems to speed up the process, allowing the left hand to skip C–G altogether. The right hand, however, moves in the opposite direction, both in terms of the circle (retreating counter-clockwise from F–C to D–A) and in register (ascending rather than descending). In ms. 25 these conflicting trajectories clash, but it is not simply a matter of hands moving in opposite directions around the circle and meeting head-on: B♮–F♯ actually leaves the circle by continuing the cycle of major and minor thirds (the circle necessarily contains a kink of two consecutive minor thirds — here E–G and G–B♭ — native to any diatonic collection) and bringing the circular representation into conflict with a linear one, which can continue in one direction indefinitely. Example 1.29 visualizes this idea of "leaving" the circle. The sonority on the downbeat of ms. 25, B♭–B♮–F♮–F♯, is a product of the conflict between the two representations, which is so apparently jarring that it forces the motive, through inversion



Example 1.28. A circular representation of the space traversed in ms. 21-24.



Example 1.29. Leaving the circle and the resultant harmony in ms. 25.

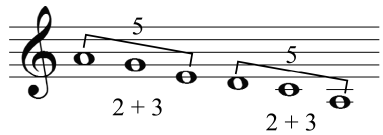
and verticalization, into a different motivic community.[119] Labeling it as an (0167), say, would be to ignore its role as an unstable intermediary, a byproduct of a process. It would make more sense to think of it as one of Richard Cohn's "transpositional combinations," as a fusion of two perfect fifths a half step apart rather than as a single entity.[120] This, already, is a more genetic view, for it explains this moment in terms of what came before.

As noted above, the process proceeding from melodic perfect fourths to harmonic seconds — which I will characterize in terms of its own, much more elaborate motivic tree in Chapter 3 — is only a small part of a larger tree of motivic forms. The rest of the motivic forms, however improbable it might seem, derive from the "soprano" descant in ms. 35-42, which is a grotesque or deformed version of the Improvisation's tune. The fact that the melodic perfect-fourth motive isolated in ms. 21 is not merely the final two pitches of the tune but the materialization of an idea that forms the entire basis for the tune makes gives this passage particular import. Example 1.30 presents what Lendvai called the "3/2 pattern," which he believed to be a manifestation of the "golden section."[121] However one characterizes this pattern (for the golden section remains controversial), it is prevalent within Bartók's pentatonic-based "Class A" tunes. No. 42 in Example 1.1 (p. 10), for instance, descends through B♭–G–F–D in just such a 3/2 pattern. Example 1.31 simplifies the rhythms of the first four measures of the tune from the Fifth Improvisation. This tune constitutes an even better example of the 3/2 pattern,

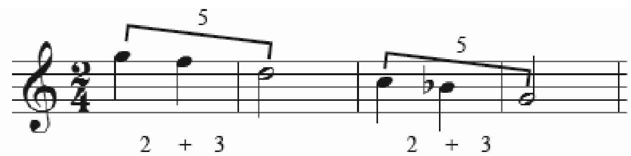
[119] Also note that B♮–F♯ and B♭–F appear in the "wrong" hands: B♮–F♯ "should" have followed E–B in the left hand, whereas B♭–F "should" have followed D–A in the right.

[120] See Richard Cohn, "Inversional Symmetry and Transpositional Combination in Bartók," *Music Theory Spectrum* 10 (1988), pp. 19-42.

[121] Ernő Lenvai, *Bartók's Style* (1955), trans. Paul Merrick (Budapest: Akkord, 1999), p. 28.



Example 1.30. Lendvai's "3/2 pattern."

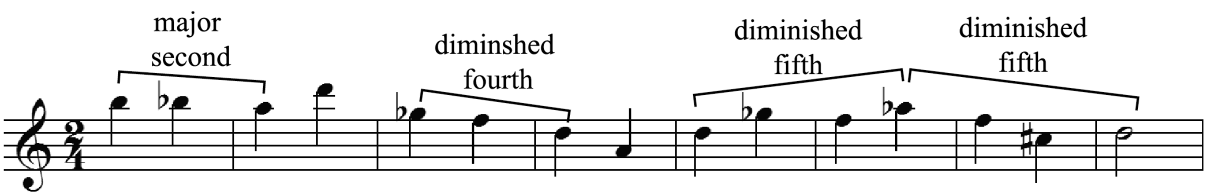


Example 1.31. The 3/2 pattern in the first half of the Fifth Improvisation's tune.

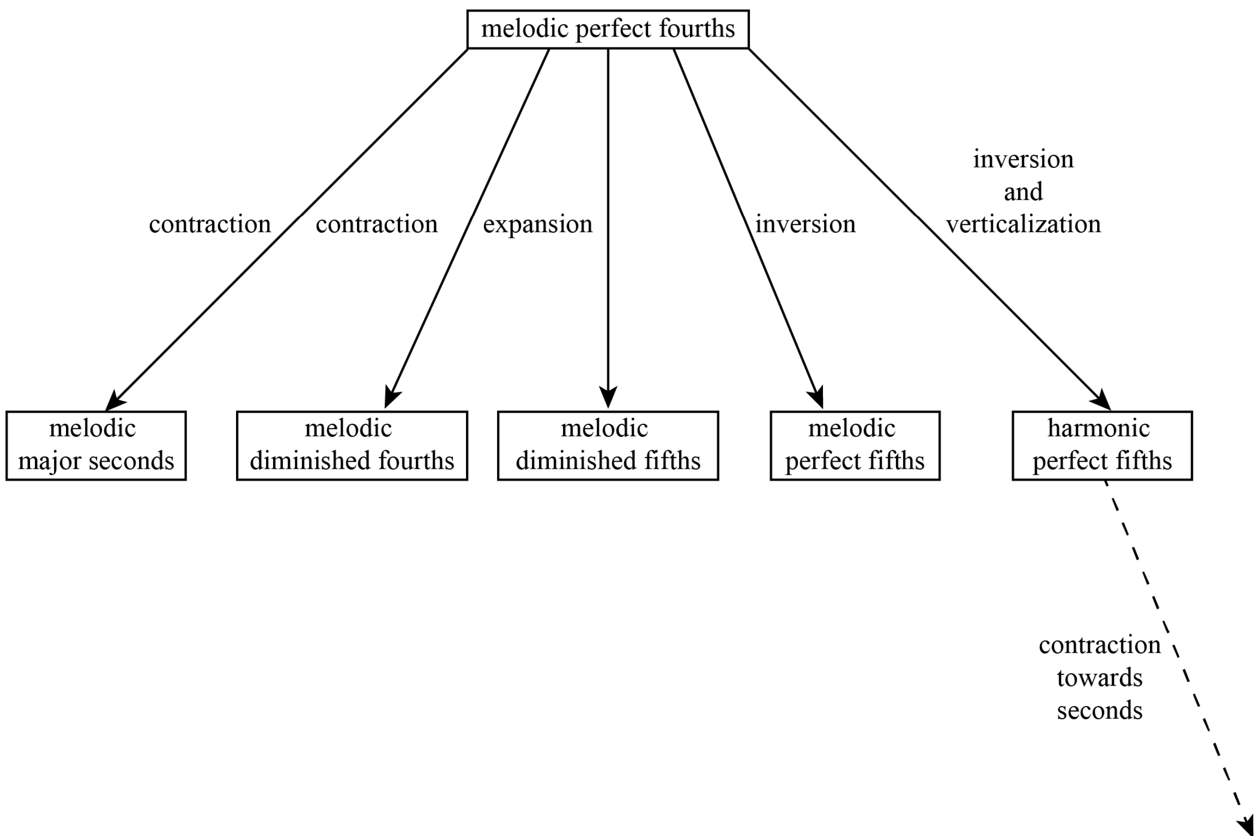
being an exact transposition of the first part of Lendvai's example. It consists of two descending 2+3 segments, each descending by a perfect fourth overall. This pattern forms the skeletal structure of the tune, made up of the pitches on the downbeat of each measure: (G–D–C–G).

Example 1.32 parses the entire tune in terms of this skeletal 3/2 pattern, yielding a series of first disjunct, then conjunct perfect fourths. The most important result of such a hearing of the tune is that the final descending perfect fourth — the one isolated in ms. 21, which begins the evolutionary process described above — is not simply the last two notes of the tune, but a representative of its most basic and pervasive structural interval. Example 1.33 presents the "deformed" descant from ms. 35-42 and labels its altered perfect fourths. The descending perfect fourth between ms. 1 and 2, for example, is contracted into a major second, and the perfect fourth between ms. 3 and 4 is contracted into a diminished fourth. While these mutations may seem trivial, they represent a typical Bartókian practice: taking a theme or motive and compressing or stretching it. In Chapter 5 I will more thoroughly consider such transformations, their relation to Bartók's "extension in range" technique, and their place within motivic trees. For the time being, Example 1.34 organizes all these motive forms into a genealogical tree that identifies the "melodic perfect fourth" as the common ancestor. On the far right is the beginning

Example 1.32. Perfect fourths in the Fifth Improvisation's tune.



Example 1.33. The "deformed" version of the tune (ms. 35-42).



Example 1.34. A motivic tree for the Tenth Bagatelle.

of the linear process diagrammed in Example 1.25, which is merely one branch. While the nodes themselves can be said to be defined by pitch equivalence, by transpositional transformations within each node, the transmutations between nodes cannot be understood in this way. They constitute, rather, the drives or tendencies that propel the perpetual variation, and each is labeled with a term borrowed from Bartók's ethnomusicological writings: expansion, contraction, inversion, *etc*. The Fifth Improvisation is of course a short piece and as such only reveals a glimpse of the kind of pervasive motivic transmutation to be found in his larger works, a few of which will be considered in Chapters 3 and 5.

Chapter 2

The Evolution of Tonal Resources

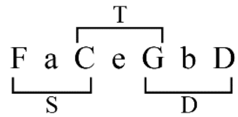
Labeling Bartók's works by key has long since fallen out of fashion. The composer's frequent claim that pieces having significantly different harmonic vocabularies may nevertheless belong to "C major" does little to inspire many listeners and analysts. I would like to suggest, however, that placing his concept of tonality within the evolutionary idealism of this thinking can breathe new life into the practice. "C major," that is, could be understood as a tonal *species,* and his "phrygian-colored C major," Bartók's famous designation for his First Bagatelle (1908) might designate a particular *individual* belonging to that tonal species. This view — that unique key *variations* are genetically related to one another — resonates not only with Bartók's evolutionary model of folk music, but also with the impression, first articulated by Milton Babbitt, that Bartók balanced "functional tonal relationships existing prior to a specific composition" with "unique, internally defined relationships" specific to each piece.[1] Just as each performance of a particular folk song is, for Bartók, a unique realization of an abstract, communal idea — an "internal form" — so each of his compositions can be understood as elaborating an individual key that realizes the communal idea of a key species. Chapter 1's analogy of the internal form of a folk song to a species and a performance of a song to an individual organism may thus be extended to include the idea of key species and their individual expressions:

[1] Milton Babbitt, "The String Quartets of Bartok," *The Musical Quarterly* 35.3 (1949), p. 377.

	biology	folk music	keys
external	individual organism	individual performances	individual variations of key (“Phrygian-colored C Major”)
internal	species	abstract/communal idea of folk song	abstract/communal idea of key (“C major”)

In Babbitt’s terms, “C major” exists “prior to a specific composition” because it makes use of “functional tonal relationships,” relationships that are abstract and communally agreed upon, like the internal forms of folk songs. “Phrygian-colored C major,” on the other hand, is an individual expression of the idea or concept of C major. But conceptualizing and depicting such key variations will be no simple task. In this case it will require backing up some centuries and returning to Hauptmann’s non-scalar representations of keys. Recall from the previous chapter that in *Die Natur der Harmonik und der Metrik* (1853), Hauptmann depicts the constituent triads of a key — tonic, dominant, and subdominant — not in terms of ordinal degrees in a scale, but as a row of alternating major and minor thirds, as in Example 2.1, which shows the overlapping relation between the triads.[2] The upper-case letters show the primes and fifths of the three constituent triads and form a segment of a row generated by just perfect fifths (3:2); the lower-case letters show the thirds of each triad and are related to the primes by just major thirds (5:4). Since this rather simple construction — if formulated by Hauptmann in anything but a simple way — was malleable and flexible enough for music theorists to expand and elaborate on in

[2] “What is striking about Hauptmann’s presentation,” notes Nora Engebretsen, “is that he does not collapse the triads’ pitch-class content into a scalar representation of the key, but instead characterizes the key in terms of a spatially conceived schema in which the central tonic triad is flanked by its two dominants.” Nora Engebretsen, “The Chaos of Possibilities: Combinatorial Group Theory in Nineteenth-Century German Harmony Treatises” (Ph.D. diss., State University of New York at Buffalo, 2002), p. 86.



Example 2.1. Hauptmann’s row for C major.

numerous ways, the resultant evolution of key representations can provide a model for illustrating the individual expressions of key — key variations — in Bartók’s music.

1. Toward a Concept of Key Variation

Hauptmann

Hauptmann’s theories resonate in numerous ways with Bartók’s evolutionary model. While most commentators have described Hauptmann’s method as dialectical, others have discerned in it the influence of Goethe’s and Hegel’s philosophies of nature, which, as forerunners of fin-de-siècle *Lebensphilosophie*, provide many points of contact with Bartók’s evolutionism.[3] Consider Hauptmann’s frequent analogies with nature, such as his comparison of the “expansion” of a triad (into an infinite number of possible musical expressions) to the blossoming of a “seed” into the “golden tree of life.”[4] Such language supported a powerfully genetic method, for Hauptmann also suggests that the “principle” underlying such an

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[3] On the influence of Goethe and Hegel on Hauptmann, see Peter Rummenhöller, *Moritz Hauptmann als Theoretiker* (Wiesbaden: Breitkopf & Härtel, 1963); Wilhelm Seidel, “Moritz Hauptmanns Organische Lehre: Tradition, Inhalt und Geltung ihrer Prämisse,” *International Review of the Aesthetics and Sociology of Music* 2.2 (1971), pp. 243-266; and Maryam Moshaver, “Structure as Process: Rereading Hauptmann’s Use of Dialectical Form,” *Music Theory Spectrum* 30.2 (2009), pp. 262-283.

[4] Mortiz Hauptmann, *Die Natur der Harmonik und der Metrik* (Leipzig: Breitkopf & Härtel, 1853), p. 10; and *The Letters of a Leipzig Cantor* (1892), Vol. 2, ed. Alfred Schöne and Ferdinand Hiller, trans. A.D. Coleridge (New York: Vienna House, 1972), pp. 174-175.

"expansion" is immanent to the process, already implicit in the "seed," and that in order to better understand them, one should abstract such "principles" from their immediate context.[5] This in turn would allow one to compare processes based on their propelling "principles" irrespective of what's being propelled.

In terms of the intellectual antecedents to the Sunday Circle — the intellectual group centered around György Lukács and Béla Balázs — such principles function like the "drives" that make up Nietzsche's "will to power" or the "tendencies" that animate Bergson's *élan vital*. Bergson, for instance, rejected radical teleology and mechanism (the idea that evolution is calculable like a collection of billiard balls in a perfectly closed system) because both of these viewpoints see the future as contained in the present, eliminating the possibility for the creation of the truly new: radical teleology presupposes a particular endpoint, while mechanism believes that, given a set of initial conditions and rules, an endpoint is inevitable. Bergson staked out a position between these two versions of finalism, positing a tendency towards differentiation he called the *élan vital*. But since the intellect cannot conceive of it without recourse to analogy, this concept was unsatisfactory even for Bergson. It is psychological only by analogy, he writes, for "no image borrowed from the physical world can give more nearly the idea of it."[6] Nor does "intelligent finality" — the idea of a transcendental mind controlling the flow and goals of evolution — apply "to the things of life."[7] Bergson thus takes directions, drives, or tendencies from finalism (as represented by the *élan vital*), but rejects the idea that these forces are

[5] Hauptmann, *Die Natur der Harmonik und der Metrik*, p. 10.

[6] Henri Bergson, *Creative Evolution* (1907), trans. Arthur Mitchell (New York: Henry Holt and Company, 1911), p. 257.

[7] *Ibid.*, p. *x*.

psychological or have predetermined goals.[8]

Nietzsche likewise dismissed determinism as “mechanical stupidity,” and regarding radical teleology writes that perhaps by learning to think truly historically “final purposes fall from our eyes like scales.”[9] Much like Bergson, he sought a way to formulate evolution different from the prevailing mechanical view, developing the idea of the “will to power,” which is made up of various “drives” in the same way the *élan vital* is made up of tendencies or directions.[10] He also rejected predetermined goals or aims for a “directing force,” writing that “one is used to seeing the driving force precisely in the goals (purposes, professions, *etc*.), in keeping with a very ancient error; but it is only the directing force — one has mistaken the helmsman for the stream.”[11] The drives that make up the will to power are, like Bergson’s tendencies, themselves natural, the result of an evolutionary process. In *Nietzsche’s New Darwinism* (2004), the most thorough treatment of Nietzsche in relation to evolutionary theory, John Richardson suggests that “Nietzsche’s key borrowing from Darwin is a general answer to this challenge — a way to decognitivize and naturalize life’s directedness.”[12] The will to power and its constituent drives, in other words, are naturally selected rather than psychological.

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[8] *Ibid.*, p. 163.

[9] Friedrich Nietzsche, *Human, All-Too-Human* (1880), trans. Helen Zimmern and Paul V. Cohn (Mineola: Dover, 2006), p. 150; Friedrich Nietzsche, *The Dawn of Day* (1881), trans. J.M. Kennedy (Mineola: Dover, 2007), p. 129.

[10] John Richardson suggests that “drives are the primary ‘units’ of the will to power.” John Richardson, *Nietzsche’s New Darwinism* (Oxford: Oxford University Press, 2004), p. 35.

[11] Friedrich Nietzsche, *The Gay Science* (1882), trans. Josefine Nauckhoff (Cambridge: Cambridge University Press, 2001), p. 225.

[12] Richardson, *Nietzsche’s New Darwinism*, p. 14.

Since his explanation of musical growth through "prevailing or ruling" principles mirrors their positing of immanent forces to replace the mechanical or teleological views of evolution, Hauptmann treads a path similar to that of Nietzsche or Bergson. But unlike the "will to power" or the *élan vital* (forces that change over time), Hauptmann's "principles" are more like transcendent, axiomatic laws. He states unconditionally that "there are three directly intelligible intervals: the octave, the perfect fifth, and the major third," which are moreover "unalterable." And since he presupposes an undercurrent of mental continuity that is, at best, frozen within his representations, Hauptmann's version of a natural force is explicitly psychological. But these differences do not disqualify Hauptmann as a model for representing a Bartókian evolution of tonal resources. It is a matter of reinterpreting Hauptmann's transcendental, idealist dialectic into Bartók's more materialist version of historical change. Recall that while Bartók too acknowledges the presence of immanent forces —of a "drive toward perfection" and an "impulse for variation" in particular — he understood "perfection" and "variation" not as predetermined goals, but plastic states that must be understood in relation to their environment. Like his contemporaries, Bartók viewed such drives not as transcending the cultural environment, but as natural, themselves evolving.

Immediately after presenting his first complete row depiction of a key, Hauptmann issues the following qualification:

> The organic quality of an articulated whole can never be represented exhaustively, either by symbols and numbers or by words; it is only a mentally sensed, i.e. rational concession (*Entgegenkommen*) that is able to reproduce, to mentally imply, living thought, which is trapped alive (*gebannten lebendigen*) in symbols, numbers, and words. For if one adheres only to the literal meaning of words and not to the ineffable, then contradiction and doubt — yet never the living sense — arises everywhere .… Since this concept [that of the third mediating the conflict between a chord's prime and its fifth] … can only be fulfilled in an endless and continual passing over into the opposite — the gathering together of all opposites — it has to be considered an endless process and thus to be like the concept of

> eternal becoming, the living, or the real — like nature, which emerging from the primordial unity [*Ureinheit*] as duality, merges its opposites into continuously transformative activity. It is living being itself and reality.[13]

While Hauptmann, in describing nature as "emerging from the primordial unity," is probably referencing some kind of pre-Darwinian evolutionary biological process, what is perhaps most striking is the contrast between this conception and the later, more positivistic, views of Helmholtz, von Oettingen, and Riemann, writers often considered to have followed in Hauptmann's footsteps.[14] Wilhelm Seidel, in a memorable turn of phrase, writes that "Helmholtz's intervals are stillborn, for they are left to their own devices, whereas for Hauptmann they are alive and growing."[15] Seen in this light, Hauptmann's representations of key should be understood as static rationalizations of a messier, fluctuating "reality." For Hauptmann such a reality does not fully correspond with any inert representation, since he understands keys in terms of "living growth," a conception of key crucial to any kind of understanding of an evolution of tonal resources — Bartókian or otherwise. For Hauptmann, this process was a

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[13] Hauptmann, *Die Natur der Harmonik und der Metrik*, pp. 28-29.

[14] "What passed on from Hauptmann into the mainstream of German theoretical writings in the nineteenth century was little more than an abstract framework that retained various aspects of the theory's 'content' while disregarding what was perceived as an unnecessary and philosophically and methodologically over-determined 'form' or presentation. A generation later, the particular slant of Hauptmann's theoretical outlook, the form-generating dialectical processes which provided the logical momentum for every detail of his treatise — from the formation of triads, keys, and scales, to the principles of metric formation, dissonance treatment and harmonic progression, and extending even to the structure of the book as a whole — was dismantled as his theory was absorbed in the positivist developments of von Oettingen's and Riemann's theories of harmonic dualism." Moshaver, "Structure as Process: Rereading Hauptmann's Use of Dialectical Form," p. 265.

[15] Seidel, "Moritz Hauptmanns Organische Lehre," p. 253. "Hauptmann thus attributes life to compositions, the artificial structure of which hypostatizes the natural imaginations of tones and which materialize (*ausschreiben*), so to speak, organic responses — indeed, in his opinion, even a theory that unfolds the natural interplay between stimulus and object, partaking in the life of the products, dismisses the mind (sense)."

mental continuity; for Bartók and his contemporaries it was a *de*psychologized process.

More specifically, Hauptmann understood his representations to be locked into an unending struggle between a closed system represented by a circle and an open-ended space represented by an infinite line. “We can picture the idea of something passing into itself by thinking of a finite straight line bent into a circle with its beginning and end connected. Absolute finiteness (*absolute Endlichkeit*) would be suggested by the bounded line; absolute infinity (*absolute Unendlichkeit*) by the line running on without limit (*unbegrenzt*).”[16] Example 2.2 presents what is perhaps the first depiction of a closed key as a circle, fashioned in 1855 by one of Hauptmann’s students, Louis Köhler; Example 2.3 presents a more fully realized circle created in 1882 by Otto Bähr.[17] The latter has “connecting lines” outside the circle to show major triads, as well as inside the circle to show minor and diminished triads.

Example 2.4, standing in opposition to these circular representations, presents Hauptmann’s “row of major keys” (*Durtonart-Reihe*), which, as the ellipses on the left and right suggest, depicts an open-ended or infinite linear space created by extending the “finite straight line” of Example 2.1 (p. 83).[18] In Hauptmann’s description, closed (circular) keys are made from the same stuff as the row itself: they are isolated or expressed from the row at key-defining moments created by diminished triads. Chords that include the diminished triad “include the

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[16] Hauptmann, *Die Natur der Harmonik und der Metrik*, p. 42.

[17] Louis Köhler, “Studien und Betrachtungen über Hauptmann’s Buch ‘Die Natur der Harmonik und Metrik,’” *Neue Zeitschrift für Musik* 43.20 (9 November 1855), p. 210; Otto Bähr, *Das Tonsystem unserer Musik* (Leipzig: F.A. Brockhaus, 1882), p. 22. Hauptmann describes bending a key into a circle, but never actually depicts one that way. Köhler and Bähr belonged to a group of music theorists who enthusiastically received Hauptmann’s theories and attempted, perhaps unsuccessfully, to simplify and popularize them. See Mark McCune, “Moritz Hauptmann: *Ein Haupt Mann* in Nineteenth Century Music Theory,” *Indiana Theory Review* 7.2 (1986), pp. 1-28.

[18] Hauptmann, *Die Natur der Harmonik und der Metrik*, p. 39.

limits of the key, and thus close the key up into itself."[19] In C major, the dominant seventh G–b–D | F, which includes the diminished triad b–D | F, joins pitches from both the far left (F) and the far right (G–b–D) of F–a–C–e–G–b–D, bending the row into a circle and thus acting to exclude all other pitches.[20] The vertical line between F and D marks where the two ends of the row join, and there are visible disjunctions between D and F in the circles: in Example 2.2, simply having two upper-case letters placed side-by-side creates a jarring effect, and in Example 2.3, the D | F pair is isolated at the bottom, the only third that does not belong to some major triad.[21]

Since Hauptmann viewed keys as embodying an internal contradiction that prevents them from fully closing, these visual disjunctions stand in for a deeper, inherent incongruity. This is most evident in his description of modulation. Modulating from C major to G major begins with the introduction of f♯ (a major third above D), which necessarily eliminates F (the prime of the subdominant) from the key; a (a major third above F) remains in the key, for the limits of the new key are not defined until the dominant seventh D–f♯–A | C appears and resolves to G major.[22] f♯ bursts the C major circle, but without entering into another circle until a full cadence on G occurs, momentarily resolving the A/a conflict in favor of A. For Hauptmann, notes sharing the same name but having different "meanings" cannot coexist within a single key. Yet all keys retain an internal contradiction created by the impossibility for the fifth of the tonic to *simultaneously* be the prime of the dominant, a contradiction that is always pushing the key out

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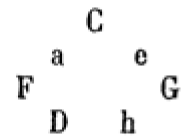
[19] *Ibid.*, pp. 42-43.

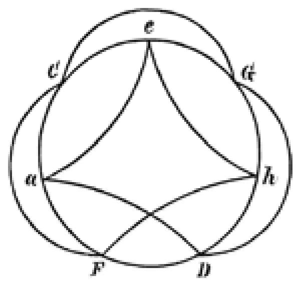
[20] Hauptmann used the vertical line "|" to indicate that D and F are not in fact adjacent within the row. The vertical line marks the place where one end of the row "wraps around" to join the other.

[21] Bähr, *Das Tonsystem unserer Musik*, p. 22.

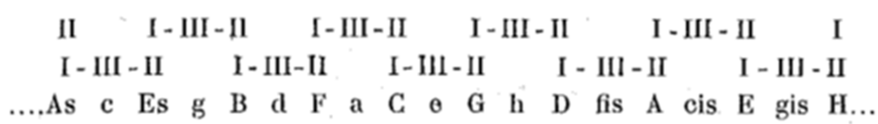
[22] Hauptmann, *Die Natur der Harmonik und der Metrik*, pp. 28-30.



Example 2.2. Louis Köhler, “Studien und Betrachtungen über …
‘*Die Natur der Harmonik*’” (1855), p. 210.



Example 2.3. Otto Bähr, *Das Tonsystem unserer Musik* (1882), p. 22.



Example 2.4. Hauptmann’s *Durtonart-Reihe* (1853).

toward other keys and toward the contradiction generated by pitches related by a syntonic comma. The difference between a (a major third above F) and A (four perfect fifths above F) is thus continuously resolved (when the key is defined) and retained through the key’s instability, its tendency to expand outwards. In dialectical terms, every key is an *Aufhebung* that both resolves and preserves its defining contradictions, these conflicting pitch interpretations acting as counter-forces that continuously push the key back towards the infinite row of triads, in which they are independent of rather than conflated with one another.

Polymodal Chromaticism

In light of all this, Maryam Moshaver comes to the following conclusion about Hauptmann's conceptualization of key:

> The key functions as an entity, a force-field rife with contradicting potentials of expansion beyond itself and reflection inwards upon itself. It has nothing of the stasis of the isolated entity — the key identified with a ready-made scale or key-signature.[23]

The common view — known as "polymodal chromaticism" — that Bartók's harmonic practice is understandable in terms of multiple scales or modes that share the same tonic pitch, is thus called into question. In his Harvard Lectures (1943), Bartók comments on these matters at length. He stresses, first of all, that his harmonies are not alterations of more basic harmonies, for altered pitches are in "strict relation to" — reducible to or dependent on — their "non-altered forms."[24] It seems that for Bartók, explaining the augmented sixth in an augmented sixth chord as a "raised $\hat{4}$" would relate it back to the natural $\hat{4}$, its function dependent on the fact that it "leads" to a member of the "following chord."[25] Bartók wants his harmonies to be understood instead as absolute simultaneities, each pitch describable in terms of some source mode rather than the exigencies of localized voice-leading.[26] This corresponds to the view that Bartók's harmonies may be genetically related to other harmonies, but are not simply reducible to them. As for von der Nüll's description of the first chord of the Tenth Bagatelle as an F–A–C tonic with an

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[23] Moshaver, "Structure as Process," p. 275.

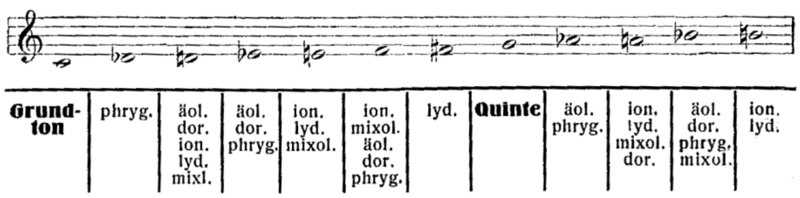
[24] Béla Bartók, "Harvard Lectures" (1943), in *Béla Bartók Essays*, ed. Benjamin Suchoff (Lincoln: University of Nebraska Press, 1976), p. 367.

[25] *Ibid.*, p. 367.

[26] *Ibid.*, p. 376.

"unresolved" G♭ "*Wechselnote*," Bartók would probably have been more comfortable designating G♭ as a "phrygian second" sourced from an F phrygian scale; to call it an "unresolved *Wechselnote*" would have been to explain the origin of the pitch in terms of imagined voice-leading.

Example 2.5 presents the earliest and perhaps most complete incarnation of the idea of polymodal chromaticism: von der Nüll's condensation of the basic premise into an inventory of possible modal designations for harmonic pitches:[27]



Example 2.5. Edwin von der Nüll's polymodal *Tonvorrat* (1930).

He extends the idea of chords having both major and a minor thirds — which he derives from major and minor scales and represents here by the aeolian and ionian scales — to the idea of chords having pitches derived from the other church modes. In his terms, the "Vermischung" of major and minor thirds in some of Bartók's harmonies becomes a model for the Vermischung of "minor phrygian seconds with major aeolian or ionian seconds or of perfect fourths with lydian fourths."[28] C in his diagram thus represents the groundtone of a harmony, and the other pitches are potential chord elements understandable in terms of one or more modes (octave species): D♭ is a phrygian second in relation to C, F♯ a lydian fourth, and so on. Assuming it's possible to

[27] Edwin von der Nüll, *Béla Bartók: Ein Beitrag zur Morphologie der neuen Musik* (Halle: Mitteldeutsche, 1930), p. 74.

[28] *Ibid.*, pp. 73-74.

differentiate between the various possible interpretations of pitches — E♭ could equally belong to the C phrygian, aeolian, or dorian scales — his inventory lists 32 separate possibilities (without accounting for enharmonic equivalence). It is a tonal inventory or grab-bag of resources from which the composer chooses.

Example 2.6, taken from José Martins's "Dasian, Guidonian, and Affinity Spaces in Twentieth-Century Music" (2006), presents an example of the latest and most inventive incarnation of this approach.[29] Martins represents "diatonic strata" — his term for scales or segments of scales that may (or may not) be combined — in the context of spaces that provide a means to systematically relate them in terms of a larger, all-encompassing, cyclical scale, such as the dasian scale of the ninth-century *Enchiriadis* treatises.[30] While discussing the First Bagatelle (1908), the *locus classicus* of bimodality in Bartók's music, Martins relegates the following comment to a footnote:

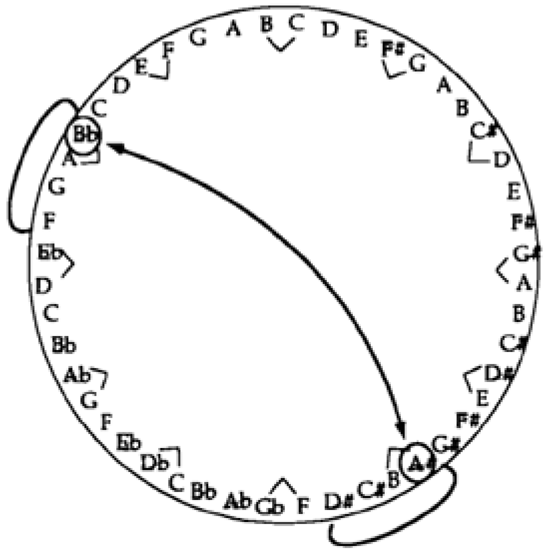
> What to make, then, of the continued insistence on the vertical interval (C, E) that coordinates phrase endings and other resting points, and which leads Bartók to see the piece in a "phrygian-colored C major"? While it seems plausible to hear this interval as providing centricity for the piece, this is a matter of compositional salience and design and not a systemic feature of the combination of strata.[31]

Martins apparently understands the choice of scales to be not a matter of "compositional design," but — something like the selection of a twelve-tone row — a pre-compositional act. Much like a twelve-tone composer who may choose to bring out certain latent possibilities of a tone row

[29]José Martins, "Dasian, Guidonian, and Affinity Spaces in Twentieth-Century Music" (Ph.D. diss., University of Chicago, 2006), p. 28.

[30] Example 2.5 relates two inversionally-related scale segments sharing A♯/B♭ from the last movement of Bartók's Fifth String Quartet.

[31] *Ibid.*, p. 10. Bartók's famous designations come from his introduction to *Béla Bartók's Early Piano Works* (1945) (Homosassa, Florida: Bartók Records, 2010), p. iii.



Example 2.6. Jose Martins's "Dasian space" (2006).

while downplaying others, Martins views the rhythmic and formal salience of the interval C–E as a result of compositional decisions rather than as something inherent to the system (the "combination of strata"), which lies outside of and prior to the actual music.

Example 2.7 presents the score of the First Bagatelle, which Bartók notates using a different key signature for each staff (and for each hand). In the introduction to *Béla Bartók Masterpieces for Piano* (1945), Bartók refers to this practice as a "half-serious, half-jesting procedure used to demonstrate the absurdity of key signatures in certain kinds of contemporary music." He then goes on to state that despite what various commentators have had to say, the "tonality" of the First Bagatelle is, "of course, not a mixture of C♯ minor and F minor, but simply a phrygian-colored colored C major."[32] After his confession that the key signatures are partly a joke, it is easy to interpret this and his other key designations as mere provocations, half-explanations intended to further confound other composers. Regarding the First Bagatelle,

[32] Béla Bartók, "Introduction to *Béla Bartók Masterpieces for Piano*" (1945), in *Béla Bartók Essays*, pp. 432-433.

Example 2.7. First Bagatelle (1908).

Bartók's comments could thus lead one to question the very idea of understanding the piece — despite the way that it is notated — in terms of two separate layers. Whereas Martins writes that "Bartók claimed the superimposition of strata created the (extended) tonality," Bartók says no such thing: he says nothing about "strata" whatsoever and certainly never claims that their combination generates (and is thus prior to) his "phrygian-colored C major."[33]

While the same combination of scales or scale segments can be realized harmonically in any number of different ways, resulting in different key variations, I believe that there is no fixed dividing line between pre-compositional combinations of scales and subsequently realized key variations (which can be depicted as harmonic schemata). And it is not even clear that this process proceeds in that particular order (from layers of scales to harmonic schemata), for isn't it somewhat odd to conceive of a "tonality" — whether "phrygian-colored" or otherwise — as something entirely *post*-compositional, something that only arises from analysis?[34] A useful comparison in this connection is to Harold Powers's concept of "tonal types" in Renaissance polyphony. Categorizing Bartók's music according to combinations of scales would be roughly equivalent to Aaron's or Glarean's desire to "reconcile a given repertory with a given system." As Powers notes:

> To show that the eightfold system can be made to constitute a set of categories to one of which any composition can be assigned *a posteriori*, as Aaron most ingeniously did, is by no means to show that a "mode" is an *a priori* pre-

[33] Martins, "Dasian, Guidonian, and Affinity Spaces in Twentieth-Century Music," p. 7.

[34] Martins calls Bartók's key designation an "analysis" (p. 7). While I agree that composers do not necessarily have a privileged insight into their own compositions, Bartók's statements about his own music nevertheless seem qualitatively different than, say, Halsey Stevens's or János Kárpáti's.

> compositional property of every piece of Renaissance polyphony, as a "tonality" certainly is a pre-compositional property in every eighteenth-century piece.[35]

So despite the fact that we are accustomed, for good reason, to thinking of Bartók's music as based on the melodic properties of folk tunes, Bartók's tonal practice cannot be so easily divided into systems of combined scales and their "subsequent" harmonic realizations. Perhaps key variations are just as or even more pre-compositional than the scales to be combined.

Consider Carl Dalhaus's article on "Tonsysteme" in the second edition (2007) of *Die Musik in Geschichte und Gegenwart*:

> The term "scale" refers to a means of representation. A tonal reservoir (*Tonvorrat*) (*e.g.*, the chromatic aggregate) … can be introduced in scalar form (*Skalenform*) without being bound by it. The diatonic scale may be represented as a row of fifths (F–C–G–D–A–E–B), and E♭ major is less a scale than a complex (*Komplex*) of chords: (A♭–c–E♭–g–B♭–d–F).[36]

For Dalhaus, E♭ major is not reducible to a scale, but is better understood as a "complex of chords," and while his Hauptmannian "complex" for E♭ major does not represent all of the possible qualities or relationships that combine to create what we might understand as "E♭ major," it is far more effective than the scale alone at representing the harmonic possibilities within that particular Tonsystem. The determination of harmonic schemata is thus as integral to understanding the totality of relationships as the determination of modes, scales, or their combinations. As Dalhaus puts it, "tone systems are the embodiment of moments entangled together. Tonvorräte, tunings, schemata, and modes hang so closely together that it would be

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[35] Harold Powers, "Tonal Types and Modal Categories in Renaissance Polyphony," *Journal of the American Musicological Society* 34.3 (1981), pp. 433-434. Powers's last claim is of course as debatable as the idea that keys are certainly *not* pre-compositional.

[36] Carl Dalhaus, "Tonsysteme," in *Die Musik in Geschichte und Gegenwart*, 2nd ed., Vol. 9 (Kassel: Metzler, 2007), p. 638.

violent to constrain the term to one or another part."[37] The totality of a piece's harmonic relations, represented in part by various Tonsysteme, is thus a combination of many factors, and while I am mostly interested in harmonic schemata — understood as representing key variations — it is important to note that they do not replace determinations based on the combination of scales or scale segments, but enter with them into a larger totality.

But how might we represent a harmonic schema? What might a "phrygian-colored" C major "look" like?

A "colorless," *a*chromatic C major could be represented as in Example 2.1 (p. 83) by F–a–C-e–G–b–D," which would interpret the arrivals on C–E in ms. 3, 5, 10, 12, and 18 (in Example 2.7, p. 96) as tonics. Moreover, the implied arrival on F–A in ms. 6 and the subsequent emphasis placed on G in the bass in ms. 11-17 suggests a progression from tonic to subdominant to dominant, albeit a dominant unsurprisingly lacking the leading tone B♮. The white-key diatonic collection, however, can not be found in either hand alone and so must be understood either as a result of combining the collections in each hand (as Martins does) or — reversing this relation — as a abstract precursor or progenitor of these collections. The left hand's pitches could be represented in isolation by the Hauptmannian "Reihe" of major and minor thirds d♭–F–a♭–C–e♭–G–b♭ and the right's pitches by F♯–a–C♯–e–G♯–b–D♯, each "row" being made up of a "white-key" segment of the circle of fifths (F–C–G, a–e–b) interpolated with a "black-key" segment of the circle of fifths (d♭–a♭–e♭–b♭, F♯–C♯–G♯–D♯).[38] Each row in this interpretation would appear to be related to the other by inversion around an axis of enharmonically-related

[37] *Ibid.*, p. 638.

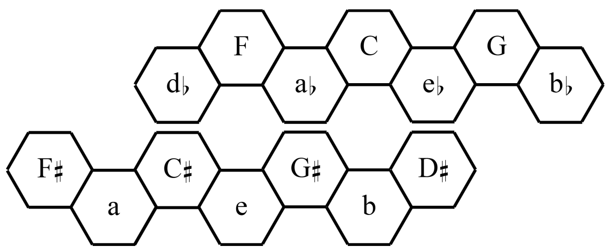
[38] The first row is a depiction of C phrygian with d♭ rather than D♭ in order to avoid repeated minor thirds. It could also be thought of as F aeolian with b♭ rather than B♭. The second row is C♯ aeolian.

pitches — C♯/d♭, G♯/a♭, D♯/e♭, and so on — a relation best shown with juxtaposed Tonnetz segments, such as Example 2.8. This hexagonal version of the Tonnetz places perfect fifths on the horizontal axis, minor thirds on the upper-left/lower-right axis, major thirds on the lower-left/upper-right axis, and chromatic semitones on the vertical axis. These four axes correspond to the neo-Riemannian D, PR, LP, and P transformations — the four ways of "going around" the hypertorus resulting from assuming enharmonic (and octave) equivalence.[39] Only three axes, however, can be represented by shared sides of adjacent hexagons. So if one wants the major-third and minor-third axes to share sides, then one must choose to have either the perfect-fifth or chromatic-semitone axis as the third shared side. For Bartók's music, I believe it is most useful and revealing to have the third shared side represented by chromatic semitones.

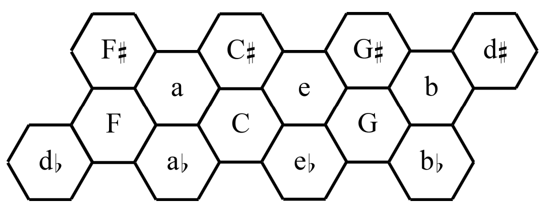
Since the enharmonically related pitches in the First Bagatelle are attained by going around the major-third axis — moving from the lower-left to the upper-right, following d♭–F–a–C♯, a♭–C–e–G♯, or e♭–G–b–D♯ — it would make more sense to represent the white-key pitches as being adjacent and the black-key pitches as being both above and below them. This would also allow for both collections to be represented by a single Tonnetz segment, such as Example 2.9, which places the white-key pitches at the center and the enharmonically equivalent black-key pitches — d♭/C♯, a♭/G♯, and e♭/D♯ —at the extremities, on the "other side" of this cylindrical segment of the four-dimensional Tonnetz torus. If one wishes to understand the two hands' collections as having a single source, then this would be it: the "primordial unity" (to use Hauptmann's terms) from which all other collections emerge. With the exception of D, F–a–C-e–G–b–D lies at the center of the diagram, but considering that ♭$\hat{2}$ is the most distinctive feature

[39] See Brian Hyer, "Tonal Intuitions in 'Tristan und Isolde'" (Ph.D. diss., Yale University, 1989), p. 210.

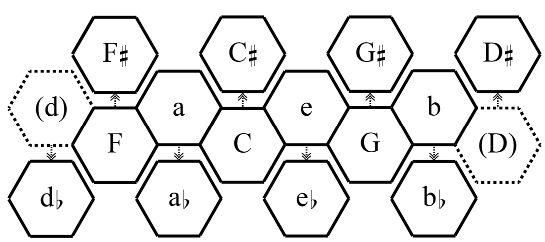
of the phrygian scale, this comes as no surprise. By disconnecting the other eight pitches, Example 2.10 shows the centrality of F–a–C-e–G–b and the way the former appear to be an extension of the latter. This idea that the black-key pitches are the result of an expansion of C major provides an alternate explanation to the idea that Bartók’s key designation results from combining two pre-compositional diatonic layers. “Phrygian-colored C major” would thus be the result of C major branching out or evolving, and the decision to represent this through two separate “layers” a red herring Bartók creates through a whimsical use of notation.



Example 2.8. d♭–F–a♭–C–e♭–G–b♭ and F♯–a–C♯–e–G♯–b–D♯ as juxtaposed Tonnetz segments.



Example 2.9. Example 2.8 as a single Tonnetz segment.



Example 2.10. The black pitches branching off from the white pitches.

An Evolution of Key Representations

There is, though, some historical support for this view: visual depictions of keys or tone systems as complexes of chords not only continued into the twentieth century, but changed over time to keep up with changing musical practices. If Hauptmann intended his representations to be static snapshots of an underlying process of living growth, then his objections to later theorists' positivistic appropriations of his ideas may be loosely characterized as an aversion to their attempt to "confine" or "cage in" this underlying process. And life, of course, tends to respond to limiting conditions or environmental obstacles with barrier-breaking explosions of diversity. Fully describing all of the ways that keys or tone systems were represented in the late nineteenth and early twentieth centuries, however, would be a daunting task that has already been attempted, a number of times, by others.[40] Organizing these representations into a cohesive narrative — particularly a narrative connecting the dots between depictions of key and the musical spaces in which they reside — would be even more difficult. I will therefore limit myself to a few, drawn mainly from the writings of Hauptmann's students Köhler and Bähr.

Example 2.11 begins with Hauptmann's "overlapping or comprehensive (*übergreifenden*) key system," his primary means of explaining augmented sixth chords.[41] By shifting a C minor row (F–a♭–C–e♭–G–b–D) one place to the right and then "joining the limits" of the resultant row

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[40] See Richard Cohn, *Audacious Euphony* (Oxford: Oxford University Press, 2012), pp. 169-194; Engebretsen, "The Chaos of Possibilities: Combinatorial Group Theory in Nineteenth-Century German Harmony Treatises"; Edward Gollin, "From Matrix to Map: *Tonbestimmung*, the *Tonnetz,* and Riemann's Combinatorial Conception of Interval," in *The Oxford Handbook of Neo-Riemannian Music Theories,* ed. Edward Gollin and Alexander Rehding (Oxford: Oxford University Press, 2011), pp. 271-293.

[41] Hauptmann, *Die Natur der Harmonik und der Metrik*, p. 155.

(a♭–C–e♭–G–b–D–f♯), he is able to form the three standard augmented sixth chords: f♯ | A♭–C, f♯ | A♭–C–e♭, and D–f♯ | A♭–C. This "horizontal" extension of the row allows for the addition of non-diatonic pitches to the key. But Hauptmann only shifts the entire row to the right: with the introduction of f♯, he must, following his own rules, eliminate F from the row altogether; the row is not actually extended, but the concept of C major is: f♯, too, now falls under it. Example 2.12 reproduces Köhler's depiction of A minor, which even though he brackets off the segment he wants to show how "the augmented sixth in an augmented sixth chord [here d♯] is not 'sharpened' but belongs natively and firmly to the Tonsystem." He explains that "the key is between two key systems (from f below to d♯ above)," in this case "between" A minor and E minor; hence the annotation "A minor im "Übergange" — A minor "in transition." Example 2.12 is the combination of an A minor row (D–f–A–c–E–g♯–B) and an E minor row (A–c–E–g–B–d♯–F♯), which explains his inclusion of g♮ as an alternative third to g♯.[42] For Köhler, keys are mobile: f and D might appear at one moment, d♯ and F♯ at another, the seven-pitch segment having to shift to the left or right in order to accommodate the chromaticism.

This convoluted solution to the problem of chromaticism appears to be a way of avoiding the idea that the key system itself is extended, most probably because the way in which one can represent a horizontally extended Tonsystem as a closed circle is far from clear: as shown in

as - C - es - G - h - D - fis

Example 2.11. Hauptmann's *Übergreifenden* key system (1853).

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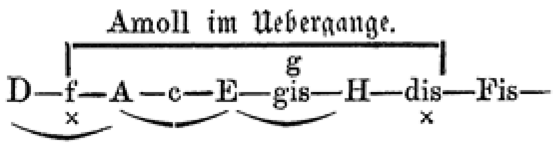
[42] *Ibid.*, p. 375.

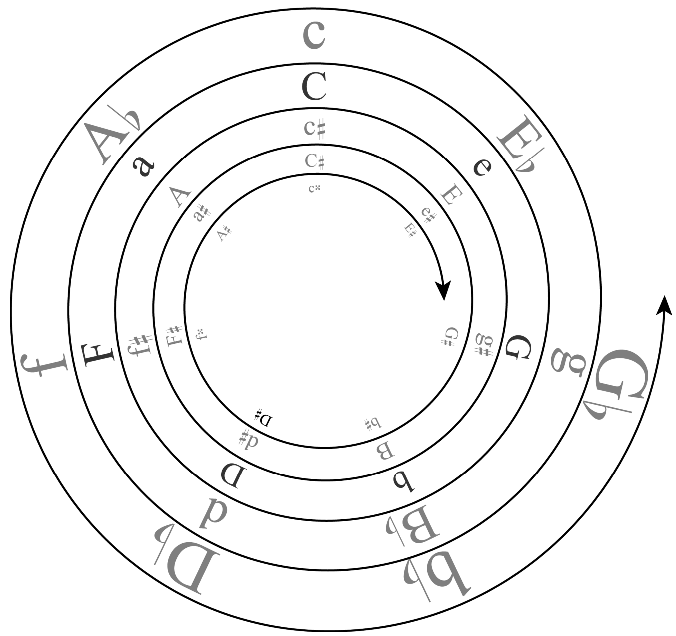


Example 2.12. Louis Köhler’s A minor key system (1873).

Example 2.13, when Hauptmann’s open-ended row of major triads is extended to the left and right, its circular representation becomes a spiral infinitely growing both inside and out, compounding the contradictions between pitches separated by syntonic commas (such as d and d) and between pitches and their chromatic variants (such as between C and C♯). This spiral might provide many options for harmonies but no systematic way to organize them functionally and thus makes it easy to see why linear models were ultimately eclipsed by grids of two or more dimensions, which show “harmonic” relations (relations of major thirds, minor thirds, and perfect fifths) far more clearly.

Considerations of *vertical* extensions to Hauptmann’s rows usually begin with his theory of modulation. Hauptmann first describes modulation in terms of horizontal shifts. Modulating from C major to D major involves a shift to the right, reinterpreting the dominant triad G–b–D as the subdominant in the new key. Since this procedure requires the two keys to share at least one triad, he limits this kind of modulation to those keys lying either one or two perfect fifths away from the tonic; in C major, that would be F, B♭, G, and D major. More distant keys “emerge out of the middle of the original key”: rather than attaining them by moving to the right or to the left, they are better understood as arising out of the interior of the row through a more radical kind of reinterpretation.[43]

[43] Hauptmann, *Die Natur der Harmonik und der Metrik*, p. 181.



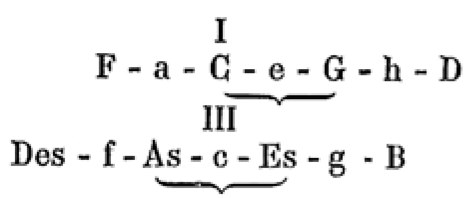
Example 2.13. Hauptmann's infinite row-form bent into an infinite spiral.

Hauptmann displays such distant keys juxtaposed two-dimensionally with the original key. Example 2.14, for instance, represents modulation from C major to A♭ major, which comes about by "placing the groundtone into the meaning of the third." C, that is, the groundtone of a C major triad, is reinterpreted as the third of an A♭ major triad.[44] Example 2.15 represents the modulation from C major to E major, which results from "placing the third into the meaning of the groundtone."

These depictions are inconsistent, however, for the goal keys are always placed below the originals. Yet following the model of Example 2.14, where moving downward lowers some pitches by a chromatic semitone, E major should be placed *above* C major in Example 2.15. C, G, and D are all *raised* by a chromatic semitone. While he thus did not seem to intend to create a consistent two-dimensional system of representation (where moving up raises pitches and

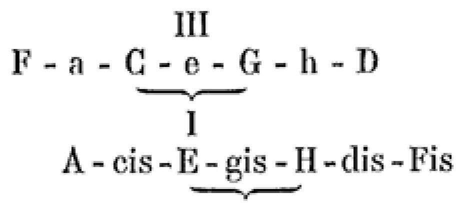
[44] *Ibid.*, p.181.

moving down lowers them), such systems often appear to be implied. Example 2.16 presents Nora Engebretsen's Tonnetz interpretation of Hauptmann's description of modulation from C major to E♭ major by way of F minor.[45] Hauptmann's own illustration is at the top of the example and shows how the groundtone of the tonic in C major is reinterpreted first as the fifth of the tonic in F minor and then as the third of the subdominant in E♭ major. The common element in each of these rows is F–C–G–D, a segment of the circle of fifths, and E♭ major is attained by substituting the chromatic variants a♭, e♭, and b♭ for a, e, and b (the thirds between F, C, G, and D in C major). Since Engebretsen's Tonnetz interpretation assumes enharmonic equivalence and thus uses all capital letters, she can position F minor and E♭ major directly below C major without any conflict between A♭ and a♭, E♭ and e♭, and so on. Yet Hauptmann clearly intends for his diagram to depict something like a wormhole that allows the C major row to "slip into" E♭ major without having to actually shift three perfect fifths to the left, *where it still resides*. Hauptmann is not suggesting E♭ major can be found both to the left *and* below C major: his vertical juxtapositions are just a way to visualize his more radical process of reinterpretation. While his juxtapositions are visually suggestive of the Tonnetz, I thus find it difficult to see them as a real precursor.

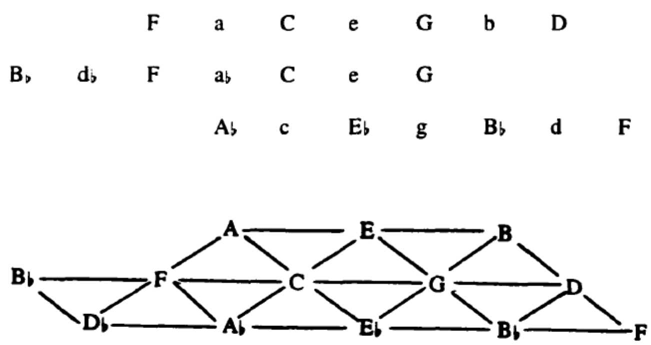


Example 2.14. Hauptmann's representation of modulation from C major to A♭ major.

[45] Engebretsen, "The Chaos of Possibilities: Combinatorial Group Theory in Nineteenth-Century German Harmony Treatises," p. 104. Cf. Hauptmann, *Die Natur der Harmonik und der Metrik*, p. 183-184.



Example 2.15. Hauptmann’s representation of modulation from C major to E major.



Example 2.16. Nora Engebretsen’s Tonnetz interpretation of Hauptmann’s description of modulation from C major to E♭ major.

Since it is hard to move directly from Hauptmann’s juxtaposed row-forms to the Tonnetz, authors often gloss over this transition, the transition between Hauptmann’s depictions of key and the larger spaces in which they seem to be embedded. Such histories leap from Hauptmann’s row-forms, that is, immediately to Oettingen’s representation of tonal space in terms of perfect fifths and major thirds or to Ottokar Hostinský’s grid of perfect fifths, major thirds, and minor thirds.[46] Hostinský’s grid was of course later picked up by Riemann and has become the standard Tonnetz-form in neo-Riemannian theory. As shown in Example 2.17, Candace Brower has attempted to bridge this gap, connecting Hauptmann’s rows to the full Tonnetz in a series of

[46] Edward Gollin places the Tonnetz in Carl Ernst Naumann’s 1858 dissertation as a precursor to Oettingen and as a kind of link between Hauptmann and Oettingen (and in turn Riemann). Gollin, “Some Further Notes on the History of the *Tonnetz*,” *Theoria* 13 (2006), pp. 99-111.

stages: the open-ended row is first expanded around a central cycle of perfect fifths, each pair supporting both a major and a minor triad. This expansion opens up "two sets of diagonal pathways, one made up of successive major thirds and the other of successive minor thirds."[47] These two pathways — corresponding to neo-Riemannian PL and PR cycles — combine with the other ways of moving through the space to expand the diagram in multiple dimensions and create "hexatonic" and "octatonic" spaces. Cohn follows a similar tactic by describing horizontal and then vertical extensions to the "diatonic Tonnetz" — his description of Hauptmann's row interpreted as a contiguous area of a Tonnetz — and provides many musical examples in support.[48]

The relationship between such grids and keys, however, is not immediately clear. In the sequence of Brower's stages, keys (such as C major and C minor in Example 2.17) get left behind as soon as pitch space begins to expand and are merely locatable in the larger space. In Cohn's words, the "encapsulated microecology" of the Hauptmannian diatonic Tonnetz region (with syntonic comma borders, such as d and D in C major) remains intact even when pieces make elaborate excursions into other regions of the space.[49] This works extraordinarily well for the music he considers, but what about music in which the concept of a key has become attenuated and harmonies are no longer limited to triads and seventh chords? Cohn writes elsewhere that despite the general acceptance of the equivalence between the Tonnetz of pitches and the Tonnetz of triads, it remains controversial to "claim that the Tonnetz of triads is equivalent to the Tonnetz of keys or regions" and is capable of representing entire keys and the

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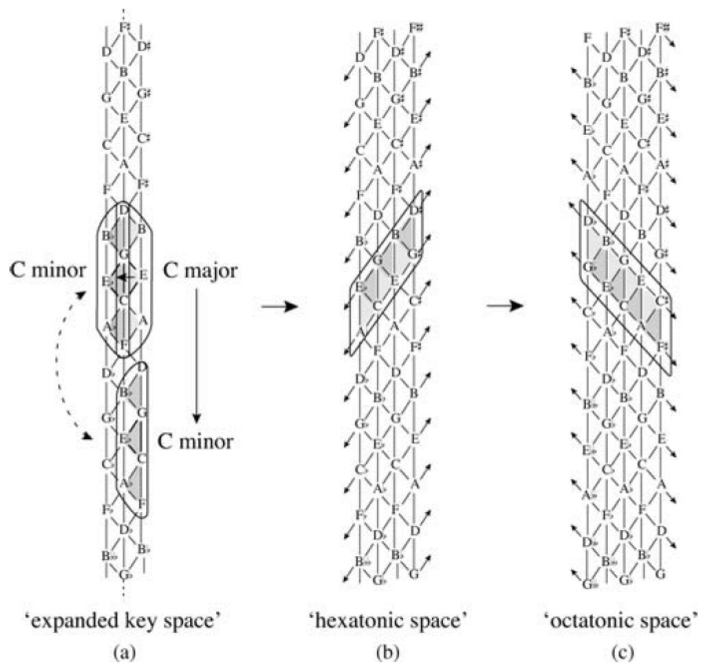
[47] Candace Brower, "Paradoxes of Pitch Space," *Musical Analysis* 27.1 (2008), p. 78.

[48] Cohn, *Audacious Euphony*, pp. 175-189.

[49] *Ibid.*, p. 178.



Example 2.17. Three of Candace Brower's stages connecting Hauptmann's row-forms to the Tonnetz.

relations between them.[50] But this controversy is an old one, stemming from the differences between Hauptmann's rows and the later acoustic matrices of Helmholtz, Oettingen, and Riemann. In "Die Natur der Harmonik" (1882) Riemann discusses these differences in terms of continuous progress:

> Hauptmann's letter nomenclature for tones, with its differentiation between fifth- and third-related tones, has been further perfected by Helmholtz and Oettingen, such that one now distinguishes between thirds below and thirds above, and third relationships of the first and second, *etc*., degrees .… Instead of the upper-case and lower-case letters, we thus now use the unambiguous comma-lines.[51]

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[50] Richard Cohn, "Tonal Pitch Space and the (Neo-) Riemannian Tonnetz," in *The Oxford Handbook of Neo-Riemannian Music Theories,* p. 326.

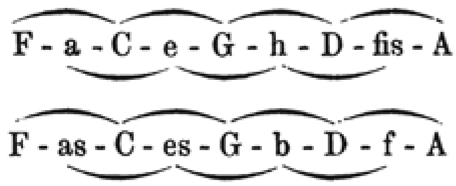
[51] Hugo Riemann, "The Nature of Harmony" (1882), trans. Benjamin Steege in *The Oxford Handbook of Neo-Riemannian Music Theories,* p. 82.

Balancing this gain in clarity, however, is a loss in the dynamics of key definition, key boundaries, and modulation between keys. Hauptmann focused on the dialectic between a defined key (made up of harmonies in precise relations with one another) and the space in which it resides, while Helmhotlz and Oettingen were more concerned with the space itself merely as a matrix that catalogs acoustic relations. In other words, when one moves directly from Hauptmann to these full-scale matrices, one abandons the dialectical balancing act between an open-ended set of tonal possibilities and a closed, exclusionary key.

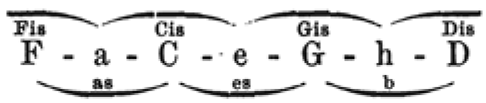
But Hauptmannian key representations did expand outward, so to speak, in the late nineteenth century. This can be seen most clearly, perhaps, in Bähr's *Das Tonsystem unserer Musik* (1882). Example 2.18 reproduces Bähr's "entwined chain of major and minor triads," in which each pair of upper-case, perfect-fifth-related pitches supports both a major and a minor triad. This chain sets the model for his later description of "the extension of the key into the chromatic system," which he frequently describes as a "geschichtliche Entwicklung," a "historical development" of the Tonsystem, translating Hauptmann's Goethean organicism into the more explicitly evolutionary language of the late nineteenth century.[52] Example 2.19 registers the next step in Bähr's extension, in which each pair of *lower-case* perfect-fifth related pitches supports both a major and a minor triad. Finally, Example 2.20 gives Bähr's representation of "rows of triads related by the transformation of thirds," which appears to be a Tonnetz segment constructed out of Hauptmannian materials, retaining the idea of upper and lower-case pitches.[53] By "transformation of thirds" he means the process by which every row of perfect-fifth related pitches can support both major and minor triads: the newly created row F♯–C♯–G♯–D♯ is filled

[52] Otto Bähr, *Das Tonsystem unserer Musik*, pp. 14 and 61. The full text is available online.

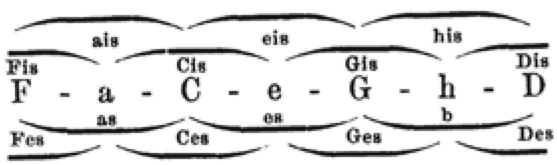
[53] *Ibid.*, p. 64.



Example 2.18. Otto Bähr's "entwined chain" of major and minor triads (1882).



Example 2.19. The next step in Bähr's extension.



Example 2.20. Bähr's "rows of triads related by the transformation of thirds."

out with a♯–e♯–b♯, a♭–e♭–b♭ is filled out with F♭–C♭–G♭–D♭, and so on. Bähr explains how this process can continue indefinitely, resulting in infinite diagonal rows of major and minor-third related pitches in addition to the infinite horizontal row of perfect-fifth-related pitches.[54]

The ambiguity that Riemann bemoans in "Die Natur der Harmonik" is lessened by the fact that Bähr changes the relative sizes of letters: the central C major portion is the largest, while the other letters are reduced in size as they recede from this core. C and C♯ are both upper case, for example, but C is larger than C♯, almost as if by being "farther away" the pitches appear smaller. Crucially, Bähr considers his diagrams to be models for single, extended keys, not

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[54] *Ibid.*, pp. 64-66.

merely spaces in which triads move only to return to a diatonic origin. "In addition to the tones of the three adjacent triads, we use many other tones in our modern music without the perception of leaving the key. We must thus add these tones to the key."[55] All that's needed is a system of categorizing and thereby "simplifying" the relationships between the harmonies found in extended keys, such as the functional system provided soon after by Riemann in *Vereinfachte Harmonielehre* (1893).[56] But part of the motivation for expanding keys themselves had to have been not only the inclusion of more and more remote triads and seventh chords, but also the introduction of other chords — such as the "gamma," "beta," "delta," and "epsilon" chords that Lendvai hears in Bartók's music — which can also act as tonics in a given key variation. Example 2.21 locates each of Lendvai's chords on a Tonnetz.[57]

I have transcribed each of these chords into musical notation along the top and mapped them onto connected Tonnetz regions below, the idea being to give each chord the most compact representation possible. In the neo-Riemannian tradition there is a strong preference for harmonies that have maximally compact locations on the Tonnetz — major and minor triads form triangles whereas major or minor seventh chords create parallelograms — so I have added dashed connecting lines to show how Lendvai's harmonies also create closed geometric shapes. The inversionally-related gamma and delta chords combine three triadic triangles to create four-sided figures, but the beta and epsilon harmonies (also inversionally-related) require that we

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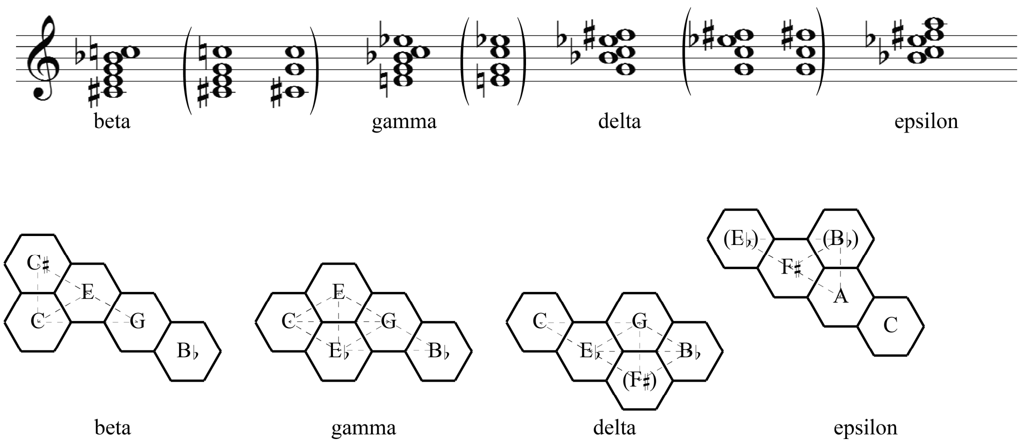
[55] *Ibid.*, p. 61.

[56] Hugo Riemann, V*ereinfachte Harmonielehre oder die Lehre von den tonalen Funktionen der Akkorde* (London: Augener, 1893).

[57] Bartók of course spells harmonies in different ways, and we should take these spellings seriously. See Ernő Lendvai, *The Workshop of Bartók and Kodály* (Budapest: Editio Musica, 1983), p. 354.



Example 2.21. Lendvai’s gamma, beta, and delta harmonies.

understand (014)s — A–C♮–C♯ or F♮–F♯–A — as also forming triangles. Beta and epsilon chords contain fifth pitches creating harmonies that, like dominant or half-diminished seventh chords, are “sprawling” or “irregular.”[58] I do not view this as a difficulty, because neo-Riemannian transformations, when organized into algebraic groups (such as the PLR-group), induce an equivalence on their objects that is at odds with Bartók’s evolutionary model. My interest lies elsewhere, in attempting to understand how such new sonorities can combine to create key variations by interpreting these harmonies as tonics and then understanding other harmonies in relation to those tonics. For our purposes, it is thus only important that harmonies be made up of “connected” pitches, adjacent pitches on a Tonnetz.

[58] Cohn, *Audacious Euphony*, pp. 141-142. Cohn comments on how the major/minor tetrachord (found in Lendvai’s gamma and delta harmonies) belongs to a group of dissonances that “benefit from compact and determinate locations on the Tonnetz.”

Boretz and Gollin

Example 2.22 reproduces Benjamin Boretz's "chain of (0369) transpositions" from his 1969 analysis of the Prelude to *Tristan und Isolde*, the opening thirteen measures of which are given (in piano score) in Example 2.23.[59] Because he assumes enharmonic equivalence, Boretz is able to present his chain as a complete cycle. The immediate visual comparison is to Hauptmann's "row of major triads," for it is also regular able to present his chain as a complete cycle. The immediate visual comparison is to Hauptmann's "row of major triads," for it is also regular in its cyclical intervals and if one assumes enharmonic equivalence, could likewise be represented as a circle. The implication of this assumption is shown in Example 2.24, which forms Hauptmann's row of major triads into a circle.[60] While Hauptmann's cycle alternates major and minor thirds, Boretz's chain alternates three T_3s with a T_4; rather than a row of major triads, it forms a row of ordered (0369)s. Boretz remarks on the obvious resemblance of his chain to similar representations of tonality: "Conceits of tonal analogy constantly suggest themselves, such as "the 'center' (0369) with its equirelated 'subsidiary' transpositions."[61] As suggested in Example 2.25, transposing the center or quasi-tonic (0369) by 1 or 11 semitones to adjacent (0369)s in the cycle generates (0369)s that can be said to express quasi-dominant or

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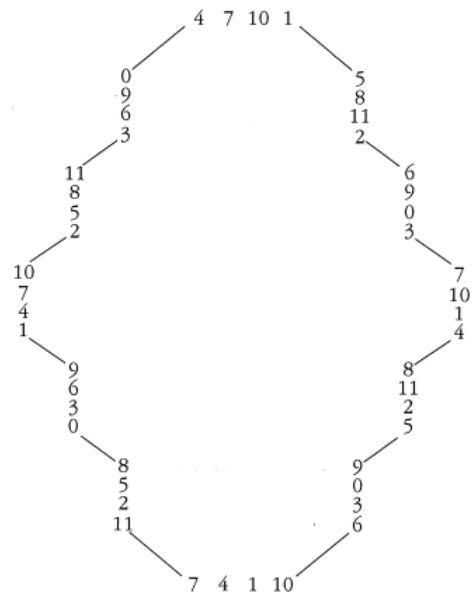
[59] Benjamin Boretz, *Meta-Variations: Studies in the Foundations of Musical Thought* (1969) (Red Hook, N.Y.: Open Space, 1995), pp. 240-319; the reduction is taken from Wagner's preliminary draft, presented in Richard Wagner, *Prelude and Transfiguration*, ed. Robert Bailey (New York: W.W. Norton, 1985), p. 103.

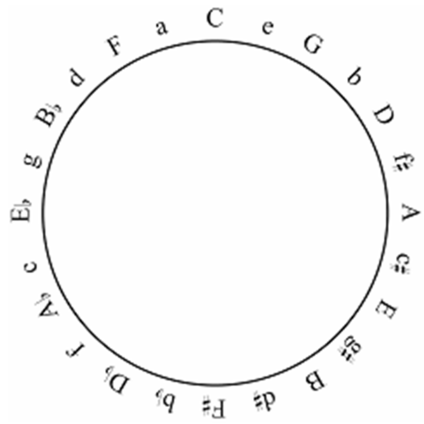
[60] Such a circle is implied in Hauptmann and was made explicit as early as Köhler's *Leicht fassliche Harmonie- und Generalbass-Lehre* (Königsberg: Gebrüder Bornträger, 1861), p. 52. See also Brower, "Paradoxes of Pitch Space," pp. 76-77.

[61] Boretz, *Meta-Variations*, p. 267.

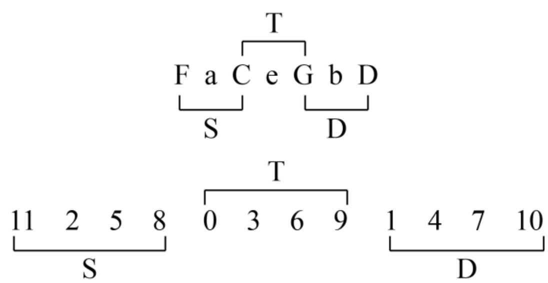


Example 2.22. Boretz's "chain of (0369) transpositions" (1969).

Example 2.23. A piano-vocal score of the Prelude to Wagner's *Tristan und Isolde* (1857-59), ms. 1-13.



Example 2.24. Hauptmann's "row of major triads" understood as a circle.



Example 2.25. A tonal analogy between Boretz's (0369) chain and a Hauptmann major-key row-form.

quasi-subdominant functions. Boretz, however, wants to let these analogies "drop unmarked in our discourse," presupposing a perfectly "naïve observer" who can approach Wagner's music without any preconceived ideas about tonal conventions, and who could therefore conclude — based solely on "observational data" — that the *Tristan* Prelude is in fact "twelve-tone" or "serial" in some way.[62] I would like to pick up where Boretz leaves off and explore — perhaps even "affirm" — the relationship between the "serial," enharmonic structure of his interval cycle and the undeniable tonal conventions with which the Prelude engages.

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[62] *Ibid.*, pp. 254-312.

Boretz chooses a “4-connected” model — a cycle of three T_3s followed by T_4 (a “4-connector”) rather than T_1, T_7, or T_{10}, any of which generates the same alteration of all three (0369)s — because it yields Tristan chords and dominant-seventh chords (tonal harmonies) in the overlap of successive (0369)s. Example 2.26 demonstrates this: the dominant seventh 8–0–3–6 is formed in the overlap of 0–3–6–9 with 11–2–5–8 (the adjacent [0369] on the left), and the Tristan chord 3–6–9–1 is formed in the overlap of 0–3–6–9 with 9–1–4–7 (the adjacent [0369] on the right).[63] I assume that the first dominant-seventh harmony on the downbeat of ms. 3 of the Prelude (E–G♯–B–D) acts as dominant in A minor. So in terms of the A minor row (D–f–A–c–E–g♯–B), Boretz’s center (0369) is g♯–B | D–f, and the dominant-seventh chord is E–g♯–B | D. The Tristan chord is g♯–B–d♯ | f, d♯ being the major third (of 4-connector) above B.[64] In an expanded Hauptmannian row, d♯ is not only a major third above B but a perfect fifth above g♯; the (0369) d♯–F♯ | A–c is likewise a perfect fifth above the (0369) g♯–B | D–f. Continuing to extend (or shift) the row to the right, that is, adds F♯, which fills out the diminished seventh chord belonging to E minor, the key a perfect fifth above A minor. Example 2.27 extends the A minor key system to F♯, while Example 2.28 presents this row as a segment of the infinite Hauptmannian spiral, revealing that in a tonal context, these (0369)s overlap rather than discretely succeed one another.

A Tonnetz model would show these relationships far more clearly. Example 2.29 thus gives the linear row as a Tonnetz segment. By wrapping everything to the left of E (the dominant

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[63] *Ibid.*, pp. 282-283.

[64] This view is consonant with the common view that the Tristan chord is some kind of augmented sixth chord. What I have done here is similar to Daniel Harrison’s derivation of the Tristan chord — which he calls a “dual” German augmented sixth — in “Supplement to the Theory of Augmented-Sixth Chords,” *Music Theory Spectrum* 17.2 (1995), pp. 181-184.

Tristan

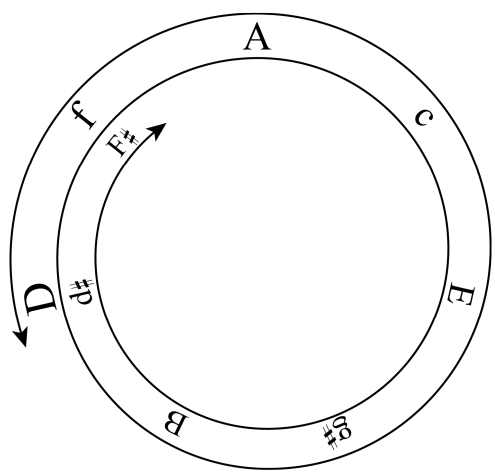
11 2 5 8 0 3 6 9 1 4 7 10

D^7

Example 2.26. Tristan and dominant-seventh chords as overlaps between adjacent (0369)s.

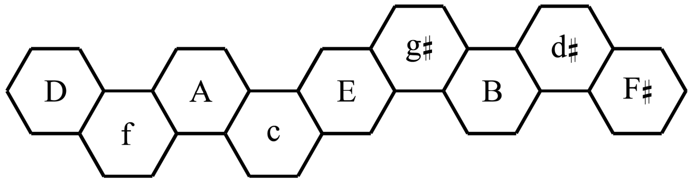
D f A c E g♯ B d♯ F♯

Example 2.27. A Hauptmann row for A minor extended to F♯.

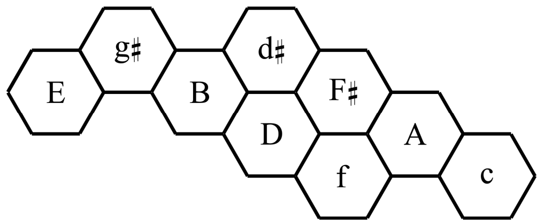


Example 2.28. Figure 2.10 as a segment of the Hauptmannian spiral.

groundtone) around to the right, amplifying the circle-bending procedure that generates all diminished-seventh chords, Example 2.30 presents the spiral segment as a segment of the Tonnetz. And as one would expect, T_7 is the only transposition in which all four pitches of successive (0369)s are the same case (lower or upper), for it is the only transposition in which each relationship retains Hauptmann's original just-intoned conception. All of the other



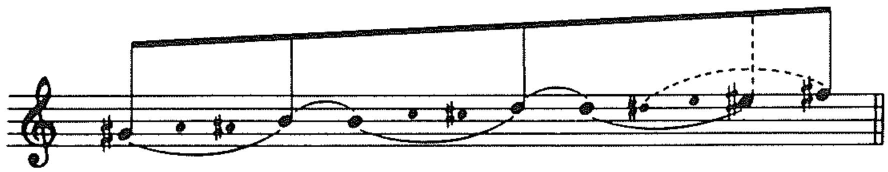
Example 2.29. A Tonnetz interpretation of Example 2.27.



Example 2.30. A Tonnetz interpretation of Example 2.28.

transpositions, including Boretz's T_1 transposition, created by his 4-connector, require an equal-tempered or enharmonic switch in order to make sense. Example 2.30, then, reveals the rich interrelationships between pitches of successive (0369)s; all four possible connectors that generate the same alteration of all three (0369)s are shown in a tonal context: G♯ is related to D♯ by a perfect fifth (a 7-connector), to C by a diminished fourth (Boretz's 4-connector), to F♯ by a minor seventh (a 10-connector), and to A by a semitone (a 1-connector).

Expanding to the right implies a kind of modulatory shift, a notion Boretz draws on in constructing his tonal analogy. Example 2.31 presents the process in ms. 1-13 of the Prelude he considers to be analogous to "modulation" to the dominant, in which the (0369) complex shifts a semitone to the right. In his terms, these measures form a "modulatory fragment" that reveals the "interlock" between 2–5–8–11 and 3–6–9–0: E♯ (5) resolving to F♯ (6) in the upper voice is the



Example 2.31. Boretz's process of modulation in ms. 1-13 of the Prelude.

"fulcrum," the point at which the "modulation" takes place.[65] In Boretz's chain, the overall transpositional interval is T_1, while I have been arguing that the transpositional interval is a perfect fifth (and not simply "T_7"): after all, F♯ in ms. 13 of the prelude is part of a B dominant-seventh chord, a perfect-fifth transposition of the E dominant-seventh chord in ms. 3. I do not want to understand one of these interpretations as better than the other, for much of the Prelude's effect hinges on the conflict between them — between T_1 and a perfect fifth, between a twelve-tone equal-tempered enharmonicism and the justly-tempered consonances of Hauptmann.

Boretz's chain is an ordering of what he had previously considered to be complexes of *un*ordered (0369)s, and this ordering — choosing a single connector interval — is necessary in an enharmonic twelve-tone world, for otherwise there would only be three (0369) complexes (analogous to only three keys), which, according to Boretz, would "drastically curtail the complexity-coherence" for which he is striving.[66] In a justly-tempered context, however, this is not a problem: g♯–B | D–f is without question different from b–D | F–A♭. In some performances, the distance between D♯ in the cellos (ms. 2) and D♮ in the English horns (ms.3), for example, is audibly larger than an equal-tempered semitone, but at other times the necessity for enharmonic

[65] Boretz, *Meta-Variations*, pp. 263-267.

[66] *Ibid.*, p. 277.

hearing/playing becomes ineluctable. One way to conceptualize what Boretz has done is as a grafting of (0369) complexes onto the row of major triads (and, in turn, to the circle of fifths). His successive (0369)s can be construed as successive diminished-seventh chords belonging to successive minor keys a perfect fifth apart. In other words, there is an intimate historical and conceptual relationship to be made between the Hauptmannian cycle of alternating major and minor thirds and Boretz's cycle of three T_3's followed by a T_4.

About his "chain of (0369) transpositions," Boretz makes the following observation: "A complete unfolding of the (0369)-systematic transposition cycle produces a multiple partitioning (exhaustion) of the pitch-class octave, a partitioning in which each construct is internally pitch-class ordered."[67] Unlike the chromatic scale or the circle of fifths, which exhaust the aggregate exactly once before repeating, or cycles of major or minor thirds, which do not exhaust even a single aggregate, Boretz's chain exhausts the aggregate four times before repeating. His chain is an example of what Edward Gollin calls a "multi-aggregate cycle." [68] Gollin would describe it as a "(3,3,3,4)-cycle," where the commas separate the intervals of the cycle's repeated sequence. Gollin is far more interested than Boretz, however, in drawing parallels between multi-aggregate cycles — which he hears as unfolding on the surface of and in relations between harmonies in Bartók's music — and Hauptmann's rows, which he calls "tone schemes." In "Multi-Aggregate Cycles and Multi-Aggregate Serial Techniques in the Music of Béla Bartók" (2007), he observes that "we can … understand the structures and boundaries of tone schemes to be determined by the structural features of the (4,3)-cycle:

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[67] *Ibid.*, p. 279.

[68] Edward Gollin, "Multi-Aggregate Cycles and Multi-Aggregate Serial Techniques in the Music of Béla Bartók," *Music Theory Spectrum* 29.2 (2007), pp. 143-176.

> The component triads reflect the component generating intervals — (4,3) and (3,4) are the [pitch-class] interval series that underlie major and minor triads respectively; the fundamental dominant transformations reflect the cycle's periodicity, that is, the 7-semitone sum reckoned in a positive or negative direction; and the boundaries of the scheme are given by the lesser value of the distribution vector, in this case 7.[69]

Gollin begins by noting that when understood as a cycle of alternating major and minor thirds, the (4,3)-cycle gives rise to overlapping major and minor triads. For instance, C–E–G–B–D (a segment of a [4,3]-cycle) contains overlapping C major, E minor, and G major triads. Since the periodicity of a cycle is the interval at which its sequence begins to repeat, it can be determined by simply summing its intervals: the periodicity of Boretz's (3,3,3,4)-cycle is 1 (3+3+3+4). The periodicity of the (4,3)-cycle is thus 7 (4+3), and Gollin notes that this corresponds to the distance traversed by the "dominant transformation," referring to the "D transformation" of neo-Riemannian theory. 7, that is, corresponds to the ascending intervallic distance from tonic to dominant or the descending intervallic distance from tonic to subdominant. Gollin's "distribution vector" is an array that lists the distances (measured in *cycle steps*) between appearances of a certain pitch class, so the "lesser value" is the shortest distance from one appearance to another. This not only provides the natural boundary for a key representation, but for Hauptmann's major key rows this difference between instances — such as between d and D in C major (seven *cycle steps* apart) — is key-defining.

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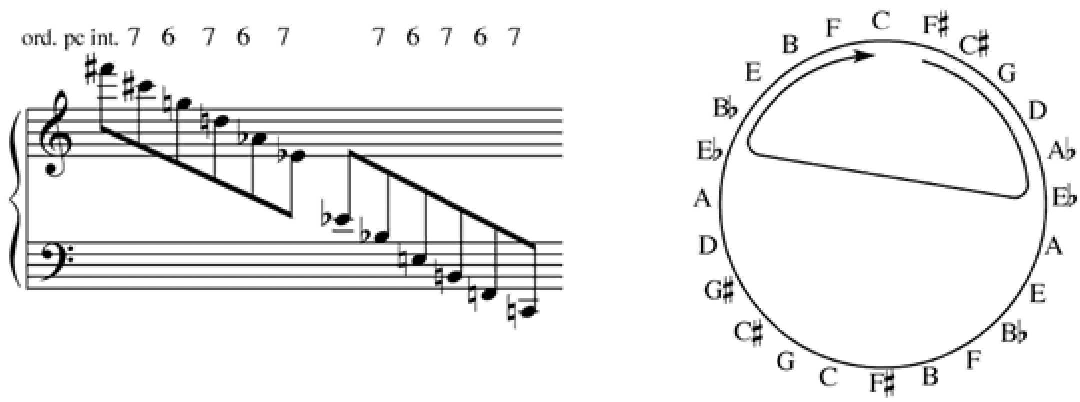
[69] *Ibid.*, pp. 148-149. While the "structures and boundaries" of Hauptmann's major-key representations may be "determined by the structural features of the (4,3)-cycle," these representations are not themselves consistent cycles, unless one considers a major key a (4,3,4,3,4,3,3)-cycle. Hauptmann's "row of major thirds," from which keys originate, could be described as a cycle when enharmonicism is introduced, but — to be faithful to Hauptmann's intentions — is better understood as a major-third/minor third-cycle with a periodicity of a perfect fifth rather than a (4,3)-cycle with a periodicity of 7.

Gollin's claim that "analogous relations between cycle structure and function … obtain in Bartók's music" suggests a new way of understanding the composer's compositional practice. Some of Bartók's harmonies, that is, could be understood as segments of cycles *other* than the (4,3)-cycle, and important transpositional relationships in his music could be understood in terms of the periodicities of such cycles, creating the potential for "dominant transformations" other than 7. Yet Gollin's parallels also raise several questions. What about diminished and augmented triads, which are present in Hauptmann's rows but are not to be found within the (4,3)-cycle? The diminished triad not only belongs to every Hauptmannian key, it is for him the force that defines the key and isolates it from the otherwise infinite chain of alternating major and minor thirds. C major is thus defined by the diminished triad b–D | F, which, by joining pitches from both ends of the F–a–C–e–G–b–D row, draws it into a closed, exclusionary circle.

There are also moments in Bartók's music in which cycles, rather than merely linearly unfolding like a sequence, actually seem to define a key by bending themselves into circles. While Gollin is sensitive to such moments, he does not make the analogy between these procedures and the role diminished triads play in Hauptmann's theories. Example 2.32 presents his analysis of ms. 55-57 of the third of Bartók's Etudes, Op. 18 (1918). Here Gollin notices a "disjunction" in a (6,7)-cycle caused by a succession of 7s, writing that "this duplication of interval 7 disrupts the linear symmetry of the right-hand chordal passage: every trichord but the last is an (016) trichord .… The last trichord, A♭–E♭–B♭, is instead a member of set class (027)."[70] But this procedure is precisely analogous to Hauptmann's circle-bending of major-third/minor-third cycles: the lesser value of the (6,7)-cycle's distribution vector is 11 (from E♭ to

[70] *Ibid.*, p. 155.



Example 2.32. Edward Gollin's analysis of ms. 55–57 of the Etude, Op. 18, No. 3.

E♭), and Gollin points out how this creates a near-aggregate, the missing A being the "centric tone of the work."[71] Instead of proceeding to A after E♭, the cycle bends into a circle and sounds the pitch that follows E♭ on the other side of the circle, B♭, creating a member of set-class (027), which — since it is also created by circle-bending upon the arrival of the lesser value of its cycle's distribution vector — is analogous to the diminished triad in the major-third/minor-third cycle. In other words, the two inversionally-related forms of set class (016) alternate in the (6,7)-cycle, just as inversionally-related major and minor triads alternate in the major-third/minor-third cycle. When a cycle bends into a circle, one of the intervals repeats: the minor third in the major-third/minor-third cycle and 7 in the (6,7)-cycle.

Gollin does not discuss augmented triads, which can't be found within the (4,3)-cycle either, but are present within every circular Hauptmannian representation of minor keys. Gollin notes that Hauptmann's representation of minor follows the form "d–F–a–C–e–G–b," which like his major-key representations, is a segment of a major-third/minor-third cycle.[72] Yet

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[71] *Ibid.*, p. 157.

[72] *Ibid.*, p. 148.

"d–F–a–C–e–G–b" is not the standard form of minor. Hauptmann in fact explicitly rejects "d–F–a–C–e–G–b" as a row form because "such a row of minor chords would only ever appear as the outcome of the row of major chords. Since the minor chord here is missing a positive unity, it can never achieve independent validity."[73] The initial "unity" for Hauptmann must be a *major* triad; he therefore takes a *major* dominant triad as initial unity, deriving the *minor* tonic triad as its negation, generated negatively (below, in a dualist sense) from the groundtone of the dominant. Thus, Hauptmann's typical representation of minor follows the form "D–f–A–c–E–g♯–B." Gollin is correct in stating that the major-third/minor-third cycle also describes Hauptmann's representations of minor keys, but we must remember that — in contrast to the diminished triad, which results from the external application of circle-bending — minor keys contain an internal disjunction. Triads generated below the groundtone of the dominant are minor, whereas triads generated above the groundtone of the dominant are major (following the major-third/minor-third cycle). So just as bending a row into a circle creates the diminished triad, minor key representations, with their duplication of the major third, always already express an augmented triad in the overlap between tonic and dominant.

It is remarkable that Gollin does not consider these elements in his tonal analogy, for disjunctive harmonies feature exclusively within the three and four-interval multi-aggregate cycles he uncovers in Bartók's music: (4,4,3), (8,8,1), (4,4,11), (3,5,3,3), and (3,4,3,3)-cycles. Such cycles can be understood in Boretz's terms as (048) or (0369) chains with various connectors and in various permutations. As shown in Example 2.33, the (9,8,9,9)-cycle Gollin discovers in "Divided Arpeggios," from Volume Six of *Mikrokosmos* (1936), is a descending permutation of Boretz's (0369) chain with a 4-connector, the passage's sequenced harmony

[73] Hauptmann, *Die Natur der Harmonik und der Metrik*, p. 36.

being the minor seventh chord found in the overlap of (0369)s. And as shown in Example 2.34, the (8,8,9)-cycle Gollin finds in *Bluebeard's Castle* is a descending (048) chain with a 3-connector, the passage's sequenced harmony being the set-class (0148) found in the overlap of (048)s. Gollin quite reasonably chooses permutations based on what he perceives to be the "fundamental" harmony of a passage, describing a passage that sequences Lendavi's gamma chord (the major/minor tetrachord) as following the (3,5,3,3)-cycle. In this way, these fundamental harmonies are analogous to the Tristan and dominant-seventh chords that inspired Boretz to suggest his (0369) chain, and we may likewise extrapolate (0369) and (048) chains from a passage of Bartók's music that has, say, gamma chords or "(0148)s" as its fundamental harmonies.[74]

But here, too, analogies with serialism should be completed by affirming connections to tonal practices; multi-aggregate cycles, like (0369) chains, can be understood as arising from tonal procedures and as informed by that genetic link. While Gollin argues that interval cycles and Hauptmann's row-forms share the same "structural features" and that Hauptmann's representations can be defined using the terminology of interval cycles, we can also understand multi-aggregate cycles in terms of Hauptmann rows. Rather than finding the twentieth-century theoretical concept of compound interval cycles in Hauptmann's nineteenth-century key representations, a more intuitive (and evolutionary) relation would be to understand compound interval cycles as descending from Hauptmann's key representations. I understand such cycles,

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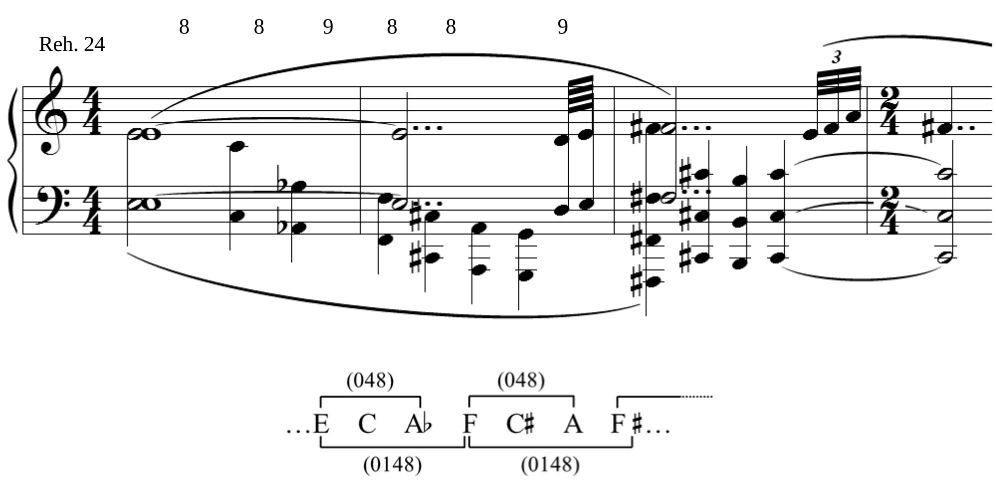
[74] Had Boretz wanted to emphasize dominant-seventh chords, he could have described (047t) chains with a 3-connector. Of course, some harmonies are ambiguous in the terms I've presented: major/minor tetrachords — because of their symmetry — may be interpreted either as two minor thirds a major third apart or two major thirds a minor third apart and can thus be understood as part of an (0369) chain (a [3,3,3,1]-cycle, perhaps) or an (048) chain (a [4,4,11]-cycle, perhaps). This is related to the fact that major/minor tetrachords can belong to either hexatonic or octatonic collections.

Example 2.33. The (9,8,9,9)-cycle in “Divided Arpeggios.”



Example 2.34. The (8,8,9)-cycle from *Bluebeard’s Castle*.

in other words, as extreme manifestations (or limit cases) of tendencies already inherent in traditional major/minor keys, and believe that the two cyclical genera — (048) and (0369) chains — descend from the two disjunctive harmonies in Hauptmann’s theories: diminished harmonies, produced when the row is turned into a circle, and augmented harmonies, which are “native” to

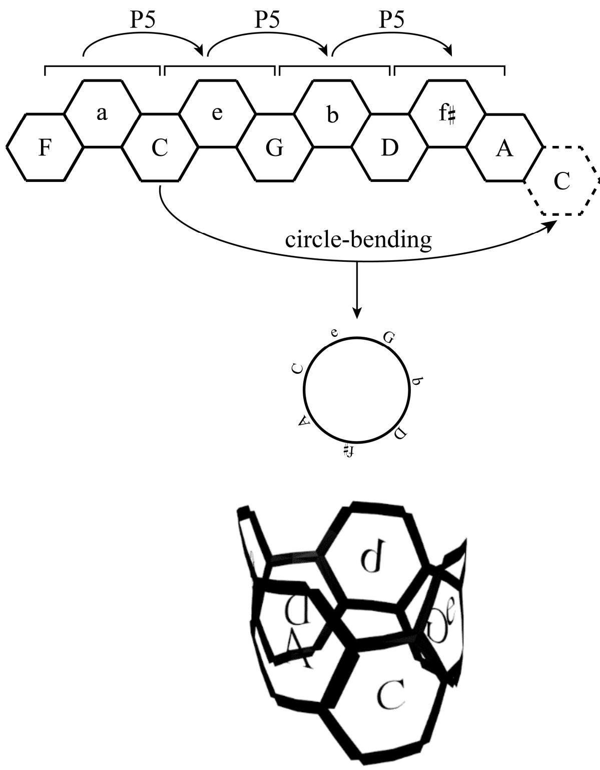
Hauptmann’s minor key row forms.

Since they unfold linearly on the surface of Bartók’s music, Gollin’s cycles are most like those passages in traditionally tonal music in which major-third/minor-third chains unfold successively. Sequences with descending or ascending fifths, which even when they do not actually present major-third/minor-third chains, are still understood as moving through them in some way, or through the chain of perfect fifths in which major-third/minor-third chain are embedded. They are sequences that instead move through augmented triads or diminished-seventh chords. Example 2.35 imagines a hypothetical ascending-fifths sequence leading to a cadence in G major. While the bass of this sequence progresses through a (3,5,11)-cycle, we nevertheless understand the cycle in relation to the (4,3)-cycle, which can be posited as an abstracted tendency or *principle* (to use Hauptmann’s terms) of tonality. The (3,5,11)-cycle has the same periodicity (7) as the (4,3)-cycle and like the (4,3)-cycle progresses through successive major triads related by that periodicity: F, C, G, and D major. As shown in the Tonnetz segment in Example 2.36, the cadence following this hypothetical sequence — because of the circle-bending diminished triad f♯–A | C embedded within the dominant seventh — isolates the key of G major from the infinite row of the major-third/minor-third chain. But the circular presentation at the bottom of the figure flattens out what is in reality a segment of an open cylinder — a cylinder without top or bottom, as shown at the bottom of the example.

Example 2.37 presents the first four measures of the Scherzo from Bartók’s *Suite*, Op. 14 (1916), which, as Gollin points out, unfolds ten pitches of an (8,8,1)-cycle: a descending (048) chain with an 11-connector.[75] In terms of Hauptmann rows, each of these successive augmented triads is analogous to e♭–G–b in C minor; each one “belongs,” that is, to one in a series of

[75] Gollin, “Multi-Aggregate Cycles and Multi-Aggregate Serial Techniques,” p. 154.

Example 2.35. A hypothetical ascending-fifths sequence.



Example 2.36. A Tonnetz representation of Example 2.35 and its cylinder-bending.

perfect-fifth related minor keys. Bartók's pitch spellings are in fact precisely what one would expect of such a sequence. So just as the major-third/minor-third chain expresses Hauptmann's basic principle of tonality, (048) chains with a periodicity of 7 represent an "augmented tendency." In contrast to cycles related to the major-third/minor-third chain, which always have a periodicity of 7, the periodicities of augmented-tendency cycles, because of the symmetry of augmented triads, can be 3 or 11 in addition to 7. Passages heavily influenced by the augmented tendency may likewise employ "dominant transformations" that traverse 3 or 11 semitones in addition to 7 — or 9, 1, and 5 when reckoned negatively, analogous to a "subdominant transformation."

Bartók's spellings, however, do not always line up with the periodicities of his cycles. Example 2.38 reproduces ms. 29-35 of "Divided Arpeggios," where in ms. 30-32 the (9,8,9,9)-cycle mentioned above unfolds: A–F♯–D–B–A♭–F–D♭–B♭–G–E.[76] Since this cycle is a permutation of Boretz's (0369) chain — its model being a descending rather than an ascending minor-seventh chord — I describe it in the same terms as Boretz's chain. The first two groups of four pitches, A–F♯–D–B and A♭–F–D♭–B♭, are related by descending chromatic semitones (the periodicity of the [9,8,9,9]-cycle is 11), but the following two pitches do not continue this pattern. Spelling these pitches as G and E (diatonic semitones below A♭ and F) rather than A♭♭ and F♭ leads one to view these chords as overlapping harmonies within a perfect-fifth-related sequence of diminished-seventh chords rather than as fundamental harmonies within a sequence of T_1-related minor-seventh chords. It is hard to view this as anything but intentional given the frequency of double flats and sharps elsewhere in the piece. Moreover, in ms. 33-35 C and E♭ appear in the "correct" register in the right hand, filling out the aggregate with pitches that, when understood as belonging to overlapping harmonies within a perfect fifth-related sequence of

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[76] *Ibid.*, p. 160.

Example 2.37. The Scherzo from the *Suite*, Op. 14, ms. 1-4.

Example 2.38. “Divided Arpeggios,” ms. 29-35.

diminished-seventh chords, are “correctly spelled”: e♭–C–A–f♯–D–b–a♭–F–d♭–B♭–G–e.[77] As shown in Example 2.39, just as (048) chains with periodicities of 7, 3, or 11 represent an augmented tendency, (0369) chains with periodicities of 7, 1, 4, or 10 represent a “diminished tendency.” Just as the periodicities of augmented tendency cycles can be either 3 or 11 in

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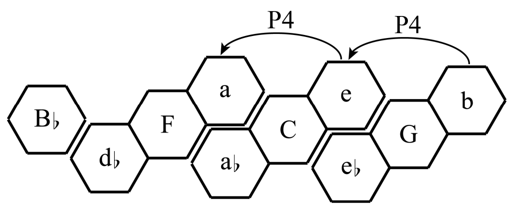
[77] If the spellings lined up with the periodicity of Gollin’s cycle, we might expect them to maintain a consistent spelling of the semitone. I have tried to be sparing in my use of Bartók’s notation as support for my arguments, for it simply will not work all the time. The classic study of Bartók’s pitch spellings is Malcolm Gillies, *Notation and Tonal Structure in Bartók’s Later Works* (New York: Garland, 1989). For the most part, I agree with Gillies’s statement that “Bartók’s pitch notations provide a key for the analyst in identifying the tonal structures of his music.”

addition to 7, the periodicities of diminished tendency cycles can be 1, 4, or 10 in addition to 7 — or 11, 8, 2, and 5 when reckoned negatively.



Example 2.39. The full collection of "correctly-spelled" pitches — a model for the diminished tendency.

2. Augmented and Diminished Tendencies in Bartók's Music

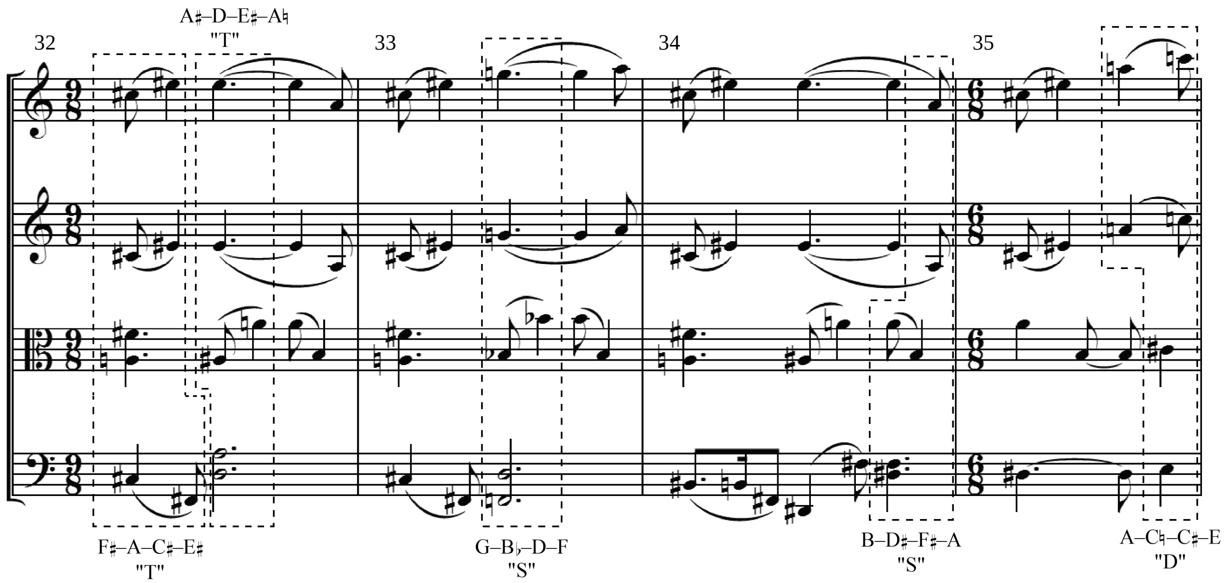
At this point, it may seem as though I have merely presented, by way of Boretz and Gollin, a different way to approach the widely-appropriated categories of "hexatonic" and "octatonic" scales, which are generally understood in contrast to the "diatonic" scale of normative major/minor tonality. It is true that (0369) chains progress through octatonic collections and (048) chains progress through hexatonic collections: just as Hauptmann's chain of major triads progresses through perfect-fifth-related diatonic collections, each (0369) or (048) creates an octatonic or hexatonic collection with each of its neighbors. But what I am proposing is actually a critique of such exclusionary categories. Explaining Bartók's music as an interaction between hexatonic, octatonic, and diatonic scales — in terms, that is, of fixed and static containers — is contrary to Bartók's self-conscious commitment to evolution. Instead of referring to interacting collections, I prefer to describe augmented and diminished tendencies exemplified by (048) and (0369) chains just as the major-third/minor-third cycle exemplifies the underlying, basic, diatonic tendency in major/minor tonality. It is a subtle but crucial distinction.

Second String Quartet

A good example of an analysis that describes Bartók's harmonic practice as an interaction between hexatonic and octatonic categories is Joseph Straus's analysis of the first movement of Bartók's Second String Quartet (1914-1917) in *Remaking the Past* (1990).[78] As Straus hears it, the movement "uses two distinct groups of harmonies," one of which is made up of "harmonies derived from the scalar hexachord 6-20 (014589)," subsets of a hexatonic collection.[79] Example 2.40 presents the opening of the second theme of the movement's exposition (presented in octaves by the violins), the first two measures of which Straus describes as belonging to a single hexatonic collection (E♯–F♯–A–A♯–C♯–D). As far as the first measure goes, this seems reasonable: Straus's hexatonic collection is expressed by two distinct harmonies, F♯–A–C♯–E♯ and A♯–D–E♯–A♮, shown in boxes in Example 2.40; while the viola's final quarter note B does not belong to this hexatonic collection, it can be construed as a neighbor note to A♯ and A♮. As the passage continues, however, it becomes harder to understand in this way. G — held for almost two beats in the violins in ms. 33 and the groundtone of the harmony G–B♭–D–F — doesn't belong to this collection, either, so Strauss explains it as an appoggiatura formation in which G resolves upwards by step to A. He does not mention the following two measures, where several other pitches fall outside his hexatonic collection: B♯ and D♯ in the cello in ms. 34 as well as C and E in the final sonority of ms. 35, A–C♮–C♯–E. Moreover, in ms. 34 B can no longer be understood as a passing note, having come to support the harmony B–D♯–F♯–A.

[78] Joseph Straus, *Remaking the Past* (Cambridge: Harvard University Press, 1990), pp. 113-121.

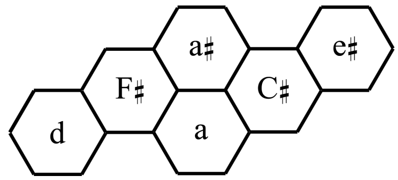
[79] *Ibid.*, p. 113.



Example 2.40. Ms. 32-25 from the first movement of the Second String Quartet (1914-1917).

Example 2.41 presents a Tonnetz interpretation of ms. 32 centered on F♯, for I understand this passage as expressing a variation of the F♯ minor species and all of ms. 32 as expressing a tonic function. Every pitch in A♯–D–E♯–A♮ is a major third above or below at least one pitch in F♯–A–C♯–E♯ — D a major third below F♯, A♯ a major third above F♯, A♮ a major third below C♯, E♯ is major third above C♯ — but this isn't surprising: transposition by a major third does not erase the boundaries of what we're used to thinking of as a hexatonic region.[80] In "As Wonderful as Star Clusters: Instruments for Gazing at Tonality in Schubert" (1999) Cohn suggests that the elements of perfect-fifth related hexatonic cycles — major and minor triads belonging to the

[80] In Strauss's terms, transposition by interval-class 4 preserves all of the pitch classes of his hexatonic collection. More specifically, since every hexatonic collection contains six instances of IC4 (its interval-class vector is 303630), transposition by interval-class 4 creates six common tones.



Example 2.41. A hexagonal representation of ms. 32, expressing tonic function.

same PL cycle — can express the same tonal function.[81] Cohn proposes that all the triads in the cycle containing B♭ major (B♭ minor, G♭ major, G♭ minor, and so on) have tonic function, all of the triads in the cycle containing E♭ major have subdominant function, and all of the triads in the cycle containing F major have dominant function. In the Second String Quartet, the harmonies are of course tetrachords rather than triads. We could reduce the tetrachords in ms. 32 to triads — F♯ minor and A♯ major (requiring enharmonic reinterpretation of D) — and say that they are in a "hexatonic pole" relation.[82] But I prefer to conceptualize such harmonies not merely as altered major or minor triads, however, but as new, independent harmonies genetically related to major and minor triads. At this point, it will suffice to note that F♯–A–C♯–E♯ and A♯–D–E♯–A♮ belong to the same hexatonic region and thus, for Cohn, have the same function.

The first harmony not belonging to this region is G–B♭–D–F on the second dotted-quarter beat of ms. 33, which is in a near-T_1 relation with F♯–A–C♯–E♯, 1 being a possible periodicity for (048) chains reckoned negatively. 1 can thus be understood as analogous to the descending major-third/minor-third chain's periodicity of a perfect fourth and analogous to a descending

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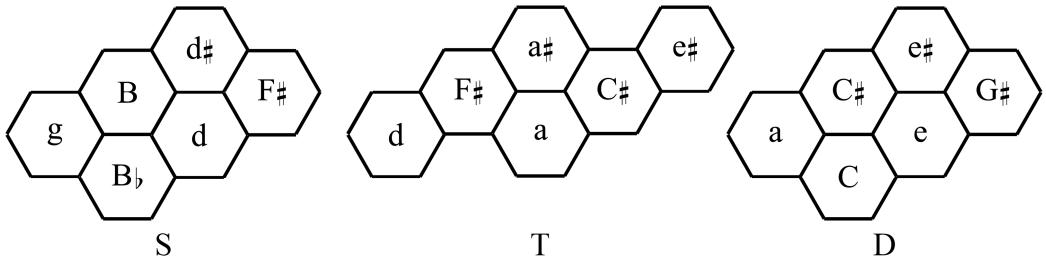
[81] Richard Cohn, "As Wonderful as Star Clusters: Instruments for Gazing at Tonality in Schubert," *19th-Century Music* 22.3 (1999), pp. 213-232. Also see Richard Cohn, "Square Dances with Cubes," *Journal of Music Theory* 42.2 (1998), pp. 283-296.

[82] Alternately, we could also reduce D–A♯–A♮–E♯ to D minor and note that it is related to F♯ minor by the LP transformation.

dominant (subdominant) transformation. More precisely, G–B♭–D–F largely belongs to the hexatonic region to the "left" of the tonic region, imbuing it with subdominant function. The respelling of A♯ as B♭ and E♯ as F highlighting this change in function — movement towards the subdominant often requires flatting of pitches — which we can visualize as a motion "southwest" of tonic. B–D♯–F♯–A, the harmony on beats two and three of ms. 34, is in a near-T_5 relation with F♯–A♯–C♯–E♯ and — since 5 is another possible periodicity for (048) chains reckoned negatively — likewise has subdominant function. In contrast to the two harmonies having tonic function, the two subdominant harmonies — G–B♭–D–F and B–D♯–F♯–A (also in a hexatonic pole relation when reduced to triads) — both contain pitches outside their hexatonic region and thus belong to *no* hexatonic collection: they cannot be understood as "derived from the scalar hexachord 6–20 (014589)." But this is entirely within the bounds of the tonal analogy: these chords are formed in the overlap of two functional regions just as seventh chords are formed in the overlap of triads in the major-third/minor-third cycle.

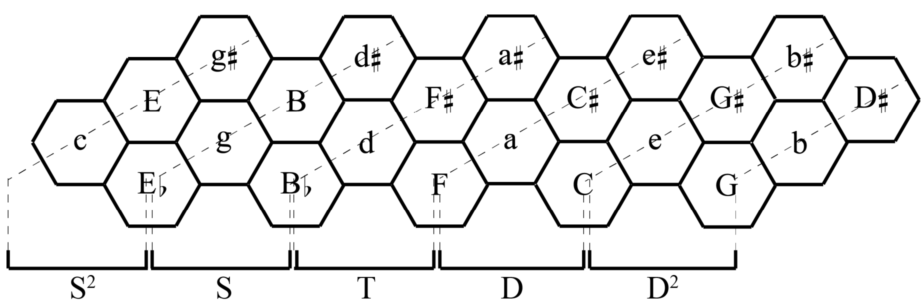
The harmony on beat two of ms. 35, A–C♮–C♯–E, is in a near-T_3 relation with F♯–A♮–C♯–E♯, 3 being a possible periodicity for (048) chains reckoned positively. It thus has dominant function and can be understood as belonging to a hexatonic region to the "right" of the tonic, shown in Example 2.42 alongside the dominant and subdominant regions. These four measures, in other words, alternate between harmonies having tonic and subdominant function before reaching a harmony having dominant function in ms. 35.2. The passage expresses a variation of F♯ minor heavily influenced by the augmented tendency. All of the possible dominant transformations in (048) chains — 3, 7, and 11 — are represented: 11 and 7 are reckoned negatively in harmonies having subdominant function and 3 is reckoned positively in a harmony having dominant function. We can understand this key variation, like that of the First Bagatelle, as having branched off F♯ minor, the only problem being that there is no cadence fully defining the key in a process analogous to circle-bending. On the downbeat of ms. 36 (not shown on the example) the cello ascends to F♯, the viola to D♯, and the violins descend to B, forming a B major triad and evaded cadence that leads into a prolonged continuation passage.

A conclusive cadence on F♯ (major/minor) does not occur until ms. 61 at the end of the secondary theme area, shown in Example 2.43. The wedge figure in ms. 60 — in which the violins descend while the viola and cello ascend — culminates with a cadence from B♯–D♯–E–G to F♯–A♮–A♯–C♯, the latter resting firmly in the center of the tonic "hexatonic" region. B♯–D♯–E–G, on the other hand, belongs to a region not shown in Example 2.42: it is T_6 — the dominant transformation T_3 reckoned positively or negatively *twice* — above *or* below F♯–A♮–A♯–C♯. So it could belong to either the functional region to the left of the subdominant region or to the region to right of the dominant region. Example 2.44 extends Example 2.42 to the left and right and labels these two enharmonically-equivalent regions S^2 and D^2. In an important way, B♯–D♯–E–G belongs to both: B♯–D♯ is related to F♯–A♮ by a diminished fifth and resolves downwards to A♯–C♯ by a whole step; E–G is related to A♯–C♯ by an augmented fourth and resolves upwards to F♯–A♮ by a whole step. Since this whole step can be understood as the 11 dominant transformation reckoned twice both positively and negatively, we can understand B♯–D♯ as belonging to S^2 (T_2 *above* A♯–C♯) and E–G to D^2 (T_2 *below* F♯–A♮). By uniting the enharmonically-equivalent S^2 and D^2 regions, this cadence is thus both an intensification and negation of the traditional D^7 to T cadence, B♯–D♯–E–G enacting a "cylinder bending" analogous to the circle-bending Hauptmann describes.



Example 2.42. Three "hexatonic" functional regions.

Example 2.43. The cadence in ms. 60-61.



Example 2.44. S^2, S, T, D, and D^2 functional regions.

"Three Autumn Teardrops"

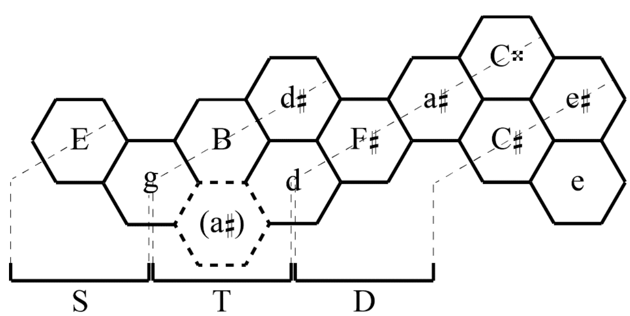
The first of Béla Bartók's *Five Songs*, Op. 16 (1916), a setting of "Three Autumn Teardrops" from Endre Ady's *Blood and Gold* (1907), is another case of the augmented tendency. Example 2.45 presents the song's opening twelve measures, which set the first of the poem's three tercets — the first "teardrop." The individual expression of key in this passage belongs to the species of B minor; the cadential tonic in ms. 10 and 12 is a segment of a (4,4,11)-cycle, the (048) chain G–B–D♯–D♮–F♯. Example 2.46 isolates the entire pitch collection of ms. 10-13 as a contiguous segment of the Tonnetz. In ms. 10 the tonic chord includes C𝄪 (rather than D♮, as in ms. 12), which, since it appears as part of an arpeggiated A♯ major triad in the right hand, we can relate to the tonic by extending the (048)-chain to include this triad: G–B–D♯–D♮–F♯–A♯–C𝄪–E♯. While the resultant minor third between C𝄪 and E♯ disturbs the strict progression of the (4,4,11)-cycle, it nevertheless conforms to the idea of an (048) chain as being successive (048)s with 1, 3, or 5 connectors (resulting in dominant transformations of 3, 7, or 11). There is thus some degree of enharmonic equivalence within each successive (048) of an augmented-tendency influenced key's referential (048)-chain. This equivalence, however, only seems to hold for determinations of function; C𝄪 and D♮, for example, might both be elements of the tonic here, but they have different derivations represented by different locations on the Tonnetz.[83]

As we proceed, keeping track of such equivalencies will be crucial. The chord E–G–A♯–B from ms. 10, which expresses subdominant function through the near-T_5 relation between it and the tonic, can only be represented as a contiguous area by assuming a relation

[83] The same relation held for B♭/A♯ and F/E♯ in the first movement of the Second String Quartet, except there the enharmonic switch signaled a change in function.

Őszi délben, őszi délben,	Autumn at noon, autumn at noon,
Óh, be nehéz	Oh, how hard it is
Kacagni a leányokra	To laugh at the young girls

Example 2.45. "Három Őszi Könnycsepp" [Three Autumn Teardrops], from *Five Songs*, Op. 16, No. 1 (1916), ms. 1-12.



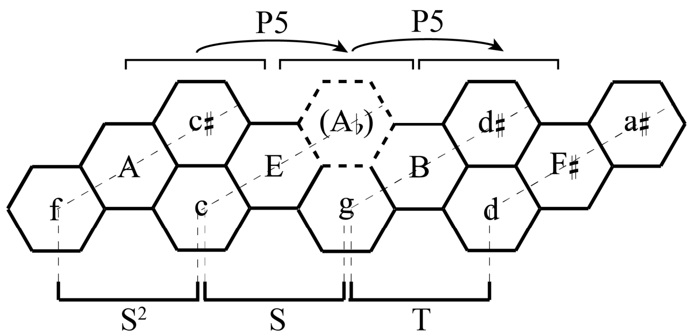
Example 2.46. The three functional regions of ms. 10-12.

between A♯ and B♭ analogous to that between D♮ and C𝄪. The chord A♯–C♯–E♯–E♮ in ms. 11 expresses dominant function through the near-T_{11} relation between it and the tonic. But while this chord is intervallically identical to E–G–A♯–B — they are related by a diminished fifth — its E♮ functions quite differently from the latter's A♯. The spellings of these analogous pitches, that is, betray their disparate origins. E♮ would need to be spelled D𝄪 in order to be analogous to A♯ within E–G–A♯–B, but we can understand it as the root of that chord, which has come into contact with A♯–C♯–E♯ through another act of cylinder-bending. This bending fully delineates and isolates the passage's key variation, and A♯–C♯–E♮–E♯, by combining a dominant functioning triad (A♯ minor) with the root of the subdominant (E♮), functions analogously to a circle-bending dominant seventh.

If we wanted to avoid such near-relations we could again suppose functional regions formed by perfect-fifth-related augmented triads — "hexatonic" regions. The tonic would be completely contained within its functional region, while E–G–A♯–B would be found in the overlap of the subdominant and tonic regions. By referring harmonies to perfect-fifth related functional areas, this construct allows us to avoid near relations, but not entirely — C𝄪 is not a perfect fifth above G♮. Such near perfect-fifth relations, however, are part of all minor key species, for the augmented-triad disjunction created by the overlap between tonic and dominant means that the dominant is not in a perfect-fifth relation with the tonic. In B minor, F♯–A♯–C♯ is only in a near perfect-fifth relation with B–D–F♯. Bartók's taking A♯ as the root of a major triad amplifies this innate disjunction, which is reflected in the (048) chain of "Three Autumn Teardrops": the additional major third between A♯ and C𝄪 shifts the pitch spellings from that point up by a major third.

Ms. 10-12 thus define the song's opening key variation. But what about the first nine measures? In what context, in other words, does this key definition arise? Ms. 1-6 alternate between chords in a near-T_4 relation: C♯–F–G♮–G♯ and F–A–C–E (ignoring for now the B–D–F pedal that persists until ms. 9). These alternated harmonies can be understood as a C♯ major triad with an alternative (lydian) fifth and an F major seventh chord. Just like in the quartet, this major-third relationship creates harmonic stasis; transposing harmonies by a major third preserves their function; in this case all the pitches except for G♮ belong to a single "hexatonic" functional region. This functional region is exactly a whole step below the tonic functional region. In ms. 7 and 8 the passage moves to E–A♭–G–B–D–F, an E major/minor tetrachord combined with the B–D–F pedal. Such major/minor tetrachords are central to each functional region, and since A major/minor is central to the functional region in ms. 1-6, we can understand the opening nine measures as progressing from A major/minor to E major/minor. Example 2.47 plots this interpretation on the Tonnetz, which allows us to add links to our referential (048) chain (making 11 its connector throughout): F–A–C♯–C♮–E–A♭–G–B–D♯–D♮–F♯–A♯–C𝄪–C♯–E♯. It also allows us to connect the opening measures to the final cadential passage and the tonic functional region, which has a central B major/minor tetrachord.

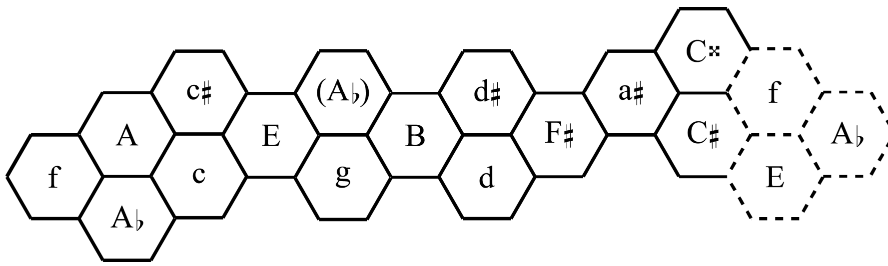
In ms.9, the B–D–F pedal finally comes into play, for when its B descends to A♯, a T_{11}-related dominant is created with the pedal's D and F. Then, in ms. 10, this harmony (A♯–D–F–A♭) seems to ascend largely stepwise to the B major/minor tetrachord. But the voice-leading suggests that the situation is actually a bit more complex. It is easy to hear A♯–D as part of the dominant functional region and as resolving upwards by semitone (the dominant transformation 11 rendered negatively): A♯ in the right hand resolves to B in the left, and D♮ resolves upwards to D♯ in register. Yet the right hand $^6_4$ figure in ms. 8-9 (D–F–A♭) moves downwards to another $^6_4$ in



Example 2.47. A major/minor (in ms. 1-6) shifting to E major/minor and B major/minor.

ms. 10 (B–D♯–F♯), suggesting that A♭ and F resolve *down* by whole step to F♯ and D♯. This voice-leading implies is that while A♯–D belongs to the dominant functional region, F–A♭ belongs to the S^2 region and resolves downwards by two semitones (the dominant transformation 11 rendered twice).

The song thus begins on the "subdominant of the subdominant" (ms. 1-6), progresses to the subdominant (ms. 7-8), and arrives finally on the tonic in ms. 10 by way of another cylinder-bending harmony, A♯–D–F–A♭. Much like our hypothetical "Monte" (Example 2.35, p. 128), which ascended through the major-third/minor-third chain to end in a definition of G major, the opening of "Three Autumn Teardrops" sequences through an (048) chain with an 11-connector and then defines and separates its "mutated" key. Rather than progressing through major triads, this key variation progresses through major/minor tetrachords: A, E, B, and then — because of the minor key species' innate disjunction, A♯ major/minor. The passage's sequenced harmony, in other words, is the major/minor tetrachord found in the overlap between (048)s. Example 2.48 presents the entire key variation on the Tonnetz. While this key variation clearly retains the basic contours of B minor, particularly in the way that it shifts up by a major third at the dominant, it is not merely an altered version of B minor: it is a new species of key genetically related to the abstract, communal idea of B minor.



Example 2.48. The key variation of “Three Autumn Teardrops,” ms. 1-12.

The Fourth Dirge

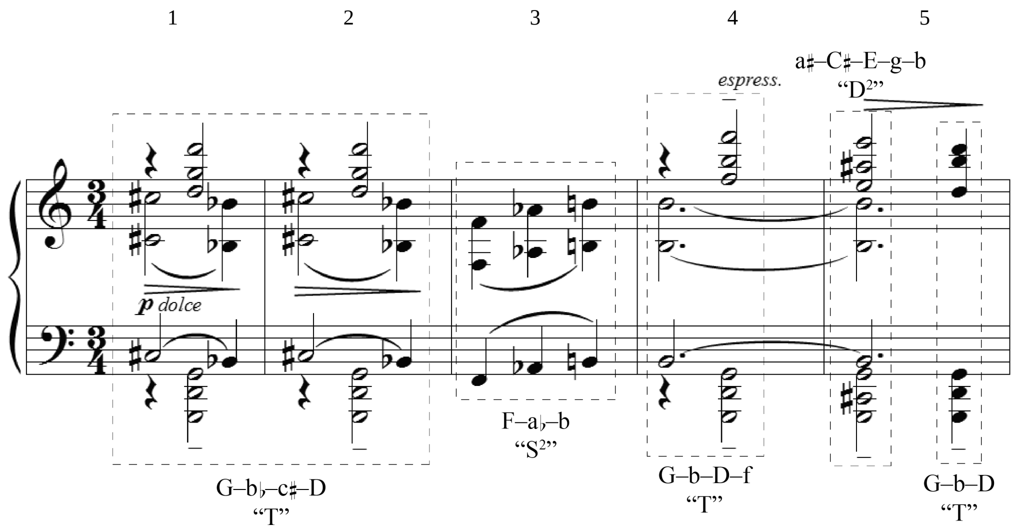
At this point, an attempt at formalization would be potentially useful, but as we have seen, Bartók’s harmonic practice — by being affected in an unquantifiable way by multiple tendencies — resists such attempts. Suppose, however, that a hypothetical key-species variation completely ruled by the augmented tendency did exist: we could say that it would have segments of cycles belonging to the genus of perfect-fifth-related (048) chains as fundamental harmonies, a function-preserving interval-class 4 transpositional interval derived from the generating interval of the augmented triad, and dominant transformations defined by the possible periodicities for (048) chains: 3, 7, and 11. In the same way, a key-species variation completely ruled by the diminished tendency would be understandable solely in terms of the properties of the genus of perfect-fifth-related (0369) chains. The fourth of Bartók’s *Four Dirges* (1910), in which the key variation is heavily influenced by the diminished tendency, provides a chance to explore this possibility.[84] Example 2.49 presents ms. 1-5 of the Fourth Dirge, which begins on its tonic: G–B♭–B♮–C♯–D, though B♭ and B♮ are not sounded together. This harmony is a segment of an (0369) chain with a 10-connector: G–B♭–C♯–B♮–D. The opening, in fact, is saturated with diminished harmonies: in ms. 1-5, the diminished triad within the tonic, G–B♭–C♯, alternates with the diminished triad F–A♭–B in ms. 3 and the diminished triad A♯–C♯–E in ms. 5.

Attempting to understand these harmonies functionally, however, introduces some difficulties inherent to diminished tendency-influenced species of key. Understanding the origin of diminished triads in the act of circle-bending, for example, creates a potential problem for functional determinations, a problem one already encounters in Hauptmann. Hauptmann describes how the three seventh chords created by "joining the limits" of a key — G–b–D | F, D | F–a–C, and b–D | F–a in C major — are the result of combining two triads and how each has an "organic existence" in the fact that they are created from notes found in two different triads. These three chords, unlike other seventh chords (such as a–C–e–G or e–G–b–D in C major), do not actually constitute a true joining together of "real triads."[85] In C major, a–C–e–G combines two complete, "real" triads — a–C–e and C–e–G — but G–b–D | F, D | F–a–C, and b–D | F–a contain at most one.[86] G–b–D | F and D | F–a–C are nevertheless functionally understandable for him because their *unreal* triads (as it were) — b–D | F and D | F–a — "relinquish" two of their pitches to their real triad: G–b–D | F has G as its groundtone and expresses dominant function, while D | F–a–C has F as its groundtone and expresses subdominant function. Yet b–D | F–a (or

[84] I say "completely" influenced because this description is an idealized one. In reality, key variation can be more or less influenced by either tendency or both. The two tendencies, in other words, are limit cases.

[85] Hauptmann, *Die Natur der Harmonik und der Metrik*, pp. 116-127.

[86] D | F–a is "diminished" for Hauptmann.



Example 2.49. Fourth Dirge (1910), ms. 1-5.

b–D | F–a♭ in C minor) contains *no* real triads and is therefore "rootless," neither subdominant *nor* dominant. It exemplifies, for him, the concept of circle-bending in its purest form, and its lack of a groundtone allows it to completely fill this role. In the same way, this absence of function is an asset in determining function within a diminished-tendency influenced key variation, for it provides a blank slate. b♮–D | F–a♭, despite having its origin in a groundless overlap of dominant and subdominant from a "source" key (C minor), could express tonic function in a key variation. Recall my description of (0369) chains as "successive diminished-seventh chords belonging to successive minor keys a perfect fifth apart": here the "minor keys" are the source keys.[87]

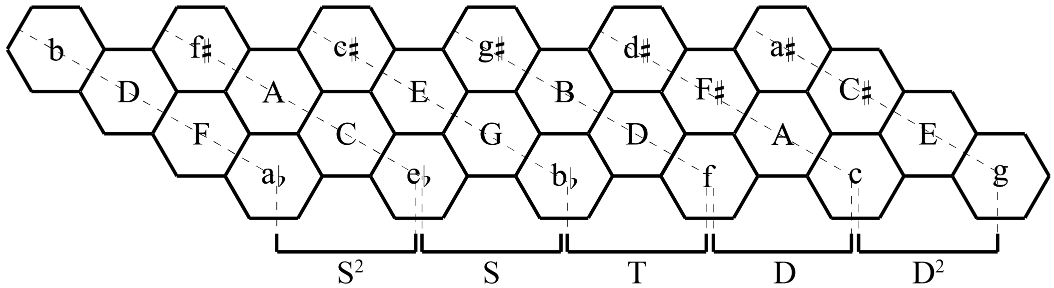
The opening of the Fourth Dirge presents a model case, for in order for C♯ to be represented contiguously with the rest of the G–B♮–B♭–D tonic, it must be brought around to it in an act of circle-bending. In a Hauptmannian row for G minor (C–e♭–G–b♭–D–f♯–A), C♯ is far

[87] Since, for Hauptmann, augmented triads are also created by combining two triads, they suffer from a similar problem. Augmented triads, however, have a definite single location, for they are made from adjacent triads rather than triads on opposite ends of a row.

from the tonic on the dominant side (above A), yet by creating the diminished-seventh chord c♯–E | G–b♭ through an act of circle-bending, c♯–E and G–b♭ — despite belonging to opposite sides — can be brought together: bending c♯–E around to the left joins it with the tonic, the source key for c♯–E | G–b♭ being D minor. By then invoking an enharmonicism between C♯ and D♭ analogous to the enharmonicism discussed in relation to augmented-tendency influenced keys (such as between C𝄪 and D♮ in "Three Autumn Teardrops), we can represent the tonic as a single, contiguous Tonnetz section. Example 2.50 presents the result of repeating this operation, creating the overall space in which the Dirge plays out and from which its individual expression of key is born. The figure also divides this space into "octatonic" functional areas that overlap by diminished-seventh chords. In terms of neo-Riemannian theory, each region is made up of triads related through the PR cycle.

By keeping in mind that perfect-fifth-related (0369) chains have dominant transformations of 1, 4, 7, or 10, we can locate the other harmonies in ms. 1-5 on this Tonnetz section. F–A♭–B♮ in ms. 3 originates in the S^2 region: its T_{10} relation with G–B♭–C♯ is not the result of the 10 dominant transformation applied positively, as one might initially think, but of the 7 dominant transformation applied negatively twice. The difference lies in the spelling of pitches: had A♭ been spelled G♯, we might have considered this harmony as overlapping with the tonic on the dominant side. One way to imagine this motion from tonic to subdominant and back is as an alternation between G minor and F minor triads both with alternative fifths — G–B♭–C♯–D and F–A♭–B♮–(C) — recalling Bartók's use of the alternation between $\hat{1}$ and ♭$\hat{7}$ in his early, more traditional folk song settings.[88] The spelling of F–A♭–B♮ and its in-register major

[88] Recall the opening of the first of Bartók's Romanian Folk Dances (1915), which descends into the subdominant from its tonic A minor through D major to G major before returning to A minor.



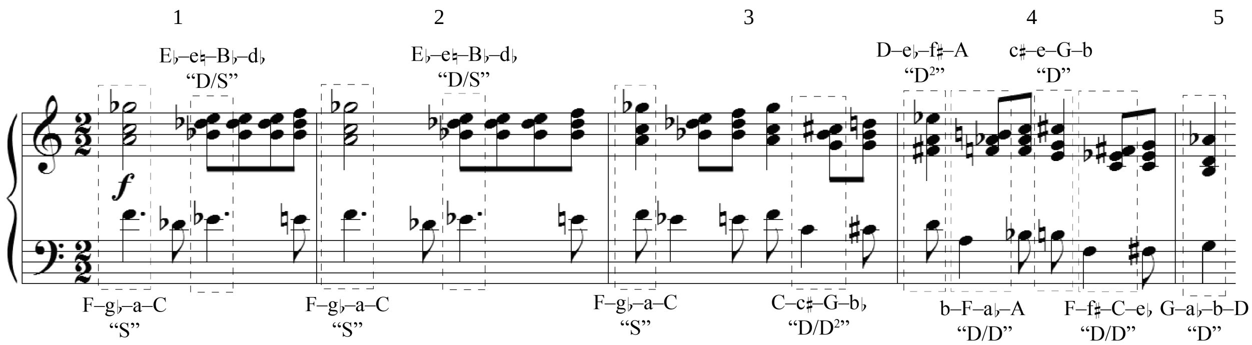
Example 2.50. The harmonic space in which the Fourth Dirge plays out.

second relationship with the tonic supports this view. F from ms. 3 is maintained into ms. 4, yet this pitch — now a minor seventh above G — is not reinterpreted as part of the tonic, but "resolves," passing through E at ms. 5.1 to D in ms. 5.3. A♯–C♯–E expresses dominant function; its T_2 relationship is, again, not the result of the 4 dominant transformation reckoned negatively but of the 7 dominant transformation applied twice. And Bartók's spelling is again crucial: had A♯ been spelled B♭, we would have considered a very different interpretation.

This passage is thus a diminished-tendency analogue to the first passage from the Second String Quartet: it alternates tonic and subdominant in ms. 1-4 before reaching dominant in ms. 5. In this case, however, we do not have to wait for a cadence; in ms. 5, A♯–C♯–E–G–B — the full harmony containing A♯–C♯–E — resolves to a tonic G major triad. If we think of B as B from F–A♭–B♮, from the S^2 region, then this harmony can be understood as bending the pitch collection into an open cylinder. There is already some precedent for this: in ms. 3, B from S^2 becomes B in T. B is then reinterpreted again as being in S^2 at the downbeat of ms. 5, joined with A♯–C♯–E–g from D^2. The conflict between the bounding pitches of a Hauptmannian row (d and D in C major) is thus expanded here into conflict between two differently spelled diminished-seventh chords: B–D–F–A♭ (S^2) and E♯–G♯–B–D (to the right of D^2).

The Tenth Bagatelle

Example 2.51 presents ms. 1-5 of Bartók's Tenth Bagatelle (1908), which I last discussed in Chapter 1 in connection with Edwin von der Nüll's roman-numeral analysis. Bartók described



Example 2.51. Tenth Bagatelle (1908), ms. 1-5.

the tonality of this Bagatelle as expressing C major, and the opening five measures (as von der Nüll noted) arpeggiate a G dominant-seventh chord from F at ms. 1-3 through D at ms. 4.1 and B at ms. 4.2 to G at ms. 5.1. G, D, and F are harmonized consistently as major triads with phrygian seconds, the *Wechselnoten* of von der Nüll's analysis: F–G♭–A–C, D–E♭–F♯–A, and G–A♭–B–D. Each of these chords is a segment of an (0369) chain with a 1-connector, the 1 manifesting in the minor ninths between the outer voices. The exception here, of course, is what tripped up von der Nüll: the harmonization of B in C♯–E–G–B, where B — unlike F, D, and G — is not related by perfect fifth to C. B marks the moment of disjunction in the sequence, the moment at which the minor third repeats. I will consider this exception shortly.

Example 2.52 shows that each bass pitch of the successive sequential iterations (on F, D, B, and G) is preceded by its lower neighbor a major second below, so I will be considering the harmonizations of these pitches as well. Example 2.53, which presents the arpeggiated pitches

Example 2.52. A diagram of the descent through G–b–D | F.

Example 2.53. The fundamental harmonies of ms. 1-5.

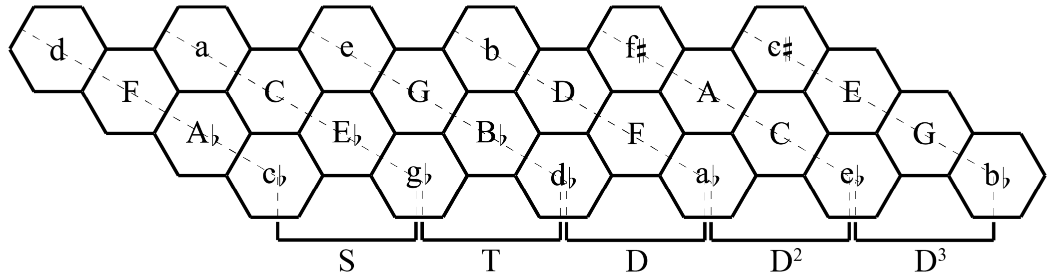
and their lower neighbors, thus contains the total harmonic collection under consideration. Since the relationships between the harmonizations of F, D, and G and the harmonizations of their lower neighbors is also consistent, including Bartók's pitch spellings, we can construct the space within which this variation of C major resides by taking the relationship between F–G♭–A–C and its lower-neighbor harmony (ms. 1-3.2) as a model to be iterated. While the diminished triads within the harmonies of the Dirge were made up of the prime, minor third, and lydian fourth (alternative fifth) of the triad, the diminished triads within the fundamental harmonies of the Bagatelle are made up of the major third, perfect fifth, and phrygian second (as an alternative prime) of the triad. They are, that is, inversions of certain harmonies in the Dirge: F–G♭–A–C is inversionally related to G–B♭–C♯–D, the former Lendvai's beta harmony and the latter his delta harmony (see Example 2.21, p. 112).[89] Since G–B♭–C♯–D is formed through bringing C♯–E from the dominant side into contact with G–B♭, F–G♭–A–C can be formed inversionally by bringing

[89] It goes without saying that these chords are also chords derived from the "interesting tritone" Bartók describes in "The Folk Songs of Hungary," discussed in Chapter 1.

E♭–G♭ from the *subdominant* side into contact with A–C. E♭–G♭ is thus bent around to A–C, the source key of a–C | E♭–g♭ being B♭ minor.

A pattern holds throughout this opening section: the right hand always presents an (036) over a fourth single pitch in the left hand. The first chord is formed from F in the left hand and G♭–A–C in the right. The harmonization of E♭ — a lower neighbor to F — continues this pattern: E–B♭–D♭ is presented in the right hand over E♭ in the left. In the harmonizations of these lower neighbors, however, the interval between outer voices is an augmented octave rather than a minor ninth. The relation between the diminished triads at each sequential level is also consistently T_7: E–B♭–D♭ is perfect-fifth transposition of A–C–G♭, for they belong to perfect-fifth related diminished-seventh chords: E♮–G–B♭–D♭ and A–C–E♭–G♭. These two harmonies belong to functional regions overlapping by diminished-seventh chords: E♭–E♮–B♭–D♭ expresses dominant function in relation to F–G♭–A–C, which itself expresses subdominant function in this variation of C major. This relation holds for the harmonizations of G and D and *their* lower neighbors: C–C♯–G–B♭ and F–F♯–C–E♭ express a similar localized dominant or leading-tone function in relation to D–E♭–F♯–A and G–A♭–B–D, respectively. Example 2.54, then, presents the entire harmonic content of these five measures. The implied or expected tonic is C–D♭–E–G.

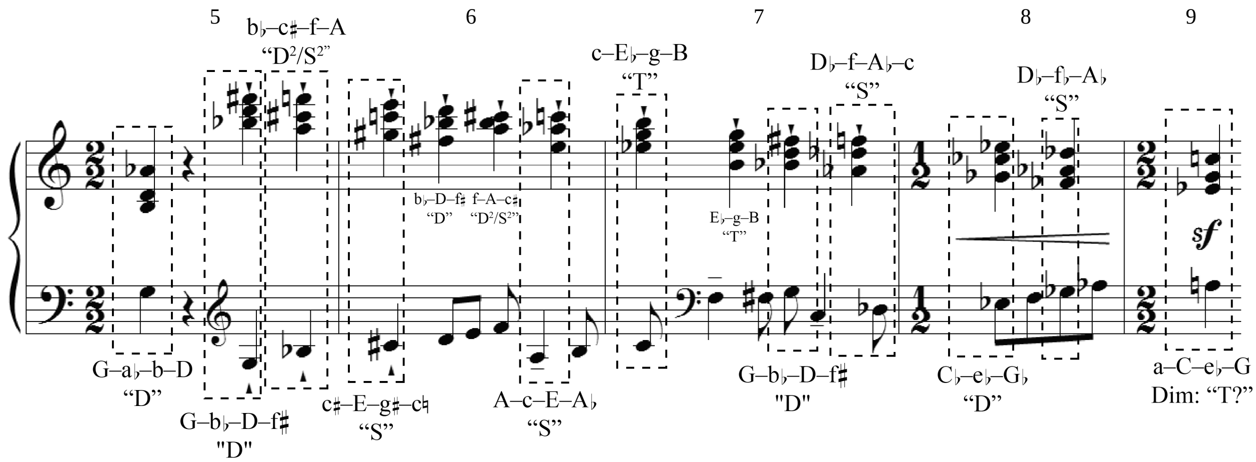
The third step of the sequence, the harmonization of B and its lower neighbor, then, is all that's missing. B–F–A♭, unlike the (036)s from the other lower-neighbor harmonies, is not related by perfect fifth to C♯–E–G, the (036) above B. If C♯ were spelled D♭, however, then we could understand these two (036)s as perfect-fifth related, for they would belong to perfect-fifth-related diminished-seventh chords: B–D–F–A♭ and E–G–B♭–D♭. Yet B, which is *not* perfect-fifth-related to C, lies a major third above the F–C–G–D axis and thus introduces the possibility of the pitches "g♯," "c♯," "d♯," *etc*., all sourced from the dominant side. This also introduces the



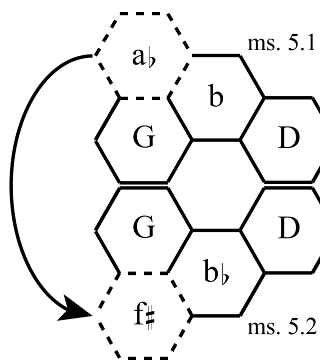
Example 2.54. The entire harmonic content in terms of functional regions.

possibility of another limited enharmonic switch: D♭ is the alternative prime of the tonic (C major), while C♯ is the alternative fifth of the dominant (G major). Each harmonization of a lower neighbor thus functions as a local dominant to the harmonizations of the arpeggiated dominant seventh. This third sequential step is crucial, for by expressing the resolution of D^2 to D — harmonizing B the same way as G — it makes the sequence “tonal” rather than totally chromatic. Overall, the passage begins in the subdominant region and, by moving to the left, ends up in the dominant region: it traverses a cylinder bent by enharmonically equating T with D^3 and S with D^2.

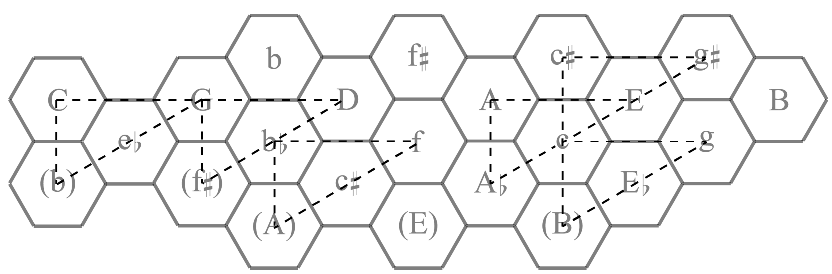
Finally, consider ms. 5-9, shown in Example 2.55. The chord at ms. 5.1 is the last chord of Example 2.51 (p. 148), G–A♭–B–D, which expresses dominant function. Beginning at ms. 5.2, a new phrase begins that continues the opening measures’ syncopated pattern in the left hand, but this time accompanied by augmented instead of diminished triads. As shown in Example 2.56, the first chord at ms. 5.2, G–B♭–D–F♯, is an inversion of G–A♭–B–D about the G–D perfect-fifth axis: we can think of this motion as an amplification of the P transformation from neo-Riemannian theory. The overall effect is of an abrupt shift from the diminished to the augmented tendency. Example 2.57 presents the complete pitch content of ms. 5-9 on the Tonnetz, making reinterpretations with enharmonic equivalence so that each transpositionally-related chord can be represented as a contiguous triangle (outlined with dashed lines). This allows us to give each



Example 2.55. Ms. 5-9 of the Tenth Bagatelle.



Example 2.56. The inversional relation between G–A♭–B–D in ms. 5.1 and G–B♭–F♯–D in ms. 5.

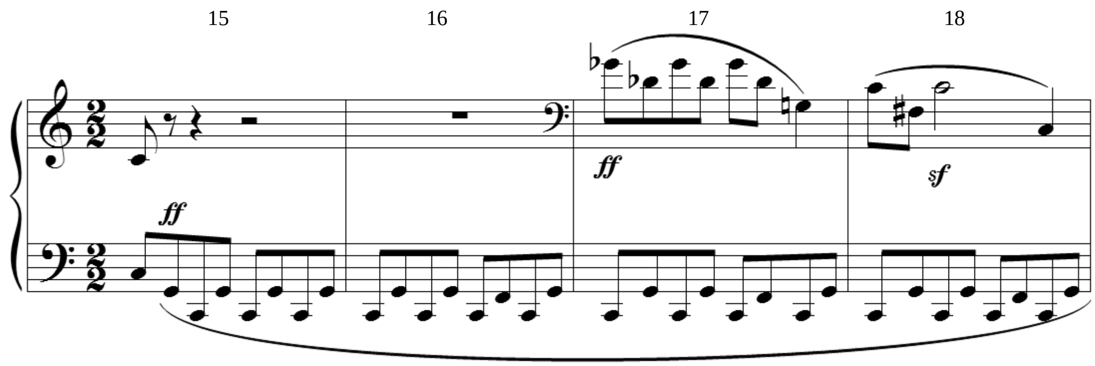


Example 2.57. Harmonies analogous to G–B♭–F♯–D in ms. 5-9.

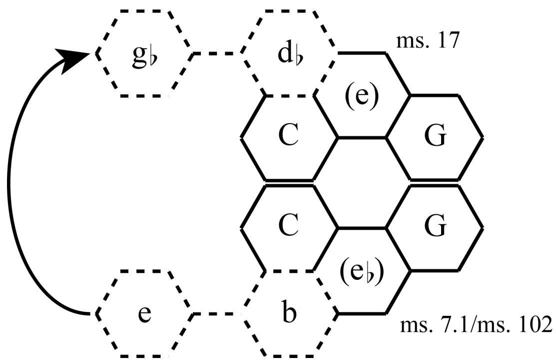
chord transpositionally related to G–B♭–D–F♯ — such as C♯–E–G♯–C♮ and A–C–E–A♭ in ms. 6 — a functional interpretation. If ms. 1-5 moved to the left on the Tonnetz, moving clockwise on a cylinder, ms. 5-9 reverse this motion and move counterclockwise, from D through D^2/S^2 to S and finally to T, C–E♭–G–B, at ms. 7.1.

Assuming G–B♭–D–F♯ retains the dominant function of G–A♭–B–D from ms. 5.1, this passage would seem to progress to D^2 and D^3, which is a bit complicated. I prefer instead to understand the D^2/S^2 region — which we will encounter again in Chapter 4 — as a cylinder-bending region that allows the dominant (G–B♭–D–F♯) to move to the tonic (C–E♭–G–B) by moving to the right three regions rather than one to the left, just as ms. 1-5 moved from S to D not by moving to the right but to the left. In ms. 7-9 the harmonies move back towards the diminished tendency: D♭–F–A♭–C at the end of ms. 7 still belongs to a "hexatonic" functional region, but the C♭ major and D♭ minor triads that follow could belong to either "hexatonic" or "octatonic" regions. The harmony at the end of the passage — A–C–E♭–G — is squarely in the tonic "octatonic" functional region of Example 2.54 (p. 151). Rather than the abrupt shift in ms. 5, here the augmented-tendency influenced harmonies gradually lose their characteristic features until all that is left are minor triads, which are very easily put into the service of the diminished tendency. After a passage of whole-tone harmonies (ms. 9-14) — "omega" harmonies that, according to Lendvai, serve to "dissolve" or "melt the sound material" before climaxes — the awaited diminished-tendency tonic (C–D♭–G♭–G) finally arrives in ms. 17, as shown in Example 2.58.[90] This harmony is in an inversional relation to the tonic at ms. 7.1 (G–E♭–G–B), similar to the relation between G–A♭–B–D and G–B♭–D–F♯ shown in Example 2.56 (p. 152). As Example 2.59 suggests, the tonic at ms. 17 (C–D♭–G♭–G) is in fact in precisely the same inversional relation with the final chord of the Bagatelle: C–E–G–B at ms. 102.

[90] Lendvai, *The Workshop of Bartók and Kodály*, p. 387.



Example 2.58. Tenth Bagatelle, ms. 15-18.



Example 2.59. The inversional relation between C–d♭–e–g♭–G and C–e♭–e♮–G–b.

As noted above, we will encounter the D^2/S^2 region again in Chapter 4, for such enharmonically equivalent regions (such as D/S^2 and D^2/S within the augmented tendency) play an important part in my interpretation of *The Wooden Prince* (1914-1916), that chapter's focus. Another idea that reappears in Chapter 4 is the interaction or combination of augmented and diminished tendencies. While in the relatively short pieces discussed here, one or the other tendency seems prominent, but in a larger work such as *The Wooden Prince* (Bartók's longest stage work), multiple key variations appear and interact. Over the course of its dialectical drama, in fact, possibly new, unforeseeable ways of defining keys emerge.

Chapter 3

Evolving Motives

Recall the following two statements by Bartók, quoted previously in Chapter 1: (1) "A given performance of a folk melody has never occurred before and will never occur again in exactly the same way," and (2) "I never repeat [an idea] unvaried" because of my "love of variation, of thematic transformation."[1] The similarities are striking, particularly the use of "never" to express his conviction that both folk melodies and his own compositional ideas are always changing, beliefs he could have easily articulated in more positive, declarative ways. He even goes so far as to use the double negative "never unvaried" when he could have simply said "always varied." I believe these grammatical constructions express an antagonism to the received notion that there is a static, original version of any musical idea, or that there is an unchanging model for every folk song. In terms of the fundamental analogies laid out in the previous chapters, these juxtaposed quotations suggest that the concept of a given motive is like a biological species and that the always-varied forms of this motive are like individual organisms belonging to that species. We can thus expand the biological analogy to a final, complete form:

	biology	folk music	keys	motives
external	individual organisms	individual performances	individual expressions of key	individual motivic instances
internal	species	abstract/communal idea of a folk song	abstract/communal idea of key	abstract concept of motive

[1] Béla Bartók, *Serbo-Croatian Folk Songs*, trans. Albert B. Lord (New York: Columbia University Press, 1951), p. 19; Denijs Dille, "A Béla Bartók Interview" (1937), *Bulletin of the International Kodály Society* 31.1 (2006), pp. 44-46.

Formulating a more complete view of the Bartókian motive, however, will require considering how it differs from contemporaneous theories, such as Schoenberg's "developing variation." In *Der musikalische Gedanke und die Logik, Technik, und Kunst seiner Darstellung* (1934-1936), Schoenberg writes that "composing is thinking in tones and rhythms," and in "Composition with Twelve Tones" (1941), he claims that "musical ideas must correspond to the laws of human logic."[2] For Schoenberg, it seems that musical objects are analogous *not* to individual organisms, but to thoughts or ideas that should follow one another coherently and logically. So, instead of comparing motives or themes to organisms, he echoes a more familiar *organicist* analogy:

> Above all, a piece of music is … an articulated organism whose organs, members, carry out specific functions in regard to both their external effect and their mutual relations .… To symbolize the construction of a musical form, perhaps one ought to think of a living body that is whole and centrally controlled.[3]

If the composition is itself like an organism, motives are analogous to that organism's parts, parts that work together under some kind of "central control" ensuring their comprehensibility. But how, then, would variation work? How would musical ideas change? In *Fundamentals of Musical Composition* (1937-1948), Schoenberg writes that in the process of variation, "changing every feature produces something foreign, incoherent, illogical" and that "the use of such remotely related motive-forms may endanger comprehensibility."[4] But if one should not vary a

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[2]Arnold Schoenberg, *The Musical Idea and the Logic, Technique, and Art of Its Presentation* (1934-1936), ed. and trans. Patricia Carpenter and Severine Neff (New York: Columbia University Press, 1995), p. 370; "Composition with Twelve Tones (1)" (1941), in *Style and Idea*, ed. Leonard Stein, trans. Leo Black (New York: St. Martin, 1975), p. 220.

[3] Schoenberg, *The Musical Idea*, p. 117.

[4] Arnold Schoenberg, *Fundamentals of Musical Composition* (1937-1948), ed. Gerald Strang (New York: St. Martin, 1970), pp. 8 and 17.

motive too greatly for fear of losing the comprehensibility of its relation to an original — a circumstance that, given his analogy, sounds a little like cancer — then how can truly new motives appear?

For Schoenberg, it is "developing variation" that allows for the production of new ideas, typically though a process he calls "liquidation," which "involves [letting] go as quickly as possible of everything characteristic … so that a clean slate, so to speak, is effected, providing the possibility for something different to come forward."[5] When one theme is liquidated it relinquishes many of its most characteristic features, leaving only indistinct thematic DNA, a primordial soup of thematic material from which a second theme then emerges. The musical ingredients common to both themes are thus *not* themselves themes, but the material from which themes are made. Liquidation doesn't relate two themes or motives through a common ancestor that is itself a theme or motive, but through subthematic material common to each theme. In this regard, Schoenberg's nomenclature is revealing. "*Gestalten*" and "figures" are larger than motives, which themselves are made up of smaller "features": intervals and rhythms.[6] There is a definite — if rather vaguely and disparately expressed — Schoenbergian hierarchy of musical ideas, and liquidation involves moving between the levels of the hierarchy.

This hierarchical conception is carried on by Schoenberg's followers, becoming the most recognizable characteristic of this particular, and very popular, strain of music analysis. Rudolph Reti writes in *The Thematic Process in Music* (1951) that "the composer ... strives toward

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[5] Arnold Schoenberg, *Coherence, Counterpoint, Instrumentation, Instruction in Form* (1917-1951), ed. Severine Neff, trans. Charlotte M. Cross and Severine Neff (Lincoln: University of Nebraska Press, 1994), p. 39; Schoenberg, *The Musical Idea*, p. 253.

[6] Schoenberg, *The Musical Idea*, p. 27.

homogeneity in the inner essence but at the same time toward variety in the outer appearance."[7] There is of course a connection between this formulation — a static "inner essence" shared by apparently different surface figures — and twelve-tone technique. Adorno, in attempting to trace what he called the "prehistory of serial music," makes just this connection:

> The themes of [Schoenberg's] First Quartet go a long way toward fulfilling the serial principle .… From [the secondary theme] Schoenberg derives the theme of the subsequent main section .… What the two thematic shapes, taken together, have in common with serial technique is that underlying both is a kind of "subcutaneous" material.[8]

This "subcutaneous" material acts as an unchanging point of reference lying at the deepest level of a hierarchy: "*Gestalten*" and "figures" *contain* the motives, which in turn *contain* intervals and rhythms.

Such an "inclusion hierarchy" follows from Schoenberg's organic analogy but is unsuitable for characterizing a more Bartókian motivic evolution. Rather than boring into a collection of folk songs in search of some essential musical or thematic core, Bartók's "internal form" is a way of *aggregating* the units that constitute its lowest rank (individual folk songs). A hierarchy of motive-forms would instead need to be an "aggregative" hierarchy, first described by Ernst Mayr in *The Growth of Biological Thought* (1982) and best understood as opposed to inclusion hierarchies, which Mayr called "constitutive" hierarchies.[9] In a constitutive hierarchy, units at one level are part of the units at the next higher level — they *constitute* those units. In an aggregative hierarchy, levels are just ways of grouping together the most basic units; a taxonomy

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[7] Rudolph Reti, *The Thematic Process in Music* (New York: MacMillan, 1951), p. 13.

[8] Theodor Adorno, "The Prehistory of Serial Music," in *Sound Figures* (1959), trans. Rodney Livingstone (Stanford: Stanford University Press, 1999), p. 59.

[9] Ernst Mayr, *The Growth of Biological Thought* (Cambridge: Harvard University Press, 1982), p. 65.

is an aggregative hierarchy. The two organicist analogies — "pieces are organisms" *vs*. "motives are organisms" — thus correspond to these two types of hierarchy: a single organism is a constitutive hierarchy (made up of cells that form into tissues, which form into organs and systems of organs), while species, genera, and so on (ways of *grouping* organisms) form an aggregative hierarchy. In short, if one motive-form derives from another, it is not *contained* in its antecedent in the same way a theme contains motives or a motive contains intervals. The trade-off is that this view requires understanding even the smallest musical objects as motives, but without consideration of how motives combine into themes — which of course they do. Crossing the line between organs and organisms involves a shift from a constitutive to an aggregative hierarchy, while crossing the line between motive and theme requires a shift from an aggregative to a constitutive hierarchy.

Viewing motivic forms as analogous to evolving organisms suggests a kind of evolutionary logic: if one motive-form is descended from another, the former *implies* the latter. A path from any one instance back to a common ancestor is a chain of implications terminating in the single form necessary for the existence of all the other instances sharing that ancestor. Such a logic, however, *cannot* be modeled on classical logic, because classical logic construes implication in terms of inclusion, creating a constitutive hierarchy. Any logic connecting motives in an aggregative hierarchy would have to be understood in some way separate from classical logic. A motive-form *can* be said to belong to its species in a way analogous to set-theoretical inclusion, but the relation between one instance and another *cannot*. The arrow connecting two forms in a motivic tree must be construed as something more generalized — something that behaves in many ways like inclusion, but in some ways not. At the end of the chapter I will thus suggest the category-theory idea of *subobjects* as a way to conceptualize a relation of descent as a generalization of set-theoretical inclusion. This will allow us to conceive of any sort of logic between motive-forms non-classically. But I would first like to take David Lewin's transformation networks and Dora Hanninen's "associative lineages" as starting points in exploring how motivic concepts can be represented as branches of a tree.

1. Motivic Trees

Transformation Graphs

Lewin defines a *transformation graph* as an "ordered quadruple (NODES, ARROW, SGP, TRANSIT)" satisfying four criteria, the first stipulating that (NODES, ARROW) is an "ordered pair … where NODES is a set and ARROW is a subset of NODES × NODES."[10] In other words, ARROW is some subset of every possible pair of elements of NODES. In the nomenclature of graph theory, such node/arrow systems are called *graphs*, defined similarly as "a pair G = (V, E) of sets such that $E \subseteq V^2$"[11] Elements of V (vertices or nodes) are typically depicted as points, while elements of E (edges) are depicted as line segments connecting their constituent pairs of vertices. Lewin's node/arrow systems are thus *directed* graphs in which arrows constitute edges and in which every edge/arrow is ordered (or "directed") by designating one of its vertices "initial" and the other "terminal."[12] Consider Example 3.1, Figure 0.1 from

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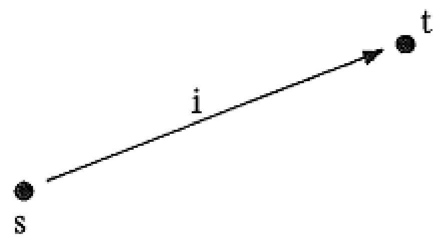
[10] David Lewin, *Generalized Musical Intervals and Transformations* (1987) (Oxford: Oxford University Press, 2007), pp. 193-195. I have replaced Lewin's "family" with "set," for I think we can safely disregard his concern that we might conflate the broad mathematical notion of a set with the specifically musical-theoretical concept of a pitch-class set.

[11] Reinhard Diestel, *Graph Theory*, 4th ed. (New York: Springer, 2010), p. 2.

[12] *Ibid.*, p. 28.

Lewin's *Generalized Musical Intervals and Transformations* (1987); in this case, V = (s, t) and E = [(s, t)]. The set of vertices (V) has two elements, s and t, and the set of edges (E) has one element, (s, t). Following common convention, Lewin depicts the graph's single directed edge as an arrow pointing towards its terminal vertex.[13] If E contained (t, s) rather than (s, t), the arrow would point in the other direction.



Example 3.1. Lewin's "Figure 0.1."

A *tree*, in contrast, is a "graph with no cycles," a cycle being a path of connected vertices that begins and ends on the same vertex.[14] Trees can be understood as graphs in which only one path exists between any pair of vertices. Genealogies are a good way to visualize these equivalent definitions. In a genealogical tree there is no way to proceed in a circle — to be one's own grandfather — and there is also only one relationship between any two vertices: one's cousin cannot also be one's niece. A *directed tree* is a tree containing only directed edges. A

[13] Lewin, *Generalized Musical Intervals and Transformations*, pp. 196-197. What turns a transformation *graph* into a transformation *network* is the function CONTENTS, which maps a graph's nodes onto a set S of objects to be transformed, "filling" each node with some musical object, like a pitch or triad. CONTENTS could thus map s in Lewin's "Figure 0.1" onto, say, a G major triad and could map t onto a C major triad, S in this case being the set containing those two triads.

[14] Charles Semple and Mike Steel, *Phylogenetics* (Oxford: Oxford University Press, 2003), p. 7. The two fields with the greatest use for tree theory are phylogenetics and computer programming, and I have thus found that the most useful texts for dealing with the graph-theoretical properties of trees come from these disciplines. For a description of graph theory within a musical context see Dora Hanninen, *A Theory of Music Analysis: On Segmentation and Associative Organization* (Rochester: University of Rochester Press, 2012), pp. 119-123.

rooted (or *oriented*) tree — such as the one in Example 3.2 — is a directed tree that has one vertex labeled the *root* (R) meeting the following criteria:

> (*a*) Each vertex V ≠ R is the terminal vertex of exactly one arrow.
> (*b*) R is the terminal vertex of no arrow.
> (*c*) For each vertex V ≠ R there is a path from R to V.[15]

(*a*) ensures that each node has only one direct ancestor, which in turn ensures that only one path exists between any distinct pair of vertices. If an arrow connected vertex A to vertex D, then Example 3.2 would not be a tree: there would be two separate paths from the root to vertex D as well as a cycle in the underlying undirected graph (R–A–D–B–R). (*b*) ensures that the root has no ancestor, and (*c*) ensures that there is a unique, directed path from the root to any vertex. Every vertex is descended from the root by only one path; all of the arrows in the tree are thus "oriented" away from the root.

A transformation *network* is a transformation graph in which NODES has been mapped into a set S of musical objects. In an essay on Stockhausen's *Klavierstück III* (1952), Lewin describes two options for constructing such transformation networks: (1) a narrative, blow-by-blow representation of a piece's chronological progress, and (2) an abstract space through which a piece moves.[16] Of these two choices, a motivic tree would seem to belong to the second. In Bartók, there are certainly passages — or entire works, such as the Fifth Improvisation discussed in Chapter 1 — that appear to move abstractly through the space of a tree, yet there are also motivic transformations or juxtapositions that would necessarily be absent from any such tree.

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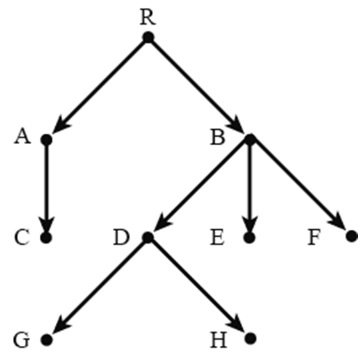
[15] This definition adapted from Donald Knuth, *The Art of Computer Programming* (1968), 3rd ed., Vol. 1 (Reading: Addison-Wesley, 1997), p. 373.

[16] David Lewin, "Making and Using a PCset Network for Stockhausen's *Klavierstuck III*," in *Musical Form and Transformation* (New Haven: Yale University Press, 1993), pp. 31-37.



Example 3.2. A rooted tree.

Since the latter measures degrees of identity and difference, direct transformations between distantly related objects cannot be represented by a single arrow, at least not without breaking the rules of the tree. I will be restricting my motivic networks to trees because I believe the "logic" of Bartók's motivic practice to be decidedly and rigorously evolutionary. Sudden, direct leaps from one part of a tree to another, which often account for the most immediate motivic relationships in Bartók's music, need to be considered, perhaps above all, but I believe the power of such moments derives from the disruptive nature of their relationship to the underlying arboreal logic.

Returning to Lewin's four criteria for transformation graphs (see p. 160), the second stipulates that "SGP is a semigroup," a set of musical transformations with an associative binary operation: SGP × SGP → SGP.[17] The set of pitch-class transpositions (mod 12) with "addition" is a familiar example. If one adds any two elements of the set, the result will always be another element of the set, so that $T_5 + T_8 = T_1$ (mod 12).[18] Every pair is associated with a third element. As suggested above, such closed algebraic structures resemble the "biological" species concept:

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[17] Lewin, *Generalized Musical Intervals and Transformations*, p. 195.

[18] T_n is not just a semigroup, of course, but a full-fledged group, for it has also inverse (T_{-n}) and identity (T_0) elements.

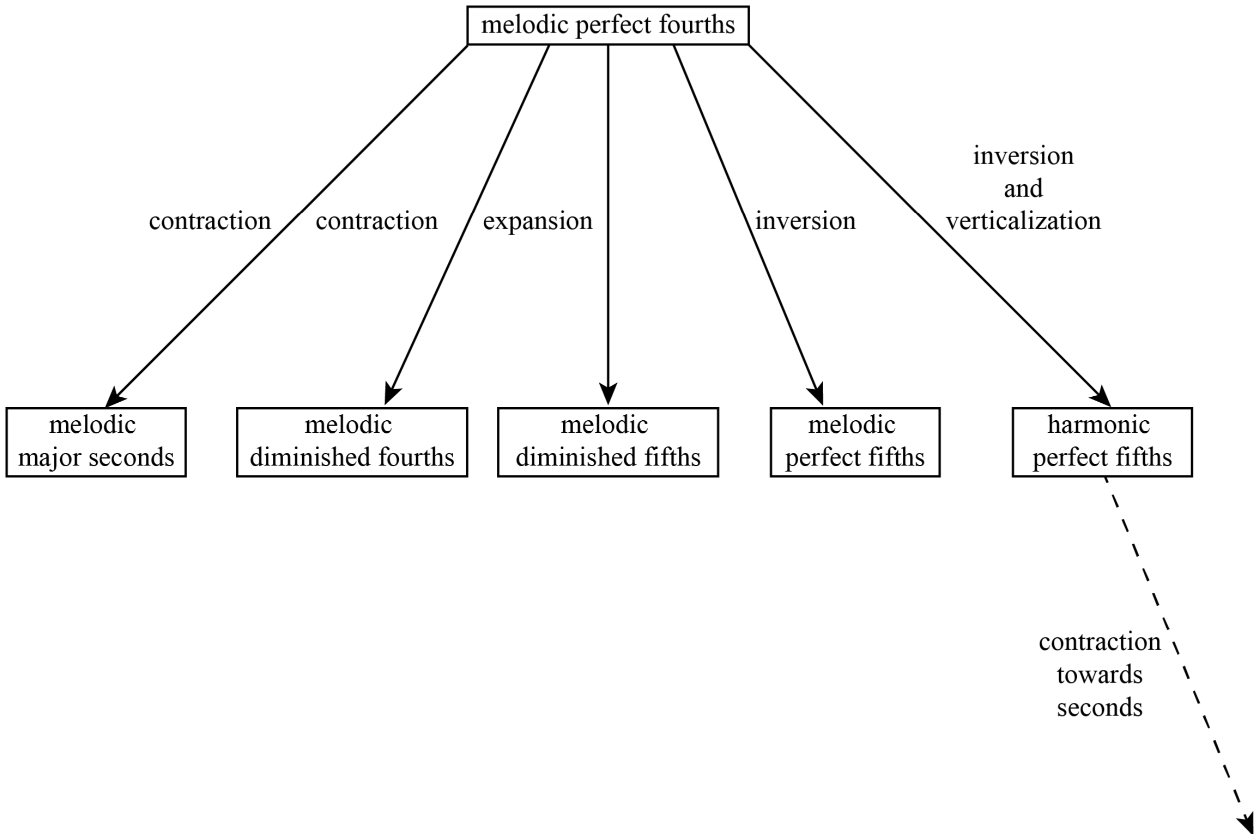
when any two transformations belonging to some set "reproduce" by way of their binary operator, another element of the same set is produced. A binary operator is thus a bit like sexual reproduction, but with absolutely no chance of variation or mutation. And in the same way, the set of musical objects that fill a network's nodes — Lewin's S — also belong to the same species, but since the set of transformations that relate them is closed, it is an "eternal" species that can never evolve. This becomes clearer when we consider Lewin's third criterion, which states that "TRANSIT is a function mapping ARROW into SGP."[19] By way of TRANSIT, each element of ARROW — a graph's set of directed edges — is mapped onto or labeled with some transformation belonging to SGP. This rule imposes an equivalence relation on the elements of S, so just as SGP is closed under its binary operation, S is closed in terms of the possible relations between its elements. The most obvious musical example comes from pitch-class set theory. The transposition/inversion group T_n/T_nI generates the pitch-class set equivalence classes, so in a transformation network that takes T_n/T_nI as its group, all of the elements of S belong to the same pitch-class set class.[20] Lewin calls a transformation network in which SGP is a group an *operation network*; mathematicians would say that SGP forms a "group action" on S.

[19] *Ibid.*, p. 195. The fourth and final criterion constitutes what Julian Hook has called the "path consistency condition," which ensures that given two distinct nodes and two separate chains of arrows connecting them, the semigroup products of the two chains are equal. Since only one path exists between any pair of distinct vertices in a tree, path-consistency will not concern us. Julian Hook, "Cross-Type Transformations and the Path Consistency Condition," *Music Theory Spectrum* 29.1 (2007), pp. 1-40.

[20] Other oft-cited examples include the twelve-tone operator group, which induces equivalence classes (row classes) on the set of twelve-tone rows, and the PLR group, which operates on and makes equivalent the twenty-four major and minor triads.

Association Digraphs

Example 3.3 reproduces my motivic tree for the Fifth Improvisation. The musical segments that belong to the “melodic perfect fourths” vertex are related by transposition, so



Example 3.3. A motivic tree for the Fifth Improvisation (1920).

constructing a group of transformations for them would be easy and would correspond to the way in which these objects seem to reproduce themselves in the piece. Incorporating the other vertices would also be possible, but one would need to account for verticalization, expansion, and so on by constructing some kind of direct product. The end result would be an induced equivalence between melodic and harmonic dyads of any size, which seems reasonable enough. Yet such absolute equivalency would also seem to negate the revelatory nature of the way the piece shows the relation (rather than equivalence) between qualitatively different and opposed categories, in this case between melody and harmonic accompaniment. How feasible would such incorporation be in a much larger-scale work that presents dozens of far more complicated motivic forms? In theory, one could progressively construct a group that induces an equivalence on the infinite set of every possible musical motive, but wouldn't one quickly arrive at a point where such an endeavor becomes trivial?

Dora Hanninen has solved similar issues with her "association digraphs," directed graphs that "depict … associative adjacency and relative proximity/distance among the segments of an associative set," the latter being a grouping of musical segments interrelated by various "contextual criteria" such as contour, intervallic order, and the like.[21] Hanninen frames the relation between her graphs and Lewin's networks this way:

> In a transformation network, each arrow … between nodes carries a *single* transformation and all transformations in the network derive from a *single* semigroup, SGP. So whereas the nodes and arrows of a transformation network involve *one* musical dimension and *one* set *S* whose members are interrelated by *individual* transformations drawn from *one* semigroup SGP, the nodes of an association digraph typically involve *many* musical dimensions, and thus also *many* sets *S*. A single edge in an association digraph can carry *multiple* contextual criteria, and the set of elements defined by contextual criteria evident in the graph need not form — in fact, it rarely forms — a mathematical semigroup, group, or direct product group.[22]

Through a prodigious use of italics, Hanninen emphasizes the difference between her digraphs and Lewin's networks in terms of the one versus the multiple, but it seems to me that the distinction lies more fundamentally in that Lewin's networks describe small, quantitative differences between equivalent theoretical objects while Hanninen's association digraphs

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[21] Hanninen, *A Theory of Music Analysis*, p. 123.

[22] *Ibid.*, pp. 404-405.

describe the many similarities between *not*-necessarily equivalent musical objects. Lewin's S is always a *classical* category, which as described in Chapter 1, is a class of musical objects defined by a particular list of observable properties. In this case, S is defined by the shared property of being related through SGP. Hanninen's associative sets, however, since they do not assume any sort of common essential features, can often form *prototypical* — also known as "fuzzy" — categories.[23] To put this in evolutionary terms, as Hanninen herself does in "Species Concepts in Biology and Perspectives on Association in Music Analysis" (2009), Lewin's S is based on a phenetic or morphological species concept in which all of its elements belong to the same equivalence class, whereas an associative set can easily be understood by way of some other species concept, such as the phylogenetic. This allows Hanninen to provocatively suggest the idea of "associative lineages," which, she writes, "are the musical counterparts of phylogenetic species concepts in biology."[24]

When the necessity for equivalence among the underlying set and the closure restrictions of algebraic groups are removed, however, the distinction between multiple similarities and single, small differences recedes: one implies the other in a kind of figure-ground relationship. Consider Example 3.4, which presents Hanninen's associative digraph for Schoenberg's *Klavierstück* Op. 23, No. 3 (1923), ms. 30-31, given in Example 3.5.[25] The "core criteria" at the top form what she calls a "core contextual common set," which "can serve as a formal model of

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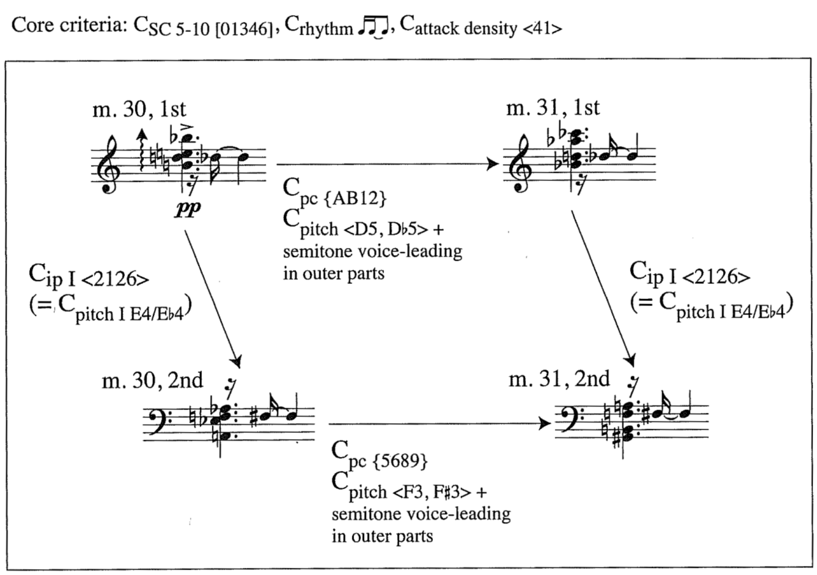
[23] *Ibid.*, p. 12.

[24] Dora Hanninen, "Species Concepts in Biology and Perspectives on Association in Music Analysis," *Perspective of New Music* 47.1 (2009), pp. 5-68. See also Hanninen, *A Theory of Music Analysis*, p. 159.

[25] Hanninen, *A Theory of Music Analysis*, p. 129. Subsequent references to this book will be given in parentheses in the main text.

musical motive” (123). The top two segments are associated not only by containing pitch classes 10, 11, 1, and 2, by diachronically executing the pitch sequence D5–D♭5, and by being related by semitonal voice-leading in their outer voices, but also by the core criteria: they belong to set-class (01346), follow the same rhythm (a sixteenth followed by a dotted eighth), and have the same “attack density” (four simultaneous pitches followed by a single pitch). If this were a transformation network, the analyst would assume these many similarities and then would choose a single small difference — such as I_0 — to label the arrow between them. Hanninen wants to avoid such assumptions or at least to expose them to scrutiny: “Analysts can take the [segments] they hear *as if* given. But they cannot take them for granted” (72).

The advantage of Hanninen’s approach is immediately obvious. Focusing on many similarities rather than single differences allows one to regard musical segments as “permeable, suffused by and interacting with their contexts” (7) One could thus imagine expanding her graph



Example 3.4. Hanninen’s “association digraph” for Schoenberg’s *Klavierstück* Op. 23, No. 3 (1923), ms. 30-31.

Example 3.5. Schoenberg, *Klavierstück*, Op. 23, No. 3 (1923), ms. 30-31.

to include a fifth — or sixth, or seventh, or eighth — musical segment associated with the top two merely, say, because it contains pitch classes 10, 11, 1, and 2, or because it executes the pitch sequence D5–D♭5. One can add to a digraph indefinitely, leading to the fascinating large-scale webs of association scattered throughout the book. In some ways, my motivic trees are an attempt to take her idea of "associative lineages" seriously, to develop a way of defining motivic species as distinct branches — or lineages, as it were — within larger motivic trees. But there is a road block that prevents us from simply exploring the idea of associative lineages in Hanninen's terms: while Hanninen explicitly frames her theory is "a theory of music analysis" rather than "aural perception or cognition," she also describes it as a "philosophical framework for thought about music" (15), thus making it difficult to conceive of motives as concepts separate from mental representations.

Phylogenetics

A more difficult task will be to reconstruct or infer motivic trees. For this reason, I will take the methods of phylogenetics as my model: attempting to infer evolutionary (or biologically "associative") lineages is the primary task of that branch of evolutionary biology. In an interesting historical parallel, the phylogenetic point of view in biological taxonomy arose in part as a response to the explicitly empiricist and positivistic approaches of phenetics (or "numerical taxonomy"), which, like American music theory, emerged as an academic discipline in the 1950s and 60s.[26] Early pheneticists, such as Robert Sokal and Peter Sneath, wanted to bring objectivity back to taxonomy, which they saw as relying far too much on the subjective intuition of its practitioners. Phenetics, in contrast, measures simple similarity (*homology*) between organisms, constructs "distance matrices," and then makes classifications based on small differences between biological units (*taxa*) that are otherwise homologous. Phylogenetics instead uses evolutionarily weighted data to construct phylogenies and then organizes taxa (such as species) into groups based on *synapomorphies*: shared, evolutionarily defined traits (or "inferred inherited similarities").[27] This directly recalls the distinction I made between Lewin and Hanninen, for we are again confronted with two opposed approaches: (1) the *phenetic*, which empirically observes homologies using raw data and then groups based on small differences within a distance matrix, and (2) the *phylogenetic*, which presupposes evolutionary derivations for data, relative weights for characters, and then groups based on synapomorphies (shared, evolutionarily defined traits), which manifest as isolated branches on a tree.[28]

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[26] Hanninen goes into detail regarding these parallels in "Species Concepts in Biology and Perspectives on Association in Music Analysis," pp. 5-6.

[27] Niles Eldredge and Joel Cracraft, *Phylogenetic Patterns and the Evolutionary Process* (New York: Columbia University Press, 1980), p. 36.

[28] See Randall T. Schuh and Andrew V.Z. Brower, *Biological Systematics* (2000), rev. ed. (Ithaca: Cornell University Press, 2009), pp. 3-13. Schuh and Brower point out that the fields of "textual criticism and historical linguistics both use methods nearly identical to [phylogenetics] for establishing historical relationships among manuscripts and languages, respectively." This comes as no surprise to us: Bartók's system of classifying folk tunes — inspired by historical linguistics — is essentially phylogenetic.

The traditional phylogenetic method for making genealogical inferences is the "maximization of parsimony." The authors of *Cladistics: The Theory and Practice of Parsimony Analysis* (1998) describe parsimony as "the universal criterion for choosing between alternative hypotheses of character distribution" as well as "a universal criterion for choosing between any competing scientific hypotheses."[29] Phylogeneticists thus use maximum parsimony to reconstruct trees containing the *least* possible number of "character changes," characters being attributes of the taxa under consideration. Characters can be understood more formally as functions that map a set of *states on* to the set of taxa. If one is considering a set of melodic groupings, for instance, one character could register cardinality (the number of consecutive pitches in a segment) by mapping from some set of natural numbers (possible states) to the set of melodic segments. In Hanninen's terminology, each character state would correspond to a single criterion that supports what she calls a "phenosegment," a readily perceptible musical segment. Most segments are supported by an entire collection of criteria/characters, which we can understand as a sort of genetic code or musical genome.[30]

To reiterate, the goal of parsimony maximization is to limit the total number of character changes within a tree. Changes in character are indexed by a *changing set* and a *changing number*. Consider a graph made up of a set of vertices (V) and a set of directed edges (E), as well as a character *f* on V that assigns to every vertex one element of a set of states. Following the definition given by Semple and Steel, the changing set of *f* is the subset of E containing every

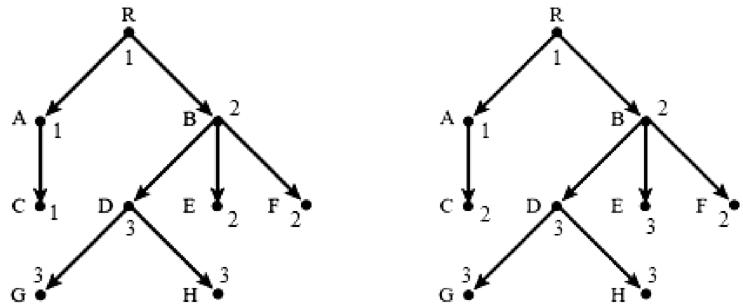
[29] Ian J. Kitching, Peter L. Forey, Christopher J. Humphries, and David M. Williams, *Cladistics: The Theory and Practice of Parsimony Analysis*, 2nd ed. (Oxford: Oxford University Press, 1998), p. 5.

[30] Hanninen, *A Theory of Music Analysis*, p. 65.

element (u,v) such that $f(u) \neq f(v)$.[31] It is the set of every directed edge whose terminal vertex has a state mapped onto it different from that mapped onto its initial vertex. Put simply, the changing set is the set of every "arrow" in a tree marking a change in a particular attribute. In the example of a cardinality character, the changing set would be every directed edge connecting two melodic segments with different cardinalities: a melodic segment with, say, four notes and one with five. The changing number is the number of arrows the changing set contains. Maximum parsimony is achieved when one finds a tree (or trees) that *minimize* this changing number, so that elements sharing attributes are grouped together as much as possible. In particular, if n is the number of states belonging to a character, then the minimum possible changing number for that character is n – 1. A tree is said to be a maximum-parsimony tree for a particular character if the changing number for that character is n – 1.

Example 3.6 presents two versions of the tree shown in Example 3.2 (p. 163) with an element of a hypothetical three-state character (1, 2, 3) mapped onto each vertex. The changing set for Example 3.6a would be [(R, B), (B, D)], for those two arrows connect vertices onto which different states have been mapped. The mapped states change from 1 to 2 for (R, B) and from 2 to 3 for (B, D). Since N (the cardinality of our set of states) is 3 and [(R, B), (B, D)] contains two elements, Example 3.6a is a maximum-parsimony tree for this character: its changing number equals n – 1. The changing set for Example 3.6b, on the other hand, is [(R, B), (A, C), (B, D), (B, E)], making its changing number 4. It is thus *not* a maximum-parsimony tree. In a maximum-parsimony tree, each character state induces a *subtree*: the vertices sharing a particular state form a tree themselves. In Example 3.6a, the subgraph induced by (1) has the vertex set (R, A, C), the subgraph induced by (2) has the vertex set (B, E, F), and the subgraph induced by (3) has the

[31] Semple and Steel, *Phylogenetics*, pp. 84-85.



a. b.

Example 3.6. Two different character-state mappings.

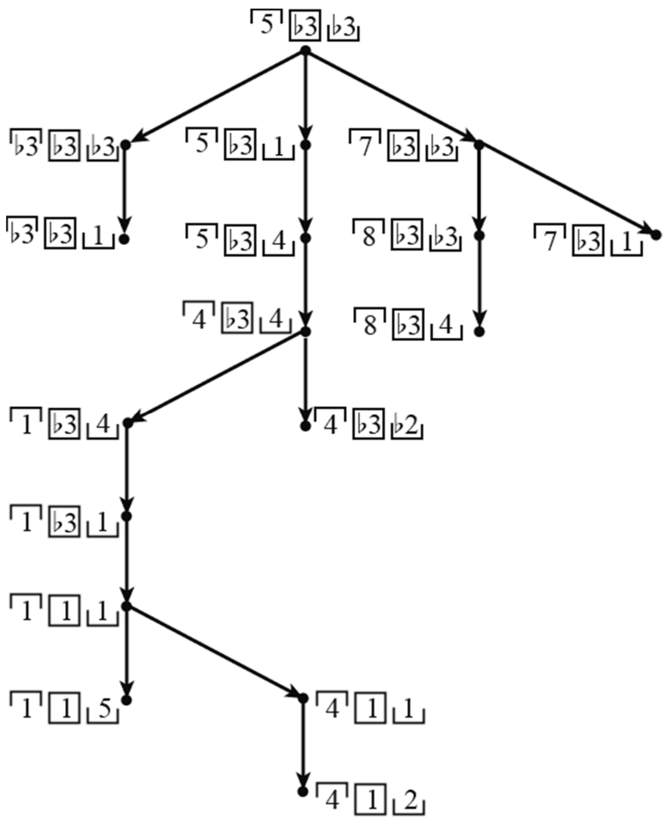
vertex set (D, G, H). Each of these three subgraphs is *connected* in a very intuitive way: any two vertices belonging to one of them are linked by some path. On Example 3.6b, in contrast, the subgraph induced by (2) is in two pieces, containing no path from vertex C to either vertex B or F. In biology, the reasoning behind the desire for induced subgraphs to be connected is obvious: as Eldredge and Cracraft explain, "the evolutionary process produces, as an expectation, a nested set of evolutionary novelties."[32] The "novelties" in Example 3.6a are character states 2 and 3, which are grouped together into three connected subtrees: each creates a distinct lineage with a common ancestor, what phylogeneticists call *monophyletic groups*.

For an example closer to home, we can return to Bartók's system of folk-tune taxonomy. Attributes such as "number of syllables per text line" can easily be understood as characters, and since Bartók suggests evolutionary relationships between attributes, they are *weighted*: changes to one require more taxonomical or evolutionary work than changes to another. The number of syllables per text line, for example, has a greater weight than the pitch level at the second caesura; Bartók makes this clear by using the former to make taxonomical determinations at a higher level than the latter. Recall from Chapter 1 that "old-style" Hungarian folk tunes have

[32] Eldredge and Cracraft, *Phylogenetic Patterns and the Evolutionary Process*, p. 11.

four text lines ending with a caesura and that Bartók classifies tunes according to the pitch levels at the first, second, and third caesuras. He uses boxes around scale degrees to represent each caesura: an entire box for the second (or main) caesura, the upper half of a box for the first, and the lower half of a box for the third. These three pitch levels together make up what he calls a "fixed formula," such as ⌜♭3⌝ [5] ⌞4⌟ . The pitch level at the main (second) caesura has the greatest weight, followed by the pitch level at the first caesura, followed in turn by the pitch level at the third caesura. The pitch level at a tune's third caesura can change without having any particularly large effect on the tune's classification, while a change in the pitch level at the main caesura has a huge effect on its classification.

Example 3.7 infers a tree from the seventeen fixed formulas Bartók placed in class A.I that have either ♭$\hat{3}$ or $\hat{1}$ at the main caesura. In the case of these fixed formulas, pitch level at the main caesura is thus a binary character, having two states: [♭3] or [1]. It is a maximum-parsimony tree for this character because it divides the tree into two subtrees, each of which is connected. Its changing number equals n – 1, for its changing set contains only one element: the arrow (⌜1⌝ [♭3] ⌞1⌟, ⌜1⌝ [1] ⌞1⌟). Pitch level at the first caesura is a six-state character, containing ⌜5⌝, ⌜♭3⌝, ⌜7⌝, ⌜8⌝, ⌜1⌝, and ⌜4⌝. Its changing number for this tree is 6, which means that it is only *nearly* a maximum-parsimony tree, containing one too many arrows in its changing set. What prevents it from being a maximum-parsimony tree is the fact that ⌜4⌝ "convergently" evolves in two separate lineages. If ⌜4⌝ truly represents the same attribute in both lineages, then ⌜4⌝ is false as an observed homology: it would only be an apparent similarity. But what if we consider, say, ⌜4⌝ [♭3] and ⌜4⌝ [1] to be different manifestations of ⌜4⌝ by taking the main and first-caesura pitch levels together as a single eight-state character? It would then be a maximum-parsimony tree for that character: its changing number would equal 7, n – 1.



Example 3.7. A fixed-formula tree.

Notice how the maximum parsimony of such characters is reflected in the way that, following the rough order given by Bartók, any two fixed formulas connected by an arrow differ by only a single change in pitch level. He specifically gives 5 ♭3 ♭3 as the “prototype” and then either explicitly suggests an order or implies one by describing the relative scarcity of character states in descending order. The arrows belonging to changing sets thus form the possible dividing points between taxonomical groups, and these groups would be the same in any tree that followed Bartók’s weighting/order and aimed for maximum parsimony. The two lineages or subtrees separated by the single element of the changing set for the main-caesura pitch-level character form groups at some taxonomical level, the subtrees separated by the seven elements of the eight-state character form groups at a lower taxonomical level, and so on. These groups are supported by synapomorphy and each creates a monophyletic group: they are "nested sets." All of the fixed formulas containing [1], for example, form a monophyletic group with connected induced subtree.

In phylogenetics, species are "minimal monophyletic groups": monophyletic groups defined by the character with the least weight.[33] In this case, species would be the subtrees defined by the eight-state character corresponding to the main and first-caesura pitch levels taken together. We could understand each species to be a function from the set of fixed formulas to the binary set containing "true" and "false," the only fixed formulas mapping onto "true" for a given species being those belonging to a particular minimal monophyletic group. The tree itself thus defines the functions that represent the *concepts* of fixed-formula species, as well as the concepts for the nested groups at higher taxonomical levels, whatever one wishes to call them. This definition of species differs from the one given in Chapter 1, where species were defined by each fixed formula, and the individuals belonging to each species were assumed to be individual performances of folk songs. The reason for this difference is simply a change in perspective: in the foregoing discussion, fixed formulas, rather than performances, were taken to be the individuals at the lowest level, the individuals aggregated into successively higher levels.

Fifth Improvisation

I would like to now return to Bartók's Fifth Improvisation (reproduced in Example 1.13, pp. 53-54), approaching it from both perspectives outlined above: (1) from a phylogenetic

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[33] *Ibid.*, p. 89.

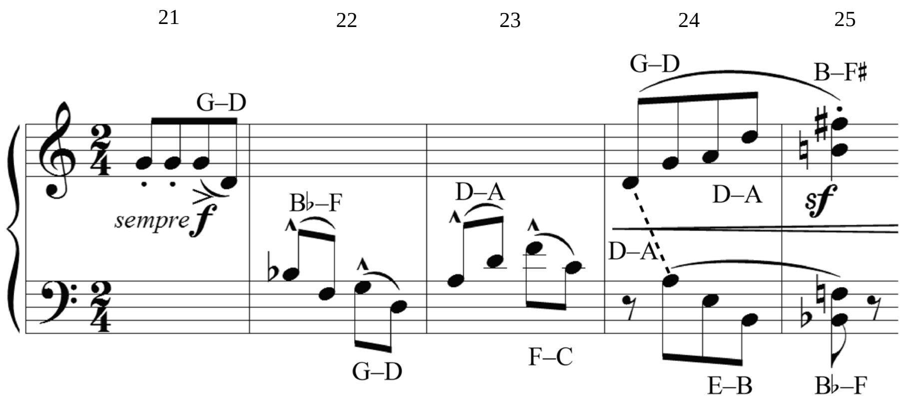
approach informed by Hanninen, and (2) from a Lewinian transformational approach, which reflects some elements of phenetic taxonomy. A *completely* phenetic approach, of course, would extract the motive-forms from the piece and then find distances among them in terms of some abstract geometric space, one that is ostensibly common to all music or at least to all of the music of a given historical/cultural repertoire. Yet the figure/ground relationship I have been aiming to expose is only that between small differences among virtually equivalent objects and multiple similarities among non-equivalent objects. A truly phenetic approach would not work here at all, for just as phenetic taxonomy aims for atemporal classifications with no supposed evolutionary relationships, it would not consider the kinds of relationships that a single piece creates within its own temporal unfolding.[34] My method will be to interpret the motives in evolutionary terms in both cases and then to construct two different trees with the same topology but different labeling.

G–D, the melodic perfect fifth isolated in ms. 21 (of the Fifth Improvisation), serves as the root of the tree, because this interval begins the piece's evolutionary process by being immediately reproduced by transposition, the upper pitches outlining a G minor seventh chord. Recall that this repetition follows a cyclical 3-4 pattern until the pattern is broken by B/F♯ in ms. 25. From this point on, I will be notating melodic (consecutive) dyads with dashes (*e.g.*, G–D) and harmonic (simultaneous) ones with slashes (*e.g.*, B/F♯). Example 3.8 and Example 3.9 reproduce examples from Chapter 1: the former annotates ms. 21-25, and the latter organizes the

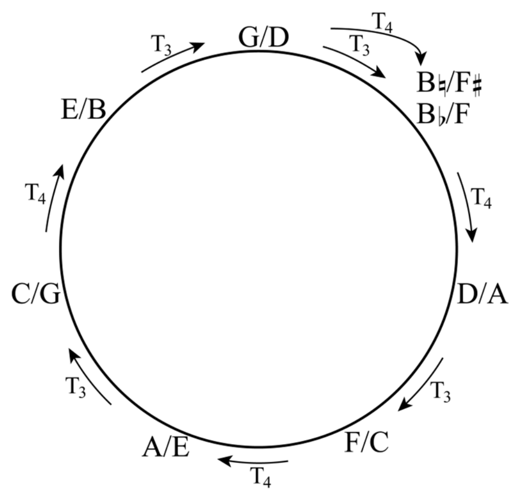
[34] The closest music theory has come to a truly phenetic approach is likely Allen Forte's "Pitch-Class Set Genera and the Origin of Modern Harmonic Species" (1988), in which he devises genera, subgenera, and supragenera of pitch-class sets using language borrowed from biology. Like a pheneticist, Forte aims only towards a classificatory system, not towards the inference of actual genealogical relationships. See "Pitch-Class Set Genera and the Origin of Modern Harmonic Species," *Journal of Music Theory* 32.2 (1988), pp. 187-270.

3-4 pattern into a circle. Example 3.10 translates this circle rather easily into the logic of a Lewinian path in which the cyclical 3-4 pattern turns into a path of alternating T_3 and T_4-labeled arrows connecting G–D to B♭–F, B♭–F to D–A, and so on, following the diachronic appearance of motive-forms in the piece. The T_3 reconnecting E–B back to G–D in Example 3.9 is not directly represented in the tree, but since it is the repetition of minor thirds in the sequence E–G–B♭ that causes the disjunction in the circular representation, this seems fitting. No E of any kind is present in the folk tune, after all, and it is the imposition of the tritone created in ms. 24-25 as E–B is juxtaposed with B♭/F that acts to break the circle, introduce B/F♯, and push the various motive-forms irrevocably towards verticalization. While the "leap" from E–B to B♭/F breaks the rules of the tree, that's what lends power to the moment, the climactic endpoint of the four-measure *stringendo* grouping the entire process together.

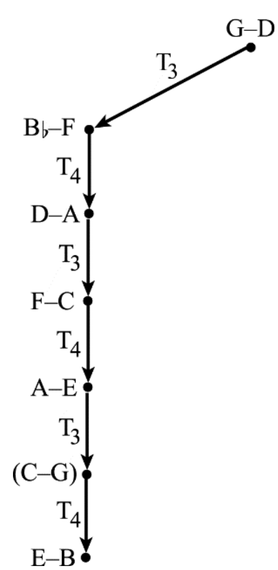
B♭/F and B/F♯ are related to G–D by T_3 and T_4 respectively, but also through verticalization. As shown in Example 3.11, by interpolating a node containing G/D between G–D and the dyad pair B♭/F and B/F♯, G/D becomes the ancestor common to all harmonic forms. In ms. 26, B/F♯ ascends directly to C/G at the *a tempo* marking the beginning of the next statement of the folk tune, but this stepwise voice-leading does not conform to the transpositional logic of this statement of the tune. Example 3.12 reproduces the annotations I added to ms. 27-35 in Chapter 1. Note how the harmonic perfect fifths in this passage combine to create seventh chords, which when strung together reveal a logic rather like that of the melodic perfect fifths in ms. 21-24: A♭/E♭ combines with C/G in ms. 27 to create the seventh chord A♭–C–E♭–G and with F/C in m. 29 to create the seventh chord F–A♭–C–E♭. With the addition of E♭/B♭ in ms. 33, one can construct another chain of thirds: F–A♭–C–E♭–G–B♭. Example 3.13 depicts the accompaniment in this passage in terms of such an analogous 3-4 cycle, which, since it contains



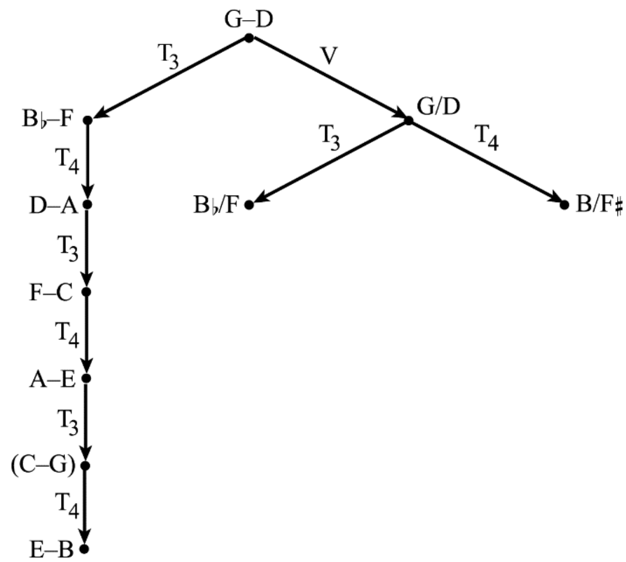
Example 3.8. The succession of the perfect-fourth motive and its bifurcation.



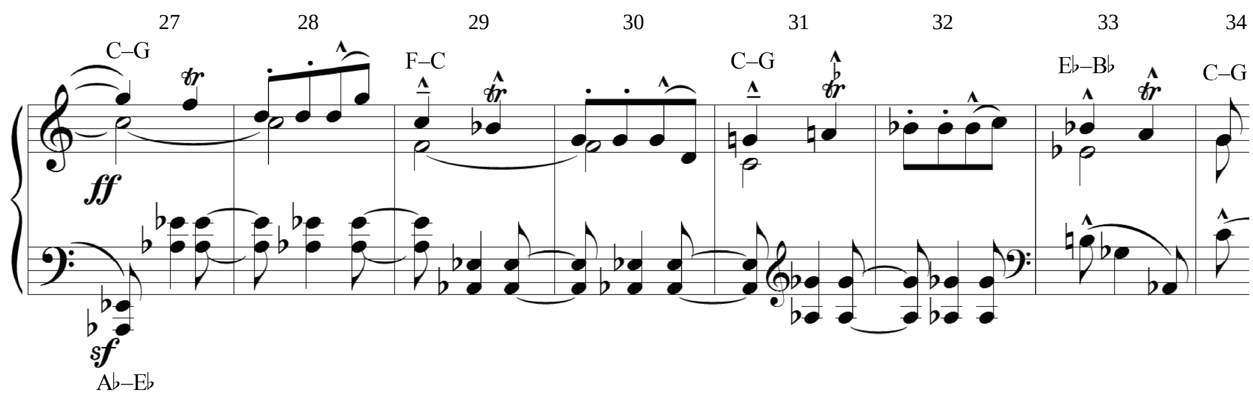
Example 3.9. Leaving the circle and the resultant harmony in ms. 25.



Example 3.10. Melodic forms of the motive in a single path.

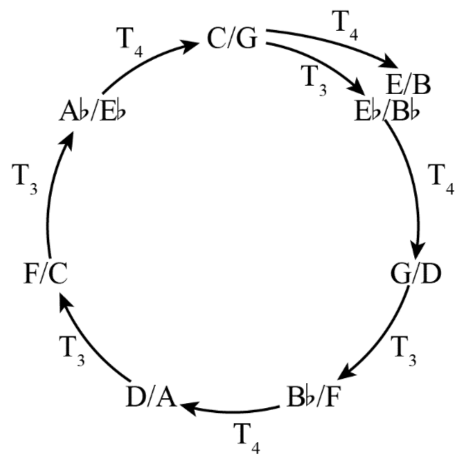


Example 3.11. Example 3.9 in the form of a tree.



Example 3.12. The third statement of the tune and its perfect-fifth accompaniment.

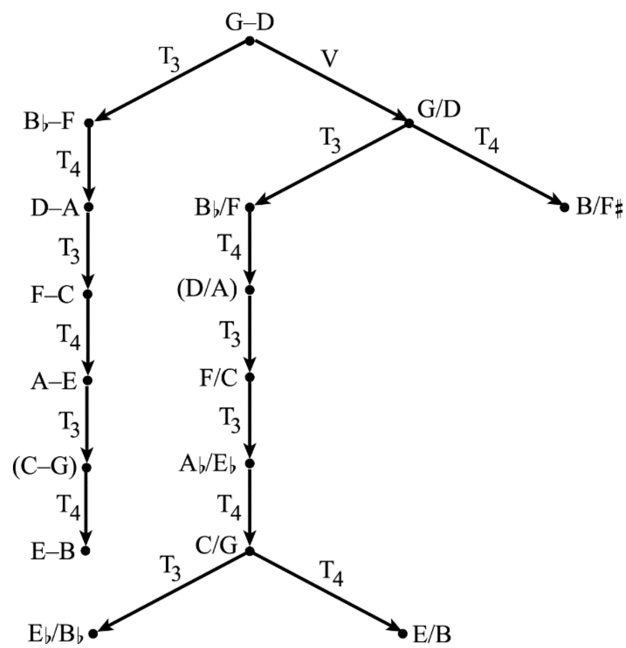
E♭ and A♭, lies a wholetone below the first, this wholetone descent (or “modulation”) being dramatized in the piece as B♭/F descends chromatically to A♭/E♭ in ms. 25-27. With the subsequent emphasis on A♭/E♭ in the left hand, this new diatonic pitch collection sounds like A♭ lydian or, given the quasi-cadential bass arrival on F in ms. 35, perhaps more like F dorian.



Example 3.13. The analogous circle of ms. 27-42.

Example 3.14 connects B♭/F by a path to C/G, which, like G/D before it, splits off into T_3-related E♭/B♭ and T_4-related E/B. In this case, T_3 is repeated within the path, but I find that acceptable given that this branch effects a “modulation” to a different pitch collection. E♭/B♭ forms an integral part of this passage’s logic, but in ms. 42 E/B signals another break, revealing an intimate relation between B/F♯ and E/B. B/F♯ was an offshoot from G/D that acted as a kind of leading tone to C/G, while E/B is an offshoot from C/G that functions similarly towards F/C: its arrival in ms. 42 sounds decidedly like a half cadence. More importantly, the binary junctions that produce these unexplored paths signal major evolutionary changes. The abandoned offshoots B/F♯ and E/B herald the fact that at these points (ms. 25 and 42) some stasis or equilibrium is being broken. B/F♯ signals verticalization, while in the case of E/B, the newly emerging form is the augmented fourth. E♭/A♮ is engendered from E/B’s binary partner E♭/B♭ just as the sudden proliferation of harmonic perfect fifths proceeded from B♭/F, B/F♯’s binary partner.

The arrow between G–D and G/D is labeled “V” for “verticalization,” marking the boundary between melodic and harmonic forms. As noted above, attempting to unite these two groups would require enveloping V into the twelve-element pitch-class transposition group T_n.



Example 3.14. The tree up to ms. 42.

While I questioned the usefulness of such a procedure earlier, I believe we should at least entertain the idea for the sake of comparison. We can begin by constructing a monoid (a group lacking inverse elements) V by defining exactly what this transformation does in context: it changes a melodic form into a harmonic one by taking the higher melodic pitch as the lower harmonic one and then placing the lower melodic pitch a perfect fifth above it. Following these steps, B♭–F (ms. 22.1) becomes B♭/F (ms. 25.1). V is "one and done," or "idempotent" in algebraic terms: when applied to melodic forms it has no affect following its first application. The problem with this construction is that every element of the direct product $T_n \times V$ contains V, making the paths presented in Example 3.14 impossible in terms of the transformations belonging to such a structure. V requires an identity element that can also apply to melodic forms. Labeling this identity element 0 and understanding it as being equivalent to T_0, here is a

Cayley table for a binary monoid I call V/0:[35]

	V	0
V	V	V
0	V	0

Employing the direct product of T_n and this monoid — a twenty-four-element monoid of the form $T_n \times V/0$ — allows one to change V to T_0V, and all the others to T_n0. If one wanted to maintain the group structure of T_n, an inverse element would also be needed, perhaps labeled H for "horizontalization." Yet horizontalization does not occur in the piece's evolutionary process, and for good reason: harmonic forms are evolutionary novelties in this piece, and while in the process of evolution an organism might "revert" to a former state, it is never an exact inverse operation; whales are evolved from land creatures that "returned" to the sea, but they did not revert back to some pre-mammalian state. Evolution is a "one-way" process. "If we want to model musical acts as taking place in irreversible time," writes John Rahn, "we will need to escape groups and inhabit monoids."[36]

Rather than using overall similarity to consider each form equivalent and then labeling the small quantitative differences between them, a phylogenetic method would understand them as qualitatively different from the start and then label the multiple similarities between them. We can, to begin with, chart out three characters for the contextual association of motive-forms: a melodic/harmonic binary character, a character for interval size, and a character for pitch level. The melodic/harmonic binary character — whose states can be designated as M and H — has a

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[35] For a small finite algebraic structure, a Cayley table allows one to completely define the binary operator, and many properties of the structure can be discovered by simply looking at the table.

[36] John Rahn, "Approaching Musical Actions," *Perspectives of New Music* 45.2 (2007), p. 60.

greater weight than interval size, which in turn has a greater weight than pitch level. The states for the interval-size character are 7, 6, 4, 3, and 1, and like Bartók's caesura pitch-level characters, are ordered: 7→6→4→3→1. It would take more labor for a character state to go from 7 to 3 than to go from 4 to 3. Finally, we can provisionally define "pitch level" as the lowest pitch for harmonic forms and as the highest pitch for melodic forms. The orders for this character, however, will vary among the interval sizes, just as in Bartók's own phylogenetics the order for pitch level at the third caesura varies according to the pitch level at the first caesura.

The character states that define the root G–D, then, would be (M, 7, G), the order for the pitch-level character in this case being G→B♭→D→F→A→C→E. Continuing this process produces Example 3.15, which labels vertices with the "genetic codes" for each dyad, laying bare what is the same between them. The tree is clearly a maximum-parsimony tree for the M/H binary character, the single member of that character's changing set ([M, 7, G], [H, 7, G]) corresponding to the arrow between G–D and G/D. The tree is trivially parsimonious for the interval-size character, since all of the forms are of the same interval size, 7. In terms of pitch level, we are confronted with a similar situation to the one encountered with Bartók's fixed formulas: the tree is far from maximally parsimonious if we view, say, F within (M, 7, F) as the same as F within (H, 7, F). The difference is one of scale degree, so — following Steven Rings's *Tonality and Transformation* (2011) — I attach scale degrees to these characters, taking F as the new $\hat{1}$.[37] The result is Example 3.16, which, since nearly every pitch level character state is unique, is also trivially parsimonious for the pitch-level character. In terms of using changing sets to define groupings, the only one that could function in this way is the M/H binary

[37] Steven Rings, *Tonality and Transformation* (New York: Oxford University Press, 2011), pp. 41-49. I prefer F over A♭ as $\hat{1}$, for the former encodes the descending wholetone relation between the two collections.

character's, which has a single element: ([M, 7, {1̂, G}], [H, 7, {1̂, G}]). At this point the tree has two minimal monophyletic groups defined by synapomorphy: a species of melodic forms and a species of harmonic forms.

Example 3.16 required nothing equivalent to the construction of a direct product. In biological terms, such a procedure is akin to taking two biologically defined species — distinct populations capable of reproducing or interbreeding — and forcing them to breed, genetically engineering a way for them to "relate" to one another. Both approaches point to the same arrows as locations that can divide a tree into subtrees or lineages, the transformational approach translating the evolutionary work required to "punctuate an equilibrium" into mathematical gymnastics. In biological terms, it is true that all organisms, either living or once-living, have something in common, but to say that they are equivalent tends to obfuscate the powerful idea that evolution can relate two non-equivalent groups of organisms, providing a way to understand how one can become another. Making nested groups (analogous to species, genus, *etc*.) would not be possible in a transformation network unless one assumes some kind of hierarchy among the various algebraic structures. I nevertheless find this idea captivating, for it builds on Edward Pearsall's concept of transformational streams and communities in an interesting way.[38] Members of changing sets, for example, are possible sites for Pearsall's "transmutations" — changes from one community (or species) to another — and tree structures, since they can construct nested communities, provide a way to understand such transmutations in just such a hierarchy. In this view, each species (or monophyletic group) is "biologically" defined by the T_n group, while the overall, irreversible process creates a "snowballing" monoid.

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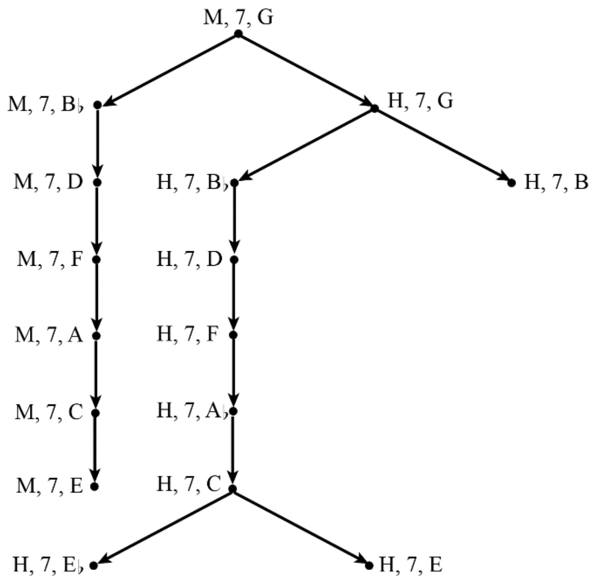
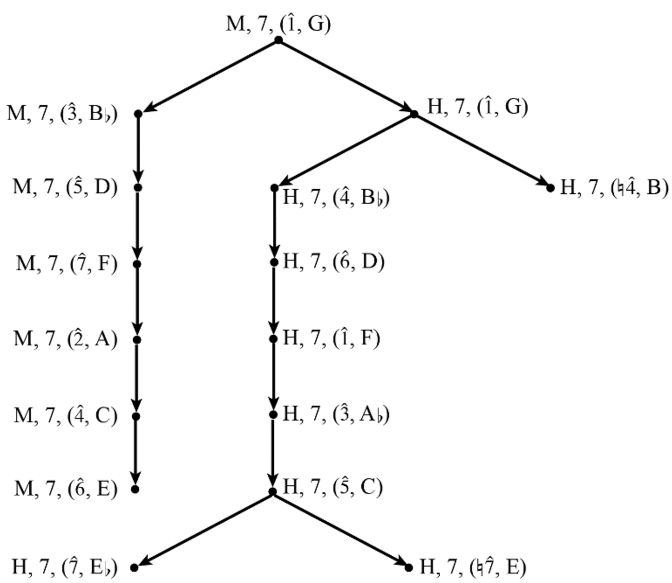
[38] Edward Pearsall, "Transformational Streams: Unraveling Melodic Processes in Twentieth-Century Motivic Music," *Journal of Music Theory* 48.1 (2004), pp. 69-98.



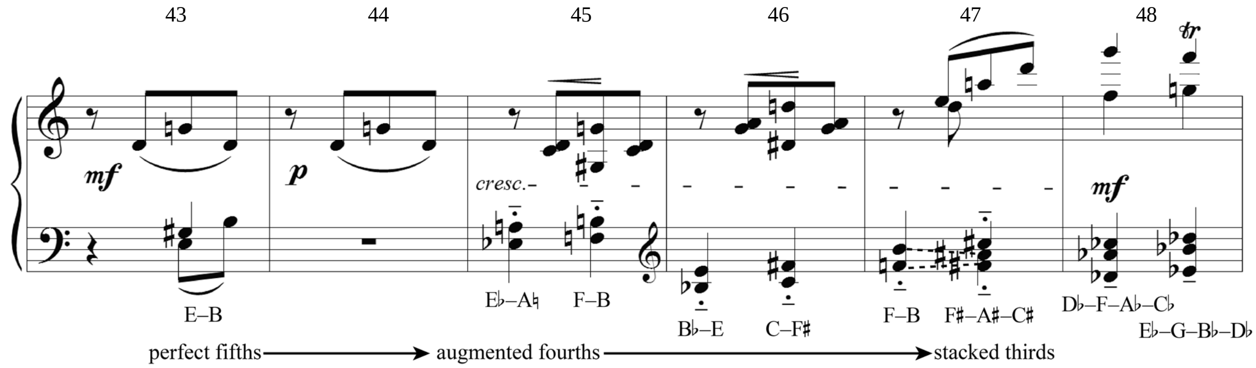
Example 3.15. The beginnings of a phylogenetically-labeled tree.



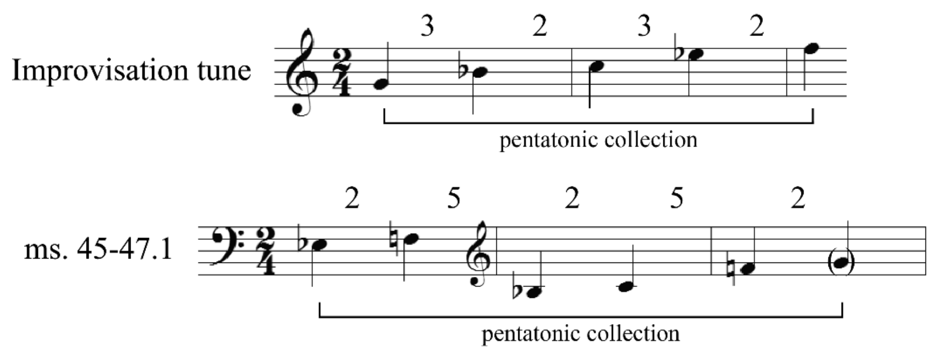
Example 3.16. The same tree adjusted for scale degrees.

Recall that in Example 3.3 (p. 165) a dashed arrow labeled “contraction towards seconds” proceeds from the “harmonic perfect fifths” vertex. The first step in this process is a small passage of harmonic augmented fourths (ms. 45-47.1) engendered from E♭/B♭: E♭/A and F/B in ms. 45, followed by B♭/E and C/F♯ in ms. 46. Example 3.17 reproduces my depiction of this passage from Chapter 1. Using the lower pitch to label pitch level (just as we did with harmonic perfect fifths) these four forms have the following character states: (H, 6, E♭), (H, 6, F), (H, 6, B♭), (H, 6, C). The logic here, however, deviates from the logic of the previous sections: it no longer consists of a 3-4 model that follows the harmonic contour of some modal collection, but rather follows the pattern of the folk tune itself. As discussed in Chapter 1, the folk tune of the Improvisation follows what Ernő Lendvai called a 3-2 pattern, though the pattern in this case is 2-5, which, as shown in Example 3.18, is closely related to the 3-2 pattern; both generate pentatonic collections. Another way to relate the pitch levels of the harmonic augmented fourths (E♭–F–B♭–C) to the tune is to understand them as an ascending version of the descending 2-5 pattern outlined by the downbeat pitches of the tune: G–D–C–G– (F), and so on.

For this reason, Example 3.19 presents the augmented-fourths “community” as proceeding from (H, 7, [$\hat{7}$, E♭]), following an (E♭)→(F)→(B♭)→(C) character order. The ([H, 7, {$\hat{7}$, E♭}], [H, 6, E♭]) arrow is thus an element of the tree’s changing set for the interval size character, and one could label this arrow in a transformation network as C for “contraction,” or perhaps more descriptively as $C_{7\text{-}6}$, marking the exact change in the interval-size character. One could then construct a $C_{7\text{-}6}$/0 binary monoid that acts only on harmonic perfect fifths, just as V/0 acts only on *melodic* perfect fifths. Crucially, since the character states “H, 6” define a new monophyletic group, the tree now exhibits nesting: (M) and (H) define subtrees at one level,

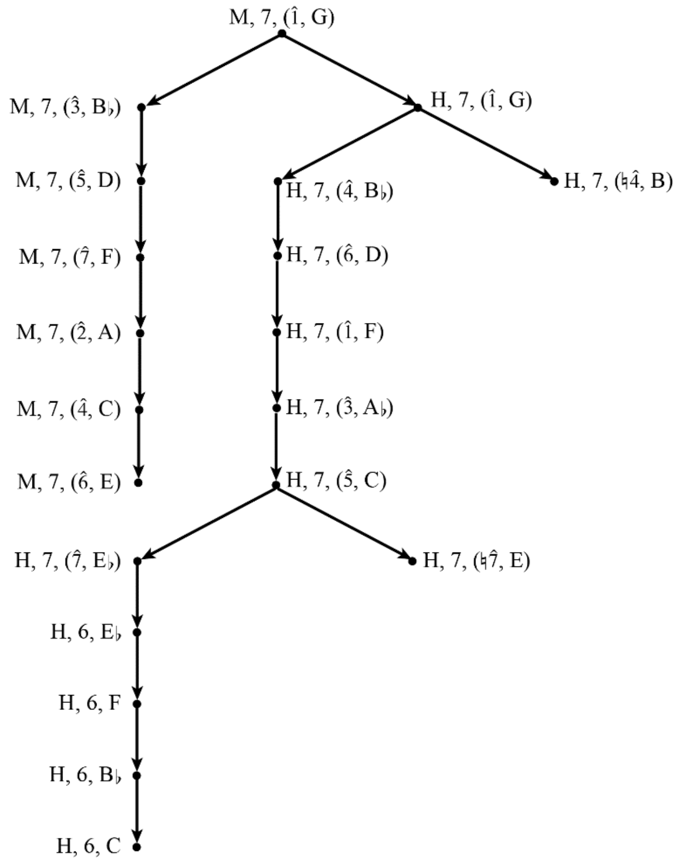


Example 3.17. The new process of contraction in ms. 43-48.



Example 3.18. The 3-2 and 2-5 patterns.

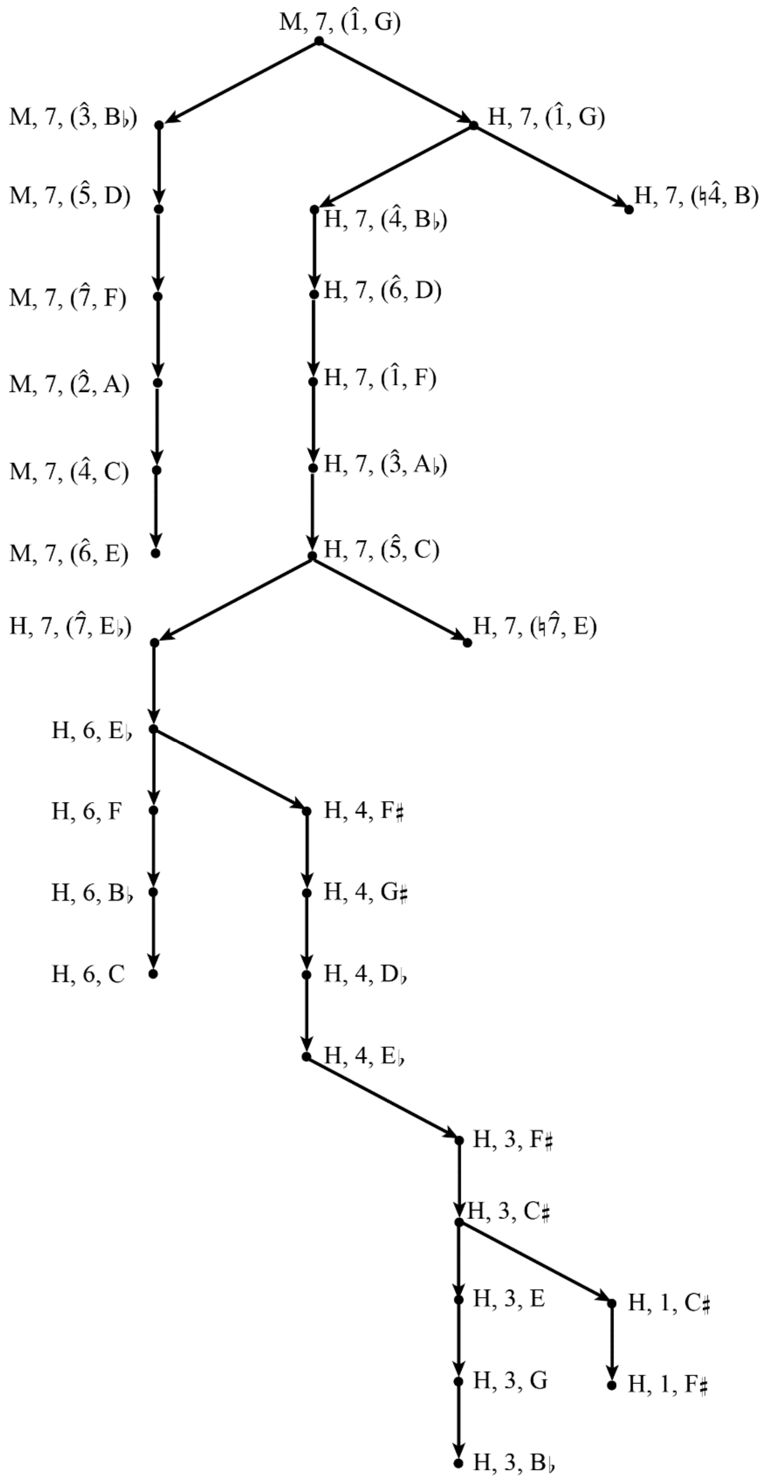
while the (H) subtree is itself divided into (7) and (6) subtrees. This nesting can be represented as nested direct products of algebraic structures: $T_n \times (V/0 \times C_{7\text{-}6}/0)$. The next step in the contraction toward seconds is major thirds. At ms. 47.2 F/B contracts directly into F♯/A♯, and then beginning at the subsequent *a tempo* in ms. 48, major thirds are found in the outer voices of the parallel dominant-seventh accompaniment: D♭/F, E♭/G and so on, the accompaniment seeming to have reached its "natural" triadic state and marking this by a proliferation of stacked thirds. This community follows the same logic as the preceding one — a 2-5 pattern derived from the folk tune; it is in fact related to the previous one by T_3 (or T_6I). With parsimony in mind, we can understand this branch as proceeding from {H, 6, E♭} and then "descending" from (H, 4, E♭) following a (E♭)→(D♭)→(G♯)→(F♯) character order. At this point the nested algebraic



Example 3.19. the continuation of the phylogenetically-labeled tree.

structures could be represented as $T_n \times ([V/0 \times C_{7\text{-}6}/0] \times C_{6\text{-}4}/0)$.

Example 3.20 finishes constructing the tree, adding two more communities: (1) the harmonic minor thirds launched by F♯/A in ms. 55 and which continue into the overlapping minor thirds C♯/E, E/G, G/B♭, and B♭/D♭ in ms. 56-67, and (2) the harmonic minor seconds found in the final sonority, F♯/G and C♯/D. After F♯/A resolves to G/B♭ in ms. 56, the harmonic minor thirds follow a (C♯)→(E)→(G)→(B♭) character order that corresponds to the repetitions of the tune's final descent: E–D♯–C♯, G–F♯–E, B♭–A–G, and D♭–C–B♭. It is here that we begin to see the conflation of tune and accompaniment: as the accompaniment contracts to harmonic minor thirds, the tune begins repeating its stepwise minor-third descent. The *sforzando* half notes combined with the *sempre stringendo* make it difficult to pry these two layers apart. But of



Example 3.20. A complete phylogenetically labeled tree.

course this only serves to highlight the final sonority, which completes the process through which the tune becomes its own accompaniment. The harmonic minor seconds — F♯/G and C♯/D, the dyad that opens the piece — follow a perfect-fourth character order corresponding to their relationship in the final sonority: G is the prime and D is the fifth. At this point, our nested structure would be T_n x ([{(V/0 × $C_{7\text{-}6}$/0) × $C_{6\text{-}4}$/0} × $C_{4\text{-}3}$/0] × $C_{3\text{-}1}$/0), each element corresponding to a minimal monophyletic subtree (a motivic species) defined by the following character states: (M, 7), (H, 7), (H, 6), (H, 4), (H, 3), and (H, 1).

2. Motivic Trees as Transcendental Logics?

Example 3.20 contains all of the information one would need regarding nesting and even provides a way to measure difference in terms of path length, changing sets, and so on. But what exactly would "distance" mean in terms of our tree? The tree provides a way to define motivic concepts, but what about a motivic logic? It is at this point that I would like to explore the idea of a motivic tree functioning as the precursor to what Badiou, in *Logics of Worlds* (2006), calls a *transcendental*: a "relational network" made up of degrees of "identity and difference."[39] For Badiou, such transcendentals organize "logics of appearing," which he opposes to the binary (or classical) "logic of being." In being, an object either belongs to a set or it doesn't, while in appearing there is a possibly infinite number of ways that one object can differ from another, and objects can exist with variable intensities of appearance. The concept of transcendentals thus gives us a means to understand a motivic tree's logic in a way different from the inclusion relations of set theory. The fact that one motive-form is descended from another is not a matter

[39] Alain Badiou, *Logics of Worlds* (2006), trans. Alberto Toscano (London: Continuum, 2009), p. 118.

of the descendant *belonging* to the antecedent (as it would be in a set-theoretical inclusion tree), but of the former differing to some degree from the former. A transcendental orders those degrees of difference.

Since a motivic tree has motive-forms rather than degrees of difference as its objects, it cannot be a transcendental; it instead acts as a way of defining those degrees. Nevertheless, a good way to approach Badiou's formal definition of a transcendental would be to consider how a relatively familiar object, a motivic tree, does and does not conform to that definition. Just as with Lewin's definition of a transformation graph, I will give Badiou's definition and then unpack it piece by piece :

> Given a world, the transcendental is a subset T of that world which possesses the following properties:
>
> 1. An order relation is defined over T.
> 2. This order relation admits of a minimum written μ.
> 3. It admits of the existence of the conjunction for every pair {x, y} of the elements of T.
> 4. It admits of the existence of an envelope for every subset B of T.
> 5. The conjunction is distributive relative to the envelope.

In his "algebra of the transcendental," Badiou defines order relations by comparing them to equivalence relations (157-159); since this resonates so strongly with the concerns of the previous section of this chapter, I too will follow this method. An equivalence relation on a set (notated with "=") applies when, for any two elements a and b, the following properties hold:

(1) reflexivity: a = a,
(2) transitivity: if a = b and b = c, then a = c, and
(3) symmetry: if a = b, then b = a.

Taking the set of all pitch-class sets of some cardinality as an example and defining equivalence as "being related by some element of the T_nI group" reveals that this is an equivalence relation, one that divides the set into equivalence classes. If a, b, and c are pitch-class sets belonging to the same set class and X and Y are elements of T_nI, then this relation is

(1) reflexive: $a = T_0(a)$,
(2) transitive: if $b = X(a)$ and $c = Y(b)$, then $c = (X\bullet Y)(a)$, and
(3) symmetric: if $a = X(b)$, then $b = X^{-1}(a)$.

An order relation (notated with "≤") shares reflexivity and transitivity with an equivalence relation, but replaces symmetry with *antisymmetry*: if $a \leq b$ and $b \leq a$, then $a = b$. Badiou explains this difference in the following way:

> The very essence of relation … is not yet captured by the "relation" of equivalence. For a comparative evaluation always presumes that we are able to contrast really distinct elements, which is to say non-substitutable elements .… In the end it is there where two terms cannot be substituted in terms of what links them that the relationship between relation and singularity is affirmed and that differentiated evaluations become possible. (158)

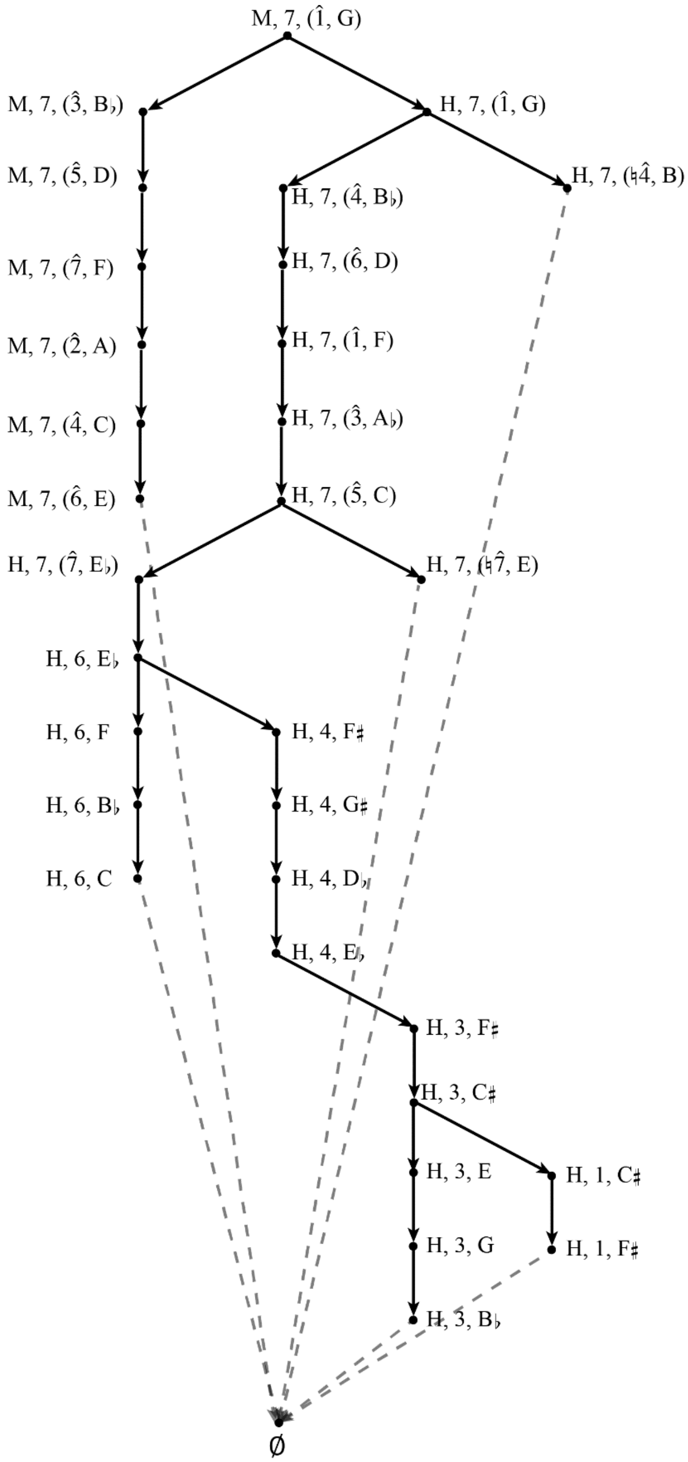
The problem with an equivalence relation, in other words, is that it removes the possibility of considering every element to be "really distinct." Furthermore, if what "links" two elements is a relation of descent — which is one way of thinking of an order relation — one cannot substitute the descendent for the antecedent or *vice versa*. In this way, antisymmetry encodes the one-way or irreversible property of a rooted tree structure. Within a rooted tree $T = (V, E)$ where a and b are elements of V, if one takes $b \leq a$ to mean that (a, b) is an element of E, then ≤ is indeed an order relation on V.

In terms of the algebraic properties of our tree, reflexivity reflects the fact that within each algebraic structure an identity element that could apply to all forms was required, and transitivity, of course, is what led us to create direct products in the first place. If I had insisted that every new transformation carry with it its inverse (symmetry), maintaining the group structure of T_n, however, this would have violated the very idea of a rooted tree and the antisymmetry of its partial order. Yet a monoid is not necessarily antisymmetric: at best, if it is commutative, it is a *preorder*, a relation that is reflexive and transitive, but neither symmetric nor antisymmetric. Since they lack inverse elements, monoids — such as the accumulative one created for the Improvisation — thus cannot be used to define equivalence in the same way. The positive integers with zero under addition, after all, is the most common example of an arithmetic monoid: if (given the closure property of monoids) one adds a positive integer to another positive integer, the result is still another positive integer. From an evolutionary perspective, then, perhaps it is less equivalence that calls such algebraic structures into question, and more their property of set-theoretical closure. It would be odd to consider the positive integers as *evolving* as they get larger: no matter how large they get, they are still integers.

This explains why the first property of a transcendental is that it must be an order rather than an equivalence relation. Badiou's second property is even simpler, for it merely requires that the transcendental have a minimal element, an element "μ" such that, for every other element a, $\mu \leq a$. This requirement follows from Badiou's claim that "it must be possible to think what does not appear within a world" (122). Such a minimal element thus represents what belongs to the world, but does not appear in it. In order to conform to this property I have added a vertex labeled ∅ (the symbol for an empty set) in Example 3.21 and arrows (x, ∅) for all vertices x that have no descendants (*leaves*, in graph-theoretical terms) — "nothing" is descended from such vertices. There are at least two problems with this solution, however. μ is supposed to be a measure of an element's appearing, not the element itself, and our tree thus far has contained only motivic forms, not measures of their appearing. Labeling this vertex ∅ is thus not a very satisfying answer to this problem and, as we will see, actually creates larger problems. Secondly, there are already motivic forms in the tree whose measure of appearing seems to be minimal: C–G and D/A, which don't appear in the piece at all, were shown in parentheses for just this reason.

The addition of ∅ to the tree, however, is crucial for Badiou's third property, which states that every pair of elements in a transcendental has a conjunction, a greatest *lower* bound. In a Boolean algebra the *and* operation is a conjunction that, given two elements, returns the least element below them. Since our original structure is a rooted tree, there are only two possibilities for the value of the conjunction between any two elements a and b ($a \wedge b$): if they are in a relation of descent — if there is a directed path from a to b or from b to a — then their conjunction is the descendant; if they are *not* in a relation of descent, and their conjunction is nil, ∅. This result reflects the very definition of a rooted tree: since each non-root vertex of a rooted tree is the terminal vertex of exactly one arrow, no non-nil vertex can be "less than" any two others. At this point in the definition, what Badiou is attempting to do begins to become clear: taking cues from order theory, he is setting up transcendentals to act as structures of *intuitionistic* logic, which — as opposed to classical Boolean logic — lacks the law of excluded middle, among other differences. As noted above, two elements within *being* are either equal or they are not, while in *appearing*, two elements can differ by one of a possibly infinite number of different degrees.

Classical logic is modeled by set theory: a set X is either a subset of set Y or it is not, which gives us two truth values. Intuitionistic logic, by contrast, is modeled by topos theory, which generalizes set theory. Without getting into the details, subsets in topos theory are generalized as *subobjects*, which can relate to other objects in any number of ways. Rather than having a set containing the two elements "true" and "false" — as in set theory — every topos contains a *subobject classifier*, which organizes a possibly infinite number of truth values. And



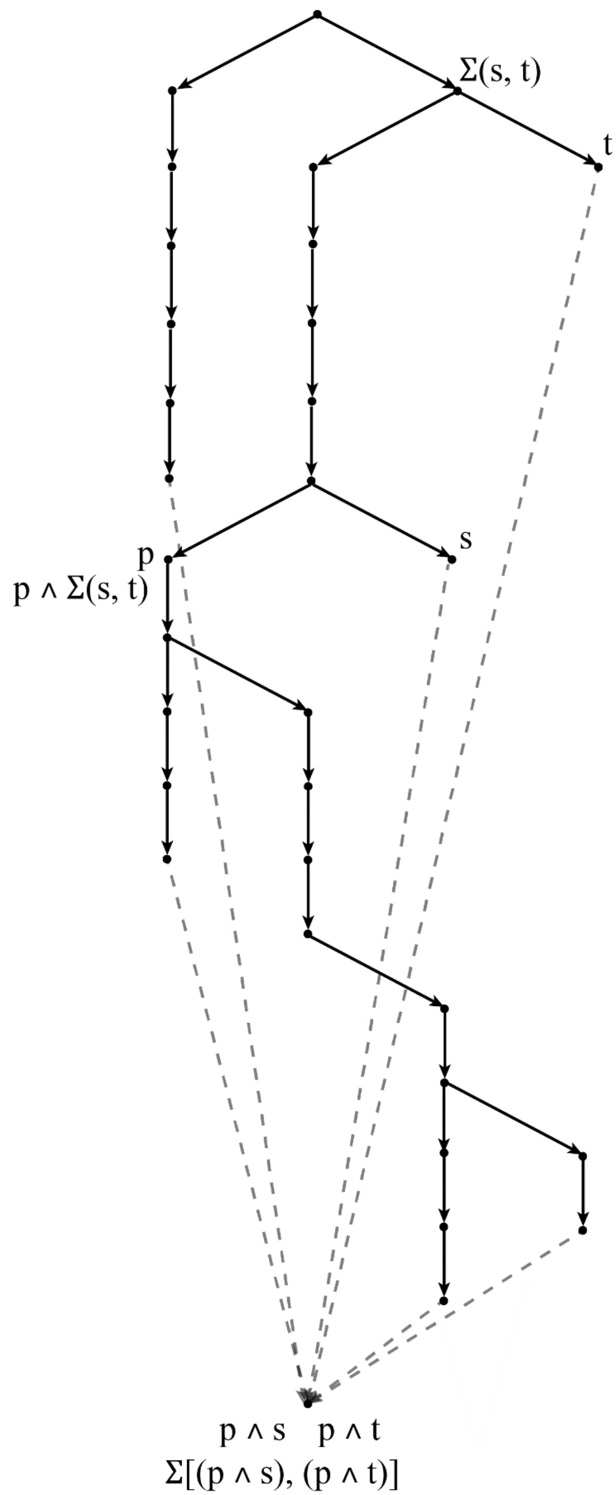
Example 3.21. The tree with Ø.

one can understand such truth values as ways two objects can relate to one another.[40] In particular, Badiou claims that a transcendental is a *Heyting algebra*, intuitionistic logic's replacement for Boolean algebras. Heyting algebras are bounded lattices, order structures requiring a maximum, a minimum, and in which every pair of elements have both a conjunction and a disjunction. A rooted tree, however, is *not* a bounded lattice, but rather what order theorists call a *join semi-lattice*, a description that elicits Badiou's fourth property, which requires that every subset of a transcendental have an *envelope*. An envelope (written ΣB) is simply the disjunction of a set of elements. If there is a greatest element of B, then that element is the envelope; otherwise, the envelope is the least of all of the elements larger than B. In evolutionary terms, the envelope of a set is simply its common ancestor. A join semi-lattice is thus a partially ordered set that has a join for every subset, just as in evolution, any arbitrary set of organisms has a common ancestor, even if that ancestor lived a billion years ago. Adding ∅ to our tree transformed it from a join semi-lattice into a bounded lattice. In this way, with ∅, the tree conforms to the first four of Badiou's five properties.

Distributivity, the final property, is important, for all Heyting algebras are distributive lattices. In order for our bounded lattice (the rooted tree + ∅) to be a Heyting algebra and a transcendental logic, it must be distributive. Badiou defines distributivity as when "the conjunction of an element p and the envelope of a subset B is equal to the envelope of the subset T comprising all the conjunctions of p with all the elements x of B" (166). Put far more simply, conjunction and envelope are distributive in a distributive lattice in the same way addition and

[40] See Alain Badiou, *Mathematics of the Transcendental*, trans. A. J. Bartlett and Alex Ling (London: Bloomsbury, 2014), pp. 151-161. For the pertinent mathematical background, see Robert Goldblatt, *Topoi: The Categorial Analysis of Logic* (1984) (Mineola, New York: Dover Publications, 2006).

multiplication are distributive in arithmetic: A(B + C) = AB + BC. Example 3.22 demonstrates that Example 3.21 is not in fact distributive. I have removed the character-state labels from the vertices and renamed three of them p, s, and t. If we take B to be (s, t), then the envelope of B is the common ancestor of s and t, labeled Σ(s, t). The conjunction of p with both s and t is ∅, so since Σ(∅) = ∅ and p ∧ ΣB = p, the conjunction of p and ΣB is not equal to the envelope of all the conjunctions of p with all the elements of B. The fallout of this non-distributivity is that the binary operator of logical implication cannot be properly defined. Implication, usually notated as a → b, would be defined in this context as the greatest element x such that x ∧ a ≤ b. If one takes p and s from Example 3.22 as a and b, then there is not a single greatest element x. The only elements less than or equal to s are s and ∅, and since there are no elements x such that x ∧ p = s, x ∧ p must equal ∅. The problem is that the set of elements disjoint with p has no greatest element. They are incomparable, which means that there is no way to define something like a complement (or negation) of a motivic instance. Thus, our motivic tree cannot be a complete transcendental, even with the addition of ∅: it is not distributive and for this reason an implication operation cannot be defined. Rather, since it a *semi*lattice instead of a complete lattice, I think of it as a "half-transcendental" or, better yet, a precursor to a true transcendental. We can use the tree as a means to identify degrees of difference, but that will require coming up with some way to measure the difference between motivic forms in terms of the tree. For forms belonging to the same community defined by the group action of T_n, that distance could easily be measured by taking n as a measure, by assuming, in other words, a generalized interval system for each community. I have up to this point assumed that the melodic perfect fifths belong to what Lewin calls the space of a GIS (S_1) and that its group (Lewin's IVLS) are the integers modulo 12 (G_1): the distance from G–D to B♭–F is 3, and so on. In the same way, the harmonic



Example 3.22. Demonstration of the tree’s non-distributivity.

perfect fifths belong to the space (S_2) of a GIS that has the same group (G_2). Since there is a group isomorphism $G_1 \rightarrow G_2$ (an identity map, in fact), one could, following Hook, describe a unique function V ($S_1 \rightarrow S_2$) by choosing two "reference points," such as G–D and G/D. V would then be "the GIS homomorphism induced by g that maps G–D to G/D." This would allow us to define "cross-type" transpositions such as $V(T_5(G\text{-}D)) = C/G$, and the like.[41] Yet what exactly is the "distance" between G–D and C/G or between D–A and B♭/F? Intuitively, any musician would immediately say "a perfect fourth" or "a minor sixth," but such an answer misses the labor expended (or the "distance" covered) in the Fifth Improvisation in order to move from melodic perfect fifths to harmonic ones. How would one measure difference in terms of the tree?

If we use T_n to measure difference even within a single species, we encounter a problem: the distance from (M, 7, [$\hat{1}$, G]) to (M, 7, [$\hat{3}$, B♭]) is the same as the distance from the former to (M, 7, [$\hat{6}$, E]) — 3 — yet in terms of path length in the underlying undirected tree, the differences are 1 and 6, respectively. T_n ignores what I have been calling the logic of each monophyletically defined species. If we simply take path length by itself, then we would end up with a linear order from 0 — the length of the path from one vertex to itself — to 23 —the longest path in the underlying graph. While a finite linearly ordered set is trivially a Heyting algebra, and we could thus understand path lengths to be the degrees of a transcendental, this is not acceptable, for it ignores the fact that some edges in the tree are elements of changing sets, and these edges create more difference than the others. Phylogenetics measures the evolutionary difference between species using a *dissimilarity map*, which takes the variable weighting of edges into account. For this reason, I propose constructing such a dissimilarity map for our tree, the first step being labeling every edge with a real-valued weight. While I hesitate to quantify

[41] Hook, "Cross-Type Transformations and the Path Consistency Condition," pp. 8-16.

such weighting, we must remember that such numbers are ultimately arbitrary and that what matters most are the order relations among them. Semple and Steel in fact write that "due to errors associated with estimating distances between species, we may have more confidence in just the order of the values than in their actual numerical values."[42] This is, in many ways, an inversion of phenetic distance matrices: I am using the tree to measure distance rather than using distance to create the tree.

So, one can conceive of edge-weighting as a function from the set of edges in a tree to the real numbers. Edges that are not elements of a changing set can be mapped to 1, which merely denotes path length. Edges belonging to changing sets should then be mapped in a way that reflects their relative weights. Recall that the melodic/harmonic binary character has a greater weight than interval size, so V ([M, 7, {î, G}], [H, 7, {î, G}]) creates more difference than any individual C (contraction): it is what separates the two lineages defined by M/H. Since four contractions are required to traverse the entire H subtree, I understand V as creating roughly four times the difference created by any one C: C = V/4. It is also curious to note that there are also four times the number of edges in the H subtree than in the M subtree. But what exactly is the *value* of V? In terms of path length, the longest directed path without a character state change is 6, which corresponds to the number of steps in a 3-4 cycle required to traverse a single diatonic collection. Since it requires seven steps to "go around" and break a 3-4 circle, I thus understand V to be roughly equivalent to a path length of 7, which would give any one C a value of 1.75. Example 3.23 presents the tree labeled with these weights.

What, then, would be the difference between any two vertices? Semple and Steel define the difference between two vertices as the sum of the weights mapped to the edges of the unique

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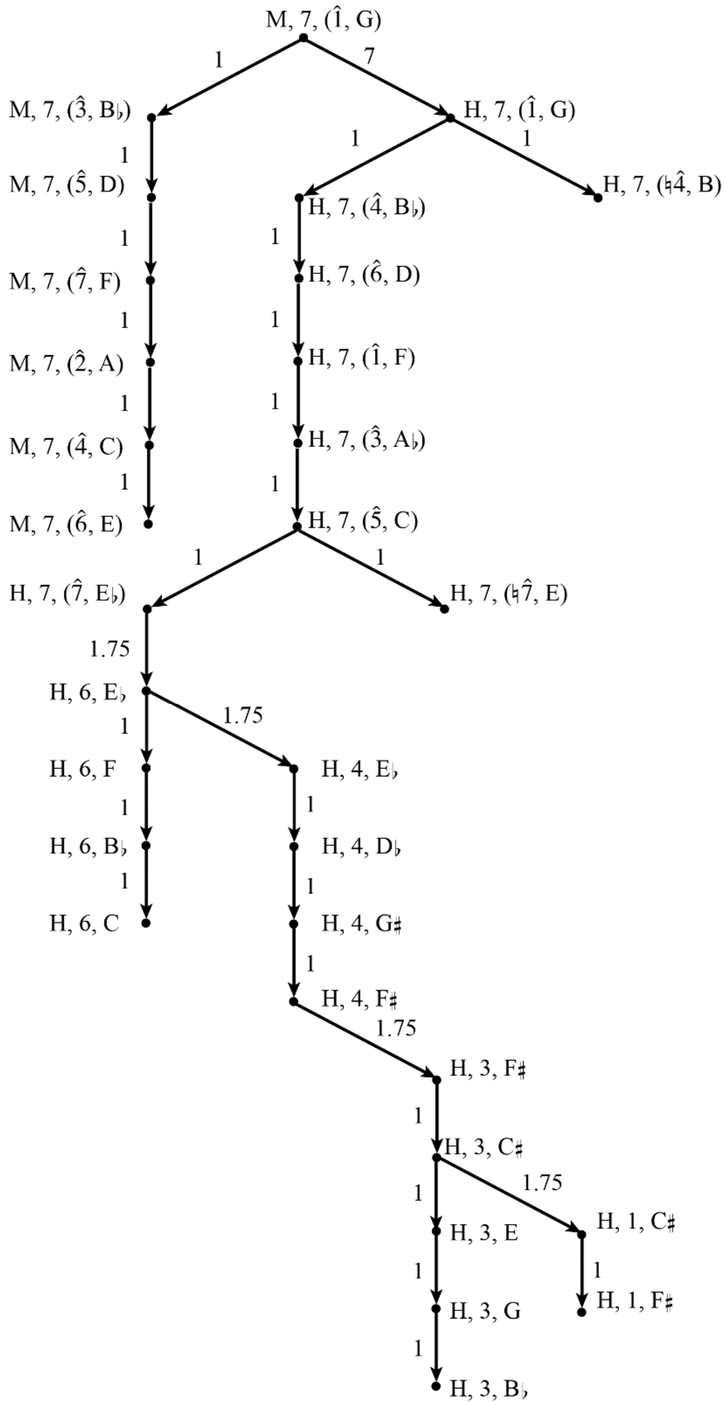
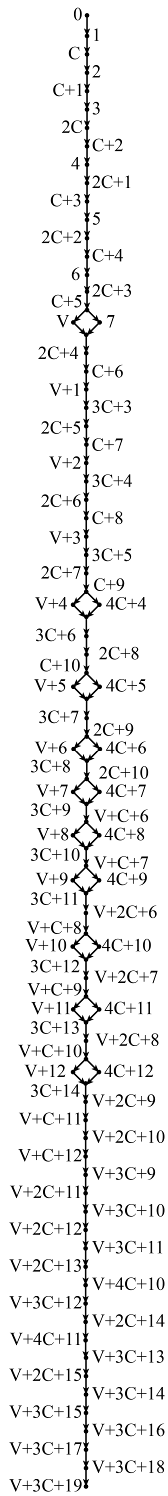
[42] Semple and Steel, *Phylogenetics*, p. 163.

path between them, while the difference between a vertex and itself is 0. A few examples are in order: the difference between (M, 7, [$\hat{1}$, G]) and (H, 7, [$\hat{1}$, F]) would be V + 3 (10). The difference between (H, 7, [$\hat{5}$, C]) and (H, 4, E♭) would be 2C + 1 (4.5), and so on. Heretofore I will thus not be concerned with the actual numerical values themselves but with the order relation within the set of 92 unique paths in the tree. It is nearly linear, but several pairs of paths have the same numerical value; I consider these unique. For example, V + 9, (M, 7, [$\hat{6}$, E]) to (H, 7, [$\hat{1}$, F]), and 4C + 9, (H, 7, [$\hat{6}$, D]) to (H, 1, F♯), have the same numerical value, but are qualitatively different, incomparable. The result of this conception is the bounded lattice shown in Example 3.24, each element of which measures the degree of difference between two elements in the motivic tree. This lattice exhibits all five properties listed by Badiou, so we could understand it as a logic, as a Heyting algebra with a binary operator of implication. Each degree is a transcendental degree, and importantly, this transcendental could not have been constructed without the tree. It has no meaning outside of Bartók's Fifth Improvisation, just as Badiou's transcendental for Dukas's opera *Ariane et Barbe-Bleue* — which contains human characters (Bluebeard and his wives), non-human characters such as the moon and stars, elements of the musical score, and abstract concepts such as "femininity" — is particular to that piece (109-172). The tree and its transcendental thus constitute what one can understand as the *motivic logic* of the Fifth Improvisation.

One matter, however, remains: the algebraic properties of the tree. How, exactly, are motivic species and instances related to one another? Groups of transformations are unsuitable because of their inverse elements, which impose the property of symmetry, and in turn an equivalence relation. Monoids of transformations are better, for they allow us to envision an evolutionary process as one-way or irreversible, yet they still require set-theoretical closure. I



Example 3.23. The same tree with edges labeled with weights.



Example 3.24. A lattice representing the transcendental logic of the tree.

believe the real problem lies not in the relations between the instances of a species but in the relations between species, and would like to end this chapter on a speculative note by proposing a category-theoretical "solution."[43] A category is a structure made up of objects and arrows (or morphisms), and the latter must compose associatively (combine to create a third arrow). In addition, each object must have an identity arrow associated with it. A category — and a topos is a kind of category — is thus a monoid without need of closure, the lack of which could truly encode the open-endedness of evolution.[44] One advantage of category theory is recursion. All partially ordered sets are categories, so we can understand a motivic tree as a category where the objects are motivic instances and the arrows mark that a descendent is a *subobject* of its antecedent.[45] Each species would be a subcategory.

We can also envision a category in which the objects are motivic species or even a category of possible motivic trees. I would like to consider the former, but before specifying the morphisms for a category of motivic species, one would need to first determine what motivic

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[43] My understanding of category theory comes mainly from Steve Awodey's Category Theory, 2nd ed. (Oxford: Oxford University Press, 2010). Goldblatt's Topoi: The Categorial Analysis of Logic (op. cit.), easily one of the most engaging mathematical texts I have come across, was also very useful.

[44] The field of "relational biology" has in fact already delved fairly deeply into the use of category theory in biology. See two utterly fascinating texts: Robert Rosen, *Life Itself: A Comprehensive Inquiry into the Nature, Origin, and Fabrication of Life* (New York: Columbia University Press, 1991), and A.H. Louie, *More than Life Itself*: A *Synthetic Continuation in Relational Biology* (Frankfurt: Ontos Verlag, 2009). Category theory has also made inroads into music theory. See, for example, Thomas M. Fiore, Thomas Noll, and Ramon Satyendra, "Morphisms of Generalized Interval Systems and PR-groups," *Journal of Mathematics and Music* 7.1 (2013), pp. 3-27. Guerino Mazzola has also made extensive (if idiosyncratic) use of not just category theory, but topos theory as well. See *The Topos of Music* (Basel: Birkhäuser, 2002).

[45] See Awodey, *Category Theory*, p. 11.

species are as objects. This is rather straightforward: each object consists of a partially ordered set (*poset*) and a group action, which I prefer over the GIS perspective.[46] Each poset is a monophyletically defined subtree, and each group action consists of a twelve-element set of T_n-related harmonic or melodic motives: (H, P5, T_n), for example, could label harmonic perfect fifths related through T_n. This reflects both meanings of distance or difference within each species: in the tree, each species is defined quasi-biologically within itself through the T_n group, a relation which I earlier described as homologous to sexual reproduction, but this measure of distance is meaningless in the larger context, in which one would measure difference through the logic of the tree. The morphisms of this category would be *monotone* functions, which map one poset to another, and morphisms of group actions, which would include the identity map $T_n \rightarrow T_n$ and a particular mapping between sets defined (as in Hook's GIS homomorphisms) by reference elements. Basically, what I am suggesting is that this "motivic species category" is the product of two simpler categories: the category of posets and the category of group actions, both of which have motivic forms as the elements of their sets.

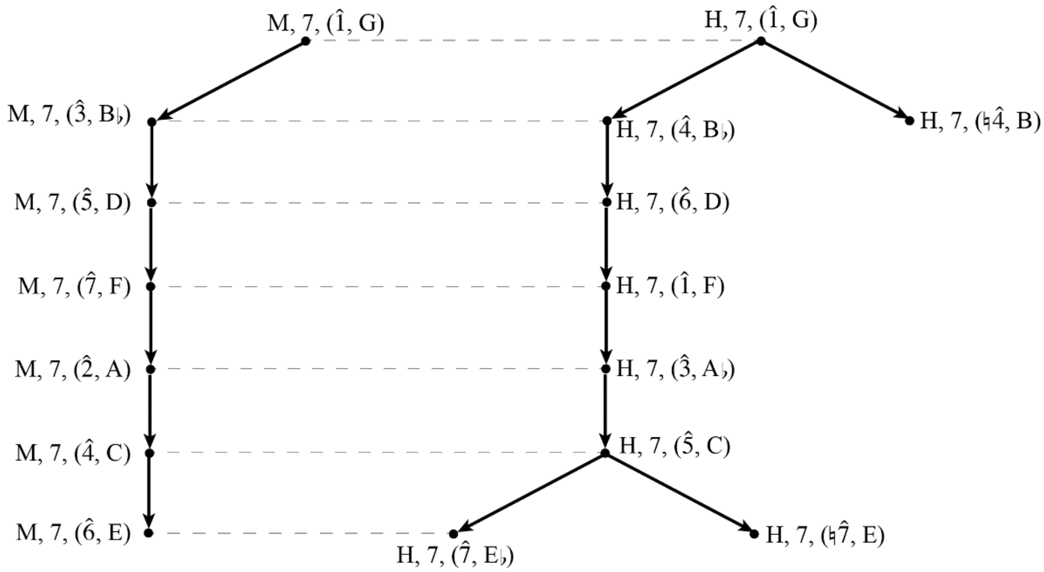
It is crucial to note that the set mappings within each monotone function are different from the set mappings within each group-action morphism. But what exactly *is* a monotone function? A monotone function is a function f from one poset A to another poset B such that a $\leq_A$ a' implies f (a) $\leq_B$ f (a'), a and a' being elements of A and $\leq_A$ and $\leq_B$ being the binary relations of A and B.[47] A monotone function is thus order preserving. Taking the (M, 7) and (H, 7) subtrees as an example, the group action morphism that takes G–D and G/D as reference

[46] For a discussion of the intimate relation between GISes and group actions on *S*, see Lewin, *Generalized Musical Intervals and Transformations*, p. 157-161.

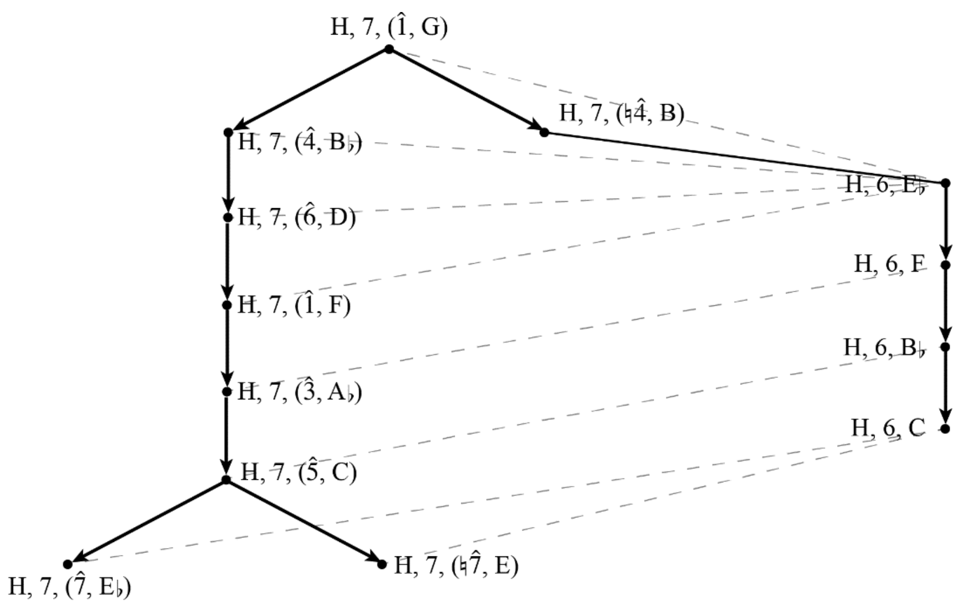
[47] Awodey, *Category Theory*, p. 7-8.

points would also map B♭–F to B♭/F and so on, but what would map onto A♭/E♭? A♭–E♭ does not belong to the (M, 7) subtree's set, but it does belong to the twelve-element space of the group action, a space of which the subtree's set is a subset. A monotone function, on the other hand, would map the elements of the first poset to some or all of the elements of the second. Example 3.25 presents such a monotone function from the (H, 7) subtree to the (M, 7) subtree; it maps G–D to G/D, B♭–F to B♭/F, D–A to D/A, F–C to F/C, A–E to A♭/E♭, C–G to C/G, and E–B to E♭/B♭. In addition to preserving order, this monotone function preserves differences: since the partial ordering of each species comes directly from the motivic tree, each object would also carry with it what Badiou calls a "function of appearing," a mapping from every pair of elements to a degree of the transcendental. In Badiou's category-theoretical musings, the "relations" (or morphisms) between objects must, above all, "conserve the structure of appearing" by not diminishing the "degree of identity" between elements (337, 592). In particular, if one has two objects A and B and a, b ∊ A, then the transcendental degree of difference between a and b must be less than or equal to the degree of difference between *f* (a) and *f* (b), where *f* is a function from A to B (337). Note that the monotone function I just suggested meets this requirement: it is a Badiouian relation between objects, the objects in this case being motivic species. The monotone function from the {H, 7} subtree to the {H, 6} subtree could take several forms, but I would like to take the perfect fifth periodicity in common between the 3-4 and 2-5 cycles into account.

Example 3.26 thus presents a monotone function that maps lower pitches F–A♭–C–E♭ to E♭–F–B♭–C, which carries the perfect fifth F–C over into E♭–B♭ and the perfect fifth A♭–E♭ into F–C. The same goes for the rest of the minimal monophyletic species, even the final {H, 1} subtree, for its character order is surely related to the perfect fifth periodicity that one could trace through the various compositions of monotone functions: G– (B♭)–D in {M, 7} to, say, F–(A♭)–C

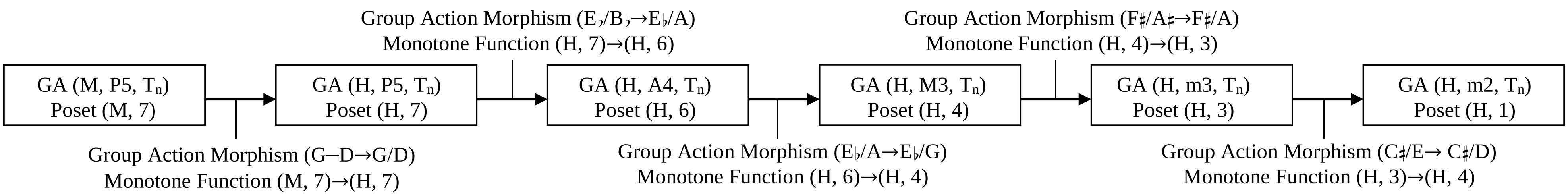


Example 3.25. A monotone function from (M, 7) to (H, 7).



Example 3.26. A monotone function from (H, 7) to (H, 6).

in {H, 7} to E♭–(F)–B♭ in {H, 6} to E♭–(D♭)–G♯ in {H, 4} to C♯–(E)–G in {H, 3} to F♯–C♯ in {H, 1}; notice the contraction within the contractions. Example 3.27 sums up this speculation in a category theoretical diagram. Each object is a pair (GA[Group Action], Poset), while each morphism is also a pair (GA Morphism, Monotone Function). Each GA morphism consists of the



Example 3.27. The evolutionary process of the Fifth Improvisation in terms of a poset/group action category.

identity mapping $T_n \rightarrow T_n$ and the set mapping defined by reference elements (G–D→G/D, for example). The exact monotone functions, on the other hand, are not defined, but the remaining ones would follow the examples given in a straightforward way. Coming up with identity morphisms for this category and proving that the composition of morphisms is associative, I believe, would be a trivial matter. In any case, I hope the advantage of such a view is relatively self-evident: the actual motive-forms belonging to each object is not important, for as long as one can come up with meaningful group-action morphisms and monotone functions, individual species could have any properties. And one can imagine constructing even larger trees of far more complicated motive-forms and connecting the monophyletic species in just this way: that will be my aim in Chapter 5, which will approach one work — the first movement of Bartók's Second String Quartet (1915-1917) — from this perspective.

Chapter 4

The Wood-Carved Prince

In every overview of the intersections between Bartók's three stage works, the happy ending of *The Wooden Prince* (1914-1917) figures prominently. Its final, triumphant embrace stands in radiant contrast to Judit's nightmarish absorption into Bluebeard's collection of wives or the consummation of the Miraculous Mandarin's sexual desire in death. As a more traditional love story, *The Wooden Prince* would thus appear to be concerned with actually bridging (rather than merely articulating) the social abyss many of Bartók's contemporaries believed separated women from men.[1] Some, however, still find *The Wooden Prince*'s love story unconvincing. Stephen Kilpatrick has recently noted that the Princess is a "symbol of the corporeal world" and thus no equal to the Prince, a manifest symbol of genuine human subjectivity.[2] As an objectified element of nature, the Princess stands apart from *Bluebeard*'s Judit and the *Mandarin*'s Mimi, characters with whom one can identify and empathize, and through whose eyes one can observe the action of their respective dramas.

Kilpatrick supports this assessment with several passages from Béla Balázs's diaries, in which the fabulist (and librettist for *The Wooden Prince*) expresses his theories about how

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[1] Their belief was a particular instance of the thesis that men and women are radically incompatible and that this lack of sexual rapport can only be overcome by some kind of sacrifice of (usually) male creativity or vitality.

[2] Stephen Kilpatrick, "'Life Is a Woman': Gender, Sex and Sexuality in Bartók's 'The Wooden Prince'," in *Studia Musicologica* 48.1-2 (2007), p. 165. Kilpatrick contextualizes the views of Bartók's contemporaries in relation to a cultural horizon that includes, among other things, Otto Weininger's *Sex and Character* (1903).

women are a “still evolving … force of nature.”[3] While consulting such sources is certainly worthwhile and enlightening, *The Wooden Prince*’s dramatic narrative alone is sufficient for interpreting the Princess not as the Prince’s feminine counterpart, but as a personification of a feminized (and overtly sexualized) natural world. Balázs describes the stream encircling the Princess’s castle, for instance, as made up of “large, tender, and round” waves displayed in “candid self-exposure like the breasts of a hundred women reclining.” He then goes on to compare the heavy, green curtains that hang from the trees of the forest to “lines of well-groomed ladies-in-waiting.” The Prince’s castle, in contrast, stands not in a forest, but on a hill at the end of a road that leads “into the world” — the real, human world of men.[4] Nature-as-woman is thus distanced and alienated from the Prince, something external and strange that he must confront. He physically struggles with the forest in the ballet’s “Dance of the Trees,” where the trees themselves become women: their trunks “sway like supple female bodies,” their branches “swing like the slender arms of women,” and their foliage “flutters like so many green veils.”[5]

I believe this struggle is not meant to be taken only — or, in fact, primarily — as a ceaseless clash between men and women. The way in which Balázs dramatizes a human subject’s alienation and its struggle towards reconciliation may reflect his attitudes towards gender, but the pathos of the drama is only about men and women superficially. The putative alienation of women from men is more representative of the Sunday Circle’s larger concern with the estrangement of the world, society, and nature from human subjects in general. Balázs

[3] *Ibid*., p. 164.

[4] Béla Balázs, “A Fából Faragott Királyfi,” in *Nyugat* 5.24 (1912), pp. 879-888; trans. István Farkas in *The Stage Works of Béla Bartók*, p. 70.

[5] *Ibid*., p. 72.

himself explained that *The Wooden Prince* “symbolizes the creative work of the artist who puts all of himself into his work until he has made something complete, shining, and perfect. The artist is left robbed and poor.”[6] Following this description, many understand the ballet as an “allegory about the fate of the artist,” a musical dramatization of an artistic creation’s alienation from its creator.[7] Kilpatrick proposes that the drama be understood as a “cynical allegory about the sacrifice of love for art,” a demonstration that sexual alienation can only be overcome by surrendering to creative alienation. Yet I think it’s possible, even desirable, to delve deeper. While both love and art figure prominently in Balázs’s fairy tales, they are only particular elements of a semiotic repository that is largely devoted to more abstract notions, such as what Jack Zipes describes as the main concerns of Balázs’s life: “marginalization, lack of identity, the experience of alienation, [and] alienation as the basic condition of human beings.”[8]

Balázs’s fairy tales, in other words, may not always be about love, art, and the like, but they are always occupied with alienation. Balázs’s first published fairy tale, “Silence” (1908), is about a man named Peter and his encounter with “Silence,” a fairy. After his dying mother gives him a “choosing” ring, Peter tries to give the ring back to his mother, to his good friend Paul, and then to his lover Ilona. Each recipient soon dies, and the ring magically reappears on Peter’s finger, whereupon he realizes in exasperation that he must give it to Silence, who has been

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[6] Béla Balázs, “A Szövegíróa Darabjáról,” *Magyar Színpad* (May 12, 1917), p. 2; trans. György Kroó in “Ballet: The Wooden Prince,” in *The Bartók Companion*, ed. Malcolm Gillies (Portland, Oregon: Amadeus Press, 1994), pp. 362-363.

[7] Kilpatrick, “‘Life Is a Woman’: Gender, Sex and Sexuality in Bartók's ‘The Wooden Prince’,” p. 163.

[8] *Ibid.*, p. 164; Jack Zipes, “Béla Balázs, the Homeless Wanderer, or, The Man Who Sought to Become One with the World,” in Béla Balázs, *The Cloak of Dreams: Chinese Fairy Tales*, ed. Jack Zipes (Princeton: Princeton University Press, 2010), p. 10.

beckoning him to join her throughout. The tale ends with Peter and the fairy descending together to the bottom of a deep mountain lake.[9] This story suggests a subject's embracing of the void, its coming to terms with the inevitability of loneliness. In a later tale, "The Three Faithful Princesses" (1917), a Hindu king named Suryakanta kills a black snake, after which the god Ganesha appears and angrily punishes him by estranging the king from his own soul. Suryakanta then goes on a quest to regain his self-identity, the tale becoming a transparent allegory of self-alienation and the subsequent yearning for a return to self.[10]

Such concerns should come as no surprise, for the Sunday Circle was preoccupied with notions of social and aesthetic alienation, yearning for their undoing in some utopian transcendence. As one of Lukács's biographers, Arpad Kardakay, points out:

> In Balázs's hillside apartment, no one topic dominated the conversation more than alienation. Bartók made his guest-appearance in the circle with *The Wooden Prince*. Balázs's libretto and Bartók's music project an "inferno" of alienation around which the Sundayers walk.[11]

The ballet's expression of artistic alienation, then, must itself be symbolic for alienation and estrangement at large. By following the historical thread of *Entfremdung* as a philosophical term, I have in fact isolated two different, if intertwined, expressions of alienation in *The Wooden Prince*: (1) the alienation of the work of art from its creator, which represents, more generally, the alienation of the product of a worker's labor, and (2) *self*-alienation, for the Wooden Prince

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[9] Béla Balázs, "A Csend," in *Nyugat* 1.14 (1908). A German translation, "Die Stille," can be found in Béla Balázs, *Sieben Märchen* (Vienna: Rikola Verlag, 1921), pp. 109-146.

[10] Béla Balázs, "A Három Hűséges Királyleány," in *Nyugat* 10.11(1917); Balázs, "Die Drei Getreuen Prinzessinnen," in *Sieben Märchen*, pp. 9-54.

[11] Arpad Kadarkay, *Georg Lukács: Life, Thought and Politics* (Oxford: Basil Blackwell, 1991), p. 177; quoted in Kilpatrick, "'Life Is a Woman': Gender, Sex and Sexuality in Bartók's 'The Wooden Prince'," p. 169. By all accounts, Bartók played his own piano transcription of *The Wooden Prince* at this meeting.

itself is not only the product of the Prince's work, but an image of the Prince becoming an "other to himself." Such a Hegelian conception would of course require us to understand the ballet's alienation as forming the second of *three* moments, but such a determination will first require taking a more detailed look at the ballet's narrative, a synopsis of which follows:

After the forest awakens, the curtain rises, revealing the Princess at play and a fairy wearing a gray veil. Soon after leaving his castle to explore the world, the Prince sees the Princess and instantly falls in love, declaring "I love her." He attempts to simply walk up to the Princess, but the fairy impedes his way by enchanting the trees of the forest and the waves of the stream surrounding the Princess's castle. His efforts proving to be in vain, the Prince realizes that he must attract the Princess's attention some other way, causing her to come to him. The object of attraction he dreams up is the Wooden Prince, which he fabricates through a nightmarish process of self-fragmentation: the Prince successively removes his cloak, his crown, and his hair, using them to complete his lure. The Princess, her interest finally gained, approaches the Wooden Prince, which the fairy enlivens with a wave of her wand. After a brief struggle with the Prince, the Princess succeeds in reaching the puppet, and they begin to dance. The Prince then collapses in despair, and in a gesture symbolic of his own death falls asleep. The fairy comforts him and by borrowing elements of the forest's flowers makes him whole again, after which the "trees, waters, and flowers" give homage to the Prince in a "great apotheosis."[12] The Princess, while attempting to revive her lifeless dancing partner, now sees the Prince in his new splendor, and their roles are reversed: she desires *him*. This reversal is only complete, however, when the Prince — after the Princess's failure to reach him and her removal, in frustration, of her own

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[12] Béla Bartók, *The Wooden Prince: Complete Stage Version*, ed. Nelson Dellamaggiore and Peter Bartók (Homosassa: Bartók Records, 2008), p. 237. All references to the score will be to this version, which includes Bartók's 1932 revisions.

crown, cloak, and hair — assumes the fairy's role as a supernatural comforter: the Prince embraces the Princess, and they kiss. After the forest returns to a state of peace, the curtain closes.

The ballet's three dialectical moments thus would appear to be: (1) the founding contradiction between the Prince (man) and the fairy-tale forest (nature), (2) the creation of the Wooden Prince, which generates the scission that fuels the ballet's "inferno" of alienation, and (3) the *Aufhebung* (or reconciliation) of the Prince with the Wooden Prince, with himself, and with nature.[13] Since *The Wooden Prince* is one of Bartók's largest compositions — both in terms of orchestral resources and in length — I confine my attention to the three passages that correspond to the above moments: (1) the opening of the ballet, from the introduction to the Prince's declaration of love, (2) the creation and placing of the Wooden Prince in the forest, and (3) the Prince's "death" and resurrection, which leads to his reconciliation with the Princess. Drawing on contemporary interpretations of Hegelian thought, in particular Badiou's decades-long encounter with Hegel, I will pose several questions. Is the third moment of *The Wooden Prince*'s dialectical fragment successful?[14] Does the ballet introduce something truly new into its world, or does it, following the cynical view posited by Kilpatrick, fail in its attempt, its final stage becoming a "dead branch," what Hegel would call a *Rückfall* — a "relapse"?[15] If it *is* successful, what is the nature of the Prince's resurrection, or "apotheosis," as Balázs describes

[13] I borrow the term "scission" from Alain Badiou, *Theory of the Subject* (1982), trans. Bruno Bosteels (London: Continuum, 2009), p. 13.

[14] See Frederic Jameson's Valences of the Dialectic (London: Verso, 2010) and The Hegel Variations (London: Verso, 2010), Badiou's Theory of the Subject (op. cit.), and Slavoj Žižek's Less than Nothing: Hegel and the Shadow of Dialectical Materialism (London: Verso, 2012).

[15] See Badiou, *Theory of the Subject*, p. 10.

it?[16] Does the Prince *evolve* into a new and better form? Would such a supposedly complete dialectical movement be a symptom of a process that resembles concentric circles, only rather than descending centripetally and inexorably towards alienation, cycles endlessly, or better yet, is somehow expansive in nature?[17] Most importantly, how does Bartók's harmonic practice aid in expressing these moments: does it reinforce or subvert the original messages of Balázs's fairy tale?

1. Contradiction

The introduction to *The Wooden Prince* is typically described as the awakening of the natural world, and while some writers have accordingly interpreted its referential harmony, C–(E♭)–E–F♯–G–B♭, as an unchanging "harmony of nature," viewing it as such a static starting point poses a problem.[18] As Frederic Jameson has observed, dialectical processes are today more often understood as "revelatory of some ontological rift or gap in the world itself, or in other words, of incommensurables in Being itself."[19] In *Science of Logic* (1817), Hegel writes that "the truth is neither being nor nothing, but rather that being has passed over into nothing and nothing into being — 'has passed over,' not passes over." Slavoj Žižek interprets this passage just as Jameson describes:

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[16] Balázs, "The Wooden Prince," in *The Stage Works of Béla Bartók*, p. 76.

[17] Jameson characterizes dialectical movements as traditionally being understood as "centripetal" or "cyclical," but credits Badiou for theorizing an "expansive" third option. *The Hegel Variations*, p. 22.

[18] The quintessential example is Lendvai's derivation of this harmony from the "natural" acoustic scale.

[19] Jameson, *Valences of the Dialectic*, p. 23.

> When he writes about the passage from Being to Nothingness, Hegel resorts to the past tense: Being does not pass into Nothingness, it has *always already passed* into Nothingness, and so on. The first triad of the *Logic* is not a dialectical triad, but a retroactive evocation of a kind of shadowy virtual past, of something which never passes since it has always already passed: the actual beginning, the first entity which is "really here," is the contingent multiplicity of beings-there (existents).[20]

So since Hegel begins his Logic with beginning itself — "abstract" beginning, which already contains both being and nothingness — not even the most basic dialectical fragment can begin with an immediate One. Rather, the initial aspect, a "thesis" in the conventional Fichtean sense, must be a Whole made up of incommensurable elements. While Balázs intended for *The Wooden Prince*'s opening music to depict nature, it was a nature rife with internal antagonisms: "Everything is plain and orderly, the music says, and things are at peace. However, the music also speaks of some great and silent, harrowing desire, for in this peace Things have spoken their last word and are now waiting for Man's reply."[21]

In Badiou's version of the dialectic in *Theory of the Subject* (1982), the founding contradiction is between what he calls the "space of placement" (P) and a term that is radically "out of place" (A).[22] In juxtaposing "Things," his term throughout for the elements of the objective world, ostensibly even the Princess, and "Man," whose form is that of the Prince, Balázs constructs *The Wooden Prince*'s version of such a contradiction. But what exactly is it

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[20] G.W.F. Hegel, *The Science of Logic* (1812-1816), trans. and ed. George Di Giovanni (Cambridge: Cambridge University Press, 2010), pp. 59-60; Žižek, *Less than Nothing: Hegel and the Shadow of Dialectical Materialism*, p. 228. What better way to symbolize such a "shadowy virtual past" than a fairy tale, such as Balázs's "Silence"? Peter's embracing of the void would thus represent the coming together of *Sein* and *Nichts*.

[21] Balázs, "The Wooden Prince," in *The Stage Works of Béla Bartók*, p. 70. The capitalizations are Balázs's.

[22] Alain Badiou, *Theory of the Subject*, (1982), trans. Bruno Bosteels (London: Continuum, 2009), pp. 3-21.

that sets the Prince "out of place"? From the moment he leaves the portal of his castle he is one-dimensional, his "rambling" music consisting of only a single line performed monophonically in octaves.[23] This might lead one to think that the Prince is distinguished by being introduced melodically in an otherwise harmony-dominated world. This separation, however, is better understood only as a weak difference, for the D mixolydian of this rambling music can rather easily be understood as a linear expression of the harmony D–F♯–A–C, which as we will see, is perfectly discernible within the introduction's harmonic language.

The Prince's status as an out-of-place in contradiction with the fairy-tale forest only becomes truly clear when he begins to become a subject. In *Being and Event* (1988) and elsewhere, Badiou reiterates that human beings are not automatically subjects (or even elements of a subject), but rather "individual animals" or "passive bodies." [24] To become a true Badiouian subject requires, among other things, an "event," and I locate *The Wooden Prince*'s "evental site" at the moment when the Prince, after glimpsing the Princess and immediately falling in love, exclaims "I love her!"[25] His declaration, the first verbal utterance registered in the ballet's dramatic narrative (for no one actually speaks or sings), is an "intervention," the naming of an

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[23] In Balázs's text, the Prince says "Oh, to go rambling — how wonderful!" as he leaves his castle. Balázs, "The Wooden Prince," in *The Stage Works of Béla Bartók*, p. 71.

[24] Alain Badiou, *Being and Event* (1988), trans. Oliver Feltham (London: Continuum, 2007), p. xiii; and *Logics of Worlds* (2006), trans. Alberto Toscano (London, Continuum, 2009), p. 50.

[25] For several reasons, Badiou would only allow for the *depiction* of an event in the course of a piece of music. It is not clear whether he considers a work of art as finite or infinite, which is crucial given that events can only occur in infinite situations or worlds. In the *Handbook of Inaesthetics* (1998), Badiou states that "a work of art is essentially finite," while in *Logics of Worlds* (2006) — after treating several works of art as worlds — he claims that "every world is infinite, and its type of infinity is inaccessible," referring to his preferred negative resolution of Georg Cantor's continuum hypothesis. One could suppose that a world is not exactly the same as a situation, and that a work of art, while perhaps a finite situation, is not a world at all, but that would contradict Francois Nicolas's musical ontology to which Badiou refers the reader.

event.[26] In this case, the name marks the moment the Prince is brought into contradiction with the world, creating the first of this dialectical fragment's three moments.

Via an elaborate set-theoretical metaphor, Badiou defines an evental site as a "multiple such that none of its elements are presented in the situation. The site itself is presented, but 'beneath' it nothing from which it is composed is presented" (175). This will require some unpacking. For Badiou, mathematics *is* ontology, so he is not positing a mathematical ontology, but a "metaontology" that makes conclusions based on the work of actual ontologists, who turn out to be necessarily unwitting or even uncooperative set theorists. A "situation" is simply a set, a multiple of multiples. "Presentation" in this context is equivalent to set-theoretical *belonging* and must be kept distinct from "representation," which is equivalent to set-theoretical *inclusion*. An element of a situation belongs to that situation, while a subset is included in the situation. So in any situation S, an evental site is a subset of (or is included in) S such that none of its elements are presented by (or belong to) S. Consider a very simple, finite example: if a situation S = (1, 2, 3, 4, X) and X = (5, 6, 7), then since 5, 6, and 7 are not elements of S, X is an evental site. None of X's elements are represented by the "state" of the situation, the set of all of its subsets.[27]

How does this relate to music? First of all, music theory typically functions as an example of what Badiou calls "constructivist thought," which "only recognizes as a subset a grouping of presented multiples that have a property in common."[28] Since the State is the "master

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[26] Badiou, *Being and Event*, pp. 201-211.

[27] *Ibid.*, pp. 173-177. It is important to keep in mind that Badiou is concerned exclusively with infinite situations. Finite set theory, for Badiou, is comparatively simple and uninteresting.

[28] *Ibid.*, pp. 286-294.

of language," constructivism is strongly aligned with the State.[29] In the view of constructivism, the excess of the State over its situation is minimal: any part, no matter how elusive, can be trapped and tagged. Constructivist thought is thus a "logical grammar" that allows only those collections of elements sharing some describable property to be subsets, and much of its activity is involved in seeking out the unnamable and finding some way of folding it back into its body of knowledge. While music theory is traditionally a kind of constructivist thought, it is important to note that for Badiou, this is not an altogether negative characterization. Constructivism is a "strong position" and one that no one can avoid; it is the underlying philosophy of the accumulation of human knowledge, and according to Badiou it is always "appropriate to be knowledgeable."[30]

Given a particular music-theoretical language, a grouping of presented multiples (elements *belonging* to a situation) is thus represented (*included* in the situation as a subset) if and only if it can be named, if every member of the group shares some expressible property. Following a particular harmonic music-theoretical language, for instance, one grouping of pitches within a musical work might be named "C major triad," while it might not be possible to name another grouping at all. The former is represented, while the latter is not. So, demonstrating that the Prince's declaration of love constitutes an evocation of an evental site will require uncovering the music-theoretical language implicit up to that point and then showing how the Prince's declaration is a multiple whose elements are not nameable and thus "interrupts the law, the rules, the structure of the situation."[31] Since this chapter is intended as a

[29] *Ibid.*, p. 287.

[30] *Ibid.*, p. 294.

[31] Alain Badiou, "Affirmative Dialectics: From Logic to Anthropology," *The International Journal of Badiou Studies* 2.1 (2013), p. 3.

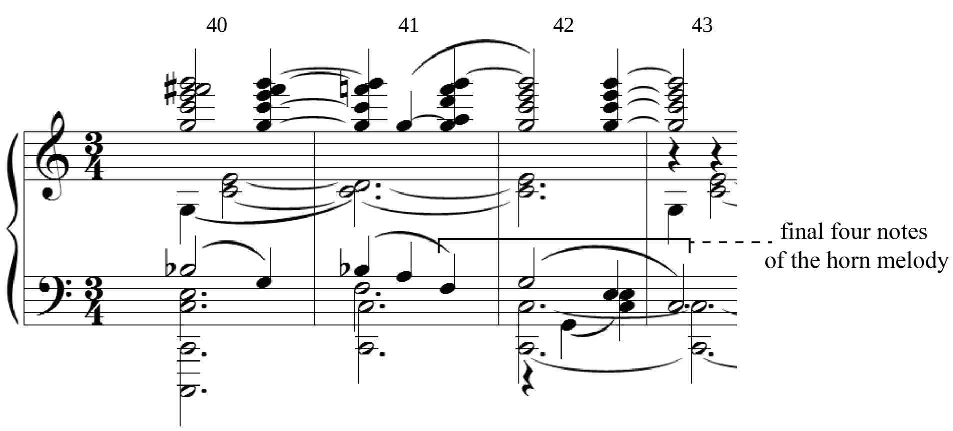
demonstration of the framework set up in Chapter 2, this music-theoretical language is a *harmonic* one.

The Introduction

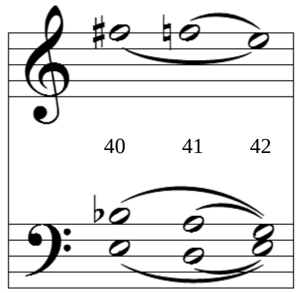
The harmonic language of the natural world without the Prince is exemplified by the so-called harmony of nature, C–(E♭)–E♮–F♯–G–B♭, hereafter HN. Example 4.1 shows the step-by-step accumulation of the opening HN, which is built up by progressively widening entrances of a leaping figure in the strings: G leaps to C in ms. 1-3, then to E in ms. 6-7, and (after some repetition) to F♯ in ms. 14. After spreading across several octaves, this first manifestation of the HN is then completed with the entrance of a single horn, which leaps from C (always up) to B♭ in ms. 36. While the introduction prolongs and elaborates this chord, it is not, like the prelude to *Das Rheingold*, a continuous expression of a single, unchanging harmony. Example 4.2 presents ms. 40-43, while Example 4.3 demonstrates some important aspects of the voice–leading in these measures. F♯ in ms. 40 descends chromatically through F♮ to E in ms. 42, while at the same time, B♭ descends through A to G, momentarily resolving the two elements (F♯ and B♭) antagonistic to a pure C major triad. While F♯ and B♭ do return (in ms. 47 and ms. 48), they soon dissolve back into C major again in ms. 54-56, creating an alternation between the C major triad and the HN.

Like the G–B♭–B♮–C♯–D tonic of Bartók's Fourth Dirge (discussed in Chapter 2), the HN is a segment of an (0369) chain with a 10 connector: C–E♭–E♮–F♯–G–B♭. So just as I described C♯ in the Dirge tonic as an alternative fifth sourced from the dominant side, F♯ can be understood as bent around from the right to come into contact with C–E♭–E♮–G–B♭. This dominant derivation is most explicit in the two transpositions of the final four pitches of the opening horn

Example 4.1. Ms. 1-36.

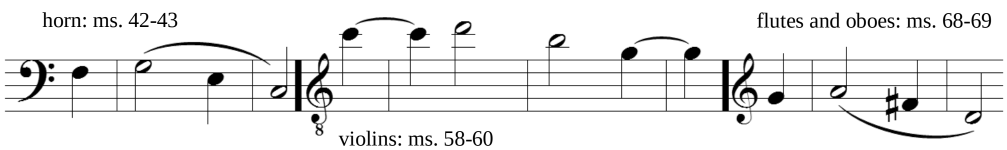


Example 4.2. Ms. 40-43.



Example 4.3. Elements of the voice leading in ms. 40-42.

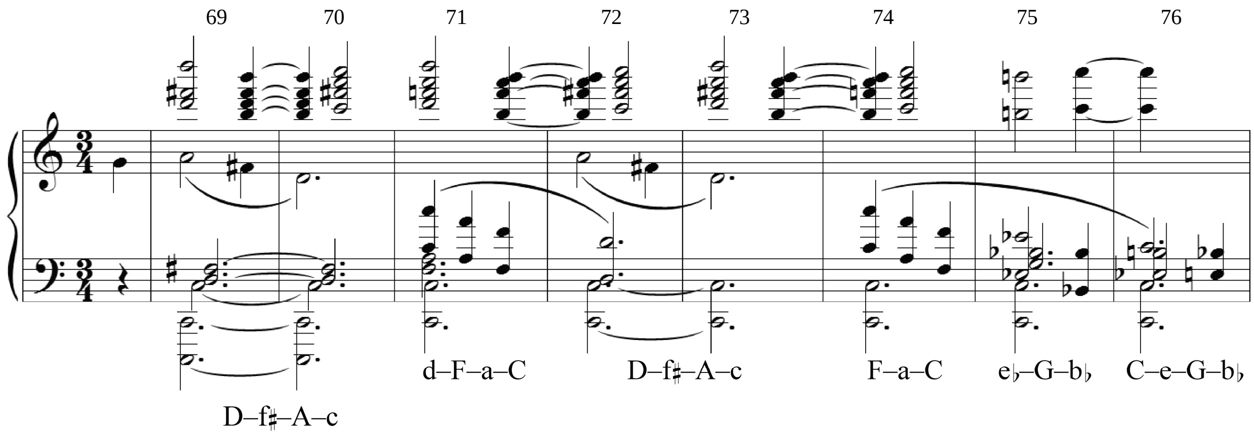
melody (F–G–E–C in ms. 41-43 — see Example 4.2). As shown in Example 4.4, the violins transpose the pitches by a perfect fifth in ms. 58-60 from F–G–E–C to C–D–B–G, and in ms. 68-70 the flutes and oboes transpose the figure by another perfect fifth to G–A–F♯–D:



Example 4.4. Transpositions of the horn melody.

Yet the harmonic support for these transpositions does not move from C major to D major by way of G major, as one might expect, but proceeds directly from C major to D major. The first new harmony of the introduction, D–F♯–A–C, arrives in ms. 58 underneath the violins' transposition of the horn figure and then continues under the flute and oboe transpositions. This harmonic shift flips the position of C from prime to seventh — from C in the HN to c in D–f♯–A–c.

As shown in Example 4.5, this reinterpretation of C is dramatized in ms. 71-74 when "D–f♯–A–c" alternates with "[d]–F–a–C." I have placed "d" in brackets because it appears in ms. 70



Example 4.5. “D–f♯–A–c” alternating with “[d]–F–a–C” in ms. 69-76.

but not in ms. 73. In ms. 75, this alternation is broken when F–A–C descends by whole step to (C)–E♭–G–B♭, which then resolves to C–E♭–E♮–G–B♭, momentarily reproducing the D major/F major alternation a whole step below. I have placed C in parentheses because it is present throughout as a pedal tone. Example 4.6 organizes the entire pitch collection of the introduction in terms of functional regions. Note how each pair of triads belongs to an “octatonic” functional region: C and E♭ major belong to T, while D and F major belong to D^2.[32] Ms. 1-76 thus expresses a T–D^2–T progression in a species of C major heavily influenced by the diminished tendency.[33] At a more background level, these seventy-six measures “compose out” the voice leading of ms. 40-42 and 54-56, in which F♯ and B♭ momentarily “pass” into E and G. Example 4.7 organizes this relation into a voice-leading diagram where C is assumed to be present in the bass (as it is in the score) throughout. Note how, within the move to D^2, F♯ is “prolonged” through the harmonic alternation of D–f♯–A–c with F–a–C. F♯ then attempts to “resolve” to E through F♮ of the

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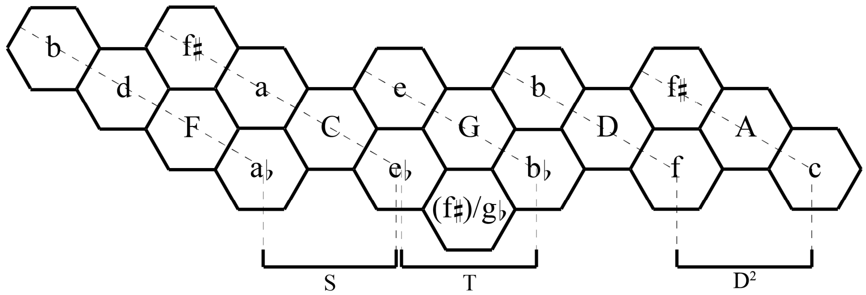
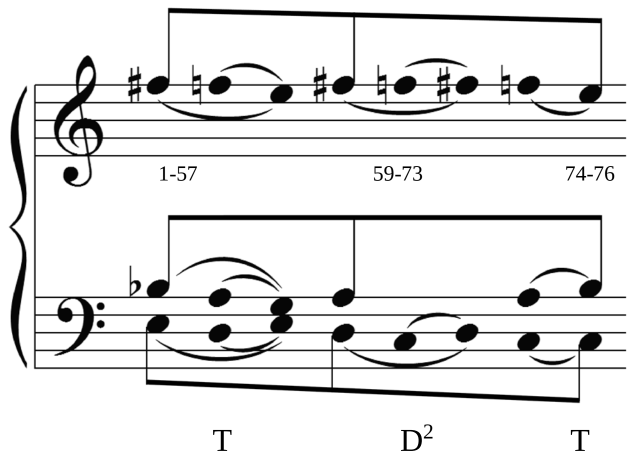
[32] For notational simplicity, I notate the region to the right of D as D^2, the region to the left of S as S^2, and so on.

[33] I include B from the violins here because after the final D–B–G arpeggiation (ms. 66-68), they repeat a B–C–D figure, thus making B (and not G) a constant presence in this dominant–functioning passage (ms. 58-74).



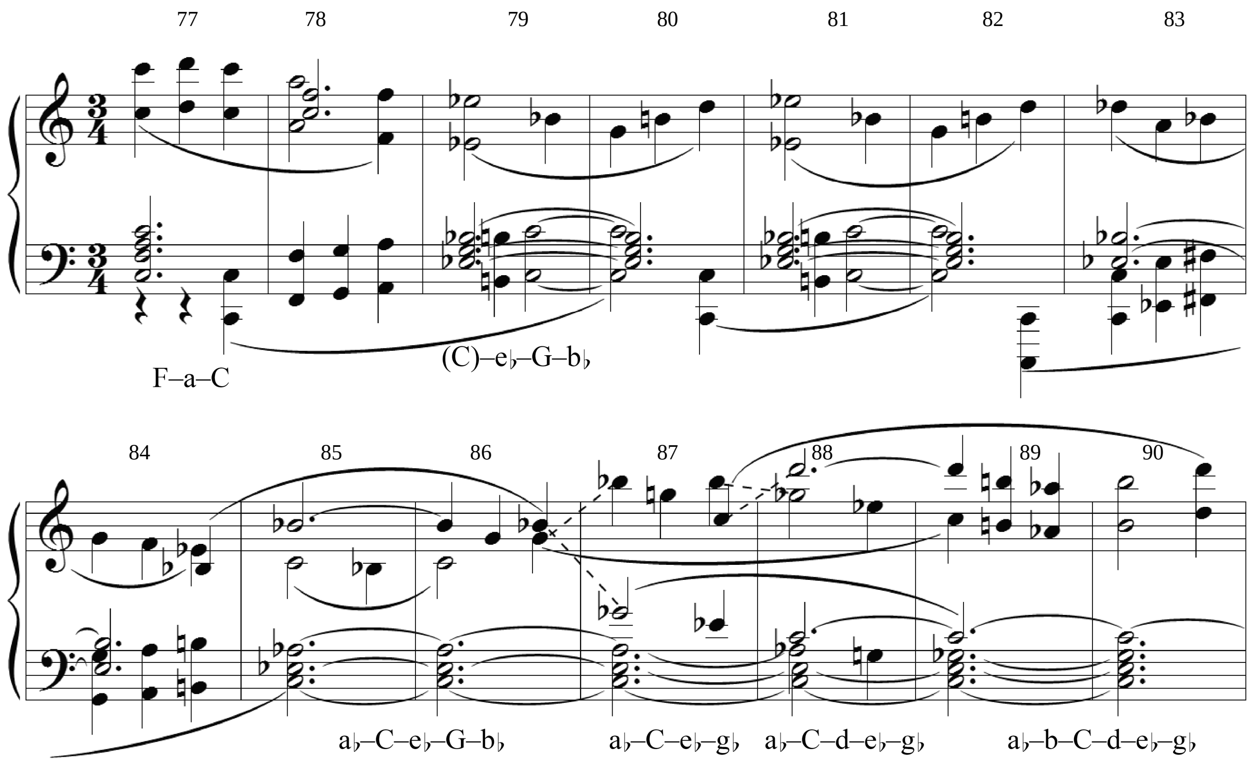
Example 4.6. The entire pitch collection of the introduction.



Example 4.7. The voice leading of ms. 1-76.

"incomplete neighbor" F–A–C in ms. 74, making ms. 1-76 a large-scale variation on Example 4.3 (p. 224). Only F♯ (and not B♭) resolves in ms. 76, which perhaps reveals F♯ as the tonic element most antagonistic to C major.

A passage begins in ms. 77, shown in Example 4.8, that articulates an F major/A♭ major complex: F–A–C in ms. 77 "passes" through (C)–E♭–G–B♭ to A♭–C–E♭–G–B♭ in ms. 85, where the *poco a poco più mosso* leading to the introduction's culminating *fortissimo* in ms. 121 begins. A♭–C–E♭ soon loses G–B♭ and gains G♭/F♯ (ms. 87), D (ms. 88), and B (ms. 89), creating a new HN: A♭–B–C–D–E♭–G♭/F♯. This HN is related to the tonic HN by T_{-4}, 4 being one of the possible periodicities for (0369) chains, and thus signals a move to the subdominant.



Example 4.8. The F major/A♭ major complex in the ms. 77-90.

In Example 4.6 (p. 226), this F/A♭ complex (the entire HN) is entirely contained within the S functional region. To reiterate: the tonic region contains the tonic HN (C–E♭–E♮–F♯–G–B♭), as well as the associated C major/E♭ major complex; the D^2 region contains the D major/F major complex with which the tonic alternates in ms. 1-76; and the S region contains the subdominant HN (A♭–B–C–D–E♭–G♭/F) as well as the F major/A♭ major complex. Since the S and D^2 regions are enharmonically equivalent, one could imagine bending the diagram into a cylinder, defining a key variation belonging to the C major species.

By ms. 96, the introduction has returned to tonic, and from this point to the raising of the curtain the harmony remains on the tonic HN. Recall Balázs's description of the fairy-tale forest: "In this peace Things have spoken their last word and are now waiting for Man's reply." While the violins and flutes make a final attempt to pass from F♯ to E and return "Things" to a state of peace, the desire for "Man's response" is simply too strong to allow the forest to achieve a complete peace. As evidenced perhaps most clearly by the English horn, bass clarinet, and horns, which ascend *forte* in the bass from E through F♮ to F♯ in ms. 96-97, reaching F♯ just as the flutes and violins reach E, the attempt to once and for all remove F♯ is in vain. Example 4.9 is a voice-leading diagram of ms. 1-103 demonstrating that this final attempt to pass from F♯ to E also occurs on an even more background level: F♯ passes through F♮ (ms. 77) to E (ms. 98), while at the same time, E passes through F♮ in ms. 77 to F♯ in ms. 97, creating a large-scale E/F♯ voice exchange. Being (E) passes into Nothingness (F♯) as Nothingness (F♯) passes into Being (E). The introduction expresses a T–D^2–T–S–T progression in which C is present throughout: every harmony in the introduction contains C either as prime, third, fifth, or seventh. It is a kaleidoscopic rumination on C and an exposition not only of the harmony of nature, but of the harmonic dialect peculiar to the fairy-tale forest.

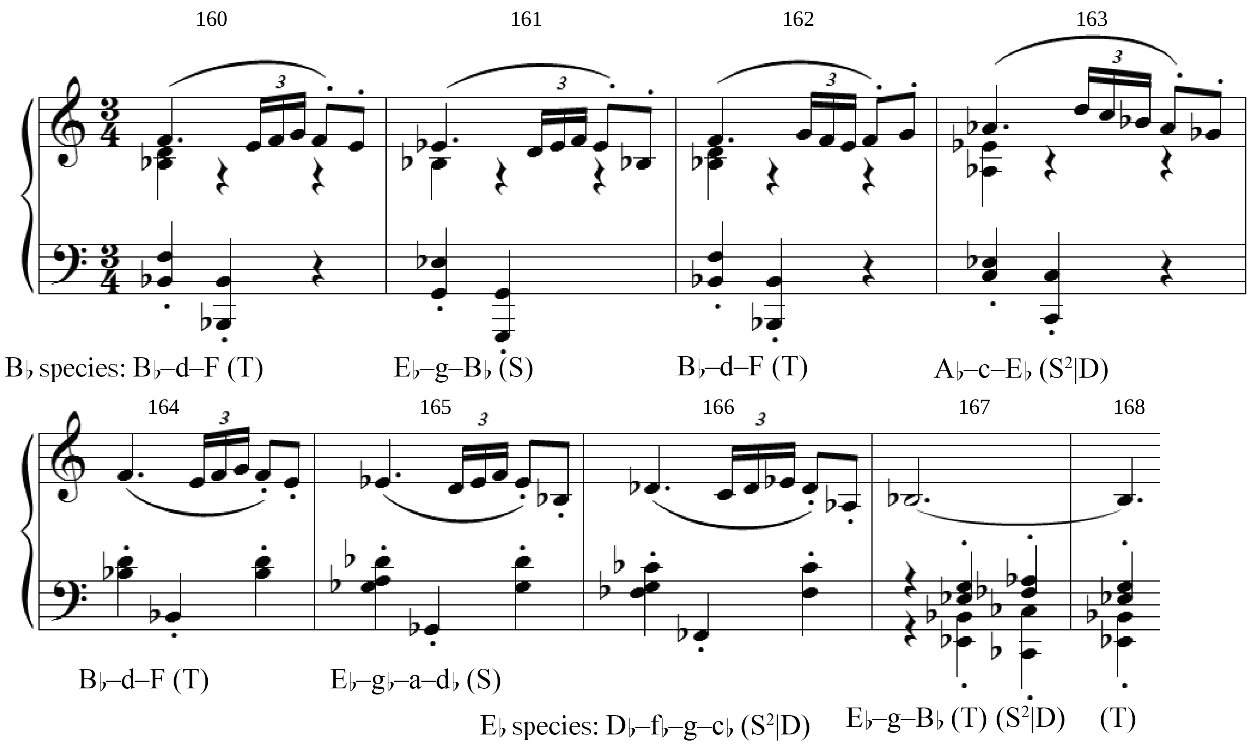
Example 4.9. The voice leading of ms. 1-102.

The Princess's Dance

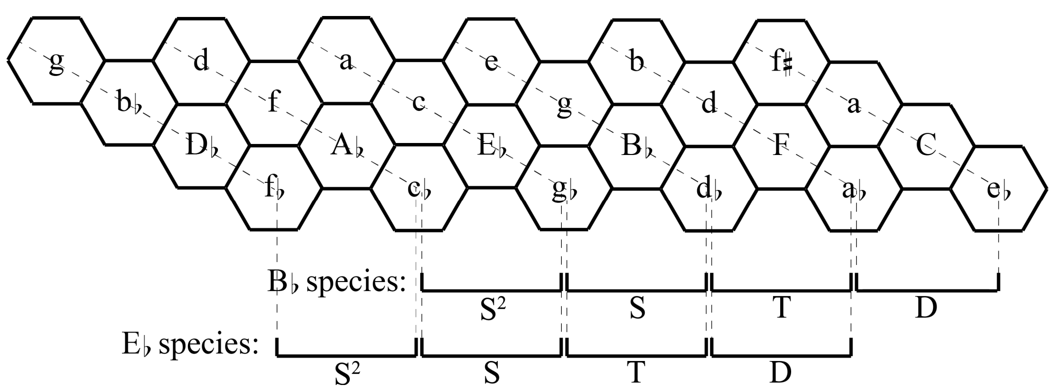
The introduction moves directly into the first dance of the ballet, the "Dance of the Princess in the Forest," which remains squarely within and thus codifies the introduction's diminished-tendency language. It does not begin immediately after the introduction, but thirty-three measures later, after the Princess and the fairy — a *super*natural emblem of the forest — are introduced. And the dance begins not in the variant C major of the introduction, but in a key variation belonging to the B♭ major species. Example 4.10 gives the first statement of the Princess's dance, ms. 160-167; Example 4.11 projects its pitch collection onto a Tonnetz labeled with functional regions. These eight measures form a modulating period, the harmonies of the "antecedent" being rather straightforward: B♭–D–F (T) alternates with E♭–G–B♭ (S) and A♭–C–E♭ (S^2). The latter can also appear to have a dominant function. One can clearly see this double meaning in Example 4.11, where A♭–C–E♭ belongs to both S^2 (as "A♭–c–E♭") and D (as "a♭–C–e♭").[34] This S^2|D harmony — where "|" is meant to represent that the harmony belongs to two regions — resolves to T in ms. 164 just as the dance's "consequent" begins. One could imagine bending the key variation into a cylinder so that the S^2 and D regions overlap, just as the S and D^2 regions overlap in the introduction.

While this second phrase begins in parallel with the first — appearing to launch another T/S alteration — it soon deviates, modulating to a variation on E♭ major. Rather than returning to the tonic, E♭–G♭–A–D♭ in ms. 165 descends a whole step to D♭–F♭–G–C♭, which then "resolves"

[34] A♭–C–E♭ would traditionally be understood as lying two perfect fifths below B♭–D–F, but since 10 is one of the periodicities for (0369) chains, A♭–C–E♭ could also be understood as having a dominant function.



Example 4.10. The first statement of the Princess's dance, ms. 160-168.



Example 4.11. The pitch collection of the Princess's dance.

to E♭–G–B♭ in an S^2|D→T motion in the new key.[35] D♭–F♭–G–C♭ plays on the same functional ambiguities as A♭–C–E♭: it could belong to either S^2 or D in the E♭ key variation. While the spelling of D♭–F♭–G–C♭ strongly suggests S^2, the voice leading — the prominent semitone descents from F♭ to E♭ and from C♭ to B♭ — suggests a dominant function. Again, one can imagine the S^2|D→T motion as bending the key into a cylinder through the overlap of the S^2 and D regions.[36] Such S^2|D→T resolutions thus replace traditional "V→I" resolutions: much like the key variation of the introduction is defined by cylinder-bending brought on by overlaps between S and D^2, these B♭ and E♭ major variations are defined by cylinder-bending brought on by an S^2|D ambivalence. This of course recalls the fact that Bartók frequently described folk tunes as being devoid of traditional "dominant-tonic" relations, as he called them. In "What is Folk Music?" (1931), he writes:

> Anyone who is slave to customary patterns will naturally qualify as unintelligible and meaningless that which deviates even slightly from them …. If his musical mentality or that of a dilettante is based on triadic variation of tonic and dominant only, how can we expect such a person to comprehend these primitive melodies, which, for instance, altogether lack the dominant in the harmonic sense of the term?[37]

Elsewhere, he specifically points out folk tunes that, like the tune of the Princess's dance, end on ascending whole steps and are thus incompatible with such traditional V→I cadences.

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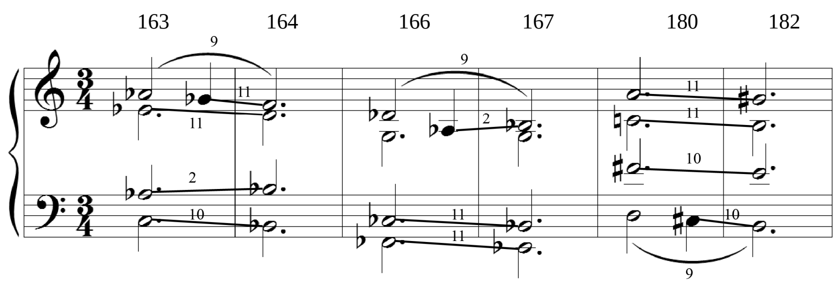
[35] There are some slight discrepancies between the full score and the piano transcription: in ms. 165 the violas have A♮, while the corresponding pitch in the transcription is spelled B♭♭; G in the violas in ms. 166 is spelled A♭♭ in the transcription. It seems reasonable to think that the change might have been made for ease of reading. Such discrepancies are common, though in general spellings in all of the C instruments concur. The harps also often wildly differ, but this is clearly due to the exigencies of pedaling.

[36] This motion is another SLIDE progression: disregarding D♭, the third, G, is constant between F♭–G–C♭ and E♭–G–B♭, while the outer voices descend by a semitone.

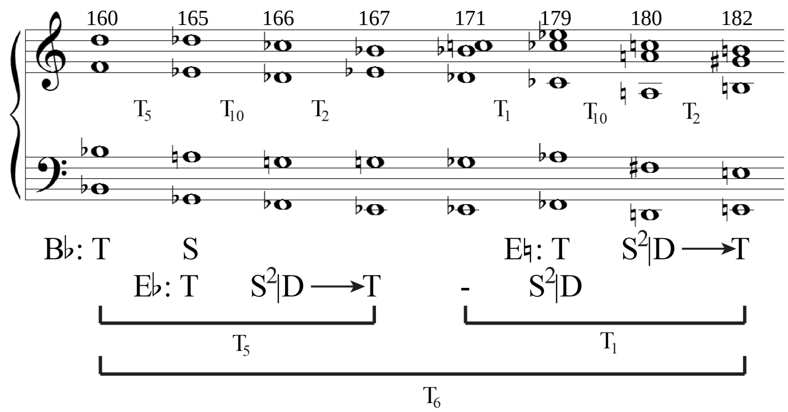
[37] Bartók, "What is Folk Music?," *Béla Bartók Essays*, pp. 6-8.

The second statement of the dance in ms. 176-183 modulates from the E♭ major variation ending the first statement to an E major variation; the third statement of the dance (ms. 189-205) remains in this E major variation throughout. Example 4.12 sets the S^2|D→T motions found in all three key variations (B♭ major, E♭ major, and E major) side by side with voice-leading intervals labeled:

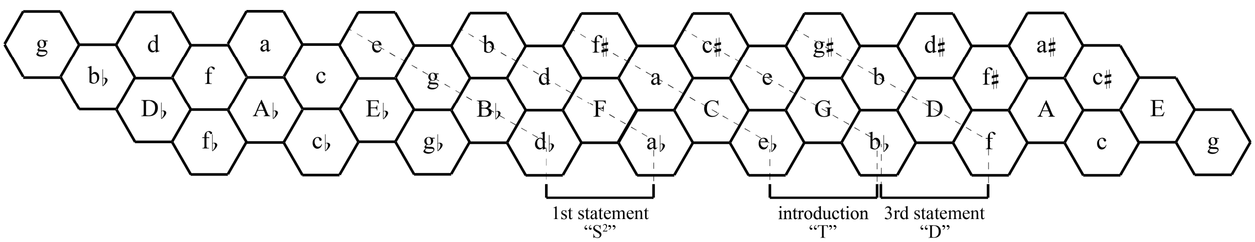


Example 4.12. Three key-defining S^2|D→T motions.

Note how each has two descending semitone motions and one T_9 that acts to define the (0369) common between the harmonies, just as in a traditional V→I motion there is a common tone between the two triads. Example 4.13 charts the overall modulatory and functional scheme of the entire dance. At first glance, this diagram would appear to suggest that the dance perfectly conforms to Lendvai's "axis tonality," that the B♭ and E major variations both express a tonic function, and that the T_5–T_1 transpositional sequence creates a T–S–T progression which traverses or prolongs the tonic "axis." The E major variation, however, lies not to the left of the introduction's C major (like the B♭ of the first statement), but, as shown in Example 4.14, to the *right*, reproducing an S^2|D relation on a more background level. The tonic region of the introduction is marked "T," while the tonic regions of the first and third statements of the Princess's dance are marked "S^2" and "D," respectively. In other words, the B♭ and E♮ key



Example 4.13. The modulatory and functional scheme of the Princess’s dance.

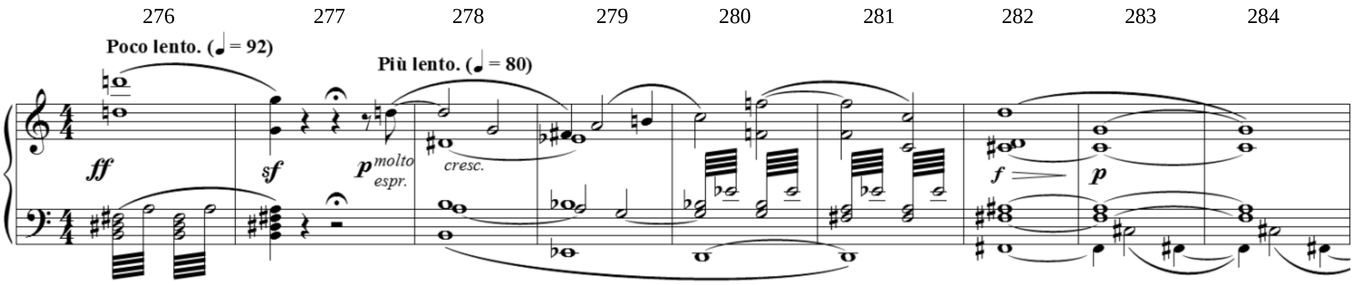


Example 4.14. The enharmonically equivalent key variations of the Princess’s dance in relation to the introduction.

variations of the first and third statements of the Princess’s dance are related in the same way as the S^2 and D regions are related in the key defining $S^2|D \rightarrow T$ motions.

The Prince’s Declaration

While the introduction and the Princess’s dance thus establish a language rife with conflict (exemplified by the harmonic tension internal to the HN), the ballet’s founding contradiction is not made explicit until the entrance of the Prince and his declaration of love for the Princess. Example 4.15 shows the Prince’s declaration in ms. 276-277 and its elaboration in ms. 278-284, which I call the Prince’s “longing theme.” Motivically speaking, the most



Example 4.15. Ms. 276-284, the Prince’s declaration and longing theme.

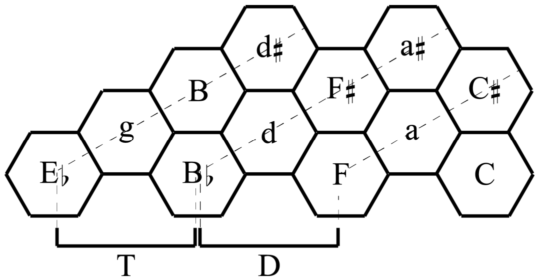
characteristic gesture here is the trumpet’s descending D–G perfect fifth in the declaration, which is echoed in different forms in the longing theme: the descending D–G in ms. 277-278 is inverted as an ascending F–C in ms. 280-281, given in its prime D–G form again in ms. 282-283, and finally as transposed down a semitone C♯–F♯ in the bass in ms. 283-284.[38] The latter is easily understandable as a $\hat{5}$–$\hat{1}$ motion within the final harmony. And it is in its harmony that the Prince’s declaration gives voice to an unnamable interruption of the fairy-tale forest’s language, an “evental site” as I called it above. In isolation, the harmony of the Prince’s declaration, G–B–D–D♯–F♯–A, does not appear particularly disruptive: the only potentially out-of-place pitch is G, but G can easily be understood to be an “added sixth” and the rest of the harmony as a segment of an (0369) chain with a 1 connector, a typical diminished-tendency chord.

Yet the “declaration chord” could be interpreted in an entirely different way, in which A rather than G could be the “added” pitch and the rest of the harmony — G–B–D♯–D♮–F♯ — would be understood as a coherent construction within an *augmented*-tendency key variation, a segment of an (048) chain with an 11-connector. The declaration harmony would thus act as a kind of pivot between the diminished and augmented tendencies, but only if the subsequent longing theme realizes that possibility. In ms. 278-279 the declaration harmony is in fact

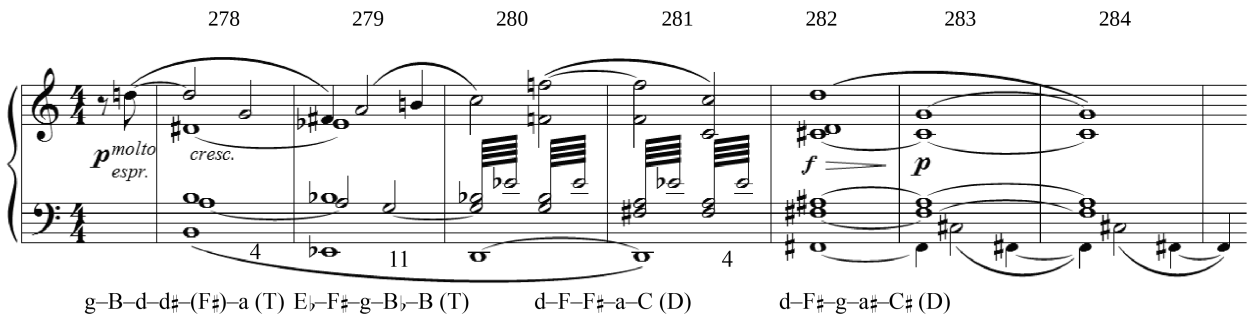
[38] I use the term “gesture” self-consciously, for Bartók makes it clear in the score’s narration that ms. 276-277 are meant to be accompanied by physical, expressive movement (*mozdulat*).

followed by E♭–F♯–G–B♭–B♮, and it would be difficult, if not impossible, to understand this succession of harmonies within a diminished-tendency harmonic language. The chords intersect four (0369)s and thus make any kind of functional interpretation tenuous. Understood in terms of an augmented-tendency influenced key variation, however, the succession is perfectly discernible: the two harmonies belong to a single “hexatonic” functional region. The T_4 between B♮ and E♭ in the bass does not create the impression of a tonic/dominant succession (as it would within the diminished tendency), but of remaining within tonic.

In ms. 280-281, E♭ descends to D in the bass and the G and B♭ “suspensions” “resolve” to F♯ and A, creating the harmony D–F♯–F♮–A–C. Given that 3, 7, and 11 are the possible periodicities for (048) chains, the T_3 between B and D in the bass (or the T_{11} between E♭ and D) effects a shift to the dominant. E♭ in ms. 281 is another “suspension” that “resolves” to D in ms. 282, at which point D–F♯–A♯–C♯ — containing an augmented triad and lying roughly T_4 from the previous harmony — defines the dominant region. Example 4.16 interprets the entire pitch collection functionally; Example 4.17 labels the harmonies of the longing theme with these same functions. Note how three out of four contain augmented triads, and that the four-pitch segment of a (4,11)-cycle in the bass (B–E♭–D–F♯) prescribes the T→D progression. The diminished sonority F♯–A–C–E♭ in ms. 281 cannot be interpreted as stable since it would be in a diminished-tendency influenced key variation, but as a dissonant confluence of suspensions and anticipations. The pitch spellings and transpositional relations thus create a multiple whose elements are unnamable within the fairy-tale language of the forest. E♭–F♯–G–B♭–B♮ and D–F♯–A♯–C♯ do not belong to a single functional region in a diminished-tendency influenced key variation. The Prince’s declaration acts as the singularity or evental site of the ballet’s founding contradiction and opens the possibility of the Prince’s emergence into subjectivity.



Example 4.16. The pitch collection of ms. 278-282 interpreted functionally.



Example 4.17. Ms. 278-284.

As a multiple, ms. 276-284 contain nothing that belongs to the fairy-tale forest, given that the state of that situation is constructed by the music-theoretical language of diminished-tendency influenced key variations. One might argue that this entire construct is predicated on ad hoc theories, and that it would be preferable to advance a theory in which there are labels for any possibility, but this is the case only because, as listeners, we stand *outside* the ballet. From the perspective of someone *inside* this ballet, the idea of anything outside its language would be impossible. And this is what gives the musical evocation of an evental site so much power: it allows us to observe a kind of process — repeatedly, potentially — that seems impossible within our own historical situation.

2. Alienation

In any dialectical fragment, the first moment entails the second. In *The Wooden Prince*, the alienation lying at the core of the ballet's narrative is a consequence of the contradiction between the Prince and the fairy-tale forest, which arises with the Prince's declaration of love. Returning to Badiou's version of the dialectic in *Theory of the Subject*, if the fairy-tale forest is the space of placement (P) and the Prince is the out-of-place element (A), then their contradiction entails what Badiou calls the *scission* of A into "A as such" (A) and "A placed in P" (A_p). He formulates this as $A = (AA_p)$ and notes that "Hegel names these two determinations the something-in-itself and the something-for-the-other." Badiou then gives two examples, one from politics and one from Christian theology. In the latter, A = infinite God and P = the finite world, so the placing of A into P (the incarnation) splits God into the Father and the Son.[39] A_p in the ballet is the Wooden Prince (the Prince placed in the fairy-tale forest), and its principle scission is the alienation of the Wooden Prince from its creator.

While contradiction entails scission, the latter is not necessarily coeval with the former; there is often a prolongation of contradiction before scission occurs. *The Wooden Prince*'s version of such prolongation is the series of events that separates the Prince's declaration of love from carving the Wooden Prince. As I describe in the synopsis, the Prince's struggle with nature and ultimate defeat are choreographed in the second and third dances, the "Dance of the Trees" and "The Dance of the Waves." And in order to get the Princess's attention, the Prince must become an artist — a creator — himself. Such labor recalls the two manifestations of alienation in the ballet: (1) the alienation of a worker's labor and (2) self–alienation. These are distinct but

[39] Badiou, *Theory of the Subject*, pp. 6-15.

in no way separate. One need only turn to Marx's *Economic and Philosophic Manuscripts of 1844* for a description of the interrelation between the alienation of one's labor and self-alienation:

> The *alienation* of the worker in his product means not only that his labor becomes an object, an *external* existence, but that it exists *outside him*, independently, as something alien to him, and that it becomes a power on its own confronting him. It means that the life which he has conferred on the object confronts him as something hostile and alien.
>
> Estrangement is manifested not only in the result but in the *act of production*, within the *producing activity* itself. How could the worker come to face the product of his activity as a stranger, were it not that in the very act of production he was estranging himself from himself .… Here we have *self-estrangement*.[40]

Marx opposes ordinary objectification (or externalization) with alienation proper, which estranges one from oneself. A consciousness, in encountering the "sensuous external world," *always* views its objects as alien; under the capitalist mode of production, however, the product of one's labor is not just another object, but an alienated part of one's own being.[41] In *History and Class Consciousness* (1923), written before the publication of Marx's early manuscripts in 1927, Lukács mirrors this idea: "Rational mechanization extends right into the worker's 'soul': even his psychological attributes are separated from his total personality and placed in opposition to it .… The fragmentation of the object of production necessarily entails the fragmentation of its subject."[42] This of course immediately recalls the step-by-step, *dis*assembly-line fragmentation of the Prince as he removes his crown, cloak, and hair to build the Wooden Prince.

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[40] Karl Marx, *Economic and Philosophic Manuscripts of 1844*, trans. Martin Milligan (Mineola: Dover Publications, 2007), p. 70-73.

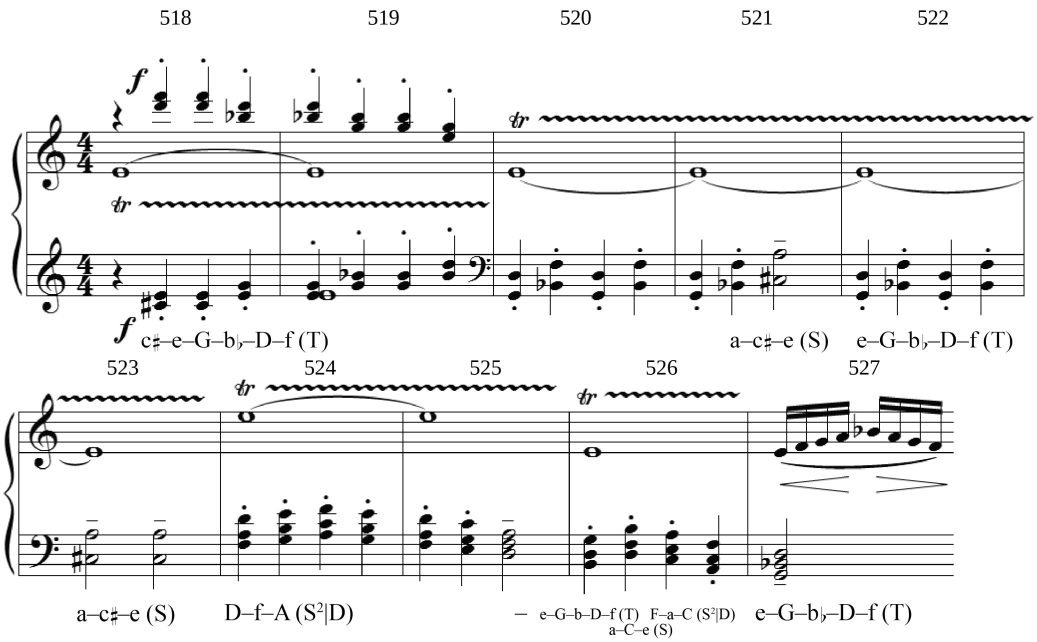
[41] *Ibid.*, p. 70.

[42] György Lukács, *History and Class Consciousness*, p. 88.

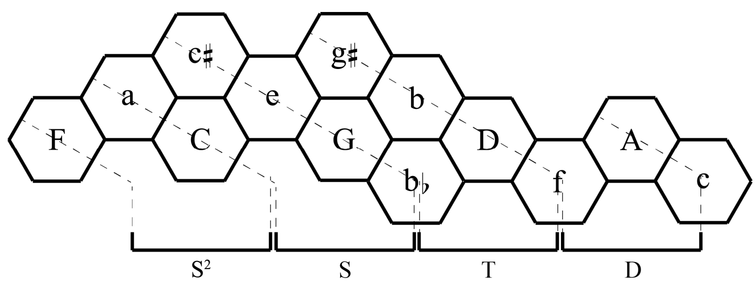
In Marxist thought, both self-alienation and the alienation of the product of a worker's labor must be understood in relation to capitalism, which — as Badiou notes in his political example from *Theory of the Subject* — creates a contradiction between the proletariat (A) and bourgeois society (P). In *The Wooden Prince*, the contradiction between the Prince and the fairy-tale forest is likewise necessary for the production of alienation, and this contradiction can be understood as either between the proletariat and the bourgeois world or between man (the Prince, A) and nature (the fairy-tale forest, P), again recalling Hegelian themes. Marxist undertones are certainly present in the ballet — Balázs was as committed a communist as Lukács, and it would be strange not to detect such commitments in his fairy tale — but perhaps the contradiction between man and nature is more fundamental.

The Prince's Work Song

Example 4.18 presents ms. 518-527, the beginning of the Prince's "work song," which comes after the "Dance of the Trees" and "The Dance of the Waves" — about 230 measures after the Prince's declaration. These measures are undoubtedly meant to mime the Prince's whittling or carving of his staff into the Wooden Prince. The ballet's original Hungarian title — *A fából faragott királyfi* — in fact translates literally as "The Wood-Carved Prince," or even more precisely as "The Prince Carved out of Wood." Example 4.19 projects this passage's pitch collection, which is coherent within the diminished-tendency language of the forest, onto a Tonnetz. Evoking the manufacture of the Wooden Prince, ms. 518-519 splinter C♯–E–G–B♭–D–F (a segment of an [0369] chain with a 4-connector) into parallel thirds in contrary motion while remaining entirely within the tonic functional region. In ms. 520-523 this tonic C♯–E–G–B♭–D–F alternates with



Example 4.18. Ms. 518-527.



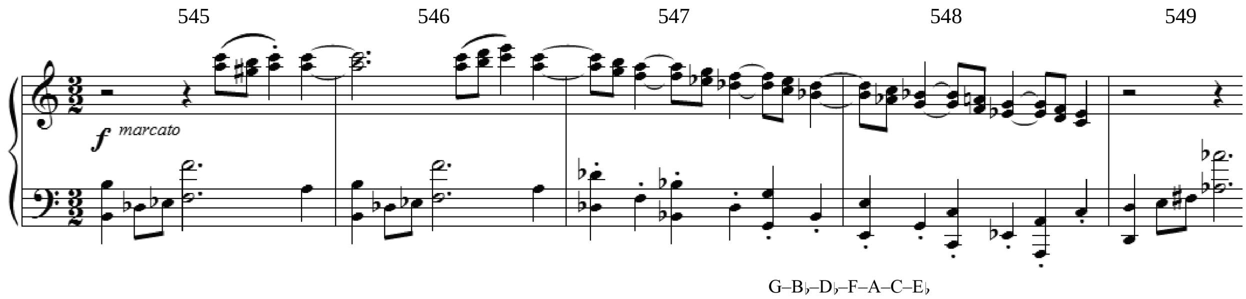
Example 4.19. The pitch collection of ms. 518-527.

A–C♯–E, which belongs to the subdominant functional region. D–F–A, expressing a dominant (or S^2) function, appears in ms. 524 and resolves in the following measure to the tonic (E–G–B–D–F), which is then reinforced by a now straightforward T–S–S^2|D–T progression.

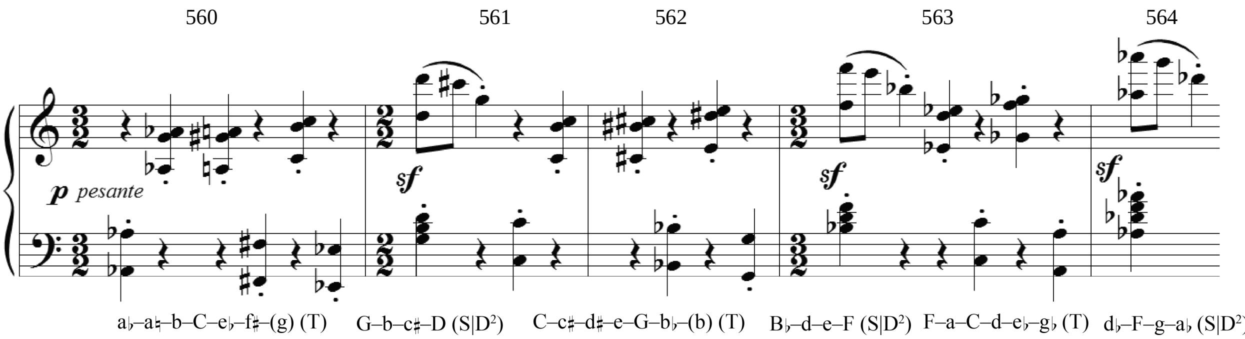
Example 4.20 turns to ms. 529-533, the continuation of and companion piece to Example 4.18: it prolongs the tonic from the end of the previous passage up to ms. 545. Here the tonic is at first spelled E–G–B♭–D♭–F–A, which can be understood as a segment of an (0369) chain but for its final pitch, A. It is almost as if an (0369) chain with a 4 connector (E–G–B♭–D♭–F)

Example 4.20. Ms. 529-533.

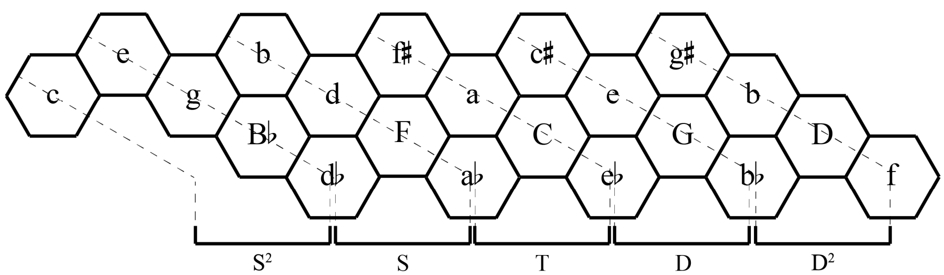
overlaps with an (048) chain with a 3 connector (B♭–D♭–F–A), but this follows logically if one understands the creation of the Wooden Prince as the placing of the Prince (epitomized my the augmented tendency) into the fairy-tale forest (epitomized by the diminished tendency). "Aberrant" pitches such as A (which prevents the chord from being entirely understandable within the diminished tendency) become increasingly prominent, a process that continues into the main theme of the Prince's working song, given in Example 4.21 (ms. 545-549). Since the left-hand theme is a nearly complete B–D♭–E♭–F–(G)–A wholetone scale, augmented triads would seem to come to the fore, yet the cycle of thirds sounded in ms. 547-548, G–B♭–D♭–F–A–C–E♭, further complicates the combination of the augmented and diminished tendencies. It is a segment of a (4,4,3,3)-cycle, which alternates augmented and diminished triads and will soon come to play a much greater role in the ballet. It is as if by reducing the harmonic complexities of the ballet to the cycle's constituent dyads (major and minor thirds), something new, something that can transcend its internal contradictions, can come forward. Example 4.22 shows ms. 560-564, which intensify the use of such aberrant pitches that mix the augmented and diminished tendencies. Example 4.23 stretches its pitch collection across the Tonnetz.



Example 4.21. Ms. 545-549.



Example 4.22. Ms. 560-564.



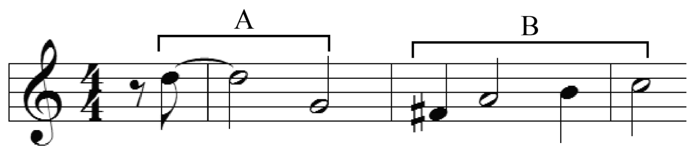
Example 4.23. The pitch collection of ms. 545-549.

All of ms. 560 belongs to the tonic functional region, except for G, which forms an augmented triad with B and E♭. One can in fact understand this measure as another example of overlapping (048) and (0369) chains: A♭–G–B–E♭ is a segment of an (048) chain with an 11-connector and B–E♭–F♯–A–C is a segment of an (0369) chain with a 4 connector. After a partial

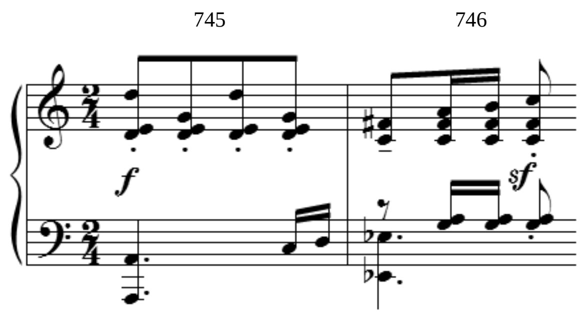
HN on G (G–B–C♯–D) expressing a S|D^2 function, the harmony is transposed up a major third in ms. 561-562, now expressing a dominant function. After another S|D^2 HN, the passage returns to tonic in ms. 563 by transposing the harmony by T_2. Overall, in presenting such a prototypical progression within the harmonic language of the forest (T–S|D^2–T) while still insinuating augmented triads and (048) chains, this passage magnifies the ballet's contradiction and prepares the way for the coming scission of the Prince into self and nonself — the Wooden Prince.

Mutations of the Prince's Longing Theme

Even after the Prince puts the finishing touches on the Wooden Prince, it does not come alive until enchanted by the fairy, an act that completes the Prince's placing in the fairy-tale forest. The following "Dance of the Princess with the Wooden Doll" (ms. 721-932) dramatizes the resultant scission and alienation through several mutations of the Prince's longing theme. In order to facilitate this discussion, Example 4.24 divides the opening melody of the Prince's longing theme into two motives, A and B: A is the descending fifth of his declaration, B the subsequent ascending motive. Example 4.25 presents the first mutation, ms. 745-746, which places the opening melody of the Prince's longing theme (D–G–F♯–A–B–C) in a very different context. While one can understand such a distortion as an instance of the Bartókian grotesque — ms. 745-746 replaces the supple suspensions and anticipations of the original with rigidly in-phase rhythms and harmonies — this mutation has more specific implications. It is the most literal: it simply *places* the Prince's longing theme into the harmonic language of the forest. The



Example 4.24. The two component motives of the longing theme.

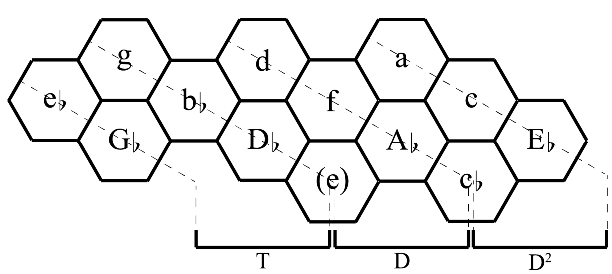


Example 4.25. The first mutation of the Prince's longing theme, ms. 745-746.

entire pitch collection of ms. 745-74 can be understood as a segment of an (0369) chain: D–F♯–A–C–E♭–E–G. With the exception of D, it belongs to a single diminished-tendency functional region. Though there's no perceptible functional change in these two measures, they clearly lie within a diminished-tendency influenced harmonic space.

Example 4.26 shows ms. 766-777, a second mutation on the longing theme that does express functional values within a diminished-tendency influenced key variation. Example 4.27 plots its pitch collection on the Tonnetz, in which Example 4.25 would express a tonic function, enharmonically speaking. In addition to expressing harmonic functions, this second mutation expands motive A into a minor ninth, which warps it into either the leaping motive from the introduction or, more likely, the defining major seventh/minor ninth of the Princess motive. While motive A in this second mutation has been warped (wrapped around a cylinder) into the Princess's motive, motive B (the arpeggiations that follow in ms. 768-770) has been warped into partial HNs: D♭–E–F–A♭–C♭, E♭–G♭–G♮–B♭–D♭, and so on. The harmonic progression adheres to

Example 4.26. The second variation of the Prince’s longing theme, ms. 766-777.

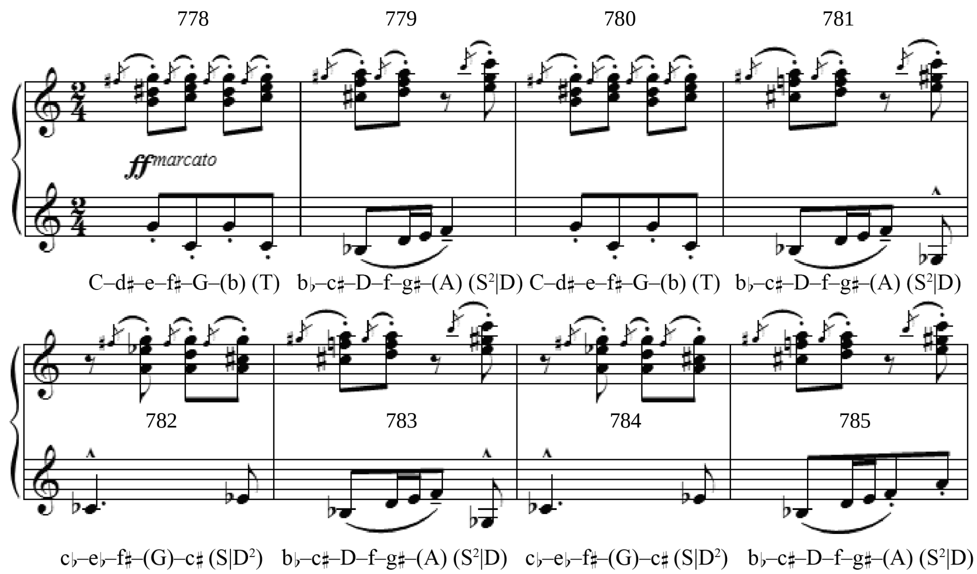


Example 4.27. The pitch collection of ms. 766-777.

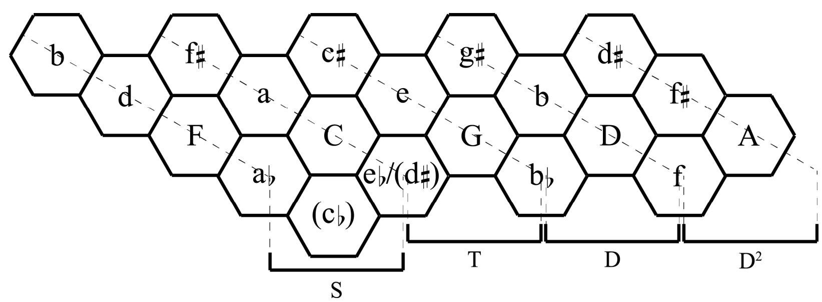
an alternation of T with D and S|D^2, so overall this mutation represents an intensification of the Prince's placing within the forest.

The third mutation of the Prince's declaration theme follows immediately in ms. 778-785. Example 4.28 gives the score; Example 4.29 charts its pitch collection, the tonic region of which is enharmonically the same as Example 4.26's. While the theme (in the left hand of the transcription) returns to a more recognizable form, its harmonization increases in complexity and has begins to show signs of the augmented tendency: most of its chords contain augmented triads. This raises an important question about the ballet's dramatic narrative: is the Wooden Prince a manifestation of the Prince, or is it merely part of the fairy-tale forest? In terms of Badiou's theological example, the parallel question would be: did infinite God the Father really descend to finite earth, or is God the Son a man like any other? This is a crucial question, for if the Wooden Prince is *not* really the Prince, but only another part of the forest, then there is no possibility of the ballet registering any real change. It would only be a static tableau of the fairy-tale forest.

This increase in harmonic complexity needs some explanation — Bartók's piano reduction simplifies the harmonies in this passage. The harmony in ms. 778, for instance, appears to be a C major triad embellished with lower neighbors B, F♯, and D♯, but these pitches are present throughout this passage in the full score; B and D♯ are even themselves embellished with lower neighbors of their own. The entire harmony is thus C–D♯–E–F♯–G–B, an HN on C with a major rather than a minor seventh, creating the prominent augmented triad G–B–D♯. This augmented triad is not simply an accented neighbor chord, as it appears to be in the piano reduction, but an integral part of the harmony. Things are similar in the following measure, the entire harmony being B♭–C♯–D–E–F–G♯–A, another HN on B♭ with an added major seventh. The



Example 4.28. The third variation of the Prince's longing theme, ms. 778-785.



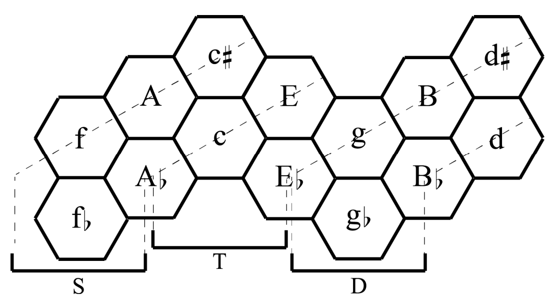
Example 4.29. The pitch collection of ms. 778-785.

entire passage is coherent within the diminished tendency: the interval between T (ms. 778) and S^2|D (ms. 779) is 10 (a possible periodicity for [0369] chains), and the interval between D and S|D^2 (ms. 782: G–C♭–D–E♭–F♯–A, an HN on C♭) is 1, another possible periodicity for (0369) chains. The passage thus moves from T to S^2|D, which then alternates with its localized dominant, S|D^2. But the brief harmony appearing on the last eighth notes of ms. 779, 781, and so on (G♯–C–E♭–E–G–B) is actually *only* understandable in terms of the augmented tendency; it is a segment of an (048) chain with an 11-connector.

These distortions are grotesque, and the passage in Example 4.28 particularly tempts one to dismiss it as mockery: the Prince stands aside while his creation dances with the Princess, usurping his imagined place. The Prince's love is certainly debased by such disfigurement, but I believe there is far more at work here. One of the roles the Wooden Prince plays is that of destroyer, its task being to abolish a world that is in contradiction with the Prince. In Badiou's political example, the project of the proletariat is the "abolition of any place in which something like a proletariat can be installed." The project of the ballet can likewise be understand as the destruction or at least annulment of the rules of the fairy-tale forest and the Prince's overcoming of himself, the end result being a world with which the Prince is no longer in contradiction. In this light, the antagonistic tone of the entire "Dance of the Princess with the Wooden Doll" becomes more comprehensible, for it is contemptuous of (1) the Princess (the gullibility evident in her infatuation with the Wooden Prince is striking), (2) her world (which engenders the contradiction between it and the Prince), (3) the Prince (whose love is seemingly naïve and impotent), and (4) his place-holder in the world (a mere puppet the Prince "forsakes" and which will have to die). Nothing is left unscathed, and this violence will culminate in the approaching death of the Wooden Prince.

The final mutation on the Prince's declaration theme I will discuss (for there are others that place it in further guises) is given in Example 4.30 (ms. 901-909). The tendencies that started to appear in ms. 778-785 blossom into a full-fledged augmented-tendency influenced key variation, the pitch collection of which is shown in Example 4.31. The derivation of this tune (sounded by the double basses, low brass, and bassoons) from the Prince's declaration theme is

Example 4.30. Ms. 901-909.



Example 4.31. The pitch collection of ms. 901-909.

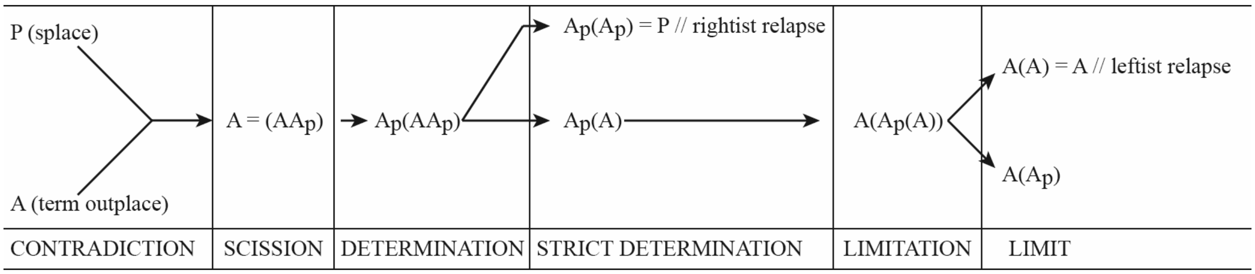
again not difficult to demonstrate: motive A has morphed into an ascending augmented triad (C–E–A♭), while motive B has been replaced by G–B–C♯–D♯ in ms. 901-902, substituting an augmented triad for the diminished triad of the original. It also bears a strong resemblance to the theme from the Prince's work song, reminding us that the Wooden Prince is indeed the alienated product of the Prince's labor (see Example 4.21, p. 242). Harmonically speaking, this is straightforward: A♭–C–E♭–E♮ in ms. 901 and F♭–G–B–D♯/E♭ in ms. 902 both express tonic function, while E♭–G♭–B♭–D in ms. 905 expresses dominant function, and F–A–C♯–(E) in ms. 906 and 908 expresses subdominant function.

Despite revealing the Wooden Prince to be the Prince himself, in comparison to the original this mutation still has an air of grotesquerie or mockery, foregrounded in the following scene, which substitutes the Prince's longing with despair. On the other hand, this mutation *is* triumphant, but the victory it celebrates is the successful separation of the Prince from his wooden likeness: in taking on the sins of the world, the Wooden Prince must be rejected. But this separation is actually a *self-separation*. Many Christians believe that the crucifixion separated God the Son from God the Father and that it is the Son's brief descent into hell that pays for the sins of mankind. What is represented here, I believe, is the paradoxical fact that the Wooden Prince is consubstantial with the Prince, that as the product of the Prince's labor, the Wooden Prince *is* his alienated self. This recalls Balázs's own description: the Prince has put "all of himself" into his work.

3. Apotheosis

Example 4.32 reproduces Badiou's entire diagram of any "dialectical fragment" from *Theory of the Subject*.[43] Recall that in terms of *The Wooden Prince,* its first two moments depict the contradiction between the Prince (A) and the fairy tale forest (P), a contradiction that

[43] Badiou, *Theory of the Subject*, p. 14.



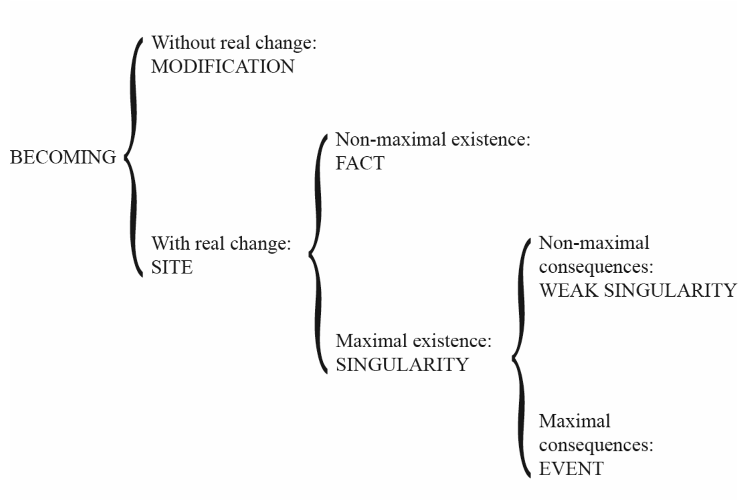
Example 4.32. Badiou's dialectical fragment diagram from *Theory of the Subject*.

commands the scission of the Prince into the Wooden Prince (A_p) and himself (A). Continuing on, its third moment is what Badiou calls the "determination of the scission" $A_p(AA_p)$: since the Prince is the "contradictory unity" of himself and his "inversion" in the forest (the Wooden Prince), this unity of opposites must be *determined* by the fairy-tale space itself.[44] And such determination has two possible resolutions: (1) the Prince is truly determined by the Wooden Prince, and each is consubstantial with the other — $A_p(AA_p)$ becomes $A_p(A)$ since $AA_p = A$ — or (2) the Prince resists being determined by the Wooden Prince, meaning that the latter is just another part of the forest. If this is the case, then the dialectical process reaches a dead branch and relapses back into its space: $A_p(A_p) = P$. In Badiou's theological example, this would mean that Jesus was just another man and not God the Son, that his death on the cross was not the death of God.

In *Logics of Worlds*, Badiou terms such a relapse a "modification," a mere shuffling of the deck, and opposes it to a "site," an idea descended from *Being and Event*'s "evental site."[45] Example 4.33 presents the more recent text's "four forms of change," an updated and extended dialectical model that begins with the bifurcation of becoming (simple change) into modification

[44] *Ibid.*, p. 9.

[45] Badiou, *Logics of Worlds*, pp. 357-361.



Example 4.33. Badiou's "four forms of change" diagram from *Logics of Worlds*.

and site.[46] Badiou intentionally conflates the definitions he gave in *Being and Event,* combining "events" and "evental sites" into the single idea of a "site." More specifically, while he defines an event in *Being and Event* as a multiple made up of an evental site and the event itself, in *Logics of Worlds*, because he wants to describe the interplay between ontology and logic, he defines a site not from beneath (in ontological terms), but simply as a paradoxical multiple that belongs to (or is consubstantial with) itself. So in order to determine the success of the ballet's dialectical fragment on the basis of whether or not the Prince's declaration results in an event, I will consider the Prince's declaration as not only an evental site, but as a site (a paradoxical multiple). In declaring his love, the Prince refers to (or "names") his declaration itself — "I love the Princess, and this is my declaration of that love," he seems to say — and thus "(self–)objectivates."[47] To put it another way, the Prince's declaration is *already* an event in terms of *Being and Event* — it is a multiple belonging to itself — but in terms of *Logics of*

[46] *Ibid.*, p. 374.

[47] *Ibid.*, p. 360.

Worlds, it is merely a site, and whether or not it results in an event depends on the intensity of its appearance and the consequences that follow.

Returning to Example 4.32, note that the final two moments are labeled “limitation” and “limit” and correspond with Example 4.33’s “fact” and “singularity” just as “rightist relapse” ($A_p(A_p) = P$) and “strict determination” ($A_p(A)$) correspond with modification and site. With “limitation” Badiou introduces the idea of “torsion,” for the former represents the “determination of the determination,” the “resistance of the term A to allowing itself to be exhaustively determined by its indexical instance A_p.”[48] It introduces a periodicity, a repetition, or a twisting back, which Badiou marks with the construction $A(A_p(A))$ and connects to the specific use of the term “torsion” in group theory.[49] A torsion element within an additive group is an element x such that nx = 0 (n being some whole number and 0 being the identity element), and a torsion group is a group in which every element is a torsion element. All finite groups are torsion groups, and most musicians are familiar with this concept through the pitch-class interval cycles: in the finite T_n group of pitch-class transpositions mod 12, n for T_2 is 6 because $T_2 + T_2 + T_2 + T_2 + T_2 + T_2 = T_0$. As usual, however, Badiou is not interested in finite groups, but with infinite torsion groups, in particular non-commutative infinite torsion groups generated by a finite set of elements. Because of their “aleatory finite suspense,” such groups form a powerful metaphor for the “perverse” or “twisted” dialectic.[50]

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[48] Badiou, *Theory of the Subject*, p. 11.

[49] *Ibid.*, pp. 148-157.

[50] *Ibid.*, pp. 153-154.

In his theological example, such a "return" or "repetition" is represented by the resurrection, but in terms of the ballet, we can understand limitation as the Prince and the Wooden Prince's "dance" of determination and resistance, which again has two possible resolutions: (1) A(A), the "simple reaffirmation of the pure identity" of the Prince, which would mean that the Prince never entered the fairy-tale forest at all and has thus prevented his own destruction (the necessary outcome of the emergence of a world where something in contradiction with it cannot exist), or (2) $A(A_p)$, the Prince "coming back" to the Wooden Prince in order to "displace the place, to determine the determination, and to cross the limit."[51] In the latter case, A is reconciled with A_p: the gap separating man and nature is closed. In terms of *Logics of Worlds* and Example 4.33 (p. 252), such a distinction between "fact" and "singularity" rests in the intensity of existence of the site; anything other than a maximal existence of the Prince's declaration would result in the Prince remaining in his initial state.

For *Theory of the Subject*, a successful dialectical fragment is achieved with $A(A_p)$, which corresponds with "singularity" in Example 4.33. In *Being and Event*, in contrast, the term "singularity" — which Badiou uses in various ways in all of his texts — is tied closely to the idea of an evental site. In fact, he defines an evental site as a multiple that is "totally singular."[52] The common thread here is that after *Theory of the Subject*, singularity is not an endpoint in itself, but a requirement for an event; it is what immediately precedes and possibly leads to an event. As shown in Example 4.33, what separates a "weak" singularity from an event (a "strong" singularity) are that singularity's consequences, which Badiou describes in terms of a given world's transcendental logic. Existence in that regard, is simple: recall from Chapter 3 that every

[51] *Ibid.*, pp. 11-12.

[52] Badiou, *Being and Event*, p. 507.

multiple has a corresponding degree of intensity on the transcendental, the maximum being the greatest element of the transcendental's bounded lattice. While this is fairly easy to intuit, consequences are more complicated.

Badiou's formula for an event in *Logics of Worlds* is $(EA \Rightarrow E\emptyset_A) = M$, which can be read as "the dependence ($\Rightarrow$) of the existence of the site's proper inexistent ($E\emptyset_A$) with regard to the existence of the site (EA) is maximal (M)."[53] Since a transcendental is a complete Heyting algebra, dependence is equivalent to implication within an intuitionistic logic. More specifically, Badiou defines the dependence of q in regard to p ($p \Rightarrow q$) as $\Sigma\{t \,/\, p \wedge t \leq q\}$: the envelope of the set of degrees whose conjunction with p is less than or equal to q. In a classical Boolean logic, an implication (if p, then q) has two possible values (true or false) but in an intuitionistic logic, the value of an implication can be any of the possibly infinite degrees between and including true and false (maximum and minimum).[54] The considerable complexities of such a conception need not concern us here, for if the site is a singularity, its existence must by definition be the maximum (M), and since the "proper inexistent" is the element of the site whose degree of existence is the minimum (μ), $E\emptyset_A$ must by definition be the minimum. An event occurs when $(M \Rightarrow \mu) = M$, but this is logically impossible: $(x \Rightarrow \mu) = \mu$ for any degree x except μ, and $(\mu \Rightarrow \mu) = M$. In short, the existence of the site must be both the maximum and the minimum in an event, which Badiou calls the "appearance/disappearance of the site."[55] In turn, $E\emptyset_A$ must be changed

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[53] Badiou, *Logics of Worlds*, p. 393.

[54] A good introduction to category theory and the differences between classical logic (represented by Boolean algebras) and intuitionistic logic (represented by Heyting algebras) is Robert Goldblatt, *Topoi: The Categorial Analysis of Logic* (Amsterdam: North Holland, 1984). Badiou's initial forays into this material are to be found in *Mathematics of the Transcendental*, ed. and trans. A. J. Bartlett and Alex Ling (London: Bloomsbury, 2014).

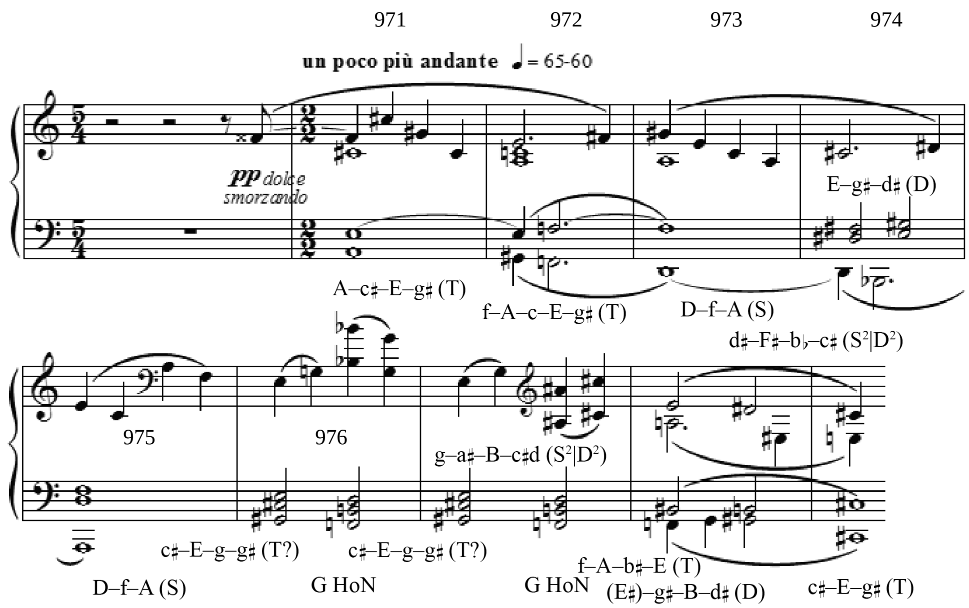
[55] Badiou, *Logics of Worlds*, p. 394.

from μ to M ($(M \Rightarrow M) = M$). In Hegelian terms, this is the *aufhebung* of $\emptyset_A$.

In terms of the ballet, the fact that the Prince's declaration is a site leaves three possibilities for the remainder of the ballet: it can demonstrate that the site is (1) only a fact, (2) a weak singularity, or (3) an event (a strong singularity). As noted above, the distinction between a fact and some kind of singularity is the degree of existence of the site, and this can be determined by examining the intensity of appearance of the augmented tendency: does it appear outside of representations of the Prince? Does it achieve an unequivocal independence and thus a maximal intensity of appearance? An event, on the other hand, would require the entrance of something *entirely* new, something that was only implicit within the Prince's declaration, but later achieves maximum existence. This would be the proper inexistent of the site, and the changing of its intensity of appearance from μ to M would entail the disappearance of the augmented tendency and the abolition of the original forms of the Prince, the Wooden Prince, and the fairy-tale forest.

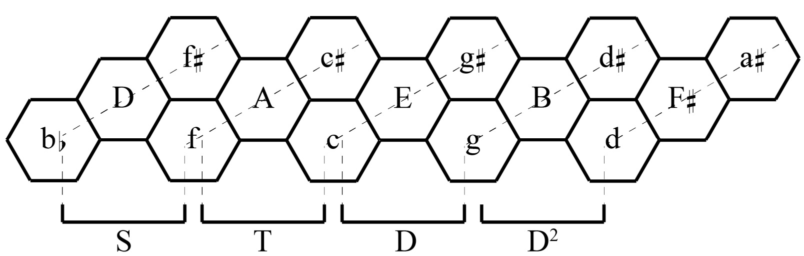
The Fairy's Comfort and the Forest's Homage

Recall that following his expression of despair, the Prince lies down and "falls asleep." He is then reborn through the fairy's reversal of the self-alienating process of creating the Wooden Prince: she replaces his cloak, crown, and hair with objects from the forest. The forest recognizes its new king and gives homage. Since the Prince's placing within the forest is not unlike an incarnation, such ascension to divinity is its inverse, apotheosis being the ballet's sublimation of resurrection, of site resolving into either fact or singularity. In terms of narrative, *The Wooden Prince* seems to stand firmly on the side of the latter, which becomes musically evident as soon as the fairy starts comforting the Prince. Example 4.34 shows ms. 971-979, which make up the first appearance of the augmented tendency in representing actions other than the Prince's:



Example 4.34. Ms. 971-979.

I have annotated it with functional labels derived from Example 4.35, which maps the pitch collection of this passage onto a Tonnetz:



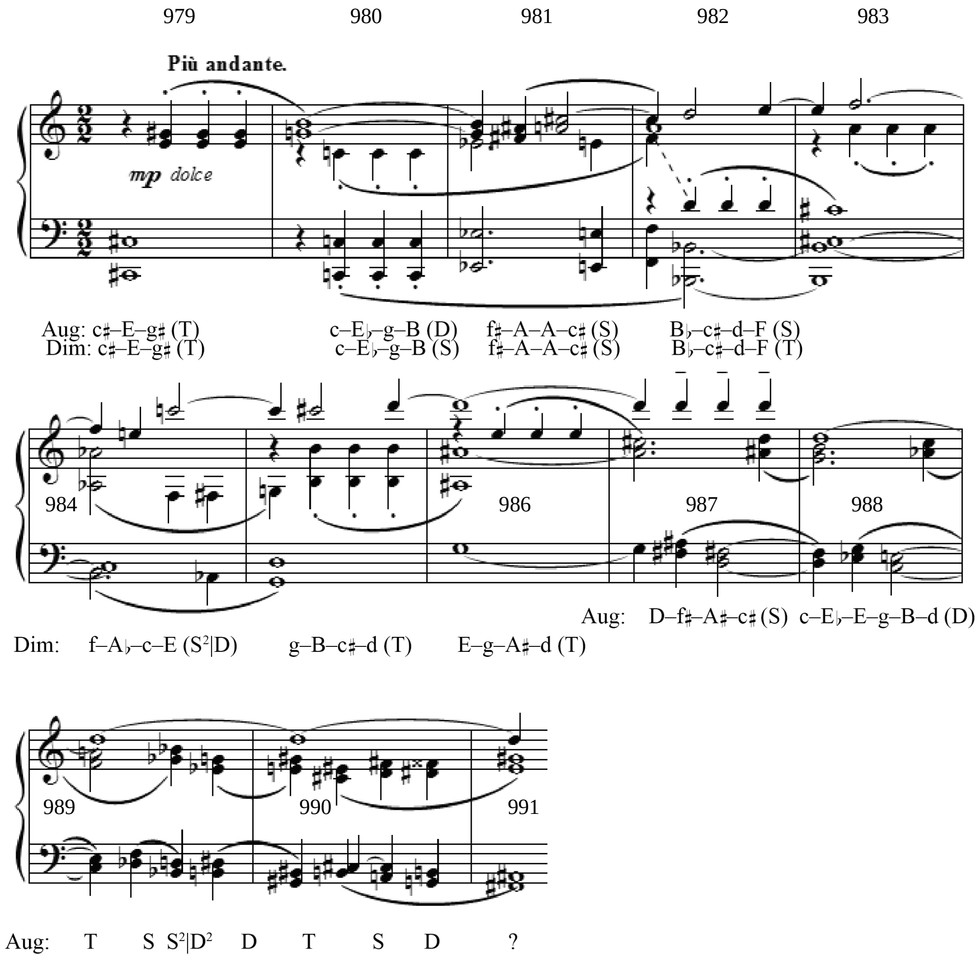
Example 4.35. The pitch collection of ms. 971-976.

A–C♯–E–G♯, the harmony of ms. 971 and a segment of an (048) chain with a 3 connector, expresses tonic function; F–A–C–E–G♯, the harmony of ms. 972 and another segment of an

(048) chain with a 3 connector, likewise expresses tonic function. With the arrival of D in the bass in ms. 973, the harmonic function shifts to the subdominant, which is prolonged by a remarkably complete act of cylinder bending through which the harmony D♯–F♯–B♭–C♯ in ms. 974 is possible. Note the cyclical leftwards movement from S (D–F–A in ms. 973), to $S^2|D^2$ (D♯–F♯–B♭–C♯ in ms. 974), D (E–G♯–D♯ in ms. 974), and finally back to S (D–F–A) through T (C–E) in ms. 975.

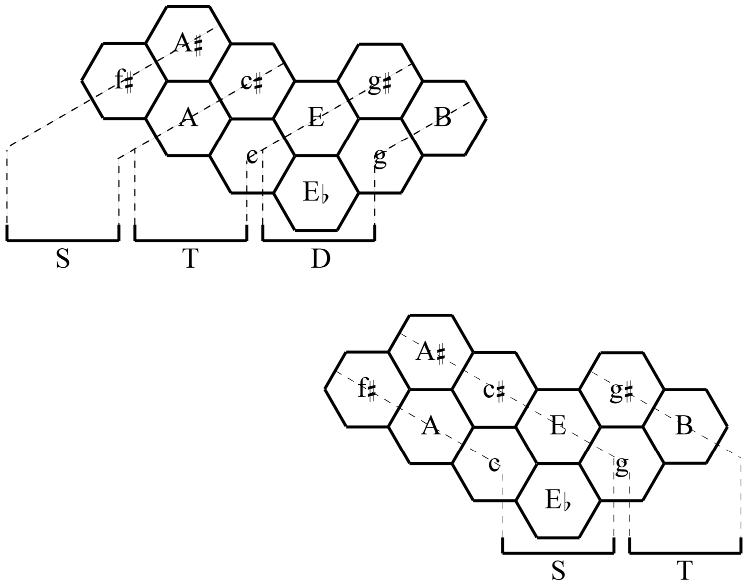
Since it represents a character other than the Prince, this passage would appear to be an expression of the augmented tendency with a maximum intensity of appearance. Yet while I rather easily construed harmonies such as D♯–F♯–B♭–C♯ — which in isolation would seem to be influenced by the diminished tendency — as agents of key-variation definition, ms. 976-979 are more complex. On the downbeat of ms. 976, tonic function seems to return in C♯–E–(G)–G♯, but this harmony then goes on to alternate with an HN on G (G–B♭/A♯–C♯–D–F), which is emblematic of the diminished tendency and thus nearly impossible to understand in terms of the preceding key variation. Ms. 978-979, in contrast, present a fairly straightforward T–D–T progression within that key variation. At this point, the back-and-forth of determination and resistance seems to be ongoing, and the passage immediately following — ms. 979–991, shown in Example 4.36 — only prolongs the struggle. This passage portrays the elements of the forest, elements that had earlier been actively thwarting the Prince's advances, as giving homage to the Prince.

It begins with the same C♯ minor tonic on which the previous passage ends, juxtaposing it with a C–E♭–G–B harmony in the following measure. One could understand these harmonies as being in a tonic/dominant relationship within an augmented-tendency influenced key species, but the introduction of F♯–A♮/A♯–C♯ in ms. 981 calls this interpretation into question. In isolation,

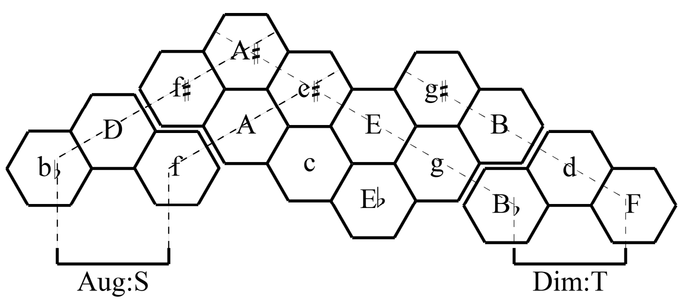


Example 4.36. ms. 979-991.

major/minor tetrachords are ambiguous in terms of augmented and diminished tendencies, an ambiguity Example 4.37 demonstrates through two conflicting interpretations of ms. 979-981: the first understands the passage as moving from T to D to S in an augmented-tendency influenced space, while the second interprets it as moving from T to S within a *diminished*-tendency influenced space. The harmony sounded in the next two measures, B♭–C♯/D–F–A, continues this ambiguity, for it could be understood as a return to tonic function or as a continuation of subdominant function. Example 4.38 expresses this ambiguity in the form of different interpretations of the B♭ major triad, which either combines with the F♯ major/minor tetrachord to circumscribe a subdominant functional region or occurs in juxtaposition with it in a return to tonic.



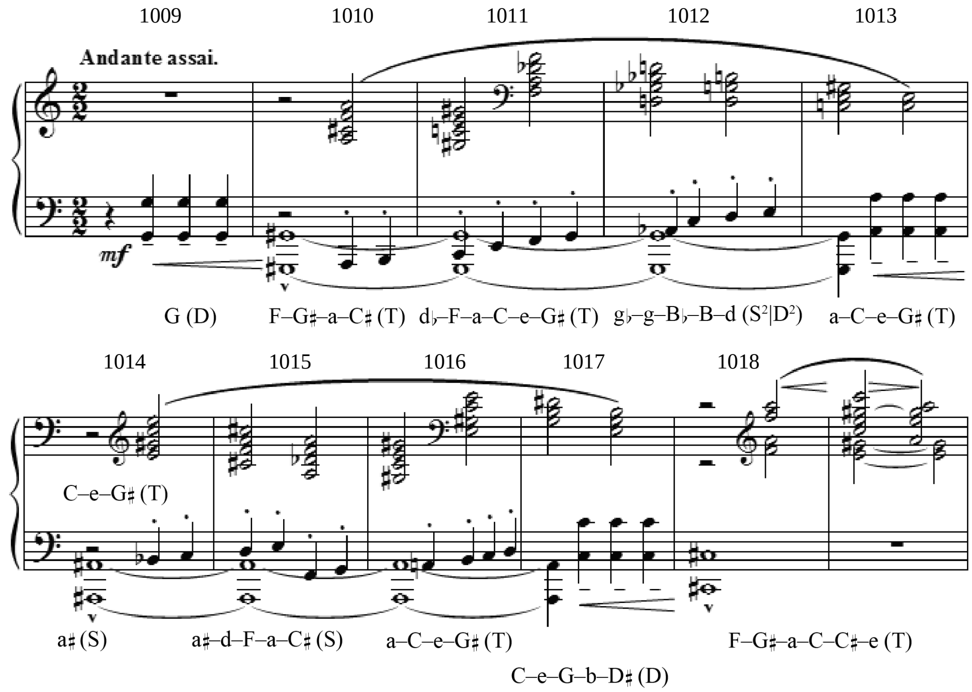
Example 4.37. Alternate interpretations of ms. 979-981.



Example 4.38. Alternate interpretations of ms. 982.

Up to the downbeat of ms. 987, I believe the diminished-tendency interpretation is the most convincing, for the clear, seemingly cadential arrivals in ms. 982 and 985 (on B♭ major/minor and G major/minor tetrachords, respectively) would be interpreted as landing on tonic, the augmented triads in ms. 983-984 (F–A–C♯ and A♭–C–E) becoming “dissonances” in need of resolution. The pitches in ms. 985-987, after all, form a segment of an (0369) chain with a 4-connector: A♯–C♯–E–G–B–D. This interpretation makes sense in terms of all of the preceding music, for elements of the forest have always been represented with the diminished tendency, but here it is a diminished tendency heavily infected by augmented triads. Yet with D–F♯–A♯–F♯ in ms. 987 and the series of T_5-related major/minor triads passed from hand to hand in the piano reduction — on C, F, B♭, E♭, G♯, and C♯ — things become muddled. While one can certainly label each of these, it becomes a meaningless exercise: the passage could be better understood simply as a sequence of transpositional combinations of major-third dyads. In any case, ms. 987-990 work considerably better in terms of the augmented tendency, and thus form a transformation or modulation from the diminished tendency to the augmented. D–F♯–A♯–C♯ in ms. 987 is more easily understood in terms of the augmented tendency, and the harmony in ms. 988 (A♭–C–E–E♭–G–B) forms a segment of an (048) chain with an 11 connector. Furthermore, the series of T_5 transpositions is best understood cyclically in terms of the augmented tendency: D (C–E–E♭–G–B) moves to the left to T (D♭–F–A–A♭–C–E), to S (G♭–B♭–D–D♭–F), and then to $S^2|D^2$ (B–D♯/E♭–G–G♭–B♭–D). Continuing to the left from D^2, the cycle concludes with a resolution from D (E–G♯–B♯–B♮–D♯) to T (C♯–E♯–E♮–G♯–B♯). The passage then ends on a "whole-tone" harmony, E–F♯–G♯–A♯, that's incomprehensible in terms of either tendency, and perhaps heralds the introduction of something truly new.

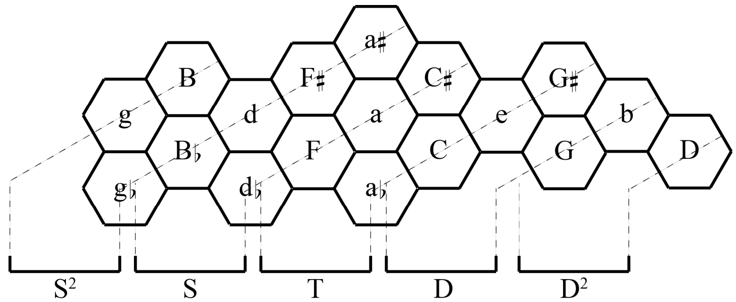
While these passages were qualified expressions of the augmented tendency, the final passage of the forest's homage — given in Example 4.39 (ms. 1009-1019) — is a very straightforward expression of the augmented tendency that realizes the promise of the entire scene: the augmented tendency's intensity of appearance is *maximal* here, for it is independent, fully realized, and immediately precedes the Prince's resurrection through apotheosis. The Princess's diminished-octave motive opens the passage, but it is fully integrated into the augmented tendency: at each of its appearances the T_1 it expresses can be understood as the 11 periodicity of (048) chains reckoned negatively, as a motion from D to T or from T to S. In terms



Example 4.39. Ms. 1009-1019.

of its pitch collection — shown in Example 4.40 — G♮ (dominant) resolves to G♯ (tonic), which belongs to F–A–C♯/D♭–C♮–E–G♯, the same harmony that began the forest's homage in ms. 970. In ms. 1012, the harmonic function then shifts to the subdominant as D♭–F–A descends by T_3 to G♭–B♭–D♮. The following harmony, a G major triad, could be understood as either S^2 or D^2 ("g–B–d" or "G–b–D)", and thus acts to close this key variation's cylinder in a way that recalls the Introduction's T–D^2–T progressions. One can in fact understand ms. 1011-1012 as descending through an 048 chain (G♯–E–C–A–F–D♭–B♭–G♭–D–B–G) that because of the ambivalence of the G major triad, becomes a circle.

A at the end of ms. 1013 resolves to A♯ in the following measure just as G♮ resolved to G♯ in ms. 1009-1010. While A♯ is a whole step above G♯, the phrase as a whole begins one functional area to the left of the first, its prolonged harmony being B♭/A♯–D–C♯D♭–F–A♮, which is perhaps best understood as being T_{11} below A–C♯/D♭–C♮–E–G♯ from the first phrase. And just



Example 4.40. The pitch collection of ms. 1009-1019.

as the pedal tone becomes dissonant in the third measure (ms. 1012 and 1016), this time the tonic (A–C–E–G♯) clashes with A♯. The passage's first real dominant-functioning harmony, C–E–G–B–D♯, then resolves to a tonic, F–A–C♯–C♮–E–G♯, prolonged for several measures in the *sempre crescendo* climax of the homage. This passage thus gives expression to an unambiguous augmented-tendency influenced key variation defined by cylinder-bending and cemented in place by an alternation between tonic and dominant. The Prince may be "dead," but his love lives on in the new community of his disciples: the trees, waters, and flowers. In this way, the chasm separating man and nature is crossed, which is immediately acknowledged in the Prince's resurrection by way of the hair, crown, and cloak the fairy fashions from the forest's flowers.

The Prince's Resurrection

In many ways, the final section of the ballet is the most difficult. Even Bartók found it vexing: out of the 293 measures he recommended cutting from the ballet, 162 (well over half) occur between the Prince's apotheosis and the final measure.[56] These cuts are also more substantive. The final two measures of Example 4.41(ms. 1040-1050, the Prince's apotheosis),

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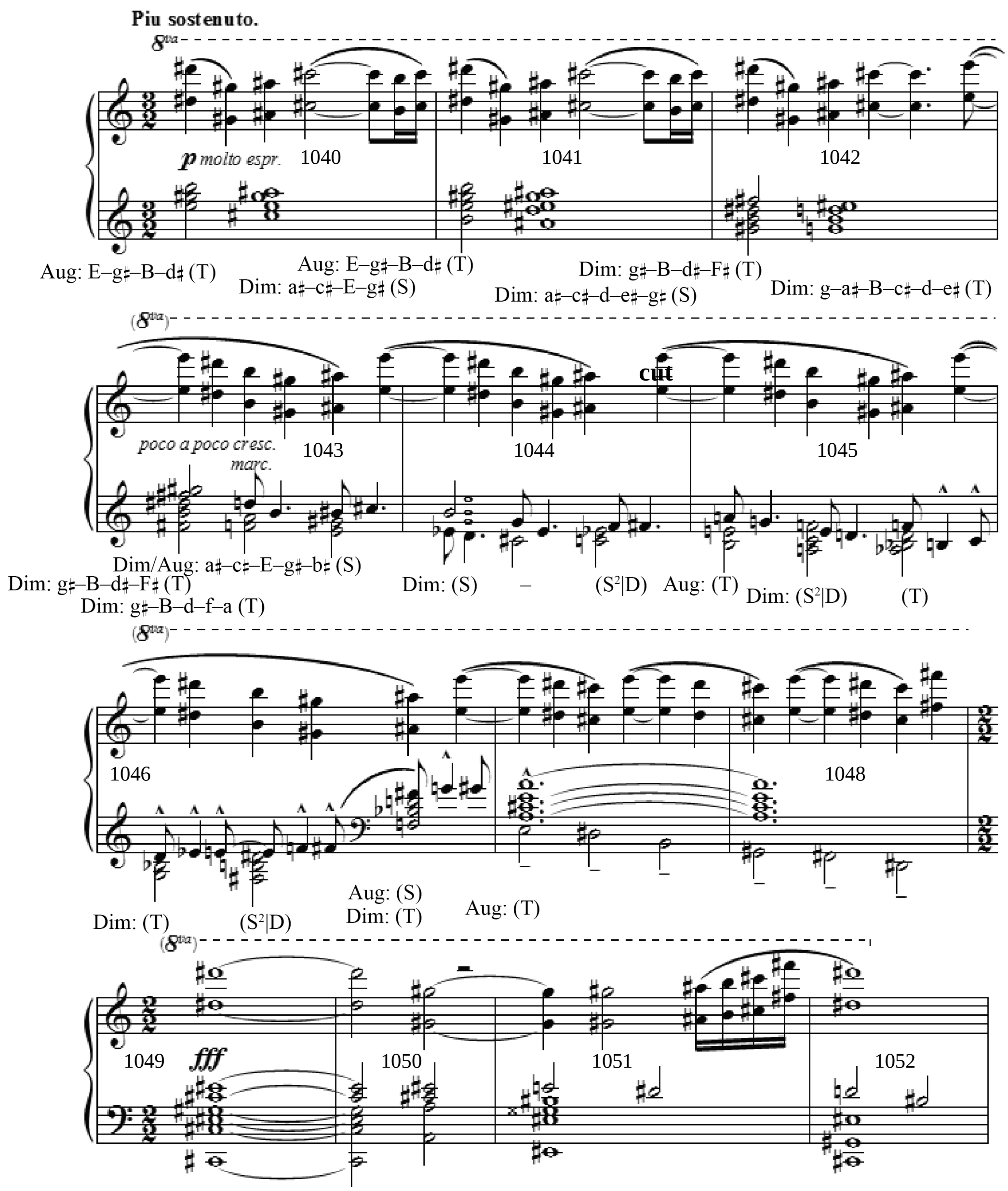
[56] Bartók, *The Wooden Prince: Complete Stage Version*, p. II.

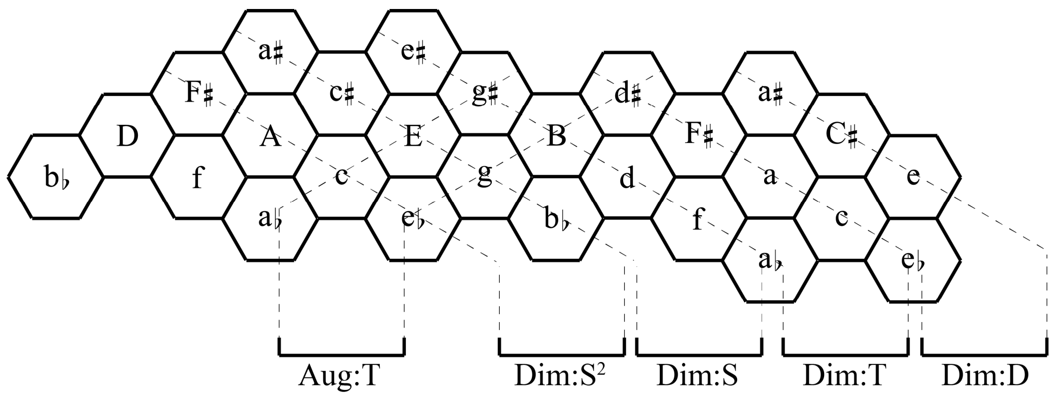
are the first two measures of a twenty-one-measure cut that considerably affects the character of this entire passage:



Example 4.41. The Prince’s apotheosis (ms. 1040-1050).

The *fortissimo* in ms. 1049 this is rather anti-climactic in both versions, and in the original it is extended for six measures, followed by a gradual and harmonically static *decrescendo* lasting for another seventeen. The overall effect is one of ironic bombast: much like the fifth door of Bluebeard's Castle, at which Bluebeard reveals his landholdings to Judit, here the fairy introduces the Prince to his "kingdom." Yet in revision the effect is muted; the climactic *fortissimo* is not stretched to absurd lengths but is rather cut short, moving almost directly into the reappearance of the Princess with the Wooden Prince. This cut also removes the final eight measures, which rest on the single harmony, A♭–B♭–C–D♭–E. While this harmony and the Prince's declaration chord are both created from diminished and augmented triads that overlap by one pitch, this harmony is not, like the Prince's declaration harmony, a beginning seemingly in need of resolution, but rather an ending, a resting place extended for eight full *sempre diminuendo* measures. Harmonies of this kind appear as early as the Prince's working song, but do not gain any real independence until this moment. Could this harmony designate the "proper inexistent" of the site — a part of the site previously invisible — as it gains a maximum intensity of appearance?

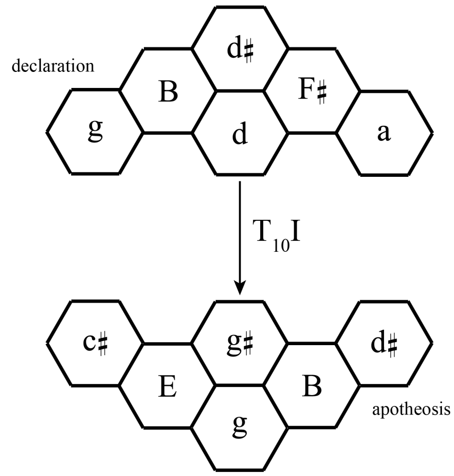
The entire apotheosis deals in similar "combinations" of augmented and diminished-tendency influenced harmonies, beginning with the juxtaposition of an unequivocally augmented-tendency influenced E–G♯–B–D♯ with the diminished-tendency influenced A♯–C♯–E–G♯. In terms of the diminished tendency, the D♯ in the first harmony could be understood as a dissonance in need of resolution, and yet the melody — composed of a descending perfect fifth followed by an ascending minor third — is clearly a variation on the Prince's longing theme, the first pitch of which has always been a constituent part of its underlying harmonization. What is the relationship between these two harmonies, then? If we conclude that they have different functions and that G♯–B–D♯ belongs to a tonic-functioning harmony in either interpretation, then A♯–C♯–E–G♯ has a subdominant function in relation to the diminished-tendency region containing G♯–B–D♯. Example 4.42 charts the pitch collection of this passage and the functional regions expressed in its first five measures, which consist of an alternation between tonic and subdominant, both defined by subtly shifting harmonies: in addition to E–G♯–B–D♯, the tonic harmonies also contain G♮s and F♯s; in addition to A♯–C♯–E–G♯, the subdominant harmonies also contain E♯s, G♮s, Bs, and D♮s, filling out an entire diminished-tendency functional region.



Example 4.42. The pitch collection of ms. 1040-1045.

The overlap between these two collections is the E–G–G♯–B major/minor tetrachord, which, if extended to include C♯ and D♯, contains another harmony made up of conjoined diminished and augmented triads, C♯–E–G–B–D♯, heretofore called COMB (for "combination") harmonies. As shown in Example 4.43, this COMB harmony is related to the Prince's declaration harmony by $T_{10}I$:

The remainder of the Prince's apotheosis extends the T_{11} relations between tonic and subdominant from the opening of the passage, such as between G♯–B–D♯–F♯ and G♮–B–D♮–E♯ in ms. 1042. This extension is exemplified by the near-chromatic descent in the bass: G♯4 in ms. 1043 descends chromatically to E3 in ms. 1047, with the exception of a whole step between B and A in ms. 1045. In addition to extending these T_{11} relations, the combination of diminished and augmented tendency-influenced harmonies is also intensified. In ms. 1043, G♯–B–D♮–F♮–A



Example 4.43. The declaration harmony and the central apotheosis harmony.

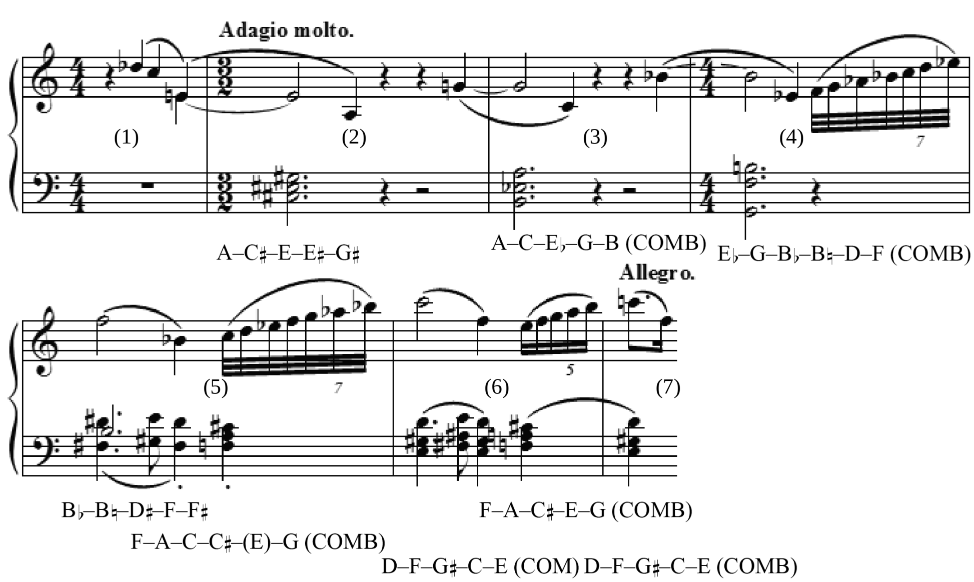
descends to A♯–C♯–E–G♯–B♯, another COMB harmony.[57] And in ms. 1044, the descending chromaticism pushes the harmony even further to the left, to the S^2|D harmony C–E♮–E♭–F♯–A♯, which then resolves to the augmented-tendency E–G–G♯–B–D♯ tonic. The passage then modulates to a key variation one functional region to the left (to the subdominant); this modulation is marked by a break in the bass's descending chromatic line. After the climax in ms. 1047, the augmented tendency completely takes over, the harmony expressed here being an entire augmented-tendency tonic functional region: A–C♯–E–E♯–G♯–B♯, a hexatonic collection. As noted above, the original apotheosis ends with eight measures of the COMB harmony A♭–B♭–C–D♭–E, which is enharmonically equivalent to A♯–C♯–E–G♯–B♯ from ms. 1043 and related to the central COMB C♯–E–G–B–D♯ harmony by T_8.

Given that the declaration harmony is inverted into the central apotheosis harmony, which is then subjected to transposition, there is the suggestion of an entirely new kind of key species here, one based on COMB harmonies that enter into functional relations with one

[57] In the piano transcription B♯ appears to be a simple chromatic passing tone, but in the full score it's held for the entire beat by flutes and celesta. It goes without saying that such COMB harmonies all belong to the same pitch-class set class.

another. Each of the four augmented triads can be combined with diminished triads belonging to three different fully-diminished seventh chords, so that a "combined" key species could potentially have twelve different functional areas: four shades of tonic, as it were, as well as four shades of dominant and four shades of subdominant. Looking at it a different way, the (4,4,3,3)-cycle we encountered earlier is made up of overlapping COMB harmonies related by inversion just as the (4,3)-cycle of traditional tonality is made up of overlapping major and minor triads. Yet we never get more than a hint of such a new key species here — the passage representing this reversal expresses a straightforward diminished-tendency influenced key species. In fact, it is so straightforward that it borders on parody, which is perhaps the intention: there is something humorous about the Princess's attempts to reanimate the Wooden Prince and belated efforts to seduce the Prince. Overall, it has the effect of a kind of comedic peripeteia.

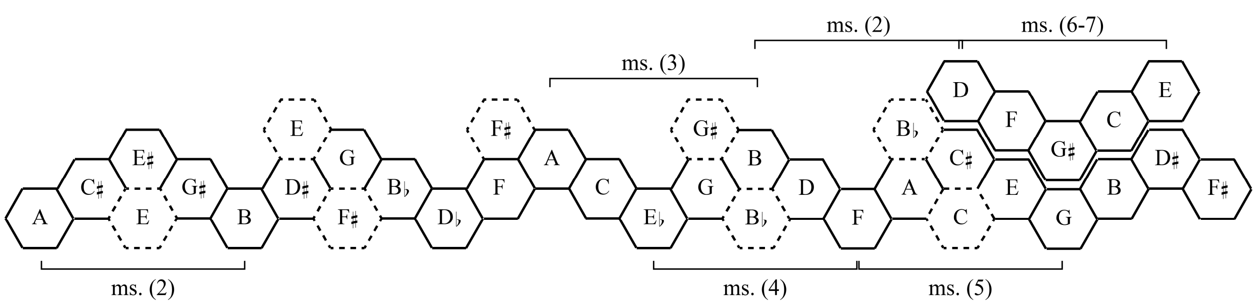
It is here that a glimmer of a new means of key-species definition shines through. Example 4.44 presents the section (cut in the ballet's revision) between rehearsal numbers 179 and 180 (which falls at ms. 1238):



Example 4.44. The Prince comforting the Princess.

It begins in what I have labeled ms. (2) with a statement of the Prince's declaration motive, the descending perfect fifth E–A, harmonized by a typical augmented-tendency harmony, A–C♯–E–E♯–G♯. As the motive is iterated, however, harmonic relations become more complex. Together with its accompaniment, the following measure's G–C forms the COMB harmony A–C–E♭–G–B, which could easily be construed as belonging to the augmented-tendency functional area to the right but is far better understood as an inversion (T_8I) of A–C♯–E♯–G♯–(B). In terms of the (4,4,3,3)-cycle, T_8I would represent a motion two functional regions to the right. The next iteration of the declaration motive, B♭–E♭, creates the harmony E♭–G–B♭–B♮–D–F with its accompaniment; this chord is an inversion ($T_{10}I$) of A–C–E♭–(E♮)–G–B, but it is again better understood as continuing to the right within a (4,4,3,3)-cycle.

Example 4.45 pictures this (4,4,3,3)-cycle as a Tonnetz segment:



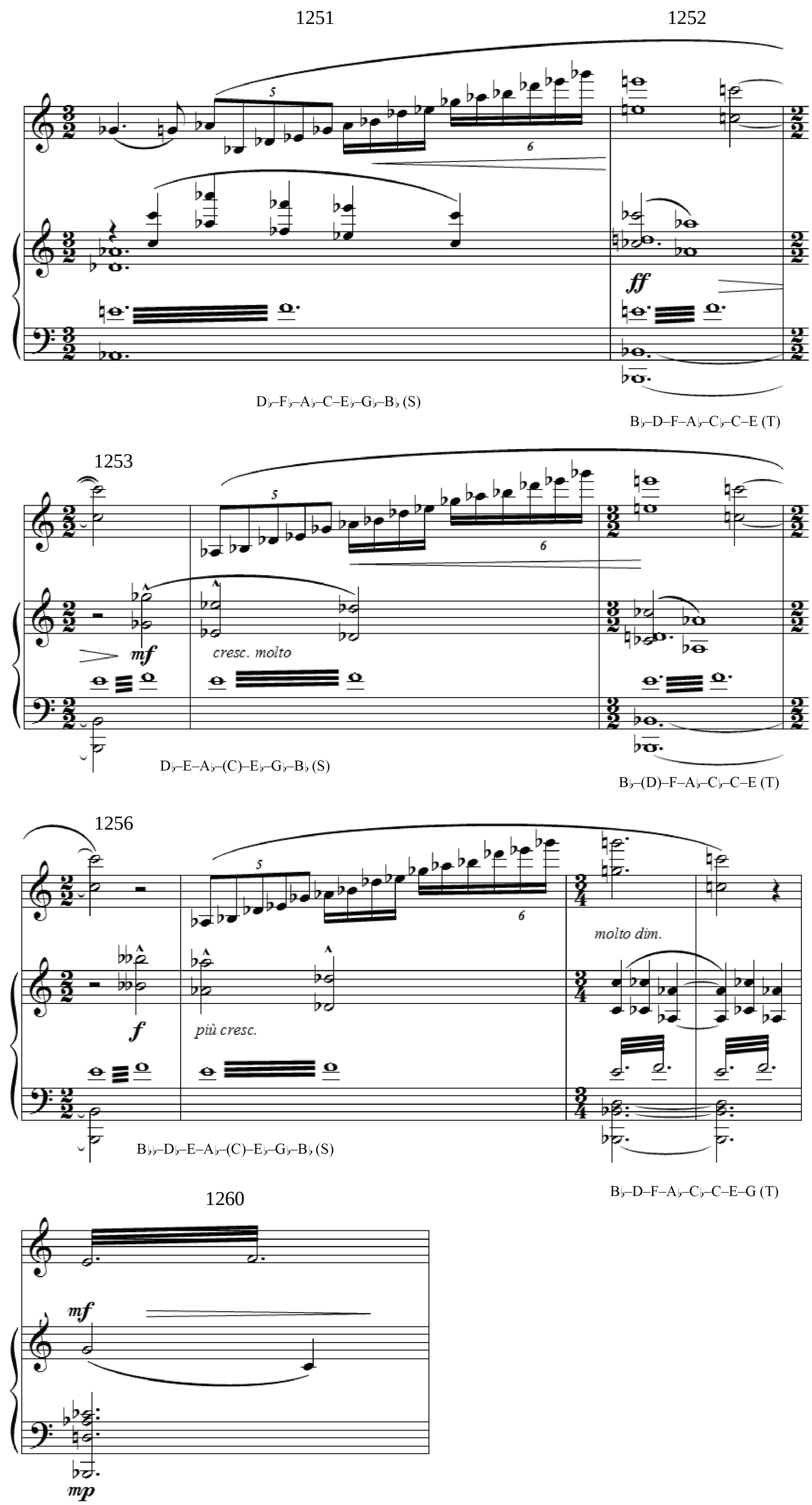
Example 4.45. A key variation based on the (4,4,3,3)-cycle and COMB harmonies.

The harmony in ms. (2), A–C♯–E–E♯–G♯, appears on the far left. E, which is not part of the cycle, is shown in a dashed hexagon; I have also included it in the diminished-seventh chord E–G–B♭–D♭, for the cycle often appears to combine diminished *sevenths* (rather than triads) with augmented triads. The chords in ms. (3) and (4) follow one another in the cycle; because they are related by inversion in the same way that minor and major triads are related by inversion in the

(4,3)-cycle, we can perhaps understand them as belonging to the same functional region. In ms. (5), the harmony B–D♯–F♯ supports a B♭–F statement of the declaration motive, and the resultant harmony moves to the COMB harmony F–A–(C)–C♯–E–G, which then alternates with D–F–G♯–C–E, another COMB harmony. F–A–C♯–E–G lies to the right of A–C–E♭–G–B in the (4,4,3,3)-cycle, but D–F–G♯–C–E does not belong to this cycle — (4,4,3,3)-cycles do not exhaust the aggregate. I have thus depicted it as part of a parallel cycle above the primary one. Note how the chord in ms. (2) could be construed as belonging to the same region as F–A–C♯–E–G in ms. (5-6) if the diminished triads of the cycle are extended to seventh chords. The passage would thus appear to be a T–S or T–D alternation in a key species based on COMB/declaration harmonies rather than major and minor triads.

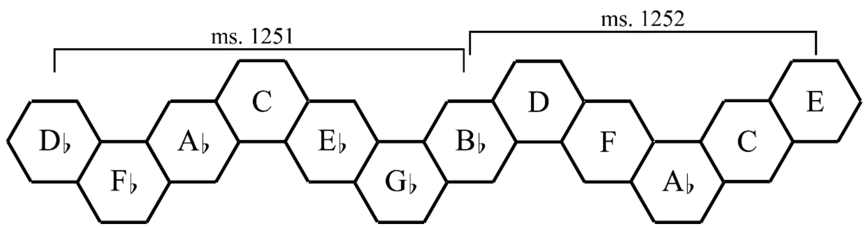
Reconciliation

The proper inexistent of the site is the COMB harmony embedded within the Prince's declaration, which is unnamable in terms of either augmented or diminished tendencies. Does this passage thus constitute the inexistent's gaining a maximum intensity of appearance? Given that Bartók marked this passage to be cut, perhaps not, and it is hardly an unequivocal new "genus" of key species. Yet all that remains of the ballet is the final embrace of the Prince and the Princess, followed by the return of the elements of the forest to their original shapes and places, which sounds very unlike the annulment of the rules of the "space of placement." Example 4.46 gives the music for the kiss and embrace, ms. 1251-1255. The harmony at the actual moment of the kiss (ms. 1252) is B♭–D–F–A♭–C♭–C–E, a COMB harmony and



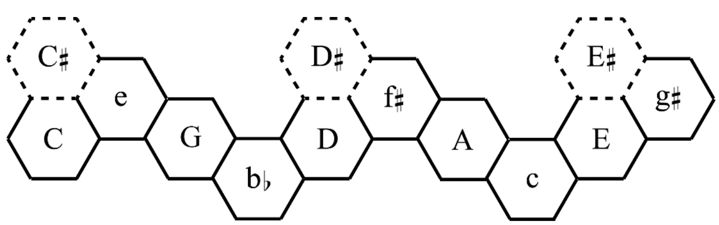
Example 4.46.: The kiss and embrace of the Prince and Princess, ms. 1251-1260.

(with the exception of C♭) a segment of a (4,4,3,3)-cycle.[58] The preceding measure presents the harmony D♭–F♭–A♭–C–E♭–G♭–B♭, which, as shown in Example 4.47, creates a twelve-pitch segment of a (4,4,3,3)-cycle with this "kiss" harmony:



Example 4.47. The 12-pitch segment of a (4,4,3,3)-cycle in ms. 1521-1252 of Example 4.45.

Overall, Example 4.45 consists of the alternation of these two harmonies, which can be understood as an alternation between subdominant and tonic: the periodicity — analogous to the periodicity of the (4,3)-cycle, which is 7 — of the (4,4,3,3)-cycle is 2, which is outlined in the bass motion from A♭ to B♭ in ms. 1251-1252. G, a continuation of the cycle, is added in ms. 1257, and B♭♭ appears in ms. 1256. C♭ assumes an increasingly prominent position within the tonic harmony, so much so that one could say that the final resting place of this passage occurs on a harmony that combines not just diminished and augmented triads, but a diminished *seventh* and an augmented triad: B♭–C♭–D–F–A♭–C–E. Example 4.48 displays the entire pitch space of this passage:



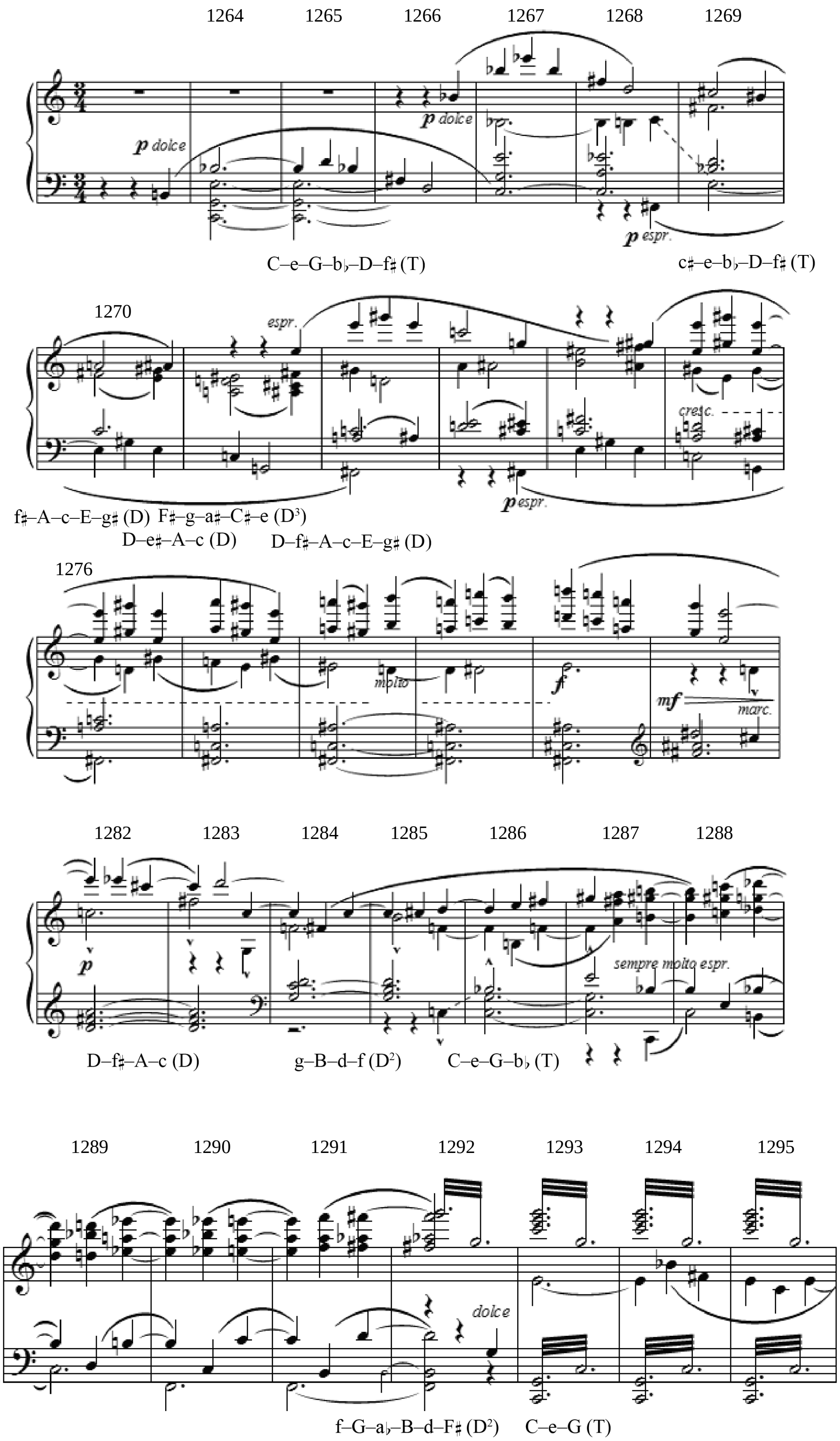
Example 4.48. The pitch collection of Example 4.47.

[58] The measure preceding ms. 1252 belongs to another cut, but nevertheless corresponds closely with ms. 1251 in the revised score.

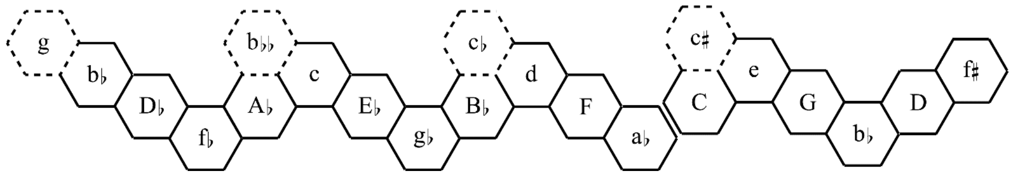
Man and nature are finally reconciled in the combination of diminished-tendency and augmented-tendency key species, which is exemplified by the (4,4,3,3)-cycle — or perhaps the (4,1,3,3,3)-cycle, including the fourth pitch of the diminished-seventh chords — replacing (3,3,3,x) and (4,4,x)-cycles as the primary reference. But if this represents something truly new, where the inexistent of the site (the COMB harmony embedded within the Prince's declaration) gains a maximum intensity of appearance, then how are we to understand the final measures of the ballet, which complete a pseudo-arch form by returning to the beginning? Example 4.49 show the final measures (ms. 1264-1288), which simply move to and repeat the C major triad to the end. At first this passage seems more or less like the introduction: the same thematic material is presented and the harmony unfolds in a familiar way, with a C major triad embellished by B♭ and F♯. Yet there are subtle differences that soon become magnified. C–E–G–B♭–D–F♯ in ms. 1264-1266 is better understood as a segment of the (4,4,3,3)-cycle than a diminished-tendency harmony, a determination reinforced by ms. 1267, which presents the COMB harmony D–F♯–B♭–C♯–E.

As shown in Example 4.50, one can understand these COMB harmonies as a continuation of the pitch space of the kiss/embrace passage.[59] This becomes even clearer in the following measures, which extend the (4,4,3,3)-cycle to F♯–A–C–E–G♯. If we interpret each functional region as encompassing two augmented and one diminished triad (or seventh chord), then the important move to D–F♯–A–C (mirroring the same harmonic shift in the introduction) is a shift simply from T to D — from C–E–G–B♭–D–F♯ to D–F♯–A–C–E–G♯ — rather than as a shift to D^2, as it is in the introduction. Since 2 is the periodicity of the (4,4,3,3)-cycle (but also of the

[59] Here I have changed the entire diagram back to having upper and lowercase letters, taking "C–e–G" from the final harmony as a model.



Example 4.49**.** Ms. 1264-1295.



Example 4.50. C–e–G–b♭–D–f♯ as a continuation of the kiss/embrace passage.

[4,1,3,3,3]-cycle), the relation between D^2|S and T would have to be reinterpreted as one between D and T. From ms. 1270-1283, the passage centers on D–F♯–A–C–E–G♯.

D–F♯–A–C–E–G♯ (D) alternates with F♯–G–A♯–C♯–E, the latter being D^3 or what one might think of as D^2 of D. In ms. 1282-1286, D–F♯–A–C moves to G–B–D–F, which then resolves to the original C–E–G–B♭ tonic. One could interpret this motion as a regression back to the diminished tendency (a progression from D^2 to D to T), but what if G–B–D–F was understood as having a D^2|S function in relation to C–E–G–B♭? In that case, a *complete reversal has taken place*: D–F♯–A–C shifts function from D^2 to D while G–B–D–F shifts function from D to D^2.[60] And after the chromatic ascent in ms. 1286-1292, this relation is amplified: F♮–A♭–B–D–F♯–G, a segment of a (4,1,3,3,3)-cycle and enharmonically equivalent to D^2, resolves to tonic in the final cadence of the ballet. In the final measures, F♯ and B♭ finally resolve to the C major triad with which the ballet began, but it is a completely transformed C major, representing a forest whose very rules have been annulled. It is a new forest in which the Prince is not in contradiction, and in retrospect, his declaration harmony is a COMB harmony, the basis of the

[60] The pitches in parentheses must be understood as also being capable of functioning as the minor third in the previous central major/minor tetrachord. E♭, for example, acts as part of the C–E♭–E♮–G–B♭–D–F♯ tonic of this final passage. G–B–D, then, is part of E–G–G♯–B–D, or D^2, which is enharmonically equivalent to S: C–E–G♯–B–D–E♯ is enharmonically equivalent to B–D–F–A♭–C–E.

new harmonic language of the new forest.

A New Contradiction?

The intensity of appearance of the Prince's declaration chord thus moves from minimal to maximal. The chord is not a nameable harmony in the declaration itself, but a seemingly coincidental collection of pitches: either a diminished or augmented-tendency harmony with a "non-chord" tone. By the end, however, COMB harmonies seem to feature within their own nascent key species, sublating the antagonism between the augmented and diminished tendencies. Yet if *The Wooden Prince* truly presents a complete dialectical fragment, then what, if anything, has really been accomplished? What kind of event has occurred? In the world-shattering singularity of the Prince's declaration of love, the possible event is first presented as amorous, but if the Princess is part of the natural world then in the end she too must be entirely transformed. Yet after duly removing her crown, cloak, and hair, she experiences no resurrection: the only transformation she undergoes is debasement, her condescension to the level of the pre-resurrection Prince. Just as the Prince takes on the fairy's role of comforter, the Princess takes on the old role of the Prince and thus must now endure in contradiction with the new forest: now *she* is the one who is alienated. Despite earlier appearances, then, this cannot be an amorous event, and the final embrace must be allegorical. The Princess being depicted as unequal to the Prince at the beginning precludes any such event, and, following Kilpatrick, is indeed "cynical." The ballet's initial conditions require this.

Yet it certainly seems as though a *musical* event has occurred, as though a being has been brought forth that "up until then was inexistent, and once it maximally appears, forces us to retrospectively reconsider the entire history of its predecessors."[61] As far back as the Prince's work song, COMB harmonies begin to appear that are comprehensible *only in retrospect*. If the ballet is not the depiction of an amorous event, then it must be the depiction of a political, artistic, or scientific event, if we're to accept Badiou's four conditions for truth. An artistic event is the only one that makes sense given the context of a drama about art as (self) fashioning. But while it does seem like love must be sacrificed for such an event to take place, it is because love serves here merely the inspiration for the carving of a *wooden* prince, a work of art that changes the world and bridges the gap between man and nature, between subject and object. Thus the ballet is less about the incompatibility of love and art than it is about the very possibility of artistic change, which is never presented, moreover, as anything *but* a possibility: it is impossible to conclusively demonstrate the existence of the truth arising from the ballet's depiction of an event. One can only participate by following the consequences of such an event, and just as there are different kinds of subjects to an event, there are different kinds of listeners to a ballet. What is without question is that some kind of singularity is depicted here, and that in itself is remarkable. Perhaps the difficulties Bartók encountered with the score and its reputation as the "least successful" of his dramatic works may be best understood as the failure of everyone — the composer included — to remain faithful to the idea that the consequences of such a singularity can indeed be maximal.

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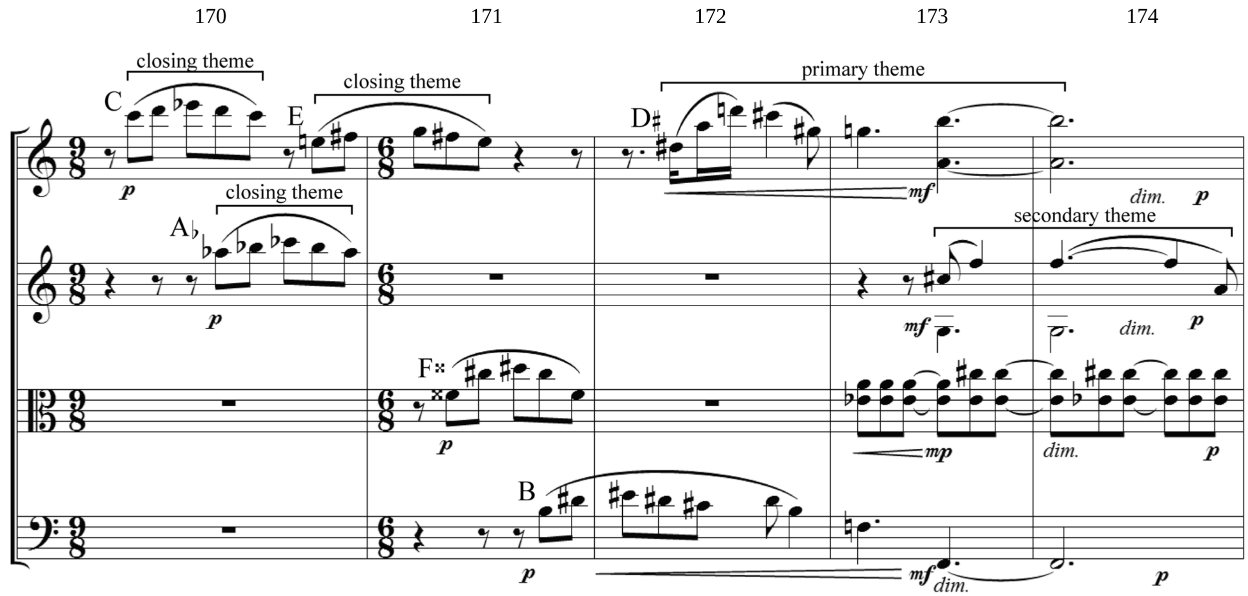
[61] Quentin Meillassoux in "History and Event in Alain Badiou," trans. Thomas Nail, *Parrhesia* 12 (2011), p. 9.

Chapter 5

Second String Quartet

Composed contemporaneously with *The Wooden Prince,* Bartók's Second String Quartet (1914-1917) shares not only the ballet's harmonic language, but also its intricate relations between motives. Perhaps because they are not tied to dramatic characters or themes, the quartet's motives weave an even more complicated — and indeed often bewildering — web of relations. Consider the opening of the first movement's coda (ms. 170-174), reproduced in Example 5.1, which begins with a stretto-like presentation of the first five notes of the movement's "closing theme." The first pitches of each entrance proceed through an (048) chain with a 3 connector — C, A♭, E, F𝄪, B, D♯ — but at the fourth statement the forms begin to change, ultimately morphing into the opening of the "primary theme" in ms. 172. In ms. 173, as the last pitch of the primary theme sounds, the second violin then presents the opening of the "secondary theme," connecting its initial diminished-fourth leap to the primary theme's final major-third leap. Since this passage appears to reveal "hitherto unsuspected motivic connections among apparently unrelated passages," it would seem to be a perfect example of the kind of revelations possible through Cone's "thematic" derivations.[1] It connects the primary theme's two motives to the openings of the closing and secondary themes, respectively, and thus also connects the latter to one another through their common connection to the primary theme. But what if the body of the movement has already suggested such connections or completely different ones? From the point of view of traditional sonata form, in which themes are supposed

[1] Edward T. Cone, "On Derivation: Syntax and Rhetoric," *Music Analysis* 6.3 (1987), p. 240. Cone is once again drawing here on the distinction between "thematic" and "textural" motives, as discussed in Chapter 1.



Example 5.1. The opening of the coda, ms. 170-174.

to contrast one another, this passage is transgressive. But what if these relations exist before this revelation, only mediated in some way? Addressing such questions will require reconstructing motivic trees for each motive of the movement and observing how such trees might combine into a larger, more inclusive one.

Remarkably, a similar method is described in Karl Mannheim's essay on "Historicism" (1924). For Mannheim, a key member of the Sunday Circle, "historicist theory" — the "crystallization point" of which is the "idea of *evolution*" — must "derive an *ordering principle* from the seeming anarchy of change only by managing to penetrate [its] *innermost structure*." He describes this derivation in detail:

> One can work out this order from two directions: firstly, via a historical vertical analysis and secondly, via a historical cross-section. In the first case, one takes any *motif* … and traces it back into the past, trying to show how each later form develops continuously, organically from the earlier. If one gradually extends this method … then one will obtain a bundle of isolated evolutionary lines …. This type of historicism is not completed until the second set of cross-sectional observations have been made; these are made to show how … the *motifs*, which

> have just been observed in isolation, are also organically bound up with one another .… The separate *motifs* are mutually conditioning at the successive stages of evolution and are components and functions of an ultimate basic process which is the real "subject" undergoing the change.[2]

Not only is there a music-theoretical analogue for this in transformation theory — the focus of which has inevitably evolved from musical objects and the arrows between them to the relations between one entire network (or indeed GIS) and another — but also in category theory, which is dominated by the study of morphisms between categories (or "functors") and the morphisms between functors (or "natural transformations").[3] In Example 5.2, each of Mannheim's "evolutionary lines" is shown within a box and together make up a "bundle." The larger arrows represent the "cross-sectional observations" and could be understood as GIS homomorphisms, functors, monotone functions, or any number of other transformations or morphisms. Whatever the context, the "real subject" — that which is "undergoing the change" — is change itself. Such a perspective requires shifting back and forth between understanding each "evolutionary line" as a set of discrete, related elements and as a single whole that can be related to other wholes.

Mannheim suggests that through this method one could possibly reconcile what he sees as the two conflicting currents of historicist thought: (1) the "logical-dialectical construction" of Hegel, which aims for an all-encompassing rationalization or systemization, and (2) the "intuitive-organic representation of gestalts," which he associates with Schopenhauer, Nietzsche, and Bergson.[4] These two currents mirror the two ways of understanding an evolutionary line (as

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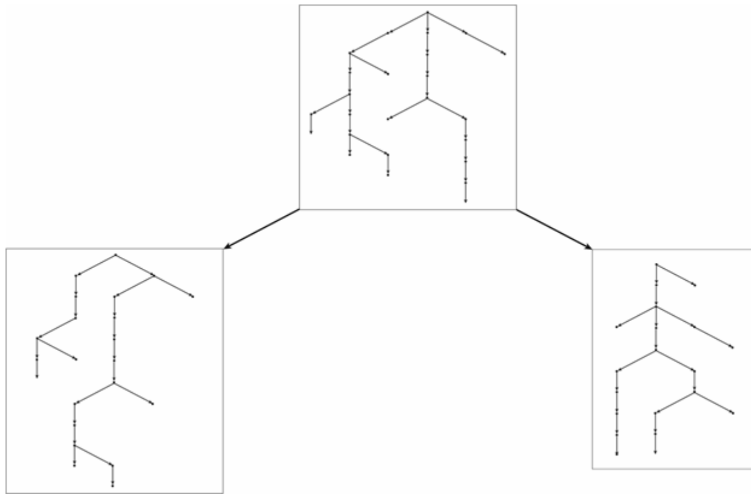
[2] Karl Mannheim, "Historicism" (1924), in *Essays on the Sociology of Knowledge*, trans. Paul Kecskemeti (London: Routledge and Kegan, 1952), pp. 86-87.

[3] See Thomas M. Fiore, Thomas Noll, and Ramon Satyendra, "Morphisms of Generalized Interval Systems and PR-groups," *Journal of Mathematics and Music* 7.1 (2013), pp. 3-27. Klumpenhouwer networks are another obvious example of "networks of networks."

[4] Mannheim, "Historicism," p. 109.



Example 5.2. A graphical representation of Mannheim's "cross-sectional observations."

a set of discrete elements or as single, continuous shape), and the conflict between them mirrors the mathematical conflict between algebra, which is combinatory or mechanistic, and topology, which deals with continuity and gestalts. For Mannheim, different human activities have different associations to historicism: science or mathematics are associated with a non-historicist Enlightenment reason in which truth is static and the only thing that is progressive is its revelation; philosophy is associated with the dialectical view, in which older ideas are not proven wrong and then replaced, but are transformed or sublated; and the arts are associated with an intuitive, dynamic process that produces a loosely connected series of movements, each representing a particular "Folkseele."[5]

Musical motives are often described as being related to one another in terms of Mannheim's second and third relations to historicism: they can be understood either as particular finite sets of motivic instances (rationalization or systemization via algebra) or as representations that confront us as continuous gestalts (dynamicism via topology). While the dominant approach

[5] *Ibid.*, p. 123.

has typically been the former, there have been several attempts in recent mathematically-oriented music theory to take a topological approach. Chantal Buteau and Guerino Mazzola, for instance, have recently described the "motivic space" of a work as the set of all of its motives combined with a distance metric, which results in a collection of topological "neighborhoods" associated with each motivic instance.[6] But even theorists not quite as devoted to this kind of mathematical formalization have turned to the idea of topology. Dora Hanninen, for example, tellingly describes her association digraphs of contextually related musical objects as "topologies" rather than sets with associated group actions. As discussed in Chapter 3, this allows her to understand associative sets as prototypical or "fuzzy" categories in opposition to the classical categories of abstract algebra.[7] While their motivations for maintaining their distance from abstract algebra often rests on dissatisfaction with transformation theory's notion of interval, there are other, better reasons. A group can also be understood as the collection of ways in which an object can be identical with itself, and the problem this poses for conceptualizing music is clear; music so often hinges on qualitative difference and the production of the new. Following Mannheim, the only way to overcome this problem is to shift constantly from the "vertical" view to the "cross-section" and back, keeping the boundary between them fluid and always being vigilant for opportunities to transition from one to the other.

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[6] See Chantal Buteau and Guerino Mazzola, "Motivic Analysis According to Rudolph Réti: Formalization by a Topological Model," *Journal of Mathematics and Music* 2.3 (2008), pp. 117-134.

[7] See Dora Hanninen, "Species Concepts in Biology and Perspectives on Association in Music Analysis," in *Perspective of New Music* 47.1 (2009), p. 19; and idem., *A Theory of Music Analysis: On Segmentation and Associative Organization* (Rochester: University of Rochester Press, 2012), pp. 118-157.

In mathematical terms, motivic trees can be understood in either algebraic or topological terms. If one understands them as partially ordered sets and "join semilattices" (as I did in Chapter 3), then any rooted tree can be understood as a semigroup defined by the join operation, a binary operation that given any two elements of the tree produces a third element that is their most recent common ancestor. Or the arrows between elements can themselves be understood as members of some algebraic structure, most likely a monoid. While either of these conceptions of a tree is combinatorial, mechanistic, and suggests a kind of motivic logic, a tree can also be understood as a dynamic, continuous space. Topology is the study of such spaces. A topological space is a particular grouping of a set into subsets — called "open sets" — that adheres to three rules: (1) that the entire set and the empty set must be open, (2) that any union of open sets is open, and (3) that the intersection of a finite number of open sets is open. The simplest example is the topology on the real line where the open sets are the open intervals $a < x < b$.

In topological terms, a rooted tree can be most simply understood as having a so-called "Alexandrov" topology wherein the open sets are all of the "lower sets," subsets Λ such that if x is an element of the tree and another element $y \leq x$, then y is in Λ and x is its root.[8] Example 5.3 presents two lower (and thus open) sets defined by their having roots a and b (shown in bold). Such sets need not be understood as chains of discrete forms; they can be understood instead as continua containing an infinite number of intermediate forms. Consider Example 5.4, which visualizes an open interval on the real line containing the real numbers $0 < x < 1$. It is a whole, a prototypical gestalt. Each "interval" on a motivic tree can likewise be thought of as containing an infinite number of intermediate forms. Since every motivic tree (1) defines such a topology and

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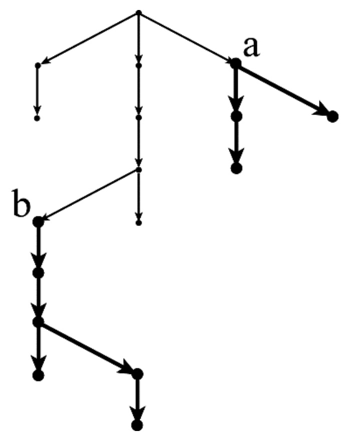
[8] The basics of topology can be found in introductory textbooks such as Donald W. Kahn's *Topology: An Introduction to the Point-Set and Algebraic Areas* (1975) (New York: Dover, 1995). I use the symbol Λ because it looks like a lower set with a root.



Example 5.3. Two lower (open) sets having a and b as roots.

Example 5.4. An open interval on the real line.

(2) has an implicit semigroup when understood a partially ordered set, one can posit a one-to-one association between the topological and the algebraic view. In terms of category theory, this association would be a functor between the category of partial orders (a subcategory of preorders) and the category of Alexandrov spaces (a subcategory of topological spaces). And since the inverse of this functor also exists, these categories are equivalent. This is a very powerful idea given that these two conceptualizations of motives — as combinatorial sets and as gestalts — are so intuitively different.

1. Primary Theme

Motives 1a and 1b

Example 5.5 reproduces the primary theme group of the exposition (ms. 1-19), which is a presentation not only of the theme and its motives, but also of the particular forces that propel the transformations of these motives throughout the movement. The first violin presents the original form of motive 1a in ms. 2, and in ms. 4 this motive — which we can understand as three short, ascending, anacrustic pitches followed by a longer, metrically stronger fourth pitch — has already contracted both rhythmically and in terms of its constituent intervals. Rather than sixteenth notes, it has triplet sixteenths, and the ten-semitone interval separating the first and third pitches of the initial form in ms. 2 (E and D) is reduced to four, from G𝄪 to C♯. Yet since the characteristic force at work here is *expansion*, this particular transformation is actually a "dead branch" whose implications will not bear fruit. Even in just the second half of the primary theme group (ms. 7-19), motive 1a expands both in terms of rhythmic values — beginning in ms. 11 the opening sixteenth notes are lengthened into eighths — and intervallic content: the cello's statement of motive 1a in ms. 7 (D–A) stretches those ten semitones into nineteen. By ms. 14-15, this interval, tenuously hanging on to its status an element of motive 1a, has become two octaves across. Motive 1b also undergoes characteristic transformations in these opening measures: the motive's contour shifts from descending/ascending (G♯–G♮–B♭ in ms. 2) to descending/descending (E–D♯–B) in the cello of ms. 7-8, and in the very next measure shifts again to ascending/descending (B♭–C♭–F), a complete inversion of the original contour. Shifts in contour and expansion, which we can understand in terms of Bartók's "extension-in-range" technique, are the two transformations that affect these motives across the entire movement.

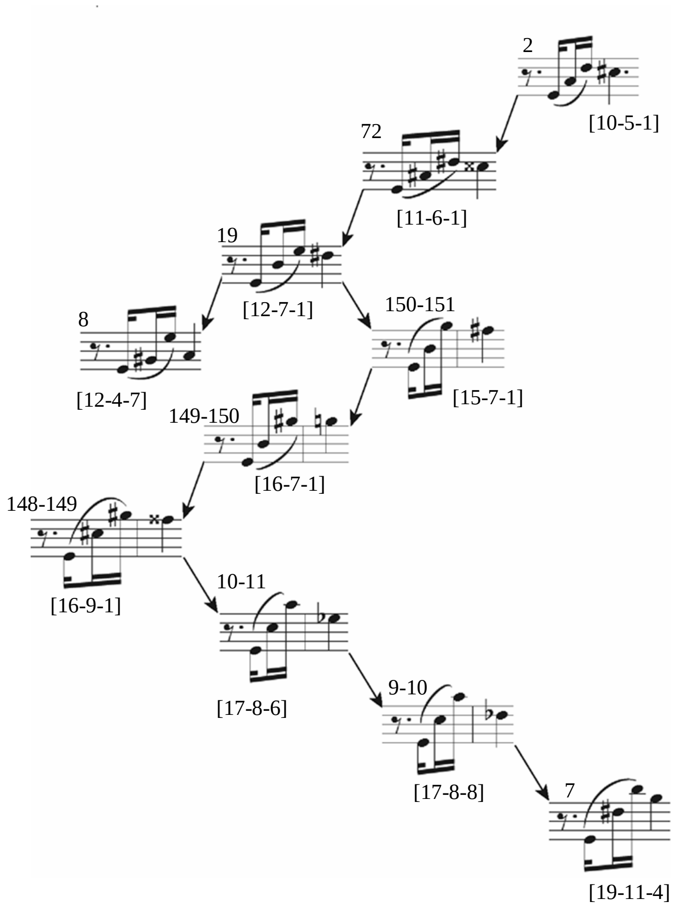
In order to see these transformations more clearly, Example 5.6 organizes every form of motive 1a into a motivic tree that maintains the rhythm and contour of the first occurrence; treble clef is assumed, all transpositionally related forms are represented by a single occurrence, and each form has been transposed to begin, like the first, on E (just as Bartók transposed folk tunes so as to end on G). This is done to facilitate comparisons between motivic forms. Each form is


1
2
3
1a
1b
Moderato. (♪ = 138 - 150.)
Violino I.
Violino II.
Viola.
Violoncello.
p
P sempre tenuto
P sempre tenuto
p
4
1a
5
6
7
3
espr.
1a
8
1a
1b
9
1a
10
1a
11
cresc.
cresc.
cresc.
cresc.
1b
1b
1b
1b

Example 5.5. The primary theme area of the exposition, ms. 1-19.

also labeled above with the measure number(s) of its first appearance and below with three numerical *characters* of descending weight designating (1) the interval between the first and third pitches, (2) the interval between the first and second pitches, and (3) the interval between the third and fourth pitches.[9] The initial form (the root of the tree, upper right) is thus labeled [10-5-1]: the interval between the first and third pitches is a minor seventh (10), the interval between the first and second pitches is a perfect fourth (5), and the interval between the third and

[9] Recall from Chapter 3 that "character" is the phylogenetic term for a property of a biological unit, equivalent to an attribute or qualia. In this case, each character corresponds to a particular interval.



Example 5.6. A motivic tree for motive 1a.

fourth pitches is a minor second (1).[10] The transformation to the form directly below it requires expanding the first two intervals by a half step each, to 11 and 6. Taking parsimony into account, what unfolds is a motivic tree of ten transpositionally distinct forms that displays an overall tendency towards intervallic expansion.[11] While this is not the chronological order in which these

[10] Since all these motive-forms follow the same contour as the first occurrence, the notation makes no attempt to capture direction: the first two intervals will always ascend, the third will always *de*scend.

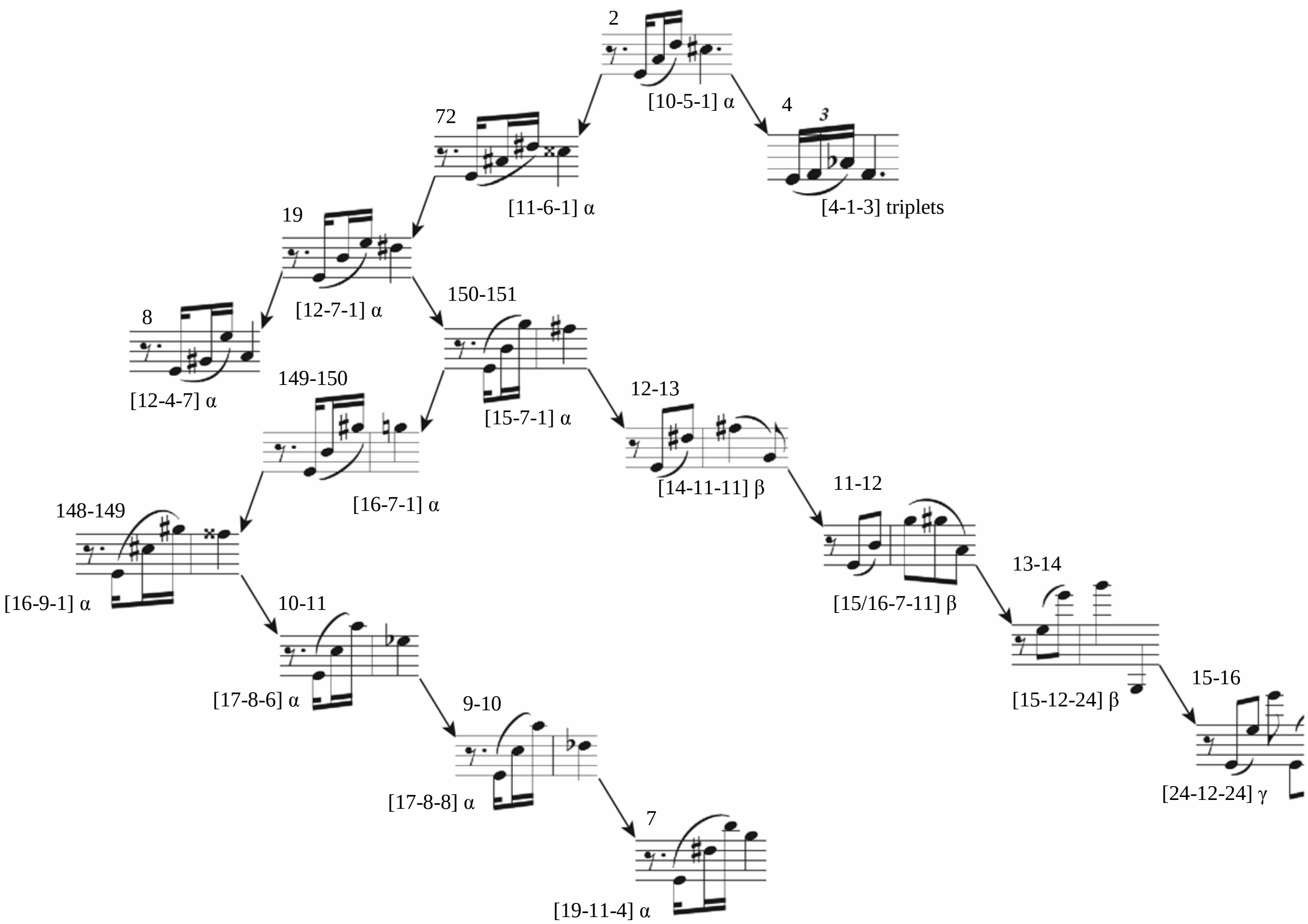
[11] For the sake of brevity, I will not describe every decision regarding parsimony. Here is one example: the motive-form in ms. 19 is connected to those in ms. 8 and 150-151 because those two transformations each require only one change of character. The choice to place one to the left and one to the right has no significance, but I have tried to organize trees so that they fit in as

motive-forms occur in the score, the tree does represent the overall logic governing this motive in its original rhythm and contour: it is a nearly linear series originating from the motive's first instance.

This is, however, only a tiny part of a much larger whole. Within just the primary theme group of the exposition this motive is transformed almost to the point of becoming unrecognizable. In ms. 11 even the motive's rhythmic character begins to change: the three opening sixteenths expand to two eighths and a quarter, which then expand to three eighths. Example 5.7 thus depicts motive 1a's motivic tree with an added branch including these three rhythms. Borrowing Greek letters from Bartók's rhythm derivations in *The Hungarian Folk Song* (1924), I have labeled them α (alpha), β (beta), and γ (gamma, for the form from ms. 15-16, shown at lower right), respectively.[12] This motive maintains its contour while not only transforming its rhythmic values, but also its metrical placement: rather than the final pitch, the highest (third) pitch begins to receive the metrical stress, often arriving on downbeats. These rhythmic and metrical transformations register the change of a character (or characters) that had hitherto been unchanged and unremarked on, thus possibly marking the beginning of a new subspecies. Both α and β/γ, that is, represent separate subspecies based on metrical placement, while α, β, and γ represent separate subspecies based on rhythmic values. Another way to understand this transformation of metrical placement would be to imagine the third pitch of each

small an area as possible. The motive-form in ms. 8 is a dead end because its opening major third does not follow the general trend of expansion. This fact is supported by its relative rarity in the score: forms of this motive beginning with intervals of size 5, 6, or 7 are *far* more common.

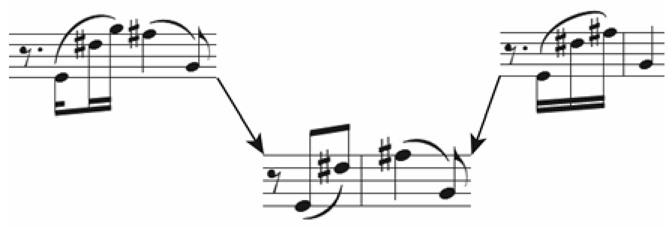
[12] In the form from ms. 11-12, I am considering G–G♯ as one rhythmic unit. I have also included the motive-form from ms. 4, which again, I hear as representing a path that for the most part, is not followed: it contracts rather than expands, and the triplet rhythm does not appear again until the transition and secondary theme.



Example 5.7. Motive 1a's motivic tree with an additional branch.

anacrusis figure as having been removed altogether. Example 5.8 gives both possible derivations: the motive-form on the left — an extension of motive 1a that includes the first pitch of motive 1b — is transformed by removing the third pitch, while the motive-form on the right is derived by metrical displacement. Another option would be to understand the result as an elision of complete forms of motive 1a and 1b, but such an understanding will require taking a closer look at motive 1b.

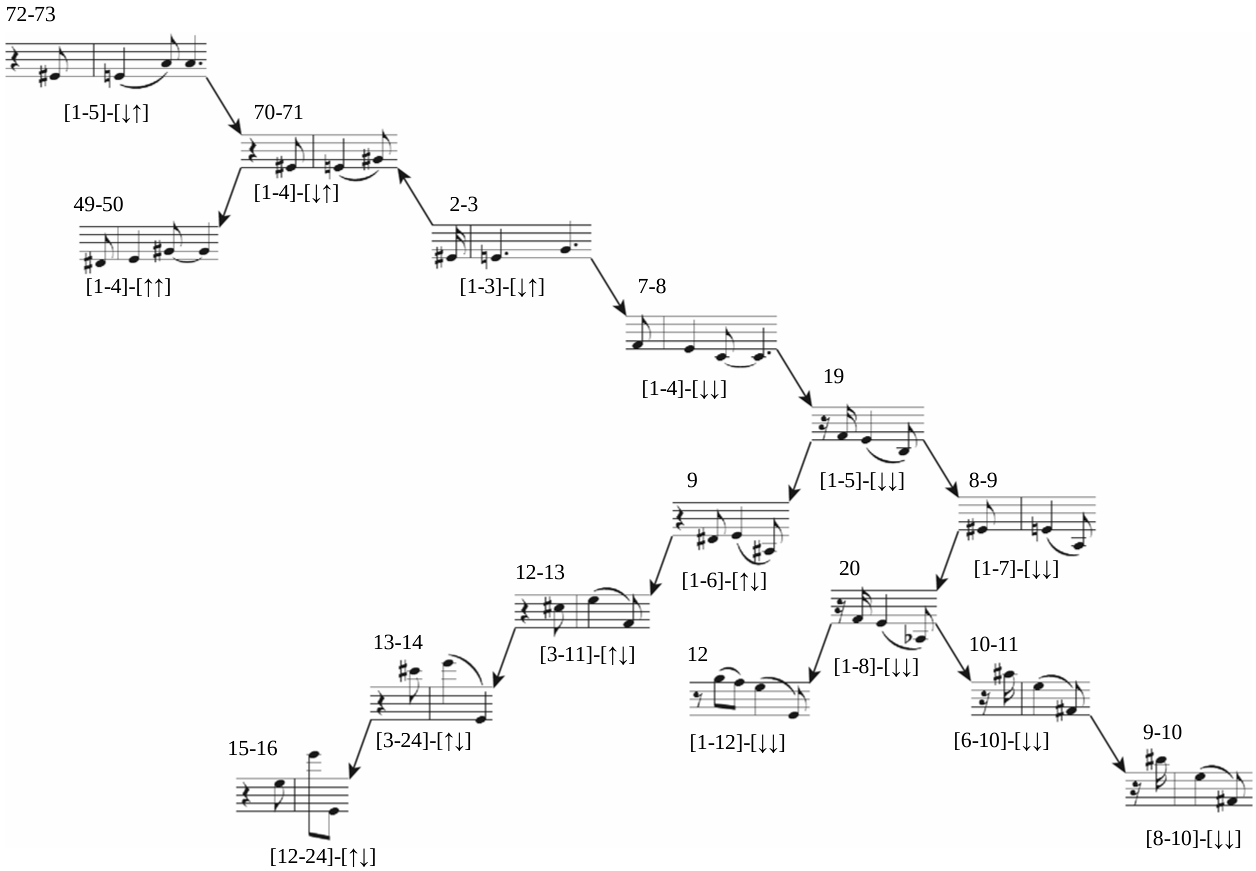
In its initial form, motive 1b contains only three pitches; perhaps because of its relative simplicity motive 1b is subjected to a greater number of transformations than motive 1a. The



Example 5.8. Two possible derivations for the β rhythm.

transformations in contour described above in fact continue, and the motive does not assume any relatively stable form until ms. 82, where it then becomes the focus of the development, and even then its contour and rhythmic character are in constant flux. Example 5.9 collects all fourteen occurrences of motive 1b (once again transposed so that the second pitch is an E) that maintain the same basic rhythmic and metrical character: each motive-form begins with a short anacrustic pitch followed by a longer pitch in a strong metrical position (usually a downbeat). The length and metrical stress of the third pitch is variable, but is typically longer than the first. Example 5.9 is divided into four motivic subspecies based on the four possible three-note contours: ↓↑, ↓↓, ↑↓, ↑↑ (descending/ascending, and so on).[13] The contour of the first form, ↓↑, only appears in three forms, and the ↑↑ contour only appears once. The most common contours are those that end with a descent, such as ↓↓, which, as discussed above, allows one to understand the form on the left of Example 5.8 to be an *elision* of motives 1a and 1b. The two motives overlap by two pitches: the first four pitches are a typical form of motive 1a, while the final three pitches are a

[13] Using notation borrowed from Robert Morris's *Composition with Pitch-Classes* (1987), all of the ↓↑ forms have the contour <102> and all of the ↑↓ forms have the contour <120>. Given that a form with the contour <101> could also be defined as "↓↑," these designations do not mark specific contours, but simply classes of series of directional changes. I nevertheless will continue to use the term "contour." Robert Morris, *Composition with Pitch-Classes* (New Haven: Yale University Press, 1987).



Example 5.9. A motivic tree for motive 1b.

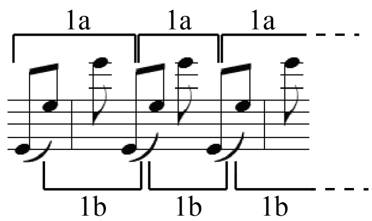
form of motive 1b having a ↓↓ contour.

In terms of pitch, I again make distinctions among members of each contour-defined group by considering the motivic forms' constituent intervals, and in this case the second interval has a greater weight than the first, largely because, like the final interval of motive 1a, the first interval is less variable, usually forming a semitone. Such a procedure reveals the continued importance of expansion/contraction, for the initial root-form's ascending minor third is the smallest second interval just as the initial root-form of motive 1a has the smallest interval between its first and *third* pitches. The extreme form in terms of expansion — the form marked [12-24]-[↑↓], shown at lower right — overlaps with the most extreme form of motive 1a**,** marked

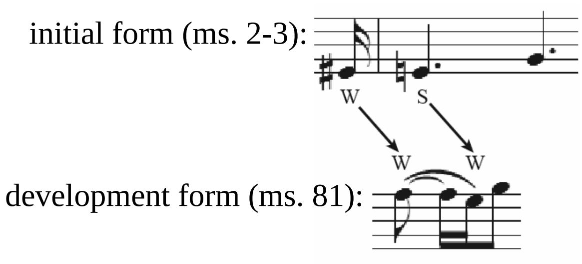
[24-12-24]γ (at the lower right of Example 5.7, p. 290). But importantly, we must understand these two constituent motives of the primary theme as simultaneously stretched to the extreme without being made equivalent in any way. As shown in Example 5.10, the climactic moment of the primary theme group (ms. 16-18) thus consists of alternating and overlapping statements of such extrema: over the course of their respective trees, motive 1a has expanded in rhythmic value and interval size, while motive 1b has expanded in interval size and shifted contour from ↓↑ to its inverse ↑↓. It's in the nature of trees constructed according to parsimony for the most divergent forms to be farthest from the root.

But we're not finished with motive 1b, for we have yet to consider its "development form," which can be characterized as containing a shift in the metrical placement of the second pitch from strong to weak. Example 5.11 gives the initial occurrences of each form, both of which are made up of a descending semitone followed by an ascending minor third. Example 5.11 also shows the metrical shift between them ("w" and "s" indicating "weak" and "strong"), one of the results of which is that the relative lengths of the first two pitches are switched, the second pitch becoming the shorter of the two. Example 5.12 presents all the metrical variants of motive 1b. Following the same procedure I did with motive 1a, the rhythmic/metric character is marked by the Greek letters δ (delta) or ε (epsilon) and has a greater weight than contour, which in turn has a greater weight than intervallic content. This added ε subtree is divided into four motivic species based on the four possible three-note contours: motive 1b is divided into eight different motivic species altogether.

At this point, it might seem like the obvious next step would be to combine these two motivic trees into one. The transformation from α to β could be understood as removing one of the anacrustic pitches of motive 1a or shifting the pitch attacked in a metrically strong position



Example 5.10. Alternating and overlapping statements of motive 1a and 1b’s extrema.

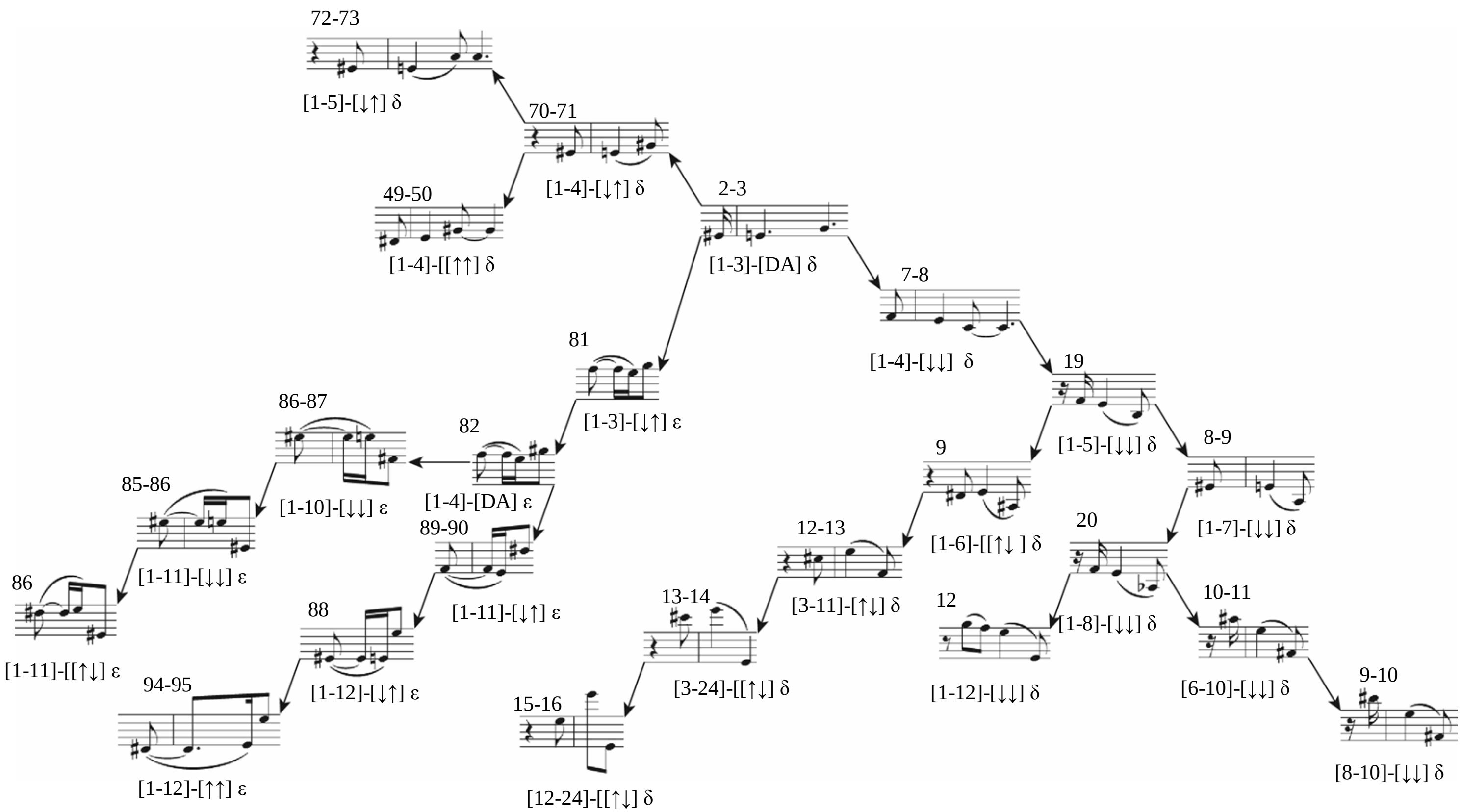


Example 5.11. The metrical shift between forms of motive 1b.

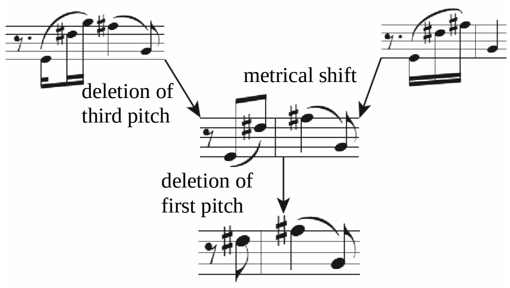
(from the fourth to the third), so that one can easily imagine continuing the process, removing another of the anacrustic pitches, as shown in Example 5.13. Taking advantage of the fact that in its original form motive 1b’s contour is the inverse of motive 1a’s — ↓↑ as opposed to ↑↓ — the result would be a form of motive 1b. But there is no passage in the movement that suggests such a relation. Without considering the possibility of motives 1a and 1b being related through the other motives in the movement, they remain distinct motives, separate (and separable) components of the primary theme.

Algebra

Before moving on to motives associated with the secondary theme, it would be useful to consider the motivic trees for motives 1a and 1b in terms of the two differing approaches mentioned in the introduction: algebra and topology. Beginning with algebra, and with motive



Example 5.12. Motive 1b's motivic tree with an additional branch.



Example 5.13. Transforming motive 1a into 1b by deleting the first pitch.

1a, one could note that the fifteen elements of motive 1a's motivic tree (Example 5.7, p. 290) form a semigroup under the join operation. Recall that the join operation is a binary operation that combines two elements of a tree to produce their most recent common ancestor. If one wanted to understand the transformations *between* motivic forms as some sort of algebraic structure, then (as I discuss in Chapter 3) it would have to be a monoid, which lacks invertibility: a tree only ever moves in one direction. Such a monoid would need to be made up of extension-in-range and rhythmic transformations. I have thus far characterized the former as simple expansions of intervals, but I believe transformations that have a closer connection to Bartok's extension–in-range technique are worth considering: Matthew Santa's MODTRANS and MODWRAP transformations.[14] I am only considering the first three pitches here, since they are the ones being extended. One can easily understand the fourth pitch as not necessarily part of the same "modular system," Santa's term for diatonic, chromatic, and other scales. They can, that is, be understood as chromatic neighbors, though not without doing some violence to my original conception of them as motives.

[14] Matthew Santa, "Defining Modular Transformations," *Music Theory Spectrum* 21.2 (1999), pp. 200-229.

Example 5.14 presents the table of "rotations" for the modular systems Santa believes to be "the most important subdivisions of the octave into collections of twelve, eight, seven, six, and five notes."[15] For Santa, a modular system is a scale, a rotation is an octave species, and a "step class" is a scale degree. There are thus seven diatonic rotations, five pentatonic rotations, two octatonic ones, and so on. The transformation MODTRANS (x, y, z) maps the pitches of one melody to those of another: x is the reference scale of the first melody, y is the reference scale of the second melody, and z is the pitch of the first melody understood as step class 0 ($\hat{1}$). A MODWRAP is a MODTRANS where x has a greater number of pitches than y, requiring one to "wrap" around while mapping into y, starting again at step class 0 when y runs out of pitches. Example 5.15 provides an example using "Twinkle, Twinkle, Little Star," the reference scale of which is 7^1 (the major scale). MODTRANS (7^1,12,D) maps the song's pitches to a chromatic scale starting on D. MODWRAP (7^1,5^3,D) maps the song's pitches to a species of the pentatonic scale; because B is step class 5 in x, it must be mapped be wrapped around to step class 0 in y.

The initial motive-form in ms. 2 maps onto the one in ms. 72 by considering the former within 7^5 and the latter within 7^4, each containing step classes 0, 3, and 6. This amounts to shifting the reference scale from E mixolydian to E lydian while maintaining scale degrees $\hat{1}$, $\hat{4}$, and $\hat{7}$, a procedure which seems reasonable enough. The following arrow, however, requires the MODWRAP transformation: the form in ms. 72 can be reconsidered in terms of the octatonic scale 8^2 (made up of step classes 0, 4, and 7) and then transformed into the form in ms. 19 by mapping it onto any diatonic scale other than 7^6 and wrapping step class 7 around to 0.[16]

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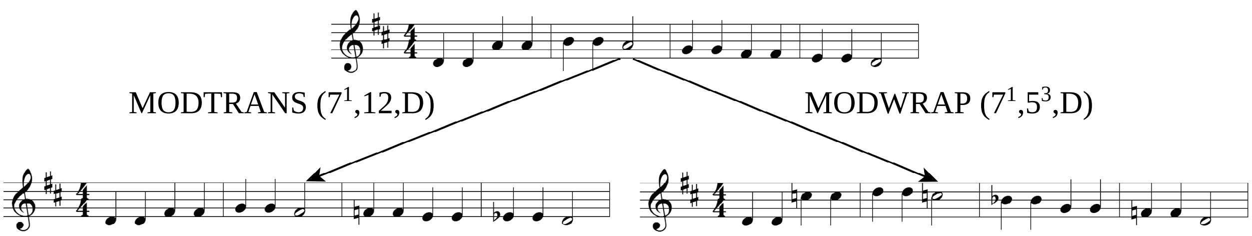
[15] *Ibid.*, p. 202.

[16] Since it was the target modulus of the previous transformation, I chose 7^4 in the diagram.

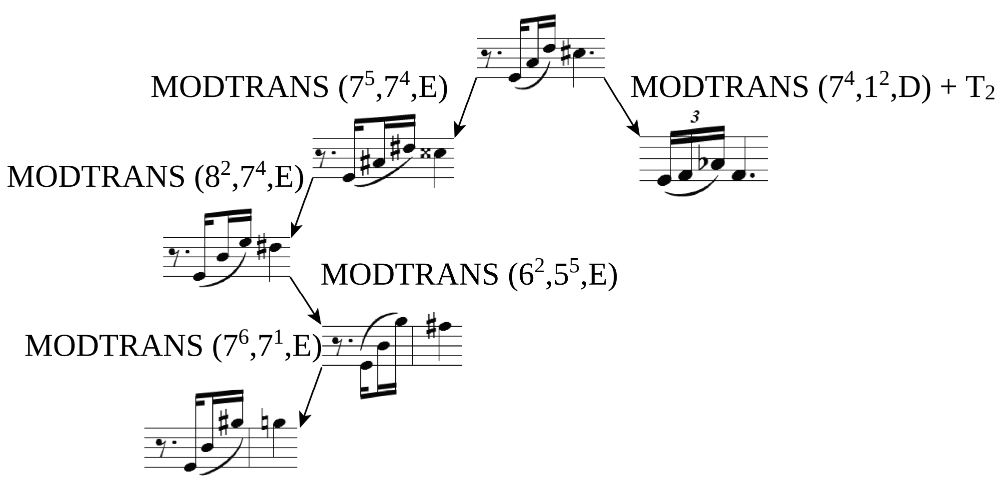
modulus	label	Step Classes 0	1	2	3	4	5	6	7	8	9	10	11
chromatic	12	0	1	2	3	4	5	6	7	8	9	10	11
octatonic	8^1	0	1	3	4	6	7	9	10				
-	8^2	0	2	3	5	6	8	9	11				
diatonic	7^1	0	2	4	5	7	9	11					
-	7^2	0	2	3	5	7	9	10					
-	7^3	0	1	3	5	7	8	10					
-	7^4	0	2	4	6	7	9	11					
-	7^5	0	2	4	5	7	9	10					
-	7^6	0	2	3	5	7	8	10					
-	7^7	0	1	3	5	6	8	10					
whole-tone	6	0	2	4	6	8	10						
pentatonic	5^1	0	2	4	7	9							
-	5^2	0	2	5	7	10							
-	5^3	0	3	5	8	10							
-	5^4	0	2	5	7	9							
-	5^5	0	3	5	7	10							

Example 5.14. Santa's table of "modular system" rotations.



Example 5.15. Transformations of "Twinkle, Twinkle, Little Star."

Example 5.15 presents part of motive 1a's tree interpreted using MODTRANS and MODWRAP.



Example 5.16 Part of motive 1a's tree interpreted using MODTRANS and MODWRAP.

Continuing in this way would require a hexatonic scale (0 3 4 7 8 11), labeled 6^2, because the next arrow involves understanding the form in ms. 19 as step classes 0, 3, and 6 within 6^2 and mapping it onto the pentatonic scale 5^5. While the remaining transformation in this chain simply creates a modal shift (from minor to major), the transformation between the initial form and the form in ms. 4 requires more extensive comment. In this case, D rather than E can be understood as the "point of synchronization," and the transformation is thus the prototypical Bartókian modular transformation between diatonic and chromatic spaces.[17] This transformation also requires a transposition, which is commutative with MODTRANS.[18]

But by making D the synchronization point (step class 0), the initial occurrence of the motive must be reduced from a minor seventh (E to D) to a perfect fifth (D to A), and such flattening ruins the character of the progressive expansions that entirely define the motive's evolution. One solution would be to continue considering modular systems other than Santa's sixteen (such as the hexatonic scale used above), but even in Bartók's discussion in the Harvard lectures it is clear that the extension of chromatic degrees into diatonic ones is a particular instance of a more general procedure of expansion that can operate independently of any reference scale or mode. Requiring that every motivic instance carry with it one or more reference scales is extraordinarily unwieldy, not unlike von der Nüll's implication that every harmony carries with it its own key. How would one construe the motive-form in ms. 15-16, for example, in terms of a particular scale? Any scale that repeats at the octave would be equally

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[17] See his example from *Music for Strings, Percussion, and Celesta* (1936) in Béla Bartók, "Harvard Lectures," in *Béla Bartók Essays* ed. Benjamin Suchoff (Lincoln: University of Nebraska Press, 1976), pp. 381-383.

[18] Santa, "Defining Modular Transformations," p. 203.

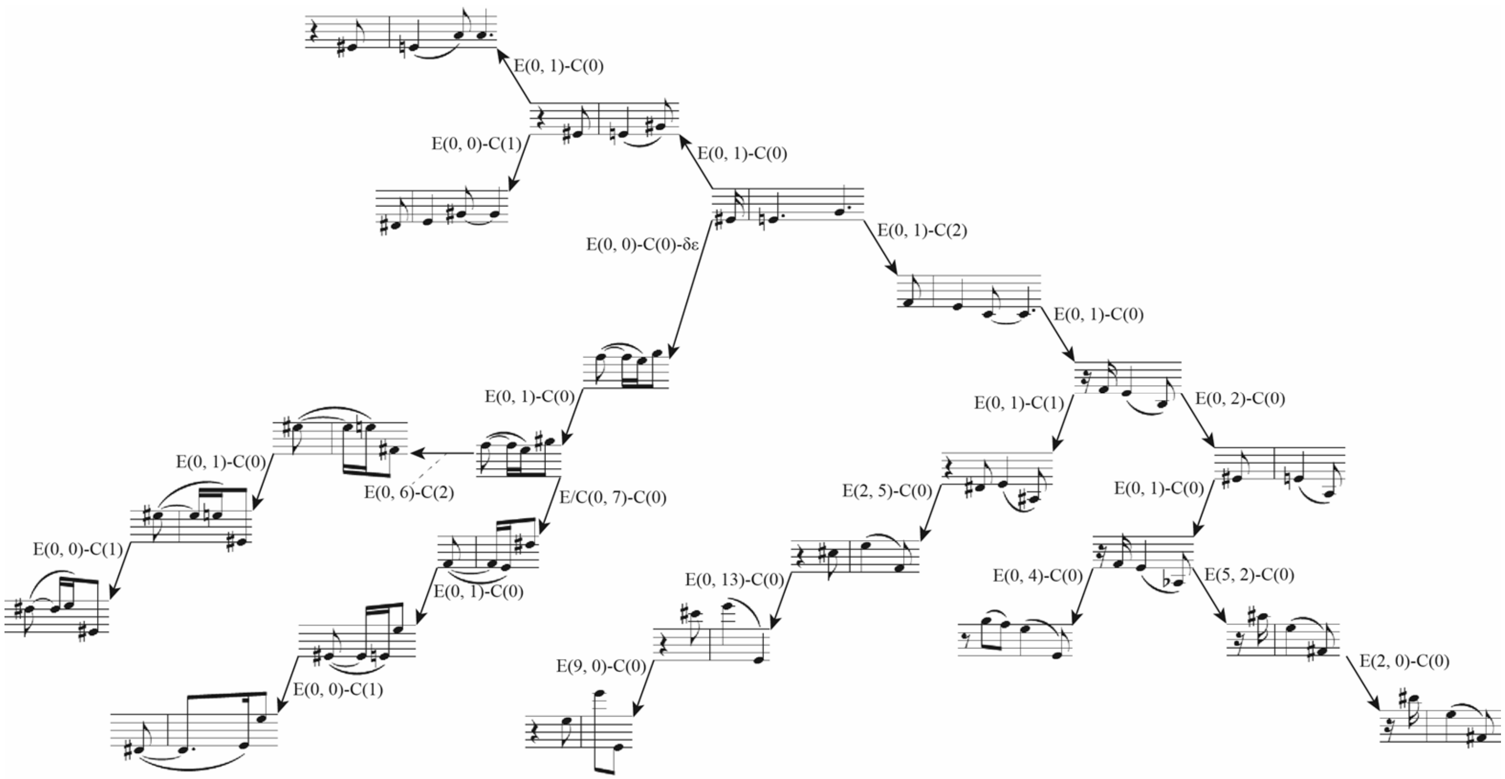
suitable.

It would make more sense in the case of motive 1a to label transformations in terms of intervallic expansion. What are being transformed are motives, not entire melodies like Bartók's examples in the Harvard lectures. Because of its relative simplicity, motive 1b is easier to work with. Since there are only two intervals to consider, one could label any intervallic expansion in terms of two integers, each representing the size of an expansion. E(x, y), for instance, indicates an expansion — or E — of the first interval by x semitones and the second by y semitones. Since E(x1, y1) + E(x2, y2) = E(x1+x2, y1+y2), this collection of transformations inherits the monoidal structure of the non-negative integers under addition. Contour shifts in the first or second interval could then be marked by a 1 if that interval's direction is shifted or a 0 if there is no change. C(1,0) marks an inversion (or change — C) of the first interval's direction, C(0,1) an inversion of the second interval's direction, and C(1,1) an inversion of both (which never happens, given the parsimony of the tree). Example 5.17 presents a Cayley table for each combination; since each contour change has an inverse, these transformations form a group.

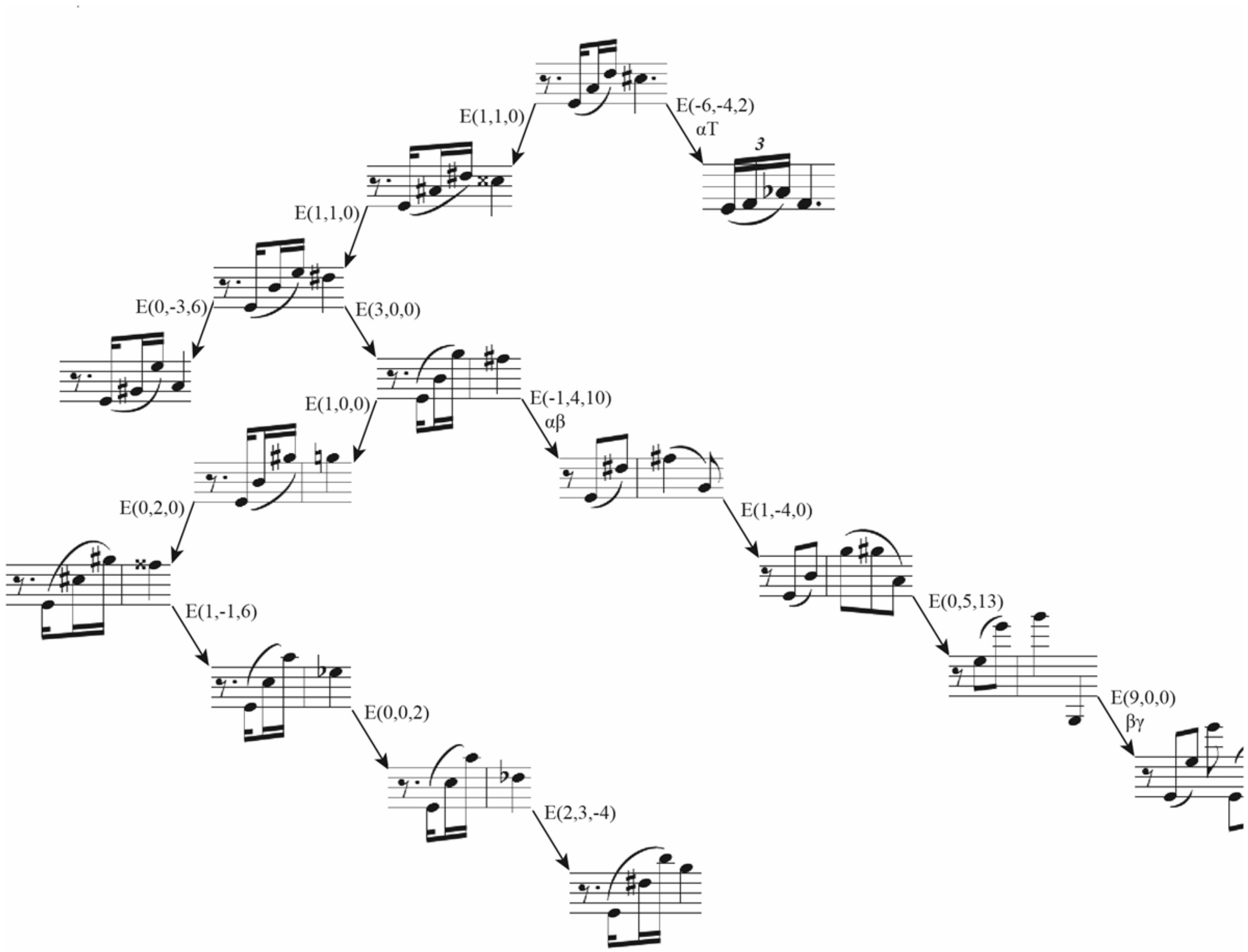
	C(0,0)	C(1,0)	C(0,1)
C(0,0)	C(0,0)	C(1,0)	C(0,1)
C(1,0)	C(1,0)	C(0,0)	C(1,1)
C(0,1)	C(0,1)	C(1,1)	C(0,0)

Example 5.17. A Cayley table of contour relations.

Example 5.18 organizes motive 1b's tree in terms of these transformations and the transformation δε, which marks the rhythmic/metric shift between δ and ε: the duration of the first pitch is increased and the second decreased (giving the second the shorter duration), while the attack of the second pitch is pushed into a weak metrical position. Since ε is an evolutionary novelty, this transformation has no inverse. In terms of nested direct products of algebraic



Example 5.18. Motive 1b's tree with transformations.



Example 5.19. Motive 1a’s tree with transformations.

structures such as those discussed in Chapter 3, the combination of E (already the direct product of two single-interval expansion transformations) and C could be notated as E(x, y) × C(x, y), while δε would need to be understood in terms of a binary monoid δε/0, 0 being the identity element (and equivalent to T0). The entire nested structure would be E(x, y) × (C(x, y) × δε/0), which mirrors the nested structure of the tree's grouping: at the highest level there are two groups defined by δ and ε rhythms, at the next level there are eight groups defined by contour, and at the discrete level, each motive-form is defined by the expansion transformation. Example 5.19 presents a similar construction for motive 1a. E(x,y,z) indicates an expansion of the first interval by x semitones, the second by y semitones, and the third by z semitones. While no contour transformation is necessary, three rhythmic/metrical transformations are required. The transformation αT marks the shift from the α rhythm to the triplet rhythm.

Topology

In terms of an Alexandrov topology, the monophyletic group in motive 1a's tree (Example 5.7, p. 290) defined by the β and γ rhythms together (and distinguished from the α rhythm by metrical placement) is an open set, a lower set with the motive-form from ms. 12-13 as its root. In topology, a closed set is the complement of an open set, so the complement of the open set defined by the β and γ rhythms together — the motivic species defined by the α rhythm — is necessarily closed. Since the complement of a lower set in a partial-order or poset is always an upper set (a subset V such that if x is an element of the tree and another element $y \geq x$, then y is in V), the motivic species defined by the α rhythm is an upper set.[19] In phylogenetics, all

[19] The distinction here between open and closed sets lies in the fact that a closed (upper) set is necessarily bounded by the root, while an open (lower) set could potentially go on indefinitely.

paraphyletic groups — which are "what remains after one or more parts of a monophyletic group have been removed" — are upper sets, and all monophyletic groups are lower sets.[20] In motivic trees, open sets are thus always lower sets, and closed sets are always upper sets. The subtree made up of only the motive-forms having the β rhythm is neither an upper set nor a lower set and is thus neither closed nor open. One way of understanding this is to note that while the changing set for the rhythmic character would contain two arrows — the shifts from α to β and from β to γ — only the shift from α to β creates a meaningful motivic subspecies; it would be odd to divide the tree into an α/β subspecies and a γ subspecies containing only one form. But there is really no topological reason to divide the tree in any particular way: there are fifteen base open sets (corresponding to the subtrees having one of the fifteen elements as its root) and fifteen corresponding closed sets. Every time a new motive-form is introduced, it also introduces a new way to understand the organization of the complete set of motive-forms.

Yet if we take the view that each open set actually contains an infinite number of motive-forms, then there are an infinite number of open and closed sets and an infinite number of motivic species. This requires a conceptual sleight-of-hand, for extending the idea of open and closed sets in such a way moves us beyond the strict one-to-one association between the algebraic and topological views. But this is the entire point of such an association, for the topological view allows one to move freely between a discrete collection and a continuous one. Since Mannheim connects the latter view — which he characterizes as "intuitive-organic" historicism — to Bergson, we can perhaps turn to Bergson for clarification. In *Creative Evolution* (1907) he describes the degrees of complexity in the social instincts of bees in

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[20] Ian J. Kitching, et al., *Cladistics: The Theory and Practice of Parsimony Analysis,* 2nd ed. (Oxford: Oxford University Press, 1998), p. 11.

explicitly musical terms:

> We seem to be before a *musical theme*, which had first been transposed, the theme as a whole, into a certain number of tones and on which, still the whole theme, different variations had been played, some very simple, others very skillful. As to the original theme, it is everywhere and nowhere. It is in vain that we try to express it in terms of any idea: it must have been, originally, *felt* rather than *thought*.[21]

For Bergson, the process that creates qualitative differences in the social organizations of different species of bees cannot be understood as "steps up a ladder." As he describes earlier, the process is better understood as made up of different points on a *circle* (a continuous space), each directed towards some common, undefined center (113). Each variation on a musical theme would thus be a "hypostatization" (Bergson's term) of some point on what is really a continuous space. Such hypostatizations point towards the same ill-defined "feeling" of a musical idea but are mere concessions to the human intellect, which for him always and falsely "represents *becoming* as a series of *states*, each of which is homogenous with itself and consequently does not change" (108). Even in biological evolution, which was and is usually described as a series of distinct states — species, individual organisms, DNA molecules, and so on — Bergson supposes a "continuity of genetic energy" (18).

The most thoroughgoing application of Bergson's ideas to music is to be found in Victor Zuckerkandl's *Sound and Symbol* (1956), where he asks: "If movement is continuous transition from place to place, how can there be movement in music, where all we have are stationary tones strung together without any transition — a perfect example of discontinuity?"[22] While

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[21] Henri Bergson, *Creative Evolution* (1907), trans. Arthur Mitchell (New York: Henry Holt and Company, 1911), p. 114.

[22] Victor Zuckerkandl, *Sound and Symbol* (1956), trans. Willard R. Trask (Princeton: Princeton University Press, 1973), p. 89.

Zuckerkandl's point of reference is the musical scale (or a simple melody), it is easy to extend his question to relations between motives and to processes like the expansion of motive 1a in ms. 1-19. Are we to understand continuity within a motivic tree as the literal pulling and compacting of a single object, as if a series of motive-forms is really just a *single* form stretched into some kind of motivic glissando? Zuckerkandl's answer is of course no, and he approvingly quotes Bergson from *Matter and Memory* (1896): "real motion is rather the transfer of a state than of a thing."[23] His ultimate solution is shown in Example 5.20, which represents the fact that musical motion of any kind is a "process on two levels": (1) the first level inhabited by discrete objects, such as tones or motivic forms, that act as static "pillars," and (2) a higher level made up of "dynamic qualities" that by way of some intrinsic force, are pointed or directed towards a goal.[24] These two levels correspond roughly to the algebraic and topological views, respectively.

Such insights can be applied to motive 1b. To begin, since the motivic group defined by the ε rhythm forms an open (lower) set, the motivic species defined by the δ rhythm forms a closed (upper) set. Within each of the resultant subtrees, the ↑↑ and ↑↓ contours define open sets, and since the union of any two open sets is an open set, their union is an open set containing every occurrence beginning with an ascending interval; its complement is the closed set containing every occurrence beginning with a descending interval. Consequently, while the highest-level motivic species of motive 1a's tree were both nearly linear chains, the relationship here is far more interesting: not only do both motivic groups contain subgroups defined by the four possible three-note contours, the partial order of their appearance is also the same. Both

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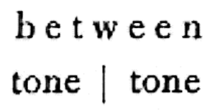
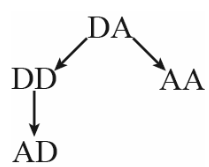
[23] *Ibid.*, p. 115.

[24] *Ibid.*, p. 137.



Example 5.20**.** Zuckerkandl's "process on two levels."

follow the order shown in Example 5.21, which is determined only in part by parsimony: ↑↓ could have descended just as easily from ↑↑ as from ↓↓. Escaping momentarily from the rules of tree construction, one could also note that since the ↑↑ and ↑↓ contours are also related through parsimony, the motivic groups defined by the ε and δ rhythms can both be understood as cycles or following Bergson, circles. This should come as no surprise, because the contour transformation forms a group: every contour transformation has an inverse.



Example 5.21. The partial order of contours for motive 1b.

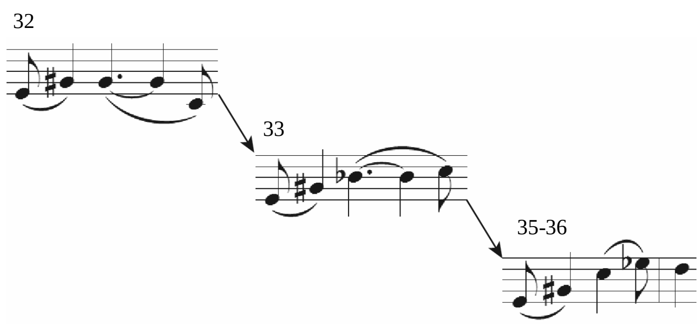
2. Secondary Theme

Motive 2a

Isolating the motives associated with the primary theme required suspending any discussion of possible relations with the movement's other motives; this is why I have only considered the primary theme area of the exposition, which of course occurs before any of the other themes have been presented. Starting with the transition to the secondary theme area, however, there is no way to continue bracketing off other motives in this way. From this point on, then, I will thus describe every motive not merely in terms of the relations between its various forms, but also in terms of its relations with other motives. This, once again, is Mannheim's method: "evolutionary lines" must be connected through "cross-sectional observations." For instance, the initial forms of what I call motive 2a (ms. 32-36), shown in Example 5.22, might suggest connections to motives 1a and 1b. The opening melodic statement of the motive in ms. 32 may be metrically and rhythmically very different from motive 1b, but it recalls the version of the latter in having a ↑↓ contour. Any motive made up of three non-repeated pitches, of course, will have one of those four contours. More striking is the version of motive 2a in ms. 35-36, which is a transformed repetition of the ascending form in ms. 33 that, by descending by half step into the next measure, recalls motive 1a's contour and metrical placement: both have ↑↓ contours overall, the ascending pitches acting as an anacrusis to the final pitch, which, more often then not, is approached by step.

In contrast to the primary theme group's first phrase, which presents a basic idea in ms. 2-3 followed by a contrasting idea in ms. 4-6, the first phrase of the secondary theme area presents a basic idea (ms. 32-33) followed by its repetition (ms. 34-36), every measure in fact, containing some version of motive 2a. As shown in Example 5.23 — in which all forms have again been transposed to begin on E (to facilitate comparisons between this motive and motives 1a and 1b) and are represented as being engendered from the initial occurrence — three separate versions of motive 2a appear in ms. 32-36, each beginning with an ascending major third in an eighth/quarter rhythm. Despite this initial potential for variation, the motive is not subjected to the same kind of incessant elaboration motives 1a and 1b are. Example 5.24 presents every form of motive 2a in the entire movement, revealing that despite the relative paucity of different motive forms it is still difficult to characterize rhythmically; even the characteristic

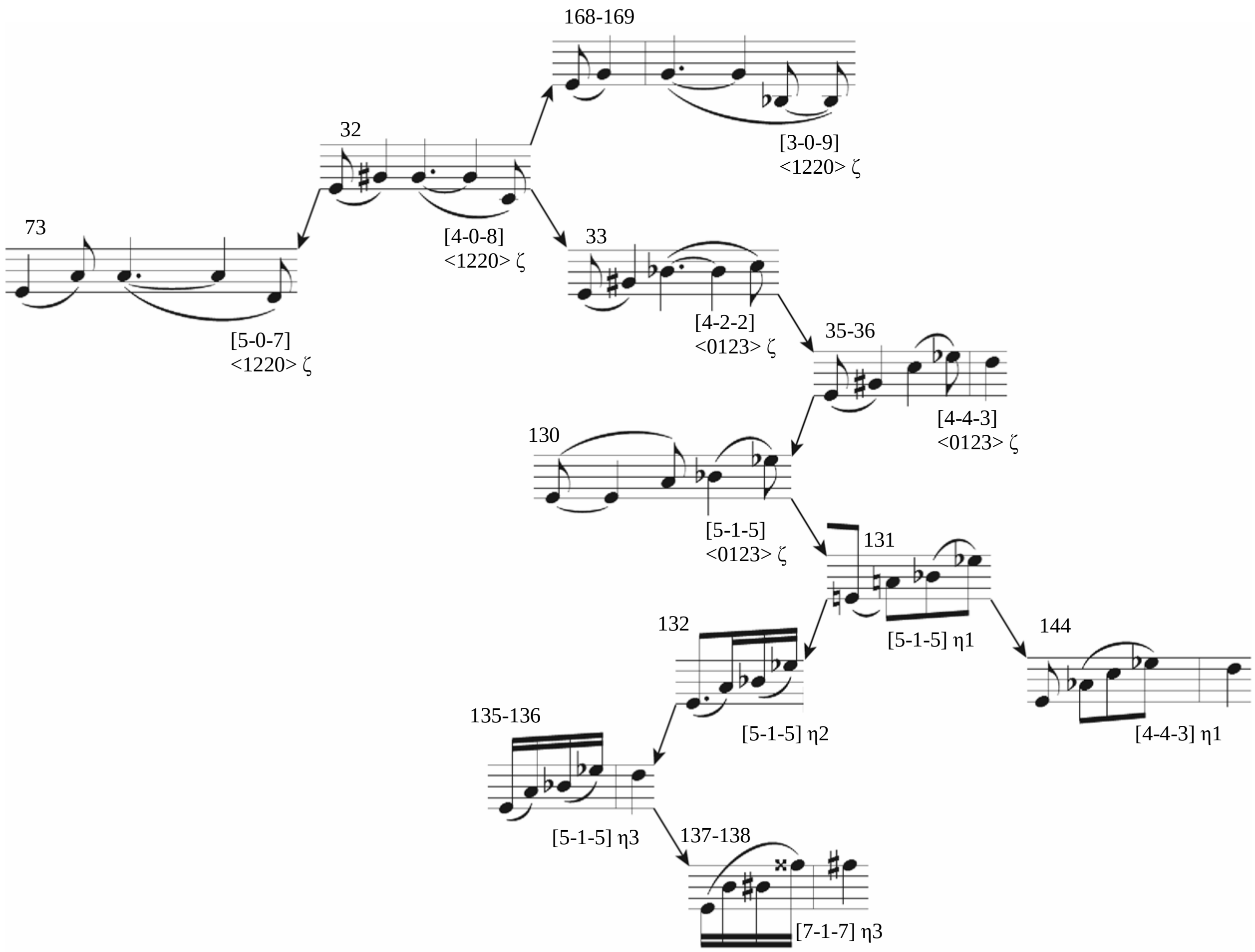
Example 5.22. The initial forms of motive 2a.



Example 5.23. The three forms of motive 2a in ms. 32-36.

eighth/quarter opening of the initial forms undergoes modification. Yet all of these forms, up until the form in ms. 131, do have something in common: the third note lands on a strong beat, typically the second beat of the measure. I have thus represented this metrical feature by the Greek letter ζ (zeta) and cases in which the third note lands after a beat by the letter η (eta).

This metrical character divides the motive's forms into two subgroups, but there is another character that similarly and conflictingly divides the motive: in terms of contour, all forms have either the original contour —labeled <1220> — or the ascending contour <0123>, which first appears in ms. 33. While this raises the question of which character has the greatest weight (metrical placement or contour), I believe that since it is the metrical shift that most prepares us to hear its relation to motive 1a, the metrical character should have the greatest weight. I have thus labeled only the motive-forms with the ζ character with a contour character, thus dividing this subgroup into two parts. The subgroup defined by η maintains the same

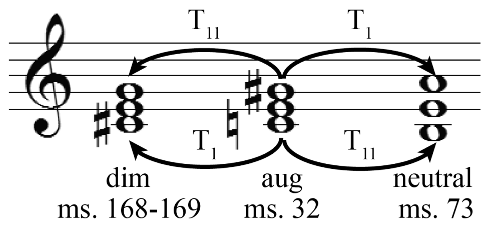


Example 5.24. A motivic tree for motive 2a.

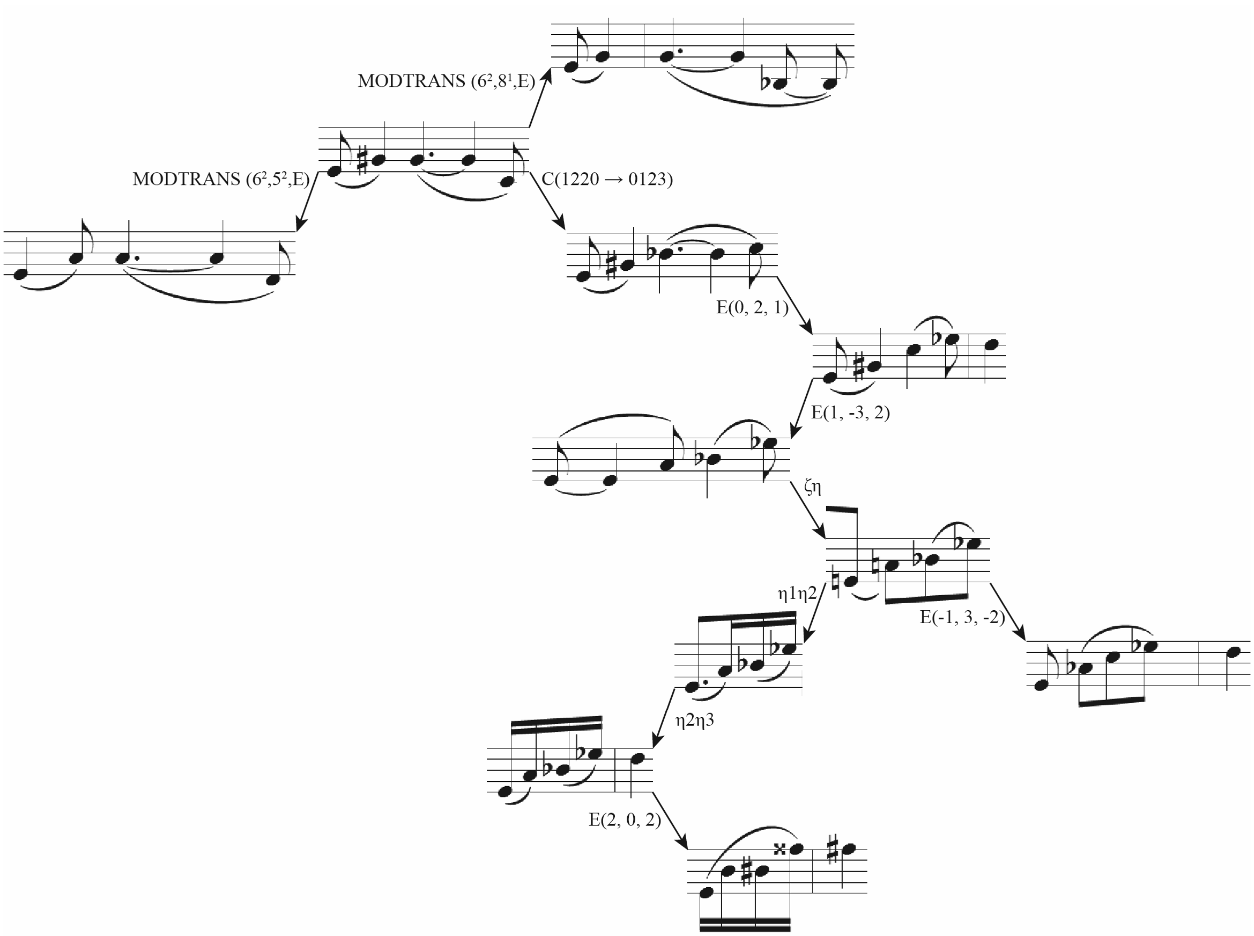
contour, but undergoes a rhythmic contraction (another of the rhythmic transformations from *The Hungarian Folk* Song), the different forms represented by the integers 1, 2, or 3. Overall, this process involves the contraction of eighth notes into sixteenths. I have also labeled the three constituent intervals — without considering the final descending semitone where it occurs — but intervallic content here has a lesser weight than metrical placement or contour; contrary to the primary role that intervallic expansion had in motives 1a and 1b, the influence of intervallic expansion or contraction in motive 2a is minimal. In the case of the <1220> forms there is no apparent pattern, while the <0123> forms merely expand the opening interval from three semitones to five, increasing the motive's similarity with the initial form of motive 1a in a different way.

In terms of algebraic transformations, Santa's MODTRANS transformations again seem worth considering, at least for the <1220> forms. The initial form in ms. 32 (an arpeggiated augmented triad) appears in the context of a rather straightforward augmented-tendency influenced key species, the form in ms. 73 (an arpeggiated segment of the circle of fifths) appears in the context of a largely diatonic passage, and the form in ms. 168-169 (an arpeggiated diminished triad) belongs to the diminished-tendency portion of a COMB harmony arriving at the climactic moment of the coda. They seem to be transformed, that is, in order to conform to their harmonic context, as motives often are in conventionally major/minor tonal music. Example 5.25 construes these transformations as the contraction/expansion of an augmented triad that, if one desired, could be transferred into a scalar context and understood as MODTRANS transformations, transformations from a hexatonic modular system to both octatonic and diatonic ones. But the <0123> forms are less suited to such a characterization: as segments of cycles — (4,4,3), (7,1), and so on — that often quickly surpass scalar *Tonvorräte*, the relations between them are again better understood as simple expansion/contractions. E thus regenerates the motivic tree for motive 2a in terms of MODTRANS operations (when suitable), as well as transformations equivalent to those used in motive 1a and 1b's trees: expansion transformations, rhythmic ones, contour transformations, such as "C(1220 → 0123)," which marks the transformation from the <1220> contour to the <0123> contour.

In topological terms, the subtree defined by the η metrical placement is a lower (open) set, while the subtree defined by the ζ metrical placement is an upper (closed) set that is itself, when understood in isolation, divided into open and closed sets defined by contour. These two

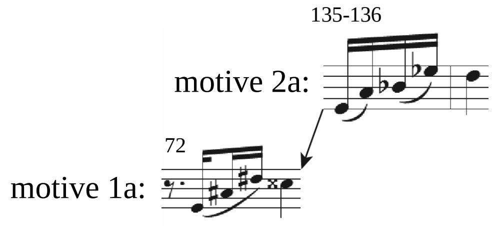


Example 5.25. The contraction/expansion of an augmented triad.



Example 5.26. Motive 2a's tree with transformations.

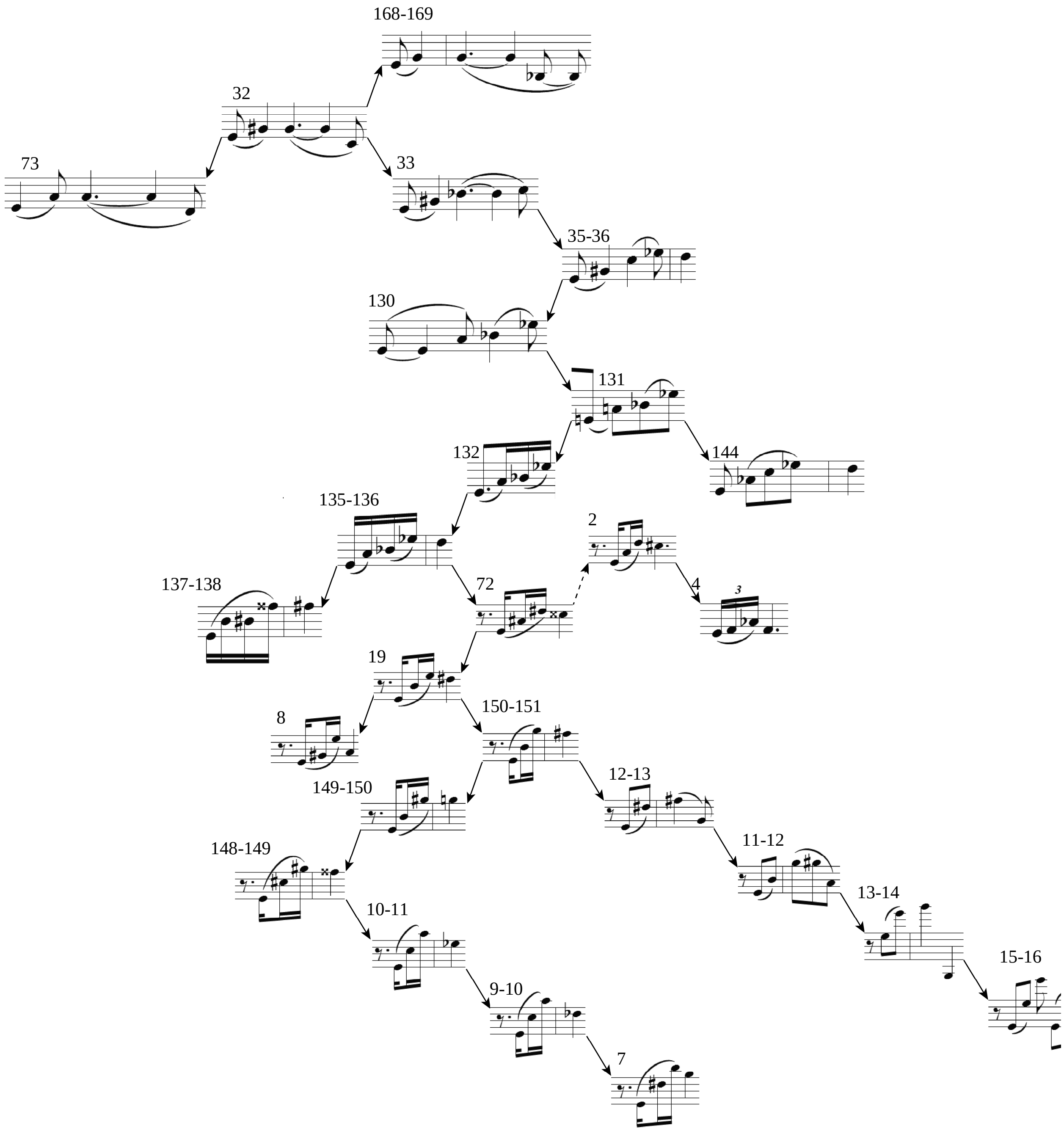
main divisions of the motive into monophyletic and paraphyletic groups are the very changes needed to bring the motive closer to motive 1a.As shown in Example 5.27, the form of motive 2a in ms. 135-136 can be transformed into the form of motive 1a in ms. 72 by moving E into the position of A. This requires that (1) B♭/A♯ occupy a strong metrical position, and (2) the motive



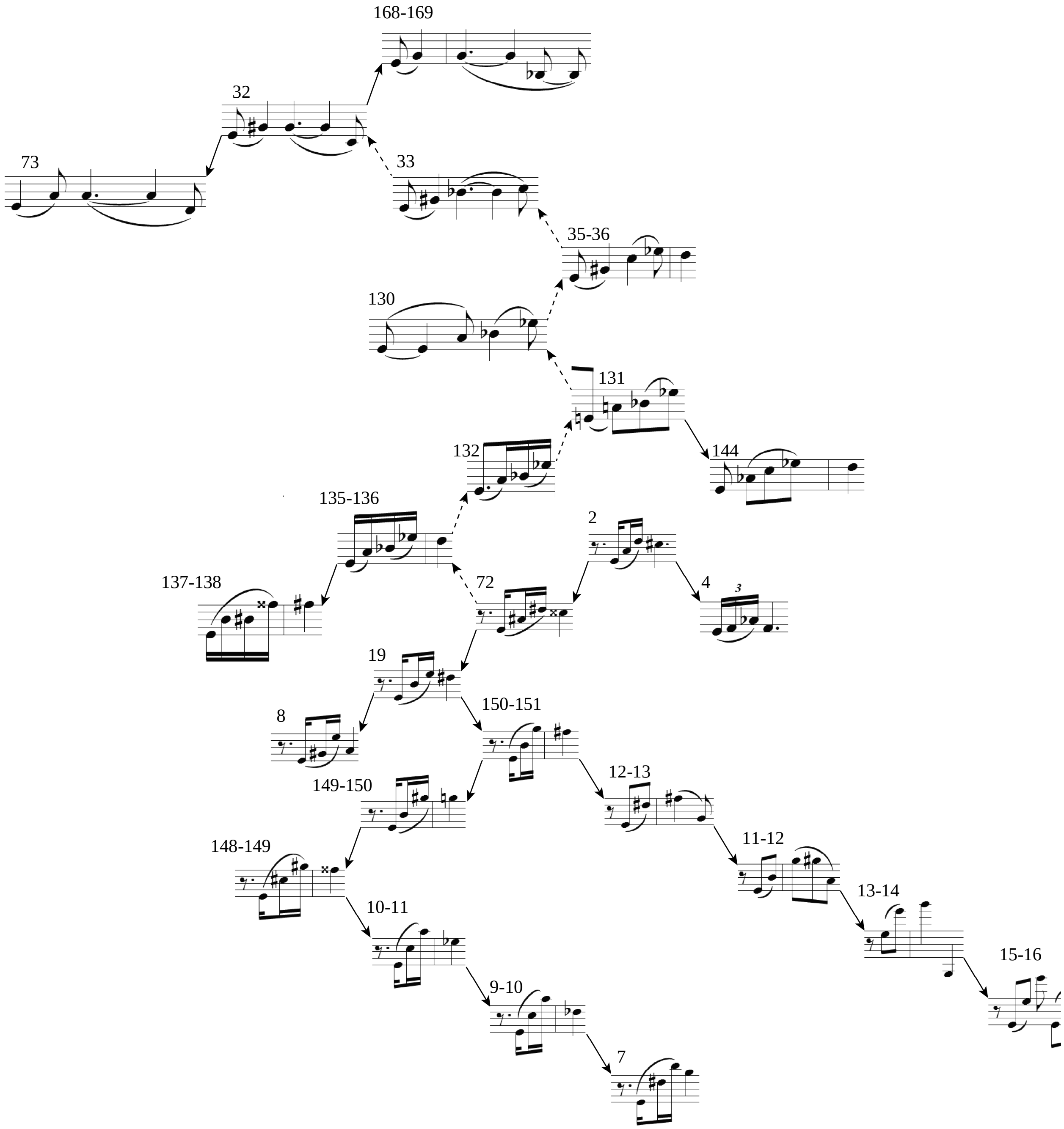
Example 5.27. The transformation of motive 2a into motive 1a.

have an ascending contour. The implication of this connection is shown in Example 5.28, which adjoins the motivic trees for motives 1a and 2a, suggesting that motive 1a is descended from motive 2a. In order for this tree to be rooted, the direction of the arrow between the forms in ms. 72 and ms. 2 (shown as a dashed arrow) has to be switched, making the form from ms. 72 the root of motive 1a's tree. Given that the initial form is far from typical — the motive-forms in ms. 72 and 19 are far more common — this is hardly a concession. Another option would be to understand motive 2a as descended from motive 1a, as shown in Example 5.29. In this case, far more (dashed) arrows have to be reversed in order for the entire tree to remain rooted.

Setting aside the choice between Example 5.28 and Example 5.29 for a moment, what's required at this point is a renewed consideration of what exactly such a "cross-section" entails, for the arrow in Example 5.27 presents not just a single transformation between motivic forms belonging to different trees, but the transformation of an entire motivic tree into another, each considered as a gestalt or whole. In order to get a grasp on such an idea, it would perhaps be useful to return to the motivic tree of all forms of motive 1b (Example 5.12, p. 295). Recall that the character with the greatest weight is the rhythmic character with two states, δ and ε. If one considers the two subtrees defined by this character to be independent motivic trees, there are several ways to conceive of a morphism between them, the simplest being a function between sets. Yet since these are not merely sets, but sets with a partial order, it would make more sense

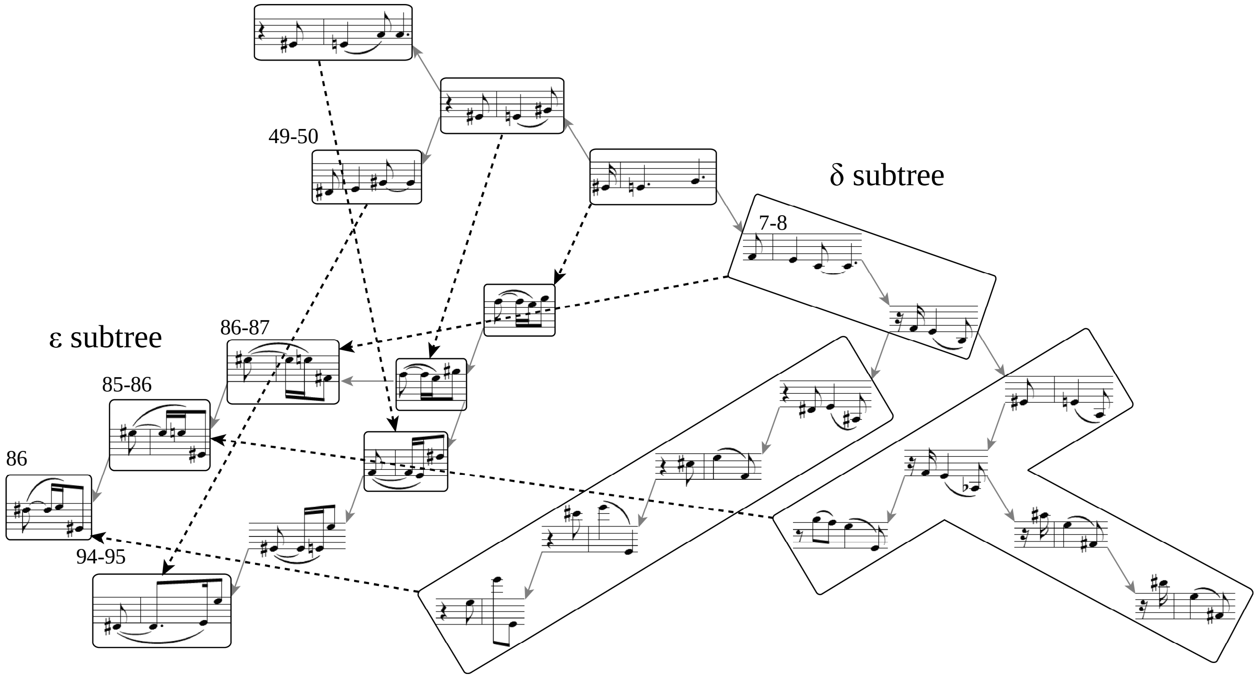


Example 5.28. Adjoining the motivic trees for motives 1a and 2a.



Example 5.29. Another option for adjoining motives 1a and 2a.

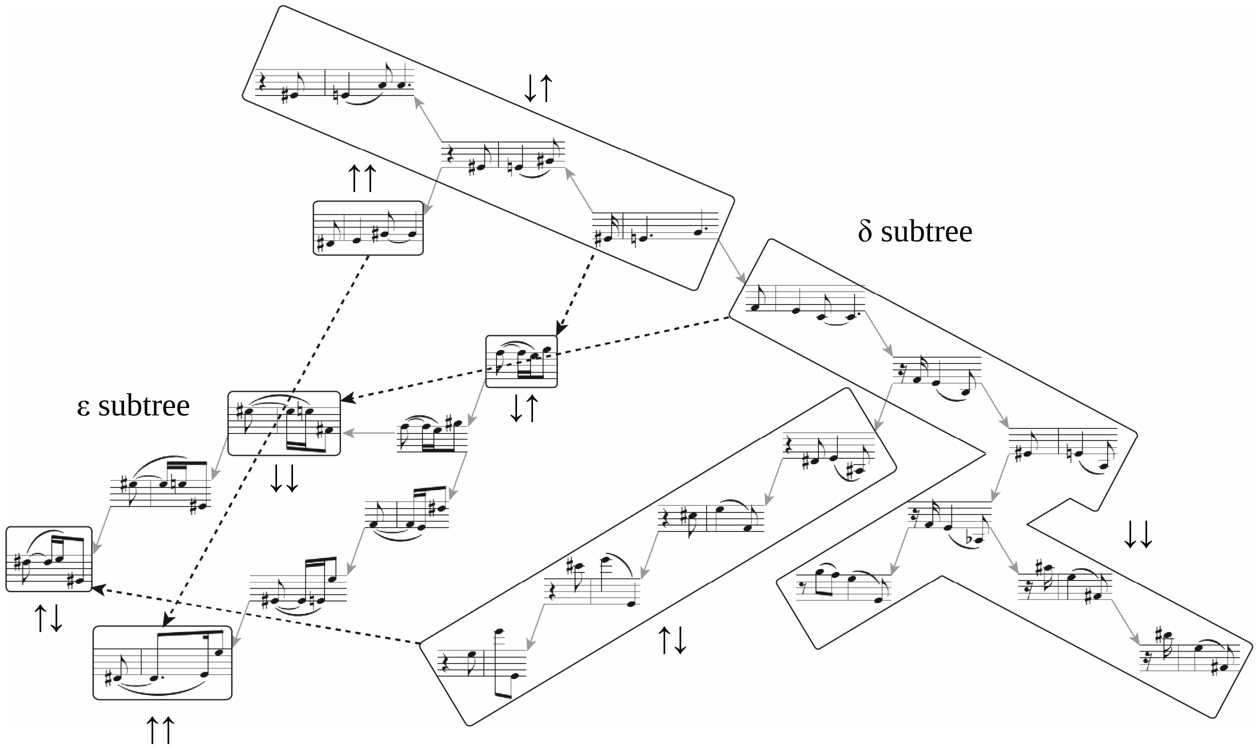
to understand the connection between them as a monotone function (as in Chapter 3), a function F between posets X → Y such that if a and b ∈ X and a ≤ b, then F(a) ≤ F(b). Example 5.30 presents one possible monotone function I have simplified by grouping together those forms within the δ subtree that have the same output in the ε subtree. Although this is only one of many



Example 5.30. One possible monotone function connecting the δ and ε subtrees.

possible monotone functions, it is one in which the motive-forms in each associated pair a/F(a) share the same contour.

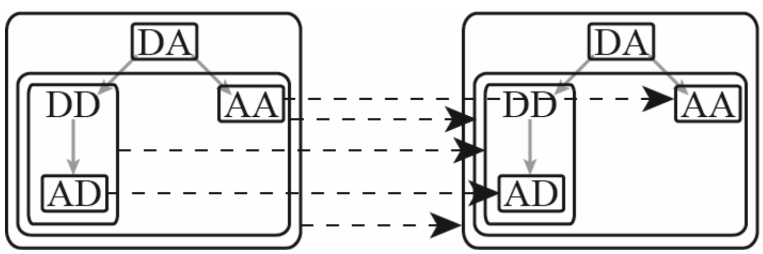
In terms of algebra, it would be possible to also understand this morphism as a semigroup homomorphism between the semigroups defined by the join operation, but as shown in Example 5.31 this would require dividing the δ subtree into four contour-based parts, the output of each being the "earliest" form in the ε subtree having the same contour, effectively reducing each to the partial order of contours. It would be much simpler to consider an isomorphism between the two monoids to which the transformations in each subtree belong, for they are the same monoid. But in the case of separate motivic trees (such as the trees for motives 1a and 2a) rather than the two halves of one tree, one cannot expect there to be such trivial and simple morphisms between the algebraic structures to which their transformations belong. In fact, the act of considering motivic trees as wholes or gestalts — moving from considering them as discrete sets to



Example 5.31. A semigroup homomorphism between the δ and ε join-operation semigroups.

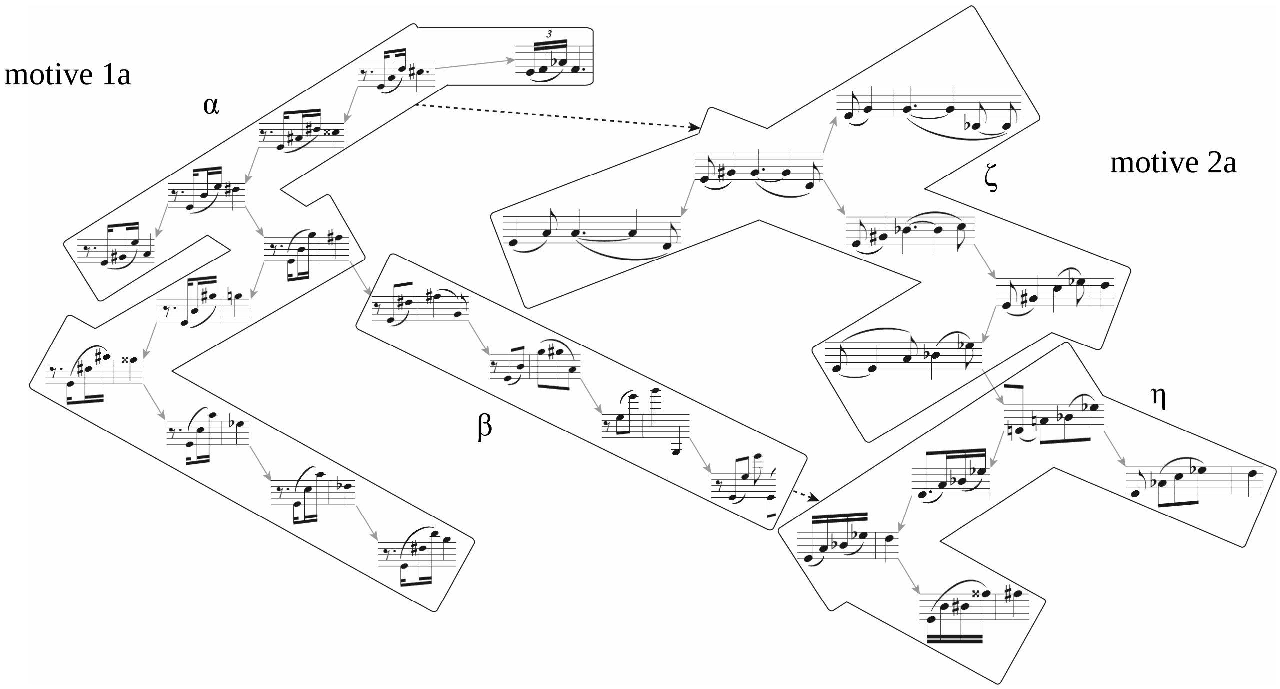
considering them as continuous spaces — removes the possibility of *any* such morphism. The only way to make "cross-sectional observations" is through considering the elements themselves and not the transformations between them. When considering actual connections between separate motives, I will thus only consider them in terms of continuous maps between topologies and their associated monotone functions.

Because of the one-to-one equivalence between the category of partial orders and the category of Alexandrov spaces, every monotone function has an associated continuous map between Alexandrov topologies. A continuous map F between topological spaces X → Y is a function such that for any open set a of Y, $F^{-1}(a)$ is an open set of X. Consider Example 5.31: the forms in the ε subtree having a descending second interval (the forms from ms. 85-86, ms. 86, and ms. 86-87) make up an open set — the lower set or monophyletic group having the form in ms. 86-87 as its root — and its preimage (F^{-1}) in the δ subtree is also an open set (the lower set or monophyletic group having the form from ms. 7-8 as its root). The single form in the ε subtree having an ↑↑ contour (the form from ms. 94-95) is an open set, and its preimage is also open (the form in the δ subtree from ms. 49-50). Since this holds for any open set in the ε subtree, one can use the topological characteristics of the subtrees defined by the tree's weighted characters to determine monotone functions. In this case, it is preferable for the open sets of the ε subtree defined by ↑↓, ↑↑, ↑↓ and ↓↓ together, and ↑↓, ↓↓, and ↑↑ together have preimages in open sets that are defined in the same way. Example 5.32 presents this idea in terms of the partial order represented by Example 5.21 (p. 307). Note that closed sets — such as those defined by ↓↑ or ↓↑ and ↑↑ together — would necessarily also have preimages in the closed sets defined in the same way.



Example 5.32. A model for a continuous map between the δ and ε Alexandrov topologies.

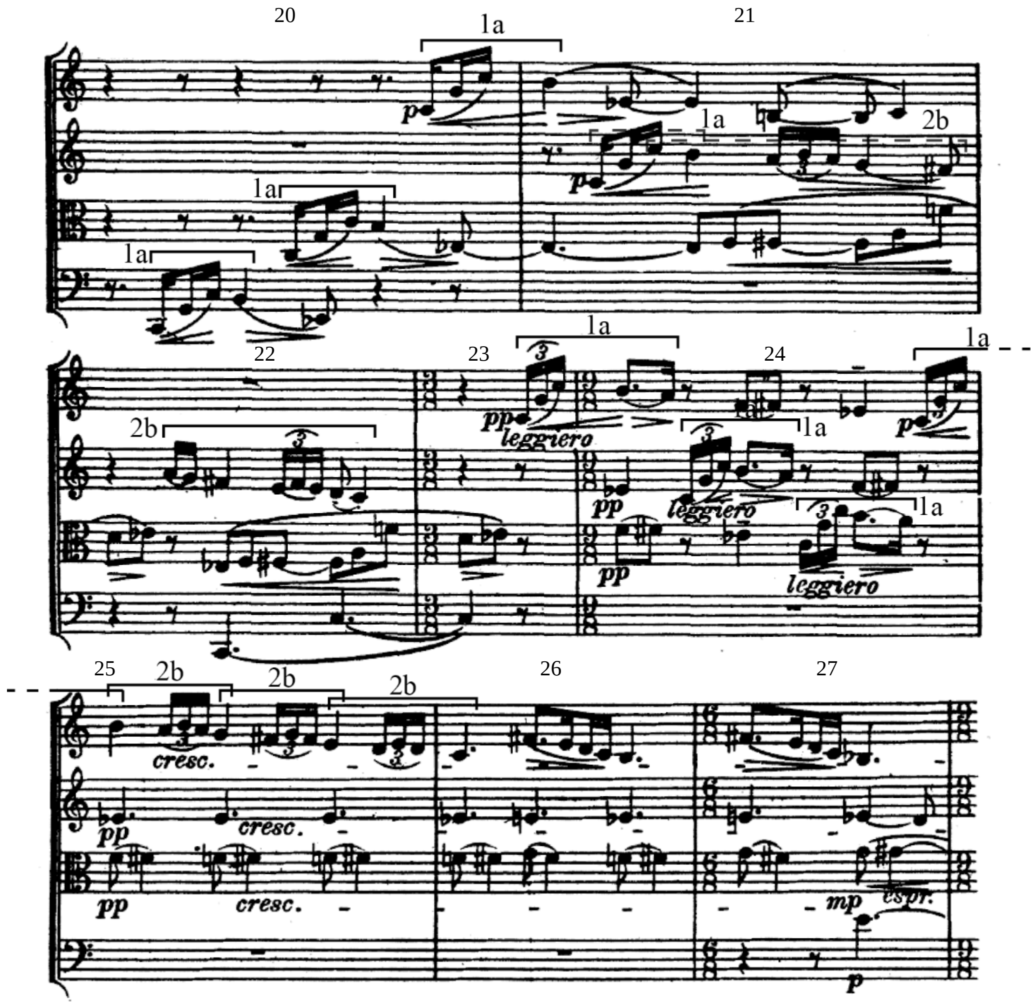
So, returning to motives 1a and 2a, considering a continuous map between the topologies of their motivic trees, one would first note that in this case, since both highest-level characters are rhythmic/metric characters, any such map should connect the open and closed sets they define. Example 5.33 presents two such maps: one from motive 1a's tree to motive 2a's tree and one from motive 2a's tree to motive 1a's tree. In terms of non-trivial subsets, each tree has one open set defined by a rhythmic/metric novelty (β or η) and one closed set defined by the initial



Example 5.33. Two continuous maps between the Alexandrov topologies for the δ and ε subtrees.

rhythmic/metric character (α or ζ, not including offshoots from the central line). Example 5.33 connects these open and closed sets, and, importantly, provides a way to prefer certain monotone functions between the trees’ partial orders over others. Any function that is monotone — that preserves order — and is equivalent to this map would be acceptable: while each element of one tree must associate with a single element of the other’s, the former must also belong to the open/closed set mapped in Example 5.32 to the open/closed set to which the latter belongs.

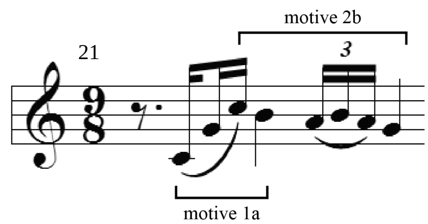
Example 5.33 also suggests a way to understand some relation of derivation between motives 1a and 2a without having to reverse the arrows in either tree; there are good reasons to prefer maintaining the original arrow directions when possible. Example 5.34 shows the opening of the transition in ms. 20-27 of the exposition. Note how forms of motive 1a are presented in a stretto-like manner — much like the closing theme in the coda — and that after the final entrance in the second violin a new idea is presented that will become the second motive of the secondary



Example 5.34. The opening of the transition in the exposition, ms. 20-27.

theme (motive 2b, which will be discussed below). Example 5.35 isolates the second violin in ms. 21, which presents this motive in a proto-form preceded by motive 1a. I say “proto-form” because, at this point, the motive does not have an existence independent from motive 1a. Since they overlap by two pitches, that is, the motive-forms cannot be said to constitute two groupings according to Lerdahl and Jackendoff’s well-formedness rules.[25] This problem could be solved by

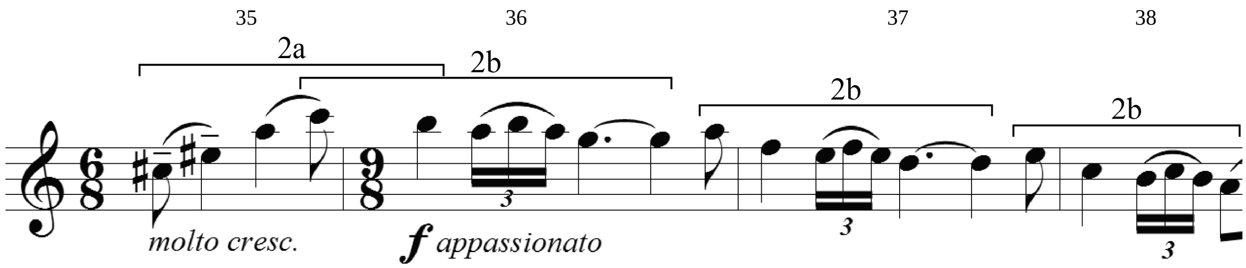
[25] Lerdahl and Jackendoff, *A Generative Theory of Tonal Music* (Cambridge: MIT Press, 1983), pp. 37-39.



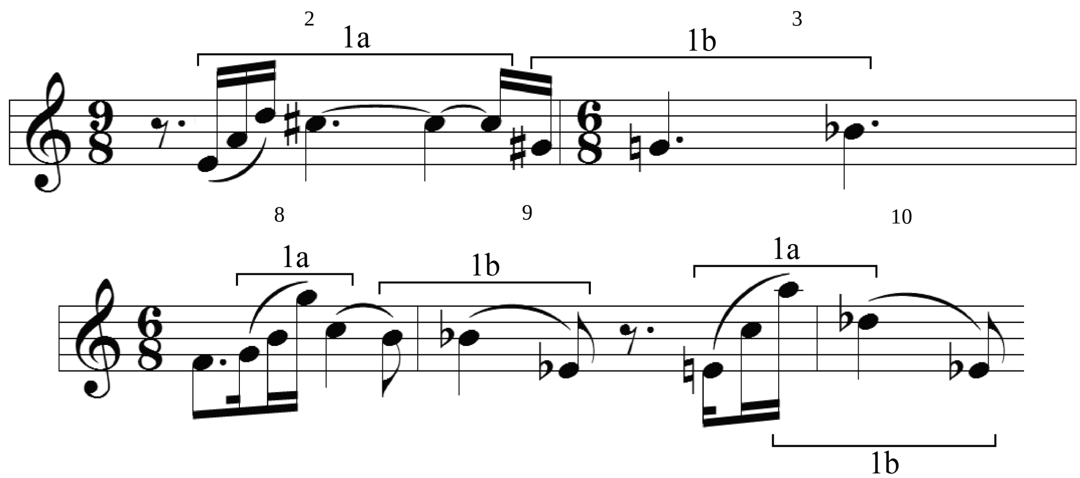
Example 5.35. the initial proto-form of motive 2b in the second violin, ms. 21.

eliminating C from motive 2b, so that the two groupings overlap by only one pitch, and this solution seems reasonable enough: the first violin presents a string of such motive-forms (lacking an anacrusis) in ms. 25-26.

When motive 2b gains independence in the secondary theme group, however, the anacrustic pitch is an integral part, as it is in ms. 22 in the second violin (see Example 5.34, p. 320). Example 5.36 presents the first appearance of this motive as an actual part of a thematic statement in ms. 35-38. Here it is preceded not by motive 1a, however, but by the ascending form of motive 2a, again creating a perceptual problem through what we can understand not as overlap but as *compression*. Such a conceptualization requires understanding motives not as always-perceptible groupings on the surface of the score, but as abstract concepts. This not only follows from Chapter 3, but resonates with the kinds of rhythmic transformations Bartók traces in *The Hungarian Folk Song*. It is also strongly suggested in the music. As shown in Example 5.37, such compression is already modeled in the primary theme group of the exposition. In the opening statement of the primary theme in ms. 2-3, motives 1a and 1b are clearly separate. In ms. 8-9 the primary theme is restated but compressed by shortening the duration of motive 1a's



Example 5.36. Motive 2b as it appears in the secondary theme, ms. 35-38.



Example 5.37. The compression of motives 1a and 1b.

final pitch. This process continues in the immediately following statement, which can be understood either (1) as a result of eliminating the final pitch of motive 1a and the first pitch of motive 1b, or (2) the further *compression* of the two motive-forms. I prefer the latter interpretation.

The fact that motive 2b is preceded by both motive 1a and motive 2a suggests a close relation between motive 1a and motive 2a. Example 5.38 shows ms. 130-136 from the recapitulation’s transition, where motive 2a in fact undergoes a rhythmic/metric transformation into motive 1a, culminating in the anacrusis to the cello’s statement of motive 2b in ms. 136, which could be understood as a form of either motive 1a or 2a. More specifically, the first violin

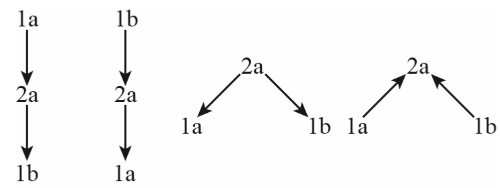
Example 5.38. The transformation of motive 2a into motive 1a, ms. 130-136.

presents an ascending form of motive 2a in ms. 130, which gradually — by changing its rhythmic values and metrical placement — becomes motive 1a. This suggests understanding motive 1a as derived from motive 2a. Considering motive 2a's relation to motive 1b — a relation first suggested at the beginning of the development (and later in the coda) — reinforces such a relation of derivation between motives 1a and 2a. Example 5.39 gives the beginning of the development (ms. 70-75): the primary theme appears four times, the ascending perfect fourth of

Example 5.39. The opening of the development, ms. 70-75.

motive 1b in the last two statements being explicitly connected with the intervallically expanded version of motive 2a. In this way, while motive 1a — regardless of derivation — is connected to motive 2a via the latter's most extreme form, motive 1b is connected to it via a form very closely related to its initial form. These connections thus strongly suggest understanding motive 2a as some kind of intermediary between motives 1a and 1b, which in turn further reduces the possible derivational relations between the three motives to four, shown in Example 5.40. The first three have roots — motives1a, 1b, 2a respectively — while the fourth is an unrooted tree, implying that motive 2a is descended from both motive 1a and motive 1b.

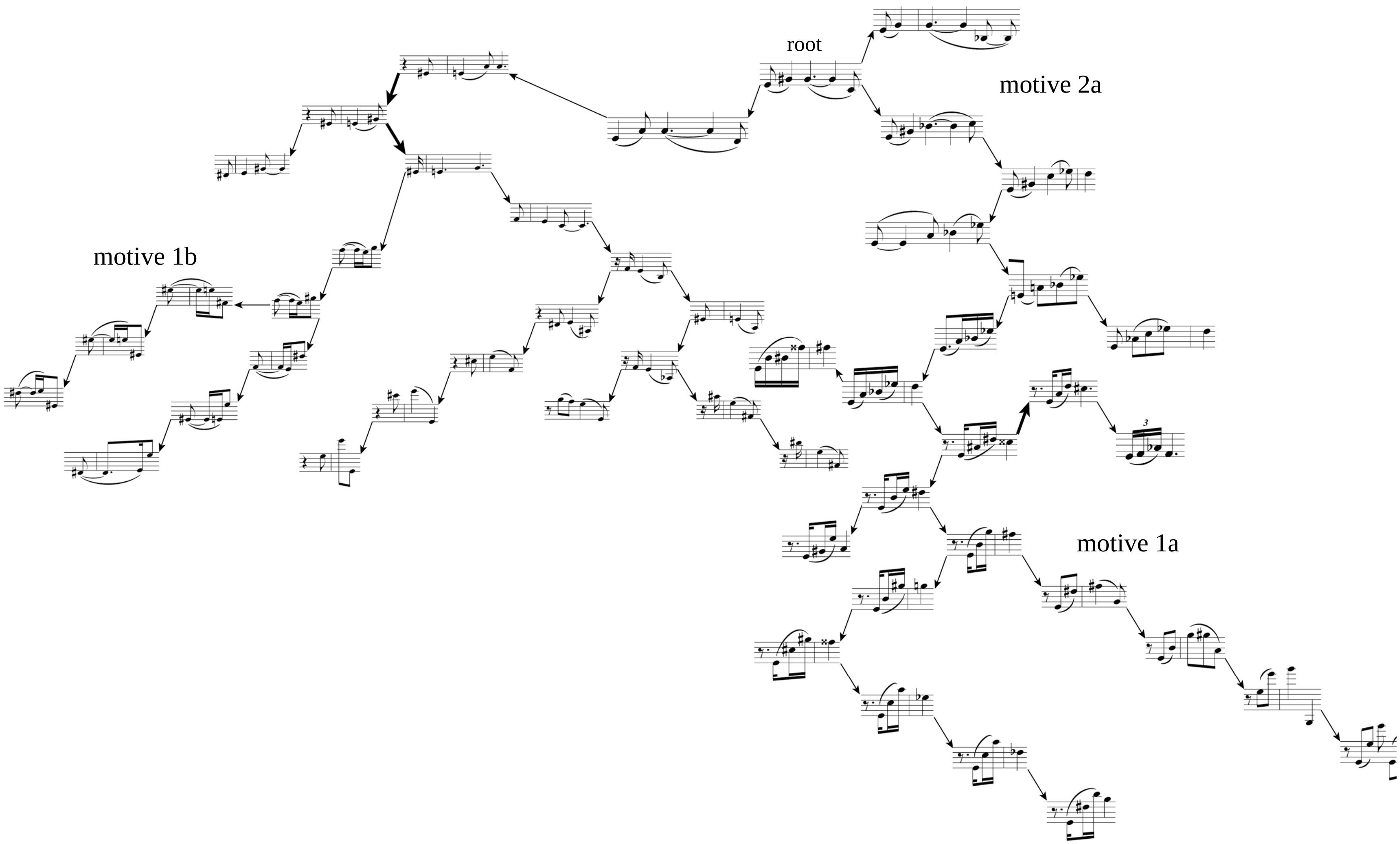
The last of these possibilities can be rejected outright, for it would be preferable for this tree of rooted trees to itself be rooted. And the same method for determining that motive 2a is an intermediary — taking into consideration where (whether at the beginning or at the end) motivic trees are connected — can be used to decide among the remaining three. Motive 1a is connected



Example 5.40. The possible derivational relations between motives 1a, 2a, and 1b.

to motive 2a very near the beginning of the former, which again implies that motive 1a is descended from motive 2a. Recall that understanding motive 1a as descended from motive 2a also produces far fewer arrow changes than the opposite view. Since motive 1b is connected to motive 2a at its beginning, it can likewise be understood as descended from motive 2a. Example 5.41 thus presents the third option from Example 5.40 in a combined motivic tree having the initial form of motive 2a is its root. This interpretation has two desirable results: (1) it causes the fewest changes to the directions of arrows — in addition to the one change in motive 1a's tree already described, motive 1b's tree has two changes — and (2) it makes the relation between motives 1a and 1b incompatible (neither is descended from the other). Since they are not in any relation of descent, we can retain the intuition that motives 1a and 1b can only be understood as related through some intermediate motive, in this case a "common ancestor" — motive 2a.

It would make sense to also consider a continuous map between the topologies for the trees of motive 2a and motive 1b. Just as with the map between motive 1a and motive 2a — which we can now finally understand as directed from motive 2a to motive 1a — this map should connect the open/closed sets defined by the character with the greatest weight. And once again it is a rhythmic/metric character; motive 1b's tree is divided into subtrees created by the δ/ε character. Example 5.42 presents this map in conjunction with the map between motives 2a and 1a. One can imagine the trees as continuous spaces that can be pulled or compressed, changing the motivic forms, but maintaining the same overall "shape." It is interesting to note that in such

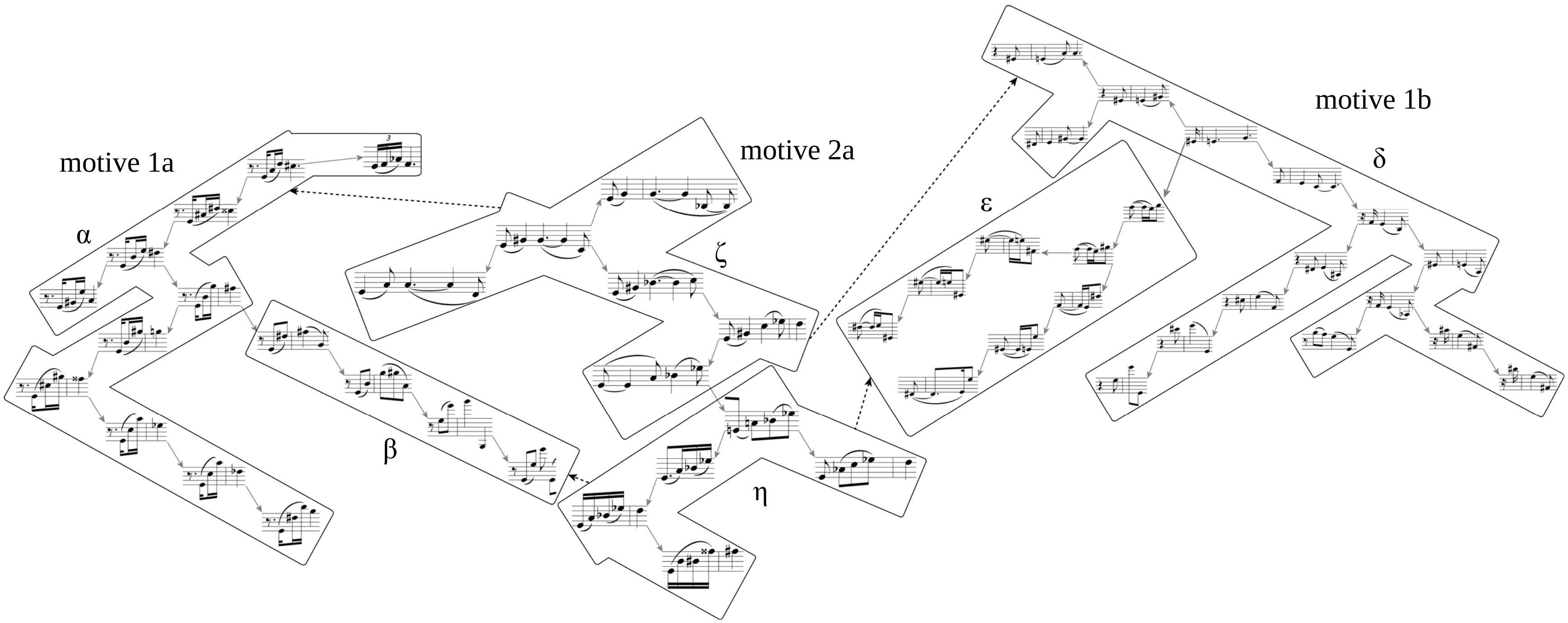


Example 5.41. A combined motivic tree having the initial form of motive 2a as its root.

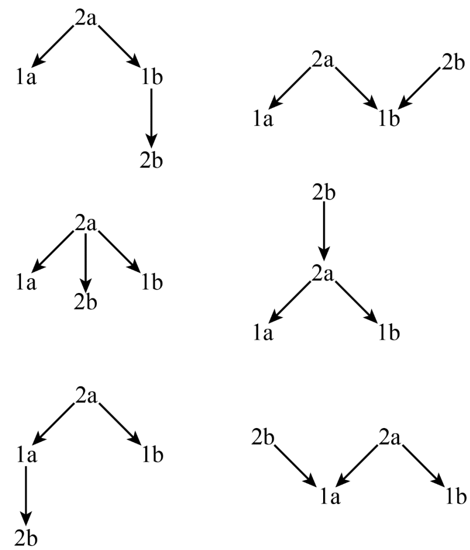
a construction, the initial, most characteristic forms of motives are found towards the center, while the stretched, extreme forms that have been deprived of many of their peculiar features are found at the outer edges. Octave leaps, in particular, are common at the edges.

Motive 2b

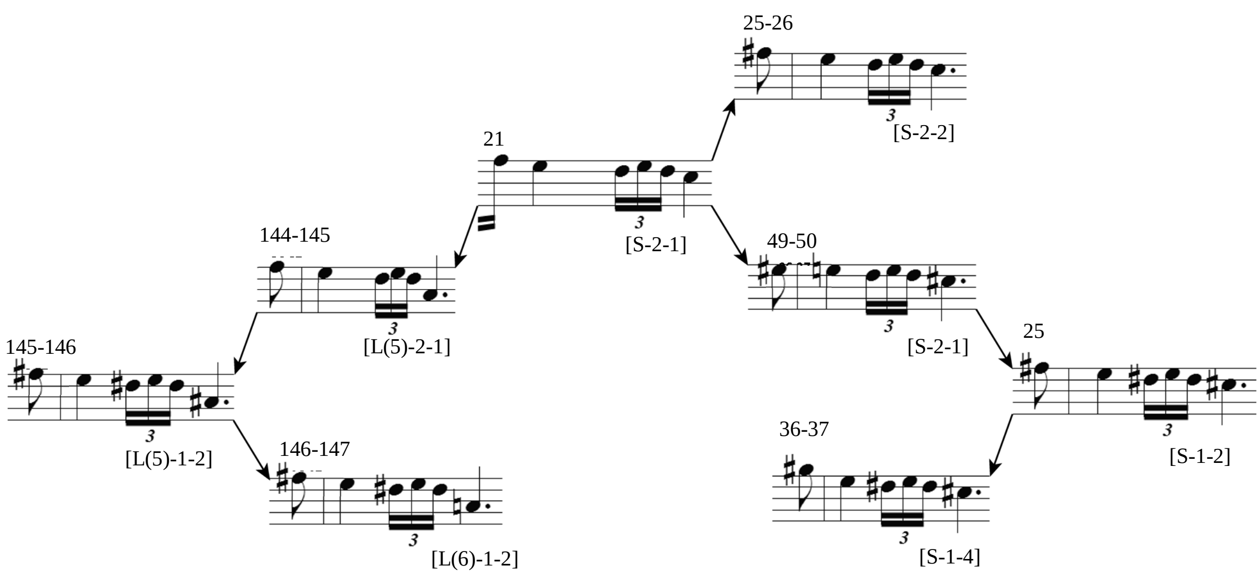
Placing motive 2a in relation to motives 1a and 1b required uncovering three (2 + 1) separate relations: motives 1a and 1b are both in a relation of descent to motive 2a, and the former are related to one another only through their common descent from motive 2a. The addition of another motive, motive 2b (already introduced above), increases the total number of possible relations to six (3 + 2 + 1), for it can be related to any of the previously-considered three. Given that each of those three possible relations has two possible directions, there are six total possible trees of motivic trees, shown in Example 5.43. Considering it first in isolation, one can define motive 2b rhythmically as a single anacrusis pitch (usually an eighth or sixteenth) that resolves to a quarter followed by triplet sixteenths, which are in turn followed by a longer pitch — a quarter note at the least. Example 5.44 presents all of the forms that maintain this basic rhythmic pattern, revealing that there are few variations just as there were few variations of motive 2a. The tree divides into two subtrees based on each form's final interval: in the exposition this interval is always a stepwise interval, while in the recapitulation it is transformed into a leap of a perfect or augmented fourth. I have thus labeled each motive-form on Example 5.44 in terms of three intervallic characters with descending weight: (1) the descending interval between the third and fourth pitches, characterized either as stepwise (S) or leaping (L), the latter also labeled in terms of interval size; (2) the descending interval between the second and third).



Example 5.42. Continuous maps between motives 2a and 1a and motives 2a and 1b.



Example 5.43. The six total possible trees of motivic trees.

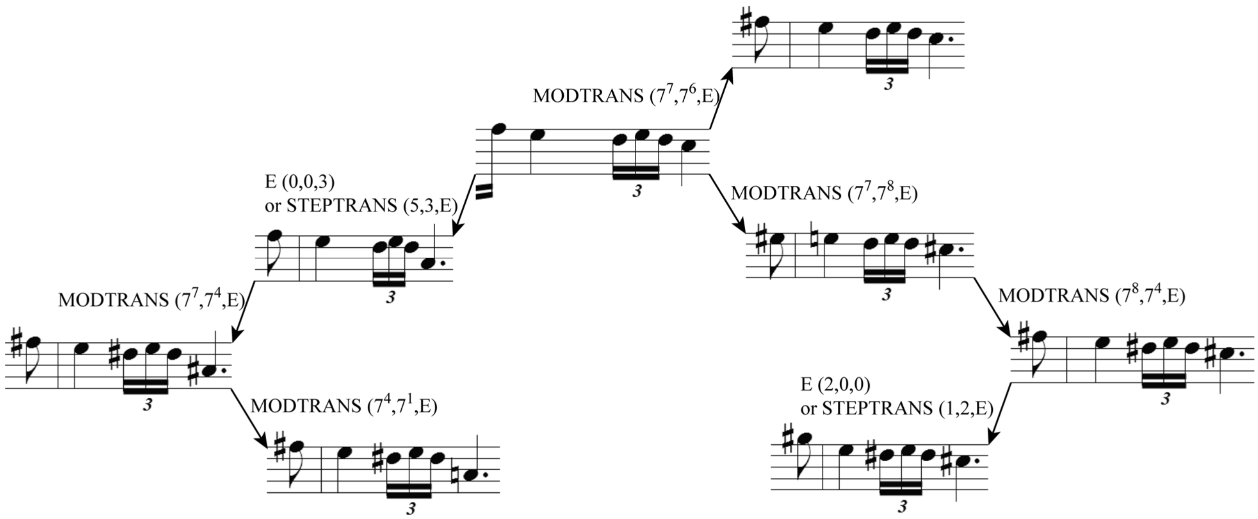


Example 5.44. A motivic tree for motive 2b.

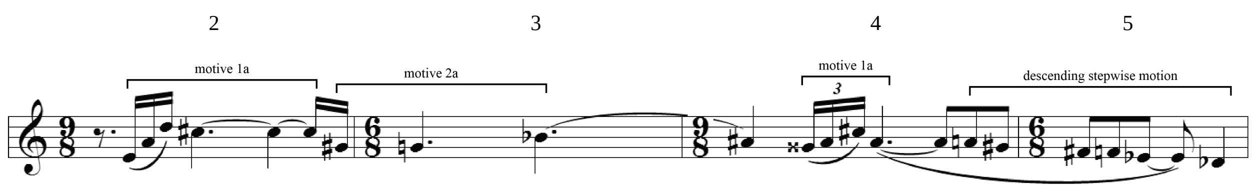
pitches; and (3) the descending interval between the first and second pitches. The initial form from ms. 21, for instance, has a stepwise interval between D and C (S), a whole step between E and D (2), and a semitone between F and E (1)

Just as with motive 2a, there is no overarching pattern. The form of the motive ending with stepwise motion simply runs through several species of tetrachords derived from major and minor scales: F–E–D–C, F♯–E–D–C, F–E–D–C♯, and F♯–E–D♯–C♯, with E again understood as the stable, reference pitch. Example 5.45 presents the tree in terms of MODTRANS transformations and what can either be understood simply as expansions — such as E(2,0,0), which expands the first interval by two semitones — or what I call STEPTRANS, transformations from one step class to another. The transition from the motive-forms that end with a stepwise descent to those that end with a leap, for example, can be understood as a transformation of step class 5 (C) into step class 3 (A) (with E being step class 0) or as an expansion of the last interval by three semitones. All of the MODTRANS transformations are from one diatonic modular system to another and correspond to some system in Santa's table of systems except for 7^8, which is my label for a particular rotation of ascending melodic minor: (0 1 3 5 7 9 10).

Rather than discussing the tree in terms of its algebraic and topological properties, it would be more useful to jump ahead to a consideration of this motive in relation to the movement's other motives. We have already seen that this motive can follow either motive 2a or 1a, which might suggest some relation to motive 1b, which of course *always* follows motive 1a in full statements of the primary theme. The movement does not overtly suggest any such relation, which would be difficult given that in its initial form motive 1b contains three pitches, a contour that includes both a change in direction and leaps, while motive 2b is initially a



Example 5.45. Motive 2b's tree with transformations.



Example 5.46. Ms. 2-5.

descending stepwise tetrachord. Yet there is already some precedent for following motive 1a not with motive 1b, but with descending stepwise motion: as shown in Example 5.46, motive 1a in ms. 4 (the "dead-branch" triplet form) is followed not by motive 1b but by descending stepwise motion. Given that the role of this passage is to contrast with the basic idea of ms. 2-3, the rhetorical function of this stepwise motion is likewise to contrast with motive 1b. And it does this not only by having different motivic characteristics, but also by acting as a forward-driving force opposed to the rather static quality of motive 1b's initial form (having a descent balanced by an ascent).

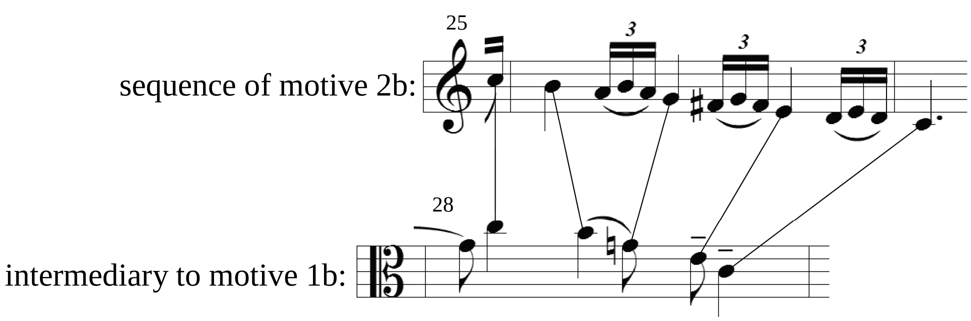
This tendency of motive 2b is exploited in the secondary theme area of the exposition, where sequences of the motive serve as an important motivating force for its extended continuation.

It would thus be enlightening to examine these sequences themselves, which extend the tetrachords of individual statements of the motive into complete scales. To begin, there is clearly more to the relation between the descending stepwise passage from ms. 4-5 and the initial sequence from the exposition's transition than the fact that they are both stepwise and descending: while the passage from ms. 4-5 suggests an octatonic interpretation (A–G♯–F♯–F♮–E♭), both can be understood as elaborations on a descending minor pentachord, the sequence from the transition even extending into a complete diatonic scale: F–E–D–C–B–A–G–F. Example 5.47 presents each of the different scalar passages created by such sequences in the order of their appearance (and again transposed to begin on E), revealing that the tetrachords shown in Example 5.44 (p. 329) are segments of larger scalar patterns. The three central scalar passages represent a different diatonic octave species and are bookended by the first (a segment of an octatonic scale) and the last (a wholetone scale). Just like the different forms of motive 2a, these transformations act to bring the sequences into — or perhaps define, in this case — their harmonic contexts. The MODTRANS transformations work well in this context.

But what about the form of the motive from the recapitulation, the form that ends with a descending fourth? As shown in Example 5.48, the sequence of this form of the motive creates the same scale as the sequence beginning in ms. 36 (E phrygian in this transposition), so the difference here is truly motivic rather than scalar: the intervallic character of the motive might change, but the scale expressed through its sequence remains the same. And it is this form of the motive that most clearly reveals a relation to one of the movement's other motives, motive 1b. As shown in Example 5.49, in ms. 28 motive 2b's sequence is explicitly transformed into descending thirds that act as an intermediary between motive 2b and the ↓↓ form of motive 1b.

Example 5.47. Sequential scalar passages with transformations.

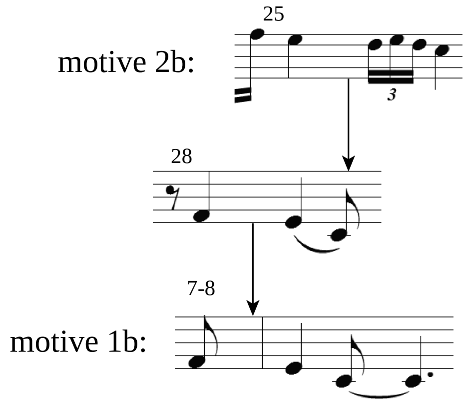
Example 5.48. Motive 2b in the recapitulation.



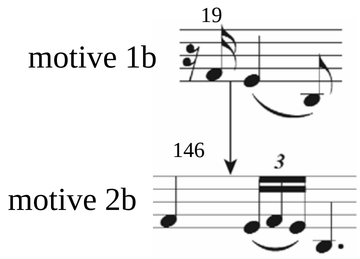
Example 5.49. The connection between motives 2b and 1b, ms. 25-28.

Consider Example 5.50, which presents the initial form of motive 2b from ms. 25 in relation to its transformation in ms. 28, which in turn, is shown in relation to the initial ↓↓ form of motive 1b. Since any stepwise line can be considered equivalent to some sequence of thirds, however, this relation requires further support. It becomes far more striking after motive 2b's recapitulatory switch to the evolutionary novelty of a final leap. Example 5.51 presents this relation between the ↓↓ form of motive 1b that first appears in ms. 19 and the form of motive 2b that ends with a descending fourth.

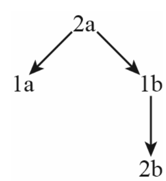
Example 5.50 and Example 5.51 trace different derivations: the former presents motive 1b as somehow derived from motive 2b, while the latter presents the inverse derivation. Example 5.50, however, is not intended to represent an actual derivation, but only the process through which the relation is revealed: the sequence of forms of motive 2b that begins in ms. 25 is immediately transformed into a series of thirds that, in turn, recalls motive 1b. Example 5.51, on the other hand, presents an understanding of motive 2b's derivation that takes into account its relation to other motives. I have already understood motive 1b as descended from motive 2a, so in order to keep this tree of motivic trees rooted, the former cannot be descended from motive 2b as well. And since the form of motive 2b to which motive 1b is related is the former's initial form, it makes far more sense to understand motive 2b as descended from motive 1b, creating the rooted tree shown in Example 5.52 and reducing the six possibilities to one. Example 5.53 combines the trees for motives 1b and 2b, while Example 5.54 presents all four motives associated with the primary and secondary themes in terms of continuous maps, for motive 2b can be understood in topological terms as being divided into the open (lower) set containing all forms ending with a leap and its complement, the closed (upper) set of forms ending with stepwise motion. This interpretation suggests, of course, that the additional three relations



Example 5.50. Full relation of motive 2b to motive 1b.



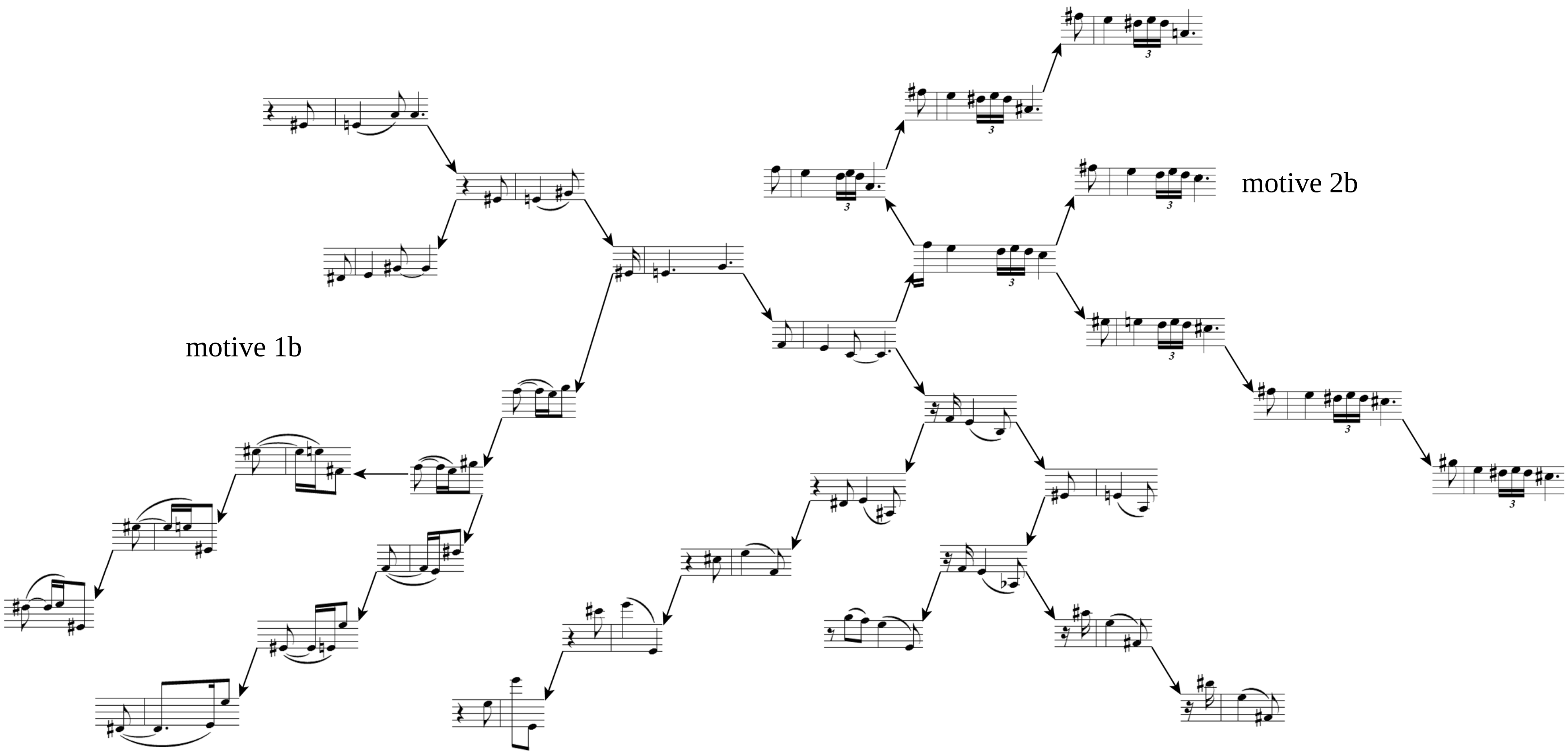
Example 5.51. The ↓↓ form of motive 1b and the recapitulation form of motive 2b.



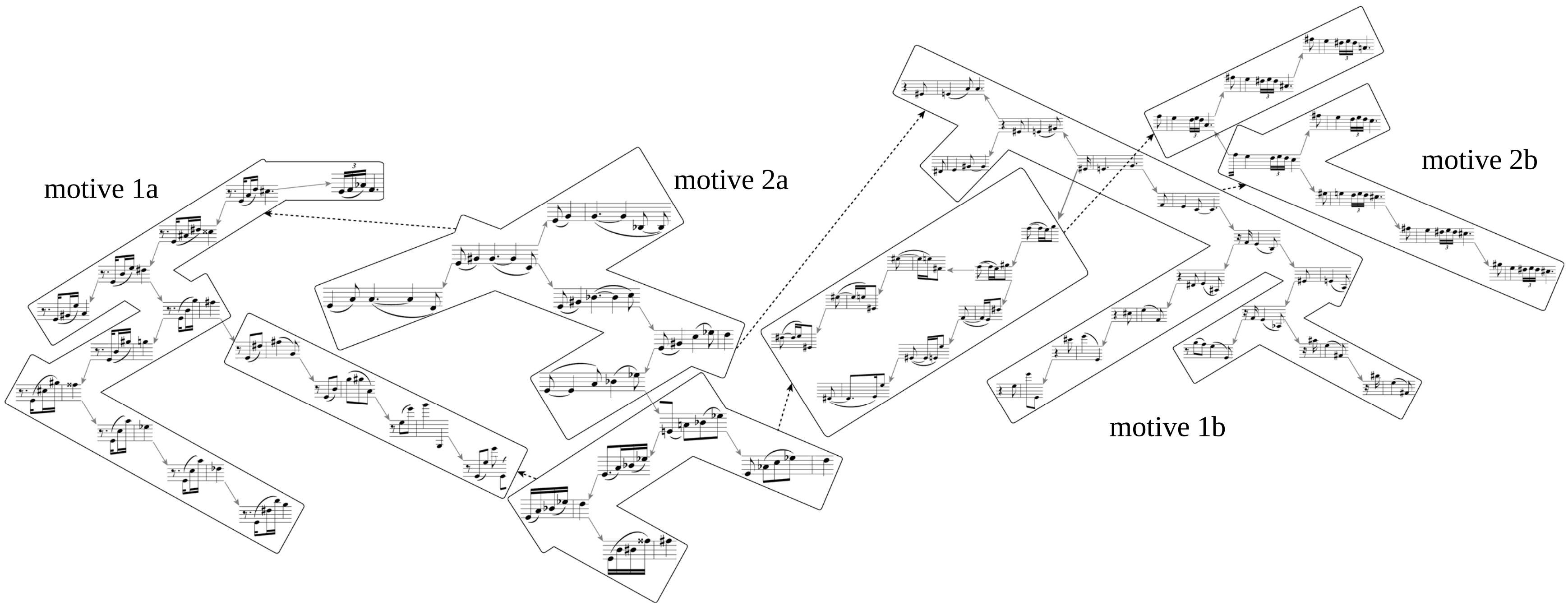
Example 5.52. The rooted tree of motivic trees for motives 1a, 2a, 1b, and 2b.

introduced by motive 2b be understood not as independent, but as mediated by one another: motive 2b is directly related to motive 1b through descent, related to motive 2a through the mediation of motive 1b, and related to motive 1a through the mediation of both motive 1b and 2a.

The cross-sectional relations between motives thus form a rooted “tree of trees” that can be understood itself as being made up of the open (lower) set of motives derived from the final



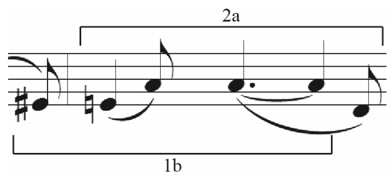
Example 5.53. The combination of the motivic trees for motives 1b and 2b.



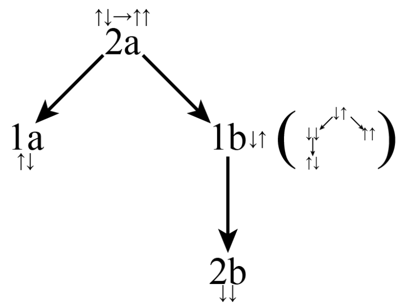
Example 5.54. Continuous maps between all four motives associated with the primary and secondary themes.

half of a thematic statements (motives 1b and 2b) and its complement, the closed set of motives derived from the first half of thematic statements (motives 1a and 2a). Example 5.52 (p. 335) is thus a template for the primary and secondary themes: *a follows b*. The crucial pivot point here is the connection between motive 2a and 1b, for it is the hinge that connects the two halves together. And, indeed, the connection between these two motives — first presented at the beginning of the development (see Example 5.39, p. 324) — is qualitatively different from the other motivic connections. As shown in Example 5.55, these two motives are juxtaposed rather than connected through some step-by-step process; in order to understand them as related we would have to invert motive 2a's contour from ↑↓ to ↓↑ and shift it metrically from beginning on a downbeat to beginning with an anacrusis. While the two shared pitches make this rather abrupt evolutionary leap forward somewhat less jarring, the leap's main purpose is to introduce the evolutionary novelty of motives that begin with a descent rather than an ascent, and there is no way to soften the crossing of that boundary.

As shown in Example 5.56, the changes in contour that occur between the movement's motives somewhat mirror the changes in contour undergone by motive 1b. All forms of motive 1a have an ↑↓ contour, and the forms of motive 2a progress from an ↑↓ contour to an ↑↑ contour, and so on. In other words, what motives 1a and 2a have in common — other than forming the beginning of thematic statements — is an opening ascending interval. And in the same way, motives 1b and 2b begin, at least in their initial forms, with descending intervals. Example 5.56 thus presents a more complete template for the primary and secondary themes than Example 5.52 (p. 335): not only does a follow b, a motive that begins with an ascending interval follows a motive that begins with a descending interval. Such complete thematic statements are found throughout the movement: the primary theme from the exposition (1a ↑↓ followed by 1b ↓↑), the



Example 5.55. The juxtaposition of motives 1b and 2a.



Example 5.56. The motivic contour changes mirroring motive 1b's contour changes.

thematic statement from the exposition's transition (1a ↑↓followed by 2b ↓↓), and the secondary theme from the exposition (2a ↑↑ followed by 2b ↓↓). Example 5.57 presents the first extension of this model (which will finally lead us to the closing theme): the entire melodic passage from the opening of the development that first connects motives 1b and 2a. It begins with motive 1a ↑↓ and moves to motive 1b ↓↑, but here the latter is compressed with motive 2a ↑↓, suggesting some kind of perpetual alternation between "a" and "b" forms just as motive 1b's transformations suggested a kind of perpetual contour cycle.

3. Closing Theme

As a Folk Song

The rather angular alternation of ascending and descending motion shown in Example 5.57 (ms. 72-73) recalls the more gently rolling changes of direction in the closing theme.

Example 5.58 presents the latter in its two forms (from the recapitulation and from the exposition). In order to reveal the differences between them, I have transposed both of them to end on G, treating the theme as if it was a tune collected by Bartók. Both forms are annotated with ↑s and ↓s to mark changes in direction, revealing that each has the same overall contour, and the second half of each has the same contour as Example 5.57: ↑↓↑↓. It should come as no surprise that the closing theme has no stable form, for the tune is clearly intended to resemble a folk song. Both statements seem to be expressions — through a mimesis of improvisation — of the communal idea of an imaginary folk song. While it is tempting to understand it as an imitation of Hungarian folk music in particular, it is too generic to pass for an actual quotation. And according to Bartók, he never used folk tunes in his "own original works" anyway. The influence of folk music appears in his chamber music, rather, either through the "general spirit of the style" or through "deliberate or subconscious imitations of folk melodies," whether they be Hungarian, Slovakian, Romanian, or some fusion of the three.[26] In any case, it would be interesting to explore the ways in which the closing theme does and does not adhere to Bartók's understanding of Hungarian folk music.

To begin with, it does not seem to represent an entire folk song, but rather only half of one, for if we interpret each half as representing a single text line, it only has two rather than the more usual four lines of most Hungarian folk songs. In *The Hungarian Folksong* Bartók does find some tunes having only two lines (and groups them together in subclass C.VI or C.VII), but

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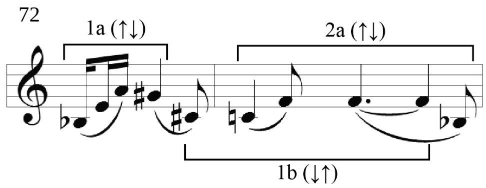
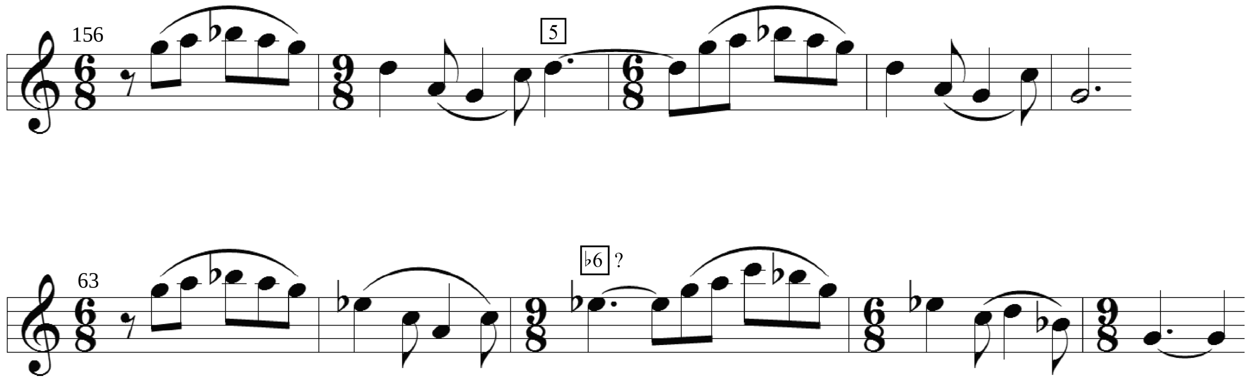
[26] Béla Bartók, "The Relation between Contemporary Hungarian Art Music and Folk Music" (1941), in *Béla Bartók Essays*, pp. 349-350.



Example 5.57. The first extension of the movement’s thematic model.



Example 5.58. The recapitulation and exposition forms of the closing theme.

adds that many of them seem to be “halves of tunes.”[27] He makes the same observation when discussing other folk repertoires. In his view, it is simply atypical for East-European folk music to have only two lines.[28] Perhaps the closing theme has only two lines because it would be out of place to find a complete folk song within a work whose motivic material is already so fragmented. But whatever the reason, the closing theme does seem to be the first half of something larger, a first half requiring a continuation. In Bartók’s notation for folksong form, these two lines would be labeled “AA_v,” where the first line is repeated with only a slight variation at the end. This particular beginning is common in both “old-style” (Class A) and “new-style” (Class B) Hungarian folk music. In the former it would be followed by BB or BC,

[27] Béla Bartók, *The Hungarian Folk Song*, trans. M.D. Calvocoressi, ed. Peter Bartók (Homosassa, Florida: Bartók Records, 2002), p. lxxii.

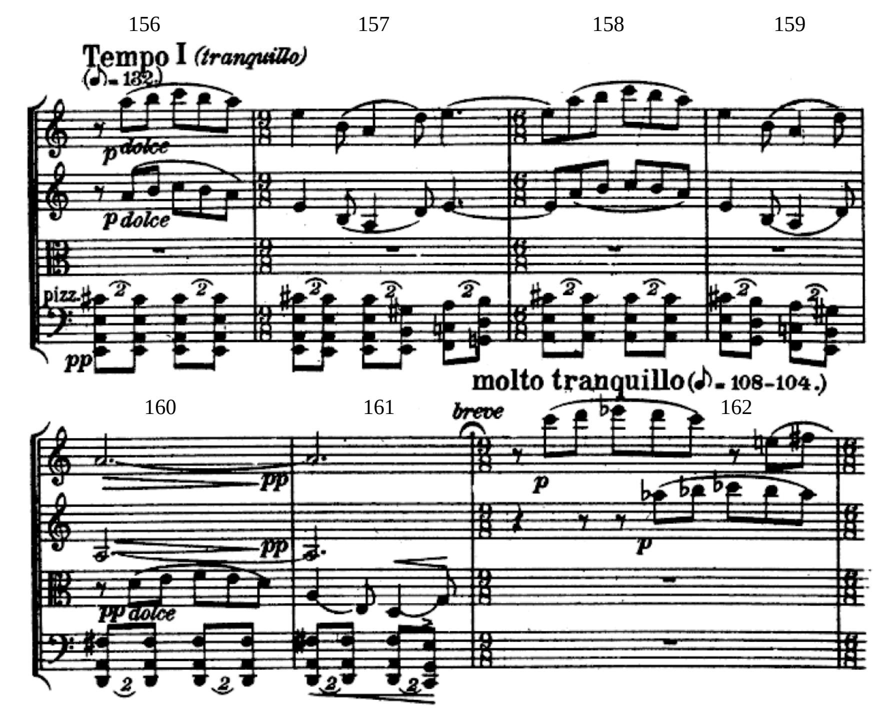
[28] See, for example, Béla Bartók, *Rumanian Folk Music*, Vol. 2, ed. Benjamin Suchoff (The Hague: Martinus Nijhoff, 1967), p. 13.

creating a type of “non-architectonic” structure, while in the later it would be followed by BA, creating a rounded or “architectonic” or rounded structure, which, for Bartók, reveals the influence of European art music.

Example 5.59 and Example 5.60 give both closing themes as they appear in the score: in the exposition the initial four-measure presentation is followed by reiterations of the arrival on C♯ in ms. 67 (and an ultimate descent to F♯), while in the recapitulation the initial four measures are followed by a two-measure echo in the viola that is cut short, giving way to the coda. The closing theme thus has many characteristics of the presentation phrase of a Schoenbergian sentence, but does not receive a satisfactory continuation until the coda. There, the theme’s opening motive is fragmented, leading to the massive arrival in ms. 168 — a more satisfactory cadence. So it’s not only half of a folk tune, it’s also only half of a musical sentence. I have already described the secondary theme in these terms, and while I described the primary theme as made up of basic and contrasting ideas, it too is followed by a continuation phrase that fragments and transforms motives 1a and 1b. In addition to the closing theme resembling the thematic statements of the movement in terms of contour, it mirrors them in terms of form.

In terms of pitch, both forms of the closing theme adhere closely to the model of Hungarian folk music. Both clearly have a pentatonic basis: C♯–E–F♯–G♯–B and A–C–D–E–G at the original pitch levels, G-B♭-C-D-F in the transposed forms in Example 5.58 (p. 341). $\hat{7}$ (G) does not appear in the recapitulation, but it does appear (as B) in ms. 67 and 68 of Example 5.59. With the addition of ♭$\hat{6}$ and $\hat{2}$ (E♭ and A in the transposed form), the tune takes on an aeolian cast: G–A–B♭–C–D–E♭–F. In the case of the recapitulation form, the non-pentatonic $\hat{2}$ (B) never appears on a strong beat and thus, to use Bartók’s terms, “preserves” the underlying pentatonic scale. The pitch at its main and only caesura is $\hat{5}$, which is not only within the realm

Example 5.59. The closing theme in the exposition, ms. 63-69.



Example 5.60. The closing theme in the recapitulation, ms. 156-161.

of possibilities, but is the most common caesura pitch for Class B tunes.[29] The exposition form, however, has $\flat\hat{6}$ (A) as its main-caesura pitch, which is far less typical: such a caesura pitch should in fact not occur at all within either old-style or new-style Hungarian folk music. Its occurrence here can be explained by looking at the way both forms are harmonized. In the recapitulation, the tune begins and ends on A and is harmonized in such a way that reinforces the status of A as $\hat{1}$ and E as $\hat{5}$. In the exposition, the harmony suggests a variation of F♯ minor, making A at the main caesura $\flat\hat{10}$ — the most common main-caesura pitch in old-style Hungarian folk music, $\flat\hat{3}$, transposed up an octave — and the first pitch $\hat{5}$ rather than $\hat{1}$. This interpretation is shown in Example 5.61, where the entire exposition form is transposed to end on G in ms. 69. Here the tune has a dorian rather than aeolian character, though the extreme compass (two octaves) would be unusual in a folk song.

Nor is the rhythm exactly what one would expect of a Hungarian folk song. It can nevertheless be made to conform to a more common folk-song rhythm: Example 5.62 presents the recapitulation form in a rhythm that conforms to one of the schemata Bartók associates within ten-syllable text lines.[30] It is not possible to definitively understand a textless tune in terms of number of syllables per line — it could easily be understood as having eight-syllable lines, for instance — but the relation between the theme's actual rhythm and any more typical rhythm from Hungarian folk music remains the same. There is tension between (1) the notated compound meter and the tune's anacrustic or out-of-phase rhythm and (2) the simple meter and in-phase, often syncopated rhythms of Hungarian folk music. As shown in Example 5.63, when the exposition form is rhythmically reinterpreted, the syncopation in ms. 67-69 suddenly

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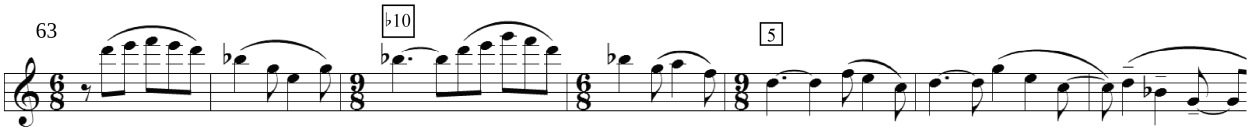
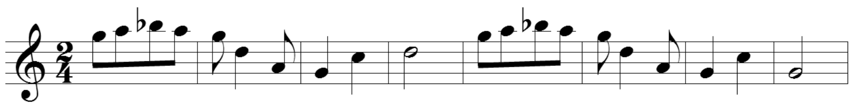
[29] Bartók, *The Hungarian Folk Song*, pp. xvi-xvii.

[30] *Ibid.*, p. xxxiii.



Example 5.61. The closing theme reinterpreted to end in ms. 69.



Example 5.62. A rhythmically reinterpreted closing theme.

Example 5.63. The “normalization” of the metrical dissonance in ms. 68-69.

becomes regular. When the closing theme first returns in the recapitulation, it is heralded (in ms. 154-155) by a unison, *fortissimo* statement of the opening four pitches —shown in Example 5.64 — that given the metrical ambiguity that precedes it and the suddenly slow tempo, is not possible to situate in a meter: it could just as easily begin on a downbeat. This ambiguity is most probably meant to suggest the front-accented rhythms (and in-phase groupings) of Hungarian folk music.

Motives and Relations

Thus in terms of formal structure, pitch, and rhythm, the closing theme appears to be an imitation of Hungarian folk music that has been placed in harmonic and metrical contexts

Example 5.64. Ms. 154-155.

bending it in various directions. Is there any significance to this? Given the generative force Bartók ascribes to folk music, this theme is perhaps generative within the movement. It is after all an unusual closing theme: understood in terms of Darcy and Hepokoski's "sonata theory," closing themes are supposed to be simple rhetorical flourishes coming after the "real" work of an exposition or recapitulation has been completed, the achievement of a cadence expressing "essential closure," not just for the secondary theme, but for the exposition as a whole.[31] This theme, however, has always struck me as a goal in itself, the culmination of everything that comes before rather than a mere "rounding off." More specifically, it seems to perform a critical function or hold a fundamental place within the movement's motivic or thematic relations.

While the opening of the coda (described at the beginning of the chapter) suggests some relation between the opening of the closing theme and motive 1a and in turn strengthens the

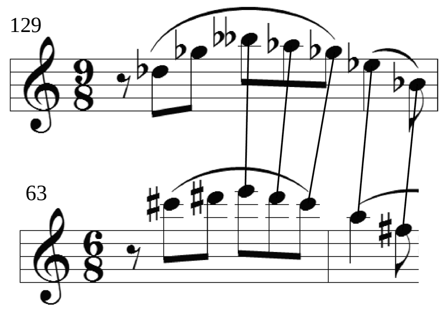
[31] James Hepokoski and Warren Darcy, *Elements of Sonata Theory: Norms, Types, and Deformations in the Late Eighteenth-Century Sonata* (Oxford: Oxford University Press, 2006).

connection between the closing theme and the extended thematic statement or chain of motives shown in Example 5.57 (p. 349), this is not the first place that such a relation is suggested. In the opening of the recapitulation, the closing theme is unmistakably recalled: it is as if while dwelling on motives 1a and 1b the music unconsciously reveals some hidden relation to the closing theme. Example 5.65 presents this entire passage (ms. 117-123), and Example 5.66 presents the brief evocation of the closing theme in ms. 129. This recollection not only reinforces the connection between the opening of the closing theme and motive 1a (the opening four pitches in ms. 129 are very similar to the forms that link the closing theme and motive 1a in ms. 171-172), but also establishes a connection between motive 1b and the material that follows within the closing theme. The final two pitches in ms. 129, E♭ and B♭, recall the melodic perfect fourths in the second measure of the closing theme's recapitulation form (ms. 157) as well as the descending perfect fourth(s) in the primary theme: C♯–G♯–(G♮–D♮). In Bartók's words, these are the "frequent leaps in fourths" that one finds in any folk tune having a pentatonic origin.[32]

Perhaps it is worth backing up a bit and examining these perfect fourths. In ms. 119, rather than ascending to B♭ as in the exposition, motive 1b descends to D♮ and then locks onto the resultant (11,7) cycle D–C♯–G♯–G♮, which alternates the perfect fourths C♯/G♯ and G♮/D until ms. 123, where the entire passage "shifts down" a semitone: the inner voices slip from A/D♯ to A♭/D♮, the cello slips from B/F to B♭/E, and the first violin shifts from D–C♯–G♯–G♮ to D♭–C–A♭♭–G♭. Given that collections such as D–C♯–G♯–G♮ belong to a single diminished-tendency functional region, this semitone slide gives the impression of a move towards the subdominant (or from dominant to tonic). But when the passage shifts down by *three* semitones in ms. 127 to B♭–A–E♮–E♭ (making for a total of four semitones), the functional area would appear to stay the

[32] Bartók, *The Hungarian Folk Song*, p. xvii.

Example 5.65. The opening of the recapitulation, ms. 117-132.

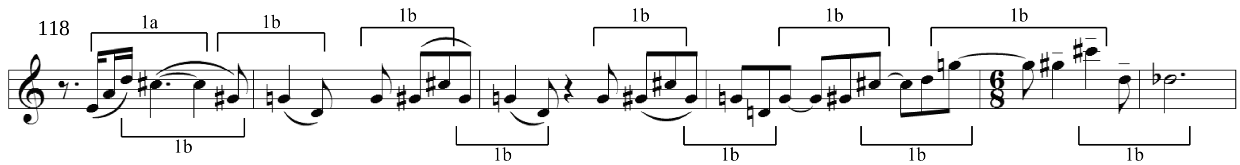


Example 5.66. The evocation of the closing theme in ms. 129.

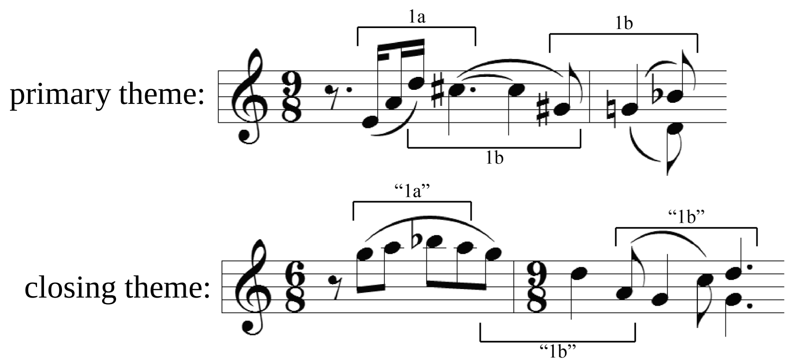
same. Since such (11,7)-cycles become strongly associated with motive 1b, much of this passage, as shown in Example 5.67, can be understood as a kind of reverie on this motive, and facilitating the connection described above.

Example 5.68 presents the formal structure common to the primary and closing themes: an opening motive having an ↑↓ contour (motive 1a or the opening of the closing theme) is followed by either (1) a descending passage with a short/long rhythm following some intervallic pattern, or (2) a figure with a ↓↑ contour that continues or cuts such a pattern short. Example 5.69 presents three examples of such forms: in the primary theme from the recapitulation this pattern is the (11,7)-cycle; in the closing theme from the recapitulation this pattern is descending whole-tones and perfect fifths, suggesting the (10,7)-cycle B–A–E–D; and in the closing theme from the exposition this pattern is a sequence of thirds, C♯–A–F♯–D♯, following the F♯ dorian (or C♯ aeolian) of the tune. The first pair could be easily understood in terms of a MODTRANS transformation from an octatonic modulus to a diatonic one. The second pair, on the other hand, must be understood as a MODCOMP (“module completion”) transformation, SANTA’s transformation wherein each source is placed in ascending (or descending) order and then mapped onto one another.[33] In this case, the descending orders are the (10,7) and (9,8)-cycles,

[33] Santa, “Defining Modular Transformations,” pp. 206-208.



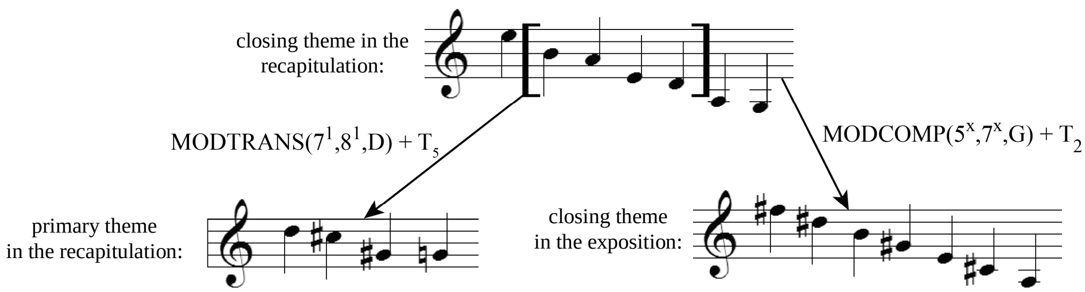
Example 5.67. The “reverie” on motive 1b beginning in ms. 118.



Example 5.68. The structure common to the primary and closing themes.

Example 5.69. Three examples of such structures and their intervallic patterns.

which generate pentatonic and diatonic collections respectively. The fact that in these constructions both the primary theme in the recapitulation and the closing theme in the exposition are related to the closing theme in the recapitulation suggests something like Example 5.70, which treats the former as both descended from the latter. If we are to view the closing



Example 5.70. A tree of intervallic patterns.

theme as generative because of its semblance of folk music, then it would make the most sense to understand the form from the recapitulation as the more primary, since it contains several of what Bartók considered the most common “pentatonic turns” — segments of (10,7) or (2,3) cycles.[34]

The relationship of such patterns to the sequences of motive 2b should be immediately clear, for there is much similarity between the MODTRANS relations described above and the ones I described between the forms of motive 2b. But this comes as no surprise, for motive 2b is descended from motive 1b, and the latter is the frequent carrier for these intervallic patterns. In other words, I hear a connection between the reverie on motive 1b at the beginning of the recapitulation and those extended passages from the secondary theme area built around sequences of motive 2b: as shown in Example 5.71, the step/leap pattern in motive 2b in the recapitulation contains segments of the (11,7) and (10,7)-cycles. This relation is spelled out in more detail in Example 5.72: the evocation of the closing theme is followed by an (11,7)-cycle that can be understood as overlapping forms of motive 1b, and the secondary theme from the recapitulation begins with a form of motive 2a closely related to motive 1a — and in turn the

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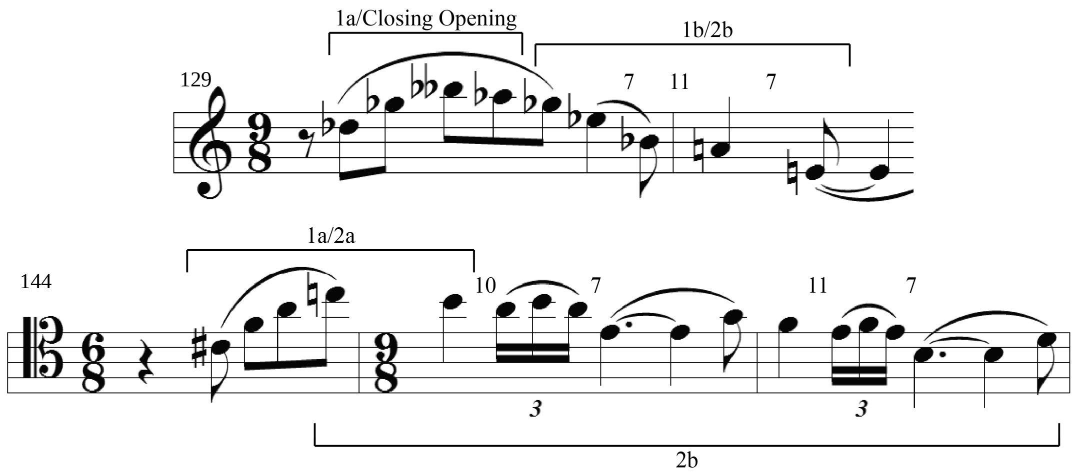
[34] Bartók, *The Hungarian Folk Song*, p. xvii.

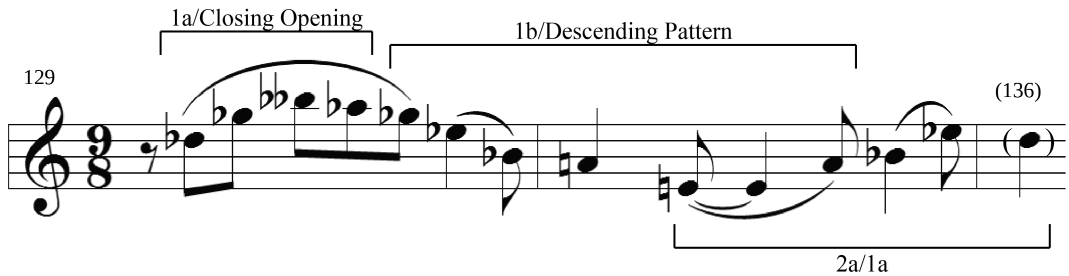
Example 5.71. Intervallic patterns in the recapitulation form of motive 2b.



Example 5.72. The recapitulation form of motive 2b and the evocation of the closing theme.

opening of the closing theme — which is followed by the form of motive 2b intervallically related to motive 1b and the continuation of the closing theme's recollection. The web is becoming quite tangled.

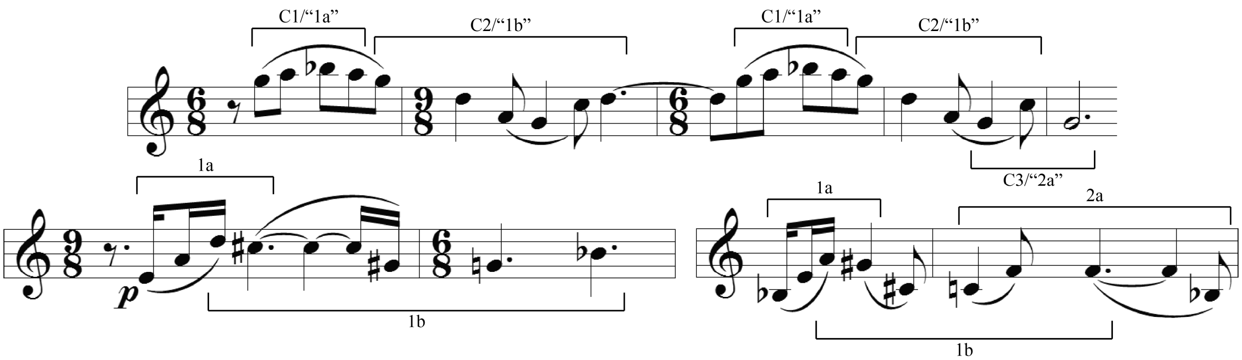
Example 5.73 presents the measures following the recollection of the closing theme: the first violin continues with the (11,7)-cycle B♭–A–E♮–E♭, which will ultimately connect the ascending form of motive 2a to motive 1a, resolving to D in ms. 136. The similarity to the extended thematic statement shown in Example 5.57 (p. 341) is obvious: there is again an overall ↑↓–↓↑–↑↓ contour that one could understand as capable of twisting around on itself in an endless loop. In other words, this momentary lapse into the closing theme in the midst of the primary theme's recapitulation reveals striking relations between the movement's motives and the entire



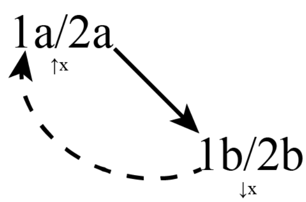
Example 5.73. From the evocation of the closing theme up to ms. 136.

closing theme. Example 5.74 traces some of these relations: not only is the opening of the closing theme (heretofore C_1) related to motive 1a and the descending pattern following the former C_2 related to motive 1b, but the second phrase of the closing theme mirrors the extended thematic unit presented at the beginning of the development. Both end with another ↑↓ figure — motive 2a or the final gesture of the closing theme, C_3 — that promises some kind of continuation through the repetition of the fundamental ↑↓–↓↑ figure that unites the movement's thematic statements. Another way to understand the opening of the coda is as the fulfillment of this promise: the stretto on the opening of the closing theme could continue indefinitely, alternating ascending with descending motion as each voice enters.

Example 5.70 (p. 351) can thus be understood as a tree of sorts for motive C_2, and at the same time, provides a way to understand (1) motive C_2 as related to motive 1b, and (2) a relation of descent between the two forms of the closing theme. I do not think that it would make sense to separate the closing theme's motives — C_1, C_2, and C_3 — and attempt to add them to the motivic tree of trees for the primary and secondary themes' motives. It will prove more useful to understand the entire closing theme as a root formal structure that acts in a generative way to the model of thematic statements, which itself is already a nested structure containing the similar tree of forms for motive 1b, both of which have a tendency to suggest the tree-breaking



Example 5.74. The recapitulation closing theme, the recapitulation primary theme, and the extended thematic statement of the development.



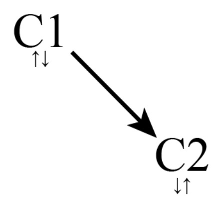
Example 5.75. A simplified version of the circular model for the primary and secondary motives.

procedure of looping into a circular structure. Example 5.75 presents a simplified version of this construction for the motives of the primary and secondary themes: “a” forms (beginning with an ascent) are followed by “b” forms (beginning with a descent).

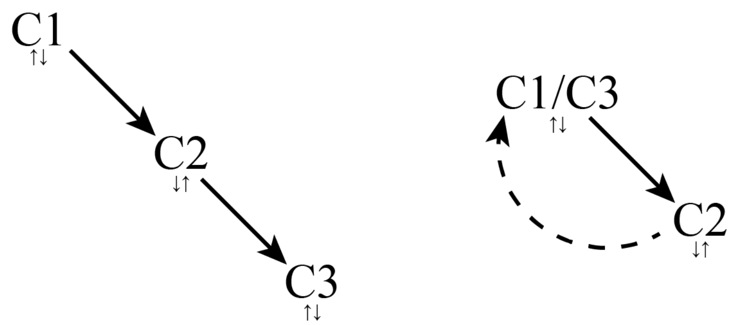
As noted above, motives 1a and 2a form a closed (upper) set and motives 1b and 2b form an open (lower) set; the latter form a monophyletic group while the former form a paraphyletic group. The classic example in biology are reptiles, which are usually defined as members of the clade (*Amniota*) that do not belong to the monophyletic groups of mammals or birds. Just as it is not incorrect to claim that birds descend from reptiles, one can say that “a” motivic forms descend from “b” motivic forms despite the fact that some “a” forms have no direct “b” descendants.

The arrow that loops the “b” forms in Example 5.75 back to the “a” forms is dashed because it does not show a relation of descent; rather, it only shows the possible return — in thematic statements — to an “a” form, which starts the process over. Example 5.76 presents the analogous situation for the first line of the closing theme: C_1 (having an ↑↓ contour) is followed by C_2 (having a ↓↑ contour). The second line of the closing moves from C_2 to C_3, which has an ↑↓ contour. Example 5.77 presents two options for this addition: C_3 can simply follow C_2, or since it has the same contour as C_1, it can be grouped with the latter. While there are few reasons to connect C_1 with C_3 in the forms of the closing theme — in the recapitulation form it does begin and end with A just like C_1 (A–B–C–B–A and A–D–A) — we can perhaps understand the relation between motives 1a and 2a as somehow projecting back to this relation. I say “back” under the assumption, manifest in Example 5.78, that following the notion that the closing theme’s folk-like character makes it generative in some way, the model for the primary and secondary themes’ motives is derived from the closing theme’s model.

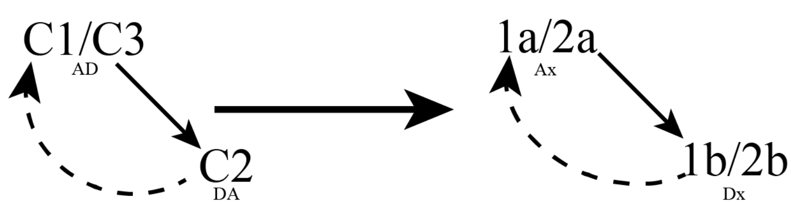
But it is not so simple: while it is certainly reasonable to understand the closing theme’s model as a progenitor for the primary/secondary theme model, the extensive transformations and relations the “a” and “b” motives undergo feed back onto our understanding of the closing theme. Example 5.79 works this out in another circular model, one intended to complicate the idea of a unidirectional understanding of influence. As a musical token for the whole of Hungarian folk music, the closing theme might act as a progenitor to the movement’s other themes, but is itself influenced by the same forces that generate those other themes. This suggests tree-breaking circles at three levels: (1) at the level of (or within) motive 1b, (2) at the level of motives (1b and 2b looping back to 1a and 2a, for example), and (3) at the level of themes (the primary/secondary themes looping back to the closing theme). But at each level, the



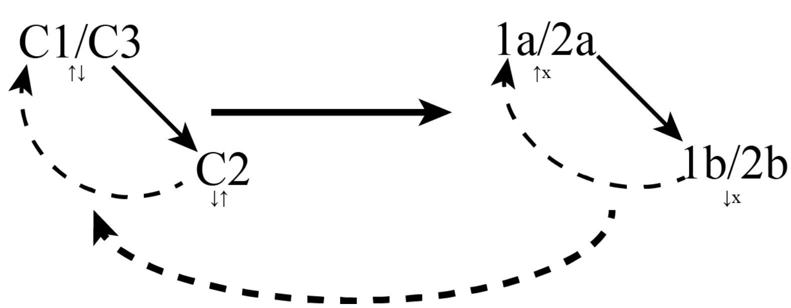
Example 5.76. A model for the first line of the closing theme.



Example 5.77. Two options for extensions to Example 5.76.



Example 5.78. The closing theme model as a progenitor.

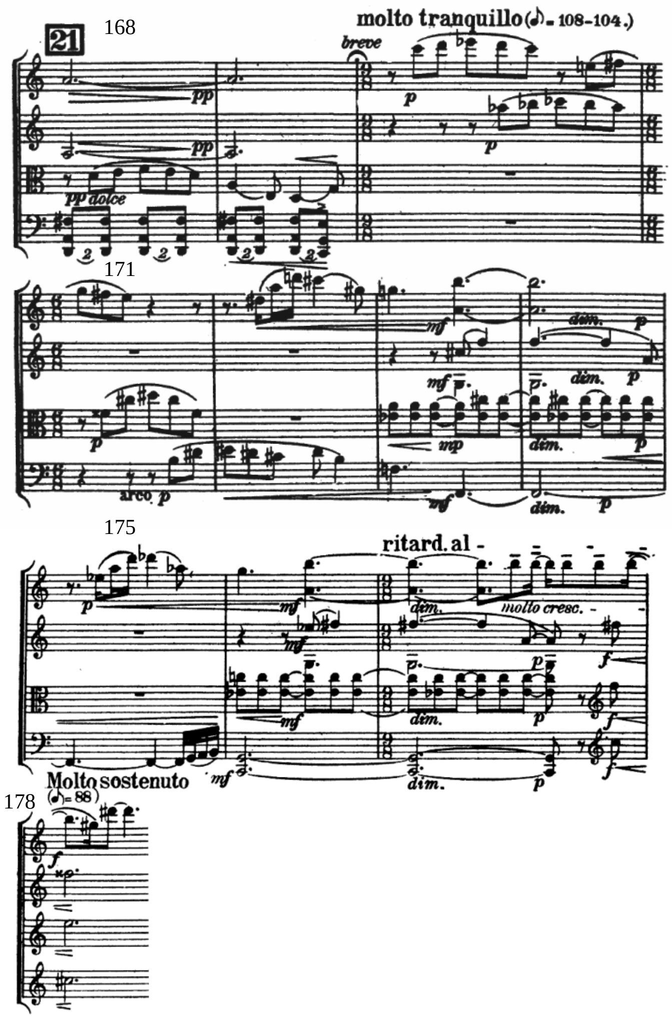


Example 5.79. Projecting back to the closing theme.

arrows mean different things: actual motivic transformations, the sequence of motives within a theme, and influence among themes themselves.

Returning finally to where we began, with the coda, we can say that it makes explicit what was implicit before. The identification of motives C_1 and 1a is implied in the recapitulation of the primary theme, but here it is made explicit. And the relation between motives 1b and 2a is certainly suggested at the opening of the development, but the potential for this relation to create an indefinite series of alterations between “a” and “b” forms is not fulfilled until the coda. Example 5.80 presents ms. 168-178. Beginning in ms. 172 — after the stretto on C_1 which already suggests an alteration of ascent and descent — there is just such a series: 1a–1b–2a–1a–1b–2a–1b–2a–1b. The final statement of motive 1b in ms. 177-178 leads to another “reverie” on that motive in the cello. Finally, as shown in Figure 5.71, the identification of motives 1a and 2a, which make up the paraphyletic group of “a” motives, is made explicit by the revelation of a connection between motive 2a and C_1 (which is already identified with motive 1a) in ms. 183 and 185. It suffices here to simply juxtapose motives 2a and C_1: they have the same contour, and their relation has already been established, at least indirectly.

This then is the ultimate conclusion one can make about the coda: it does not *reveal* transgressive connections, but rather *presents* them unequivocally. It verifies that just like folk music, the closing theme is a source or generative force that is itself already influenced by that which it influences. The course of the movement, in moving from primary theme to secondary theme, moves backward in derivation, for motive 2a’s is the root tree of the movement’s tree of trees. Moving then to the closing theme thus continues this process, proceeding *forward* in time while receding in derivation, as if the movement is itself a model of some historicist method. The arrival on the closing theme in both the exposition and the recapitulation gives the impression of



Example 5.80. Ms. 168-178 of the coda.

hitting bedrock, of arriving at some basic level, but one that is not *essentially* basic: there is a kind of perpetual cycle that always pushes us backward to the beginning. And such cycles appear at every level, whether it be motivic, thematic, or some level of influence external to the work itself.

Appendix: Foreign Language Sources

Selected passages are presented in the order of their appearance in the main text. Each entry is preceded by the page number(s) and footnote numbers(s) of the translations. For example: the first entry, labeled "1.2," is referenced on page 1 in footnote 2.

Szabolcsi, Bence. "Mensch und Natur in Bartóks Geisteswelt." *Studia Musicologica Academiae Scientiarum Hungaricae* 5 (1963)."

1.2. "Diese organische Entfaltung im Wandel, dieser naturhafte Schaffensprozeß ist zweifellos Bartóks eigentümliche Gestaltungsweise." (536)

—."Eine unmittelbare Verbindung zwischen Erlebnis und Werk kann natürlich nur außerst selten nachgewiesen werden." (528)

2.3. "Diese Grundposition, diese dreischichtige Einheit bestimmt nicht nur Bartóks musikalisches Lebenswerk, sondern auch seine wissenschaftliche Tatigkeit und seine menschliche, ethische Grundhaltung." (529)

Fétis, F.J. *Biographie universelle des musiciens et bibliographie générale de la musique* (1835-1844), 2nd. ed. Paris: Librairie de Firmin-Didot et Cie., 1877.

36.70. "Il semble n'avoir eu d'autre auteur que les peuples eux-mêmes .… Il est le fruit de l'inspiration collective." (i)

—."Par degrés, les facultés de production spontanée de poésie et de chant s'affaiblissent dans les masses." (ii)

von der Nüll, Edwin. *Béla Bartók: Ein Beitrag zur Morphologie der Neuen Musik*. Halle: Mitteldeutsche Verlags, 1930.

39.76. "Die Schaffenstendenz bei Bartók ist ausgesprochen *evolutionär*. Immer greift er Vorhandenes auf und entwickelt das Vorhandene weiter." (71)

40.78. "Besonders die chromatische Wechselnote und der chromatische Vorhalt (weniger der Durchgangston) erfahren eine Behandlung, die für die Entwicklung der Bartókschen Harmonik bereits wesentliche Resultate erzielt. Die einschneidende Wandlung im Gebrauch der Wechselnote ist ihre Nichtauflösung. Die gelegentliche Anwendung der abspringenden (also nichtaufgelösten) Wechselnote auf schwerem und leichtem Taktteil ist bekannt. Aber die konsequente Akkordbildung mit fortdauernd nichtaufgelösten Wechselnoten in der Art, daß die eine Wechselnote sofort von der anderen ohne Zwischenglied abgelöst wird, diese Akkordbildung rückt nun in den Bereich der Möglichkeiten .… Die 10. Bag. in C-dur mit Beginn auf der Subdominante bietet ein verschleiertes Tonartenbild durch die obere Wechselnote der Oktave. Der harmonische Gang ist allgemein einfach. Nur die dreimalige frei sequenzierende

Wiederholung des dürch bezeichneten Motivs bringt etwas verwickeltere chromatische Rückungen." (6-7)

Riemann, Hugo. *Hugo Riemanns Musik Lexikon*,11th ed., ed. Alfred Einstein. Berlin: Max Hesses Verlag, 1929.

45.80. "Wechselnote heißt die große oder kleine Ober- oder Untersekunde eines Akkordtons, wenn sie statt seiner in den Akkord eingestellt ist. Die Wechselnote ist am wenigsten auffällig, wenn sie der Hauptnote auf die leichte Zeit folgt und wieder zu ihr zurückleitet (eigentliche Wechselnote) oder zu einem neuen Akkordtone überführt (Durchgangsnote); ist sie aus der vorhergehenden Harmonie herübergebunden, so wird sie zum Vorhalt (s.d.); tritt sie auf die schwere Zeit frei ein, so ist sie die eigentliche Cambiata der älteren Lehre; folgt sie auf die leichte Zeit, ohne stufenweise zurück oder weiter zu führen, d. h. wird von ihr abgesprungen, so ist die sog. 'Fuxsche' Wechselnote (verlassene Wechselnote)." (1998)

Koch, Heinrich Christoph. *Musikalisches Lexikon* (1802). Repr. Hildesheim: Georg Olms, 1964.

46.82. "Wechselnoten. Darunter verstehet man solche melodische Nebennoten, die nicht in der zum Grunde liegenden Harmonie enthalten sind, und welche die harmonischen Noten aus dem Anschlage in den Nachslag verdrangen." (1736)

von der Nüll, Edwin. *Béla Bartók: Ein Beitrag zur Morphologie der Neuen Musik*. Halle: Mitteldeutsche Verlags, 1930.

47.84-85. "So entsteht der Eindruck einer Fis-dur-Melodie, die von F-dur-Akkorden gestützt ist. Die Praxis der konsequent nichtaufgelösten Wechselnote gebiert das Nebeneinander mehrerer Tonarten." (7)

Seidel, Wilhelm. "Moritz Hauptmanns Organische Lehre: Tradition, Inhalt und Geltung ihrer Prämisse." International Review of the Aesthetics and Sociology of Music 2.2 (1971).

87.15. "Organisch sind demnach fur Hauptmann diejenigen Erscheinungen, in denen sich die spezifisch humane Lebensenergie des Sinnes ausspricht, und seine Produkte, die Ton- und Zeitintervalle, haben Anteil am Leben des Organs. Kompositionen, deren artifizielle Struktur die natiirlichen Tonvorstellungen hypostasiert, die die organischen Antworten also gleichsam ausschreiben, belegt Hauptmann deshalb mit dem Attribut 'lebendig', ja, selbst eine Theorie, die das natiirliche Wechselspiel zwischen Reiz und Objekt entfaltet, partizipiert seiner Meinung nach am Leben der Produkte, die der Sinn entlafit. Helmholtzens Intervalle sind totgeboren, weil sie sich selbst iiberlassen sind, die seinen lebendig, 'wachsen', wie er sagt, weil sie als Funktion des menschlichen Sinnes gedacht werden." (253)

von der Nüll, Edwin. *Béla Bartók: Ein Beitrag zur Morphologie der Neuen Musik*. Halle: Mitteldeutsche Verlags, 1930.

93.28. “Wir haben bei vielen früheren harmonischen Analysen die direkte Vermischung von Dur und Moll durch Übereinanderstellen der Dur- und Mollterz in einem Akkord aufgedeckt. Ebenso war zu beobachten daß die Kirchentöne mehr und mehr die Harmonik durchsetzten und, ganz ähnlich der Vermischung von Dur- und Mollterz, eine Vermischung der kleinen phrygischen mit der großen äolischen oder ionischen Sekunde, oder der reinen mit der lydischen Quarte usw. herbeiführte.” (73-74)

Dalhaus, Carl. “Tonsysteme.” In Die Musik in Geschichte und Gegenwart, 2nd ed. p. 638. Kassel: Metzler, 2007.

97-98.36-37. “Der Inbegriff der miteinander verschränkten Momente ist das Tonsystem. Tonvorrat, Stimmung, Schema und Modus hängen so eng zusammen, daß es gewaltsam wäre, den Terminus auf das eine oder andere Teilmoment einzuschränken .… Der Terminus Skala oder Leiter bezeichnet eine Darstellungsweise. Sowohl ein Tonvorrat (z. B. Halbtonskala) als auch ein Schema von Tonbeziehungen (z.B. diatonische Skala), ein Modus (z.B. phrygische Skala) oder eine Transposition (z.B. E-Dur-Leiter) können in Skalenform exponiert werden, ohne an sie gebunden zu sein. Die Diatonik ist auch als Quintenreihe darstellbar (f–c–g–d–a–e–h), und E♭-Dur ist weniger eine Leiter als ein Komplex von Akkorden: A♭–c–E♭–g–B♭–d–F.” (638)

Bähr, Otto. Das Tonsystem unserer Musik. Leipzig: F.A. Brockhaus, 1882.

109.52 and 111.55. “Die Tonart in ihrer Ausdehnung auf das chromatische System. Neben den Tönen der diatonischen Tonleiter, welche, wie wir gesehen, keine andern als die Töne dreier nebeneinander liegender Dreiklänge sind, gebrauchen wir in unserer modernen Musik, auch ohne dass die Empfindung eines Verlassens der Tonart an uns tritt, noch eine Menge anderer Töne, die wir in diesem Sinne also der Tonart zurechnen müssen.” (61)

Literature Cited

Adorno, Theodor. *Philosophy of New Music* (1949), trans. Robert Hullot-Kentor. Minneapolis: University of Minnesota Press, 2006.

———. "The Aging of the New Music" (1955), trans. Robert Hullot-Kentor and Frederic Will. In *Essays on Music,* ed. Richard Leppert, pp. 181-202. Berkeley: University of California Press, 2002.

———. "Criteria of New Music." In *Sound Figures* (1959), trans. Rodney Livingstone, pp. 145-196. Stanford: Stanford University Press, 1999.

———. "The Prehistory of Serial Music." In *Sound Figures* (1959), trans. Rodney Livingstone, pp. 54-68. Stanford: Stanford University Press, 1999.

———. "Difficulties" (1966), trans. Susan H. Gillespie. In *Essays on Music,* ed. Richard Leppert, pp. 644-680. Berkeley: University of California Press, 2002.

Alpern, Wayne. "Bartók's Compositional Process: 'Extension in Range' as a Progressive Contour Transformation." Paper presented at the Annual Meeting of Music Theory Midwest, Louisville, 1998.

Awodey, Steve. *Category Theory* (2006), 2nd ed. Oxford: Oxford University Press, 2010.

Badiou, Alain. *Theory of the Subject* (1982), trans. Bruno Bosteels. London: Continuum, 2009.

———. *Being and Event* (1988), trans. Oliver Feltham. London: Continuum, 2007.

———. *Handbook of Inaesthetics* (1998), trans. Alberto Toscano. Stanford: Stanford University Press, 2005.

———. *The Century* (2005), trans. Alberto Toscano. Cambridge: Polity Press, 2007.

———. *Logics of Worlds* (2006), trans. Alberto Toscano. London: Continuum, 2009.

———. "Affirmative Dialectics: from Logic to Anthropology." *The International Journal of Badiou Studies* 2.1 (2013), pp. 1-13.

———. *Mathematics of the Transcendental*, trans. A. J. Bartlett and Alex Ling. London: Bloomsbury, 2014.

Bacon, Ernst. "Our Musical Idiom." *The Monist* 27.4 (1917), pp. 560-607.

Balázs, Béla. "A csend." *Nyugat* 1.14 (1908), pp. 748-765.

———. “A fából faragott királyfi” *Nyugat* 5.24 (1912), pp. 879-888. Trans. István Farkas as “The Wooden Prince” in *The Stage Works of Béla Bartók*, ed. Nicholas John (London: J. Calder, 1991), pp. 69-80.

———. “A három hűséges királyleány.” *Nyugat* 10.11 (1917), pp. 977-995.

———. *Sieben Märchen*. Vienna: Rikola Verlag, 1921.

———. *The Cloak of Dreams: Chinese Fairy Tales*, ed. Jack Zipes. Princeton: Princeton University Press, 2010.

Bartók, Béla. “Preface and Notes to Bach’s Well-Tempered Clavier” (1907). In *Béla Bartók Essays*, ed. Benjamin Suchoff, pp. 447-448. Lincoln: University of Nebraska Press, 1993. Original Hungarian version published in *Das Wohltemperierte Klavier II*, by Johann Sebastian Bach (Budapest: Editio Musica Budapest, 1950).

———. “Liszt zenéje és a mai közönség” (1911). In *Bartók Béla Összegyűjtött Írásai*, ed. András Szőllősy, pp. 687-689. Budapest: Zeneműkiado Vállalat, 1966.

———. “Comparative Music Folklore” (1912). In *Béla Bartók Essays*, ed. Benjamin Suchoff, pp. 155-158. Lincoln: University of Nebraska Press, 1993. Originally published as “Az összehasonlító zenefolklór” (1912), in *Bartók Béla Összegyűjtött Írásai*, ed. András Szőllősy (Budapest: Zeneműkiado Vállalat, 1966), pp. 567-570.

———. “The Problem of the New Music” (1920). In *Béla Bartók Essays*, ed. Benjamin Suchoff, pp. 455-459. Lincoln: University of Nebraska Press, 1993.

———. *The Hungarian Folk Song* (1924), trans. M.D. Calvocoressi, ed. Peter Bartók. Homosassa: Bartók Records, 2002. Originally published as “A magyar népdal” (1924), in *Bartók Béla Összegyűjtött Írásai*, ed. András Szőllősy (Budapest: Zeneműkiado Vállalat, 1966), pp. 101-350.

———. “A népzene forrásainál.” *Muzyka* 2.6 (1925), pp. 230-233.

———. “Gipsy or Hungarian Music?” (1931). In *Béla Bartók Essays*, ed. Benjamin Suchoff, pp. 206-223. Lincoln: University of Nebraska Press, 1993. Originally published as “Cigányzene? Magyar zene?” (1931), in *Bartók Béla Összegyűjtött Írásai*, ed. András Szőllősy (Budapest: Zeneműkiado Vállalat, 1966), pp. 623-640.

———. “The Relation of Folk Song to the Development of the Art Music of Our Time” (1931). In *Béla Bartók Essays*, ed. Benjamin Suchoff, pp. 320-330. Lincoln: University of Nebraska Press, 1993.

———. "What is Folk Music?" (1931). In *Béla Bartók Essays*, ed. Benjamin Suchoff, pp. 5-8. Lincoln: University of Nebraska Press, 1993. Originally published as "Mi a népzene?" (1931), in *Bartók Béla Összegyűjtött Írásai*, ed. András Szőllősy (Budapest: Zeneműkiado Vállalat, 1966), pp. 672-673.

———. "Hungarian Peasant Music" (1933). In *Béla Bartók Essays*, ed. Benjamin Suchoff, pp. 80-102. Lincoln: University of Nebraska Press, 1993.

———. "Why and How Do We Collect Folk Music?" (1936). In *Béla Bartók Essays*, ed. Benjamin Suchoff, pp. 9-24. Lincoln: University of Nebraska Press, 1993. Originally published as "Miért és hogyan gyűjtsünk népzenét?" (1936), in *Bartók Béla Összegyűjtött Írásai*, ed. András Szőllősy (Budapest: Zeneműkiado Vállalat, 1966), pp. 581-596.

———. "Béla Bartók's Opinion on the Technical, Aesthetic, and Spiritual Orientation of Contemporary Music" (1938). In *Béla Bartók Essays*, ed. Benjamin Suchoff, pp. 516-517. Lincoln: University of Nebraska Press, 1993.

———. "The Relation between Contemporary Hungarian Art Music and Folk Music" (1941). In *Béla Bartók Essays*, ed. Benjamin Suchoff, pp. 348-353. Lincoln: University of Nebraska Press, 1993.

———. "Harvard Lectures" (1943). In *Béla Bartók Essays*, ed. Benjamin Suchoff, pp. 354-392. Lincoln: University of Nebraska Press, 1993.

———. "Hungarian Music" (1944). In *Béla Bartók Essays*, ed. Benjamin Suchoff, pp. 393-398. Lincoln: University of Nebraska Press, 1993. Originally published as "Magyar zene" (1944), in *Bartók Béla Összegyűjtött Írásai*, ed. András Szőllősy (Budapest: Zeneműkiado Vállalat, 1966), pp. 758-761.

———. "Introduction to *Béla Bartók Masterpieces for the Piano*" (1945). In *Béla Bartók Essays*, ed. Benjamin Suchoff, pp. 432-433. Lincoln: University of Nebraska Press, 1993.

———.*Béla Bartók Letters* (1951). Originally published as *Bartók Béla Levelei*, ed. János Demény (Budapest: Művelt Nép Könyvkiadó, 1951).

———. *Serbo-Croatian Folk Songs*, trans. Albert B. Lord. New York: Columbia University Press, 1951.

———. *Rumanian Folk Music*, ed Benjamin Suchoff. 5 Vols. The Hague: Martinus Nijhoff, 1967.

———. *The Wooden Prince: Complete Stage Version*, ed. Nelson Dellamaggiore and Peter Bartók. Homosassa: Bartók Records, 2008.

Bartók, Peter. *My Father*. Homosassa: Bartók Records, 2002.

Bartók, Jr., Béla. "The Private Man." In *The Bartók Companion*, ed. Malcolm Gillies, pp. 18-29. Portland: Amadeus Press, 1994.

Babbitt, Milton. "The String Quartets of Bartók." *The Musical Quarterly* 35.3 (1949), pp. 377-385.

Bähr, Otto. *Das Tonsystem unserer Musik*. Leipzig: F.A. Brockhaus, 1882.

Bergson, Henri. *Creative Evolution* (1907), trans. Arthur Mitchell. New York: Henry Holt and Company, 1911.

Bernard, Jonathan. "Chord, Collection, and Set in Twentieth-Century Theory." In *Music Theory in Concept and Practice*, ed. James Baker, David Beach, and Jonathan Bernard, pp. 11-51. Rochester: University of Rochester, 1997.

Boretz, Benjamin. *Meta-Variations: Studies in the Foundations of Musical Thought* (1969). Red Hook: Open Space, 1995.

Brower, Candace. "Paradoxes of Pitch Space." *Musical Analysis* 27.1 (2008), pp. 51-106.

Bücher, Karl. *Arbeit und Rhythmus*. Leipzig: S. Hirzel, 1896.

Buteau, Chantal and Guerino Mazzola. "Motivic Analysis According to Rudolph Réti: Formalization by a Topological Model." *Journal of Mathematics and Music* 2.3: 117-134.

Cadwallader, Allen, and William Pastille. "Schenker's Unpublished Work with the Music of Johannes Brahms." In *Schenker Studies 2*, ed. Carl Schachter and Heidi Siegel, pp. 26-48. Cambridge: Cambridge University Press, 1999.

Caplin, William. *Classical Form*. New York: Oxford University Press, 1998.

Cohn, Richard. "Inversional Symmetry and Transpositional Combination in Bartók." *Music Theory Spectrum* 10 (1988), pp. 19-42.

———. "Square Dances with Cubes." *Journal of Music Theory* 42.2 (1998), pp. 283-296.

———. "As Wonderful as Star Clusters: Instruments for Gazing at Tonality in Schubert." *19th-Century Music* 22.3 (1999), pp. 213-232.

———. "Tonal Pitch Space and the (Neo-) Riemannian Tonnetz." In *The Oxford Handbook of Neo-Riemannian Music Theories*, ed. Edward Gollin and Alexander Rehding, pp. 322-350. New York: Oxford University Press, 2011.

———. *Audacious Euphony*. New York: Oxford University Press, 2012.

Cone, Edward T. "On Derivation: Syntax and Rhetoric." *Music Analysis* 6.3 (1987), pp. 237-255.

Congdon, Lee. *The Young Lukács*. Chapel Hill: University of North Carolina Press, 1983.

Dalhaus, Carl. "Tonsysteme." In *Die Musik in Geschichte und Gegenwart*, 2nd ed. p. 638. Kassel: Metzler, 2007.

Diestel, Reinhard. *Graph Theory* (1997), 4th ed. New York: Springer, 2010.

Dille, Denijs. "A Béla Bartók Interview." *Bulletin of the International Kodály Society* 31.1 (2006), pp. 44-46.

Eldredge, Niles, and Joel Cracraft. *Phylogenetic Patterns and the Evolutionary Process*. New York: Columbia University Press, 1980.

Engebretsen, Nora. "The Chaos of Possibilities: Combinatorial Group Theory in Nineteenth-Century German Harmony Treatises." Ph.D. Ddiss., State University of New York at Buffalo, 2002.

Erdely, Stephen. "Complementary Aspects of Bartók's and Kodály's Folk Song Researches." In *Bartók and Kodály Revisited*, ed. György Ránki, pp. 79-98. Budapest: Akadémiai Kiadó, 1987.

Fassett, Agatha. *Béla Bartók's American Years*. Cambridge: The Riverside Press, 1958.

Fétis, F.J. *Biographie universelle des musiciens et bibliographie générale de la musique* (1835-1844), 2nd. ed. Paris: Librairie de Firmin-Didot et Cie., 1877.

Fiore, Thomas M., Thomas Noll, and Ramon Satyendra. "Morphisms of Generalized Interval Systems and PR-groups." *Journal of Mathematics and Music* 7.1 (2013), pp. 3-27.

Forte, Allen. "Pitch-Class Set Genera and the Origin of Modern Harmonic Species." *Journal of Music Theory* 32.2 (1988), pp. 187-270

Gelbart, Matthew. *The Invention of "Folk Music" and "Art Music."* Cambridge: Cambridge University Press, 2007.

Gillies, Malcolm. *Notation and Tonal Structure in Bartók's Later Works*. New York: Garland, 1989.

Goldblatt, Robert. *Topoi: The Categorial Analysis of Logic* (1984). Mineola: Dover Publications, 2006.

Gollin, Edward. "Some Further Notes on the History of the Tonnetz." *Theoria* 13 (2006), pp. 99-111.

———. “Multi-Aggregate Cycles and Multi-Aggregate Serial Techniques in the Music of Béla Bartók.” *Music Theory Spectrum* 29.2 (2007), pp. 143-176.

———. “On Bartók’s Comparative Musicology as a Resource for Bartókian Analysis.” *Integral* 22 (2008), pp. 59-79.

———. “From Matrix to Map: Tonbestimmung, the Tonnetz, and Riemann’s Combinatorial Conception of Interval.” In *The Oxford Handbook of Neo-Riemannian Music Theories*, ed. Edward Gollin and Alexander Rehding, pp. 271-293. New York: Oxford University Press, 2011.

Gould, Steven Jay. *The Structure of Evolutionary Theory*. Cambridge: Harvard University Press, 2002.

Gould, Stephen Jay, and Niles Eldredge. “Punctuated Equilibria: The Tempo and Mode of Evolution Reconsidered.” *Paleobiology* 3.2 (1977), pp. 115-151.

Hanninen, Dora. “Associative Sets, Categories, and Music Analysis.” *Journal of Music Theory* 48.2 (2004), pp. 147-218.

———. “Species Concepts in Biology and Perspectives on Association in Music Analysis.” *Perspectives of New Music* 47.1 (2009), pp. 5-68.

———. *A Theory of Music Analysis*. Rochester: University of Rochester Press, 2012.

Harrison, Daniel. *Harmonic Function in Chromatic Music*. Chicago: University of Chicago Press, 1994.

———. “Supplement to the Theory of Augmented-Sixth Chords.” *Music Theory Spectrum* 17.2 (1995), pp. 170-195.

Hauptmann, Mortiz. *Die Natur der Harmonik und der Metrik*. Leipzig: Breitkopf & Härtel, 1853.

———. *The Letters of a Leipzig Cantor* (1892), ed. Alfred Schöne and Ferdinand Hiller, trans. A.D. Coleridge. 2 Vols. New York: Vienna House, 1972.

Hegel, G.W.F. *The Science of Logic* (1812-1816), trans. George Di Giovanni. Cambridge: Cambridge University Press, 2010.

Hook, Julian. “Cross-Type Transformations and the Path Consistency Condition.” *Music Theory Spectrum* 29.1 (2007), pp. 1-40.

Hyer, Brian. “Tonal Intuitions in ‘Tristan und Isolde’.” Ph.D. Diss., Yale University, 1989.

Jameson, Frederic. *Valences of the Dialectic*. London: Verso, 2009.

———. *The Hegel Variations*. London: Verso, 2010.

Kadarkay, Arpad. *Georg Lukács: Life, Thought and Politics*. Oxford: Basil Blackwell, 1991.

Kahn, Donald W. *Topology: An Introduction to the Point-Set and Algebraic Areas* (1975). New York: Dover, 1995.

Kárpáti, János.*Bartók's String Quartets* (1967), trans. Fred Macnicol. Budapest: Franklin Printing House, 1975.

———. "Perfect and Mistuned Structures in Bartók's Music." *Studia Musicologica* 36.3 (1995), pp. 365-380.

Kilpatrick, Stephen. "'Life Is a Woman': Gender, Sex and Sexuality in Bartók's 'The Wooden Prince'." *Studia Musicologica* 48.1-2 (2007), pp. 163-170.

Kitching, Ian J., Peter L. Forey, Christopher J. Humphries, and David M. Williams. *Cladistics: The Theory and Practice of Parsimony Analysis* (1992), 2nd ed. Oxford: Oxford University Press, 1998.

Kivy, Peter. *The Possessor and the Possessed*. New Haven: Yale University Press, 2001.

Koch, Heinrich Christoph. *Musikalisches Lexikon* (1802). Repr. Hildesheim: Georg Olms, 1964.

Köhler, Louis. "Studien und Betrachtungen über Hauptmann's Buch 'Die Natur der Harmonik und Metrik.'" *Neue Zeitschrift für Musik* 43.20 (1855), pp. 209-210.

———. *Leicht fassliche Harmonie- und Generalbass-Lehre*. Königsberg: Gebrüder Bornträger, 1861.

———. "Ueber die Verwerthung der Hauptmannschen Theorie im Unterricht." *Neue Zeitschrift für Musik* 69.37 (1873), p. 375.

Knuth, Donald. *The Art of Computer Programming* (1968), 3rd ed. Reading: Addison-Wesley, 1997.

Kovács, Sándor, and Ferenc Sebő, eds. *Béla Bartók, Hungarian Folk Songs: Complete Collection*, trans. Ria Julian and Hajnalka Csatorday. Budapest: Akadémiai Kiadó, 1993.

Kroó, György. "Ballet: The Wooden Prince." In *The Bartók Companion*, ed. Malcolm Gillies, pp. 360-371. Portland: Amadeus Press, 1994.

Lerdahl, Fred. "Tonal Pitch Space." *Music Perception* 5.3 (1988), pp. 315-350.

Lendvai, Ernő. *Bartók's Style* (1955), trans. Paul Merrick. Budapest: Akkord, 1999.

———. *The Workshop of Bartók and Kodály*. Budapest: Editio Musica, 1983.

Lewin, David. *Generalized Musical Intervals and Transformations*. New Haven: Yale University Press, 1987.

———. *Musical Form and Transformation*. New Haven: Yale University Press, 1993.

Louie, A.H. *More than Life Itself: A Synthetic Continuation in Relational Biology*. Frankfurt: Ontos Verlag, 2009.

Lukács, György. *Soul and Form* (1910), trans. Anna Bostock. Cambridge: MIT Press, 1974.

———. *History and Class Consciousness* (1923), trans. Rodney Livingstone. Cambridge: MIT Press, 1999.

———. *The Young Hegel* (1938), trans. Rodney Livingstone. Cambridge: MIT Press, 1977.

Mannheim, Karl. "Historicism" (1924). In *Essays on the Sociology of Knowledge*, trans. Paul Kecskemeti, pp. 84-133. London: Routledge and Kegan, 1952.

Martins, José. "Dasian, Guidonian, and Affinity Spaces in Twentieth-Century Music." Ph.D. Diss., University of Chicago, 2006.

Marx, Karl. *Economic and Philosophic Manuscripts of 1844*, trans. Martin Milligan. Mineola: Dover, 2007.

Mason, D.G. *From Song to Symphony*. Boston: Oliver Ditson Company, 1924.

Mayr, Ernst. *The Growth of Biological Thought*. Cambridge: Harvard University Press, 1982.

Meillassoux, Quentin. "History and Event in Alain Badiou," trans. Thomas Nail. *Parrhesia* 12 (2011), pp. 1-11.

McCune, Mark. "Moritz Hauptmann: Ein Haupt Mann in Nineteenth Century Music Theory." *Indiana Theory Review* 7.2 (1986), pp. 1-28

Morris, Robert. *Composition with Pitch-Classes*. New Haven: Yale University Press, 1987.

Moshaver, Maryam. "Structure as Process: Rereading Hauptmann's Use of Dialectical Form." *Music Theory Spectrum* 30.2 (2009), pp. 262-283.

Nietzsche, Friedrich. *Human, All-Too-Human* (1878-1880), trans. Helen Zimmern and Paul V. Cohn. Mineola: Dover, 2006.

———. *The Dawn of Day* (1881), trans. J.M. Kennedy. Mineola: Dover, 2007.

———. *The Gay Science* (1882), trans. Josefine Nauckhoff. Cambridge: Cambridge University Press, 2001.

Panchen, Alec L. *Classification, Evolution, and the Nature of Biology*. Cambridge: Cambridge University Press, 1992.

Parry, C. Hubert H. *The Evolution of the Art of Music* (1893). New York: D. Appleton, 1910.

Pearsall, Edward. "Transformational Streams: Unraveling Melodic Processes in Twentieth-Century Motivic Music." *Journal of Music Theory* 48.1 (2004), pp. 69-98.

Pekkilä, Erkki. "History, Geography, and Diffusion: Ilmari Krohn's Early Influence on the Study of European Folk Music." *Ethnomusicology* 50.2 (2006), pp. 353-359.

Perle, George. "Symmetrical Formations in the String Quartets of Béla Bartók." *Music Review* 16 (1955), pp. 300-312.

Powers, Harold. "Tonal Types and Modal Categories in Renaissance Polyphony." *Journal of the American Musicological Society* 34.3 (1981), pp. 428-470.

Rahn, John. "Approaching Musical Actions." *Perspectives of New Music* 45.2 (2007), pp. 57-75.

Reti, Rudolph. *The Thematic Process in Music*. New York: MacMillan, 1951.

Richardson, John. *Nietzsche's New Darwinism*. Oxford: Oxford University Press, 2004.

Riemann, Hugo. "The Nature of Harmony" (1882), trans. Benjamin SteegeIn *The Oxford Handbook of Neo-Riemannian Music Theories*, ed. Edward Gollin and Alexander Rehding, pp. 65-91. New York: Oxford University Press, 2011.

———. *Vereinfachte Harmonielehre oder die Lehre von den tonalen Funktionen der Akkorde*. London: Augener, 1893.

———. *Hugo Riemanns Musik Lexikon*,11th ed., ed. Alfred Einstein. Berlin: Max Hesses Verlag, 1929.

Rings, Steven. *Tonality and Transformation*. New York: Oxford University Press, 2011.

Roeder, John. "Constructing Transformational Signification: Gesture and Agency in Bartók's Scherzo, Op. 14, No. 2, measures 1-32." *Music Theory Online* 15.1 (2009).

Rosen, Robert. *Life Itself: A Comprehensive Inquiry into the Nature, Origin, and Fabrication of Life*. New York: Columbia University Press, 1991.

Rummenhöller, Peter. *Moritz Hauptmann als Theoretiker*. Wiesbaden: Breitkopf & Härtel, 1963.

Santa, Matthew. “Defining Modular Transformations.” *Music Theory Spectrum* 21.2 (1999), pp. 200-229.

Schoenberg, Arnold. *The Musical Idea and the Logic, Technique, and Art of Its Presentation* (1934-1936), trans. Patricia Carpenter and Severine Neff. New York: Columbia University Press, 1995.

———. *Fundamentals of Musical Composition* (1937-1948), ed. Gerald Strang. New York: St. Martin, 1970.

———. “Composition with Twelve Tones (1)” (1941), trans. Leo Black. In *Style and Idea*, ed. Leonard Stein, pp. 214-244. New York: St. Martin, 1975.

———. *Coherence, Counterpoint, Instrumentation, Instruction in Form* (1917-1951), trans. Charlotte M. Cross and Severine Neff. Lincoln: University of Nebraska Press, 1994.

Schuh, Randall T., and Andrew V.Z. Brower. *Biological Systematics* (2000), rev. ed. Ithaca: Cornell University Press, 2009.

Seiber, Mátyás. *The String Quartets of Béla Bartók*. London: Boosey & Hawkes, 1945.

Seidel, Wilhelm. “Moritz Hauptmanns Organische Lehre: Tradition, Inhalt und Geltung ihrer Prämisse.” *International Review of the Aesthetics and Sociology of Music* 2.2 (1971), pp. 243-266.

Semple, Charles, and Mike Steel. *Phylogenetics*. Oxford: Oxford University Press, 2003.

Sipos, János. *In the Wake of Bartók in Anatolia*. Budapest: European Folklore Institute, 2000.

Spitzer, Michael. “Tovey’s Evolutionary Metaphors.” *Music Analysis* 24.3 (2005), pp. 437-469.

Stevens, Halsey. *The Life and Music of Béla Bartók* (1953). Oxford: Clarendon Press, 1993.

Straus, Joseph. *Remaking the Past*. Cambridge: Harvard University Press, 1990.

Szabolcsi, Bence. “Mensch und Natur in Bartóks Geisteswelt.” *Studia Musicologica Academiae Scientiarum Hungaricae* 5 (1963), pp. 525-539.

Tovey, Donald Francis. “The Main Stream of Music” (1938). In *The Main Stream of Music and Other Essays*, pp. 330-352. New York: Meridian Books, 1959.

Trumpener, Katie. “Béla Bartók and the Rise of Comparative Ethnomusicology: Nationalism, Race Purity, and the Legacy of the Austro-Hungarian Empire.” In *Music and the Racial Imagination*, ed. Ronald Radano and Philip V. Bohlman, pp. 403-434. Chicago: University of Chicago Press, 2000.

Vámos, Magda. “A 1932 Interview with Bartók.” In *Bartók Studies*, edited by Todd Crow, 141-151. Detroit: Information Coordinators, 1976.

Vargyas, Lajos. *Folk Music of the Hungarians* (2002), trans. Judit Pokoly. Budapest: Akadémiai Kiadó, 2005.

von der Nüll, Edwin. *Béla Bartók: Ein Beitrag zur Morphologie der Neuen Musik*. Halle: Mitteldeutsche Verlags, 1930.

Wagner, Richard. *Prelude and Transfiguration*, ed. Robert Bailey. New York: W.W. Norton & Company, 1985.

Walsh, Stephen. *Bartók Chamber Music*. London: BBC, 1982.

Woodward, James. “Understanding Bartók’s Bagatelle op. 6/9.” *Indiana Theory Review* 4.2 (1981), pp. 11-32.

Žižek, Slavoj. *Less than Nothing: Hegel and the Shadow of Dialectical Materialism*. London: Verso, 2012.

Zuckerkandl, Victor. *Sound and Symbol* (1956), trans. Willard R. Trask. Princeton: Princeton University Press, 1973.