



Chopin, Pygmies, and Tempo Fugue: Ligeti's "Automne a Varsovie"*

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ABSTRACT: One of the goals of Gyorgy Ligeti's ongoing series of piano etudes (fifteen at last count) is to produce exceedingly complex polyrhythms—or, as he says, "illusory rhythms"—with a single, human interpreter. Among the most striking is number six, "Automne a Varsovie" (1985), which combines disparate influences, including 19th-century piano music and sub-Saharan African polyrhythm, to produce an effect which Ligeti has called "tempo fugue." To see how Ligeti's fugue works, this article examines his various influences, then analyzes the piece itself.

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1. [Introduction: Western and African Concepts of Meter](#)
 2. [Chopin, Hofstadter and Hemiola](#)
 3. [Ligeti, Simha Arom, and African Rhythm](#)
 4. [Polyrhythm and Micropolyphony in Ligeti's Music](#)
 5. [Form and Tempo Fugue in "Automne a Varsovie"](#)
 6. [Conclusion: Paradoxes of Perception and Style](#)
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1. Introduction: Western and African Concepts of Meter

[1.1] Gyorgy Ligeti's ongoing series of piano etudes embodies many elements of his music since 1980—a fascination with complex rhythms, a pursuit of new kinds of harmonies and melodies, and a strange, almost eerie reminiscence of earlier styles of music. The first book of etudes, numbers one through six, appeared in 1985; he completed the second book of eight in 1993; one more, the beginning of book three, has appeared since then. While all the etudes are innovative, one of the most striking is number six, "Automne a Varsovie." One of Ligeti's main goals in this piece is to produce exceedingly complex polyrhythms with a single, human interpreter.

[1.2] He produces these polyrhythms by combining two vastly different sources of inspiration: the Romantic-era piano music

of Chopin and Schumann, and the indigenous music of sub-Saharan Africa. The composer writes:

One often arrives at something qualitatively new by unifying two already known but separate domains. In this case, I have combined two distinct musical ideas: the hemiola of Schumann and Chopin, which depends on meter, and the additive pulsation principle of African music. . . [T]he hemiola arises from the metric ambiguity posed by a measure of six beats, which can either be divided in three groups of two or in two groups of three. . . The shimmering effect of dividing the bar simultaneously into two and three produces the metric tension which is one of the most seductive attractions of the music of Chopin, Schumann, Brahms, and Liszt.

A completely different metric ambiguity occurs in African music. Here there are no measures in the European sense, but instead two rhythmic levels: a ground layer of fast, even pulsations which are not counted as such but rather felt, and a superimposed, upper layer of occasionally symmetrical, but more often asymmetrical, patterns of varying length.⁽¹⁾

2. Chopin, Hofstadter and Hemiola

[2.1] Ligeti may have drawn inspiration regarding the European hemiola from the philosopher and scientist Douglas R. Hofstadter, whom Ligeti often cites as a literary influence. Hofstadter offers some intriguing notions in his article, “Pattern, Poetry, and Power in the Music of Frederic Chopin:”

In theory, two voices playing a three-against-two pattern need not be perfectly aligned. If you shift the upper voice by, say, 1/12 to the right, you get a different picture [Example 1]. Here the triplet’s third note starts halfway through the doublet’s second. As you can see, the triplet extends beyond the end of the interval, presumably to join onto another identical pattern. We can fold the pattern around and represent its periodicity in a circle, as is shown [also in Example 1]. By rotating either of the concentric circles like a knob, we get all possible ways of hearing three beats against two. In Chopin and most other Western music, though, the only possibility that I have seen explored is where the triplet and doublet are perfectly “in phase.”⁽²⁾

[2.2] As shown in **Example 1**, Hofstadter constructs a grid of twelve pulses underneath the three-against-two pattern, in a way that remarkably resembles what Ligeti will do in his sixth etude. Also, by suggesting that hemiolas need not be “in phase,” Hofstadter stretches the idea in a way that suggests Ligeti’s own complex hemiolas. The idea of phasing, of course, also recalls Steve Reich’s music, as well as earlier works by Ligeti—especially “Selbstportrait mit Reich und Riley (*und Chopin ist auch dabei*)” from the *Three Pieces for Two Pianos*.

[2.3] A few pages later, Hofstadter describes what he calls “a tricky bit of polyrhythm”—actually a complex combination of 2:3 and 3:8 from Chopin’s Fourth Ballade (measures 175–76). This complex hemiola is perhaps the closest precursor to the rhythms of “Automne a Varsovie” in the piano repertoire.

[2.4] At a fast tempo, the polyrhythm does not really sound like a complex hemiola, but creates an “illusory” effect of rubato. Ligeti utilizes this quasi-rubato in his sixth etude by altering the European hemiola to combine several groups of beats: instead of two against three, he uses such combinations as 3:5, 5:7, or even 3:4:5:7. At the same time, he does away with European meter—the larger grouping of beats into measures—by replacing meter with a continuous, undifferentiated pulse of sixteenth notes. This quick, steady pulse stems from an African concept of rhythm, explained by Israeli ethnomusicologist Simha Arom.

3. Ligeti, Simha Arom, and African Rhythm

[3.1] Ligeti wrote an introduction for Arom’s book, *Polyphonies et polyrythmies instrumentales d’Afrique centrale*,⁽³⁾ in which he focused on the music’s possibilities for modern composition:

. . . [Arom’s research] opens the door leading to a new way of thinking about polyphony, one which is completely different from the European metric structures, but equally rich, or maybe, considering the

possibility of using a quick pulse as a “common denominator” upon which various patterns can be polyrhythmically superimposed, even richer than the European tradition (page xviii).

[3.2] According to Arom, African music (specifically, the music of the sub-Saharan Pygmy peoples) does not rely on the Western concept of meter. Classical European meter, he says, is nothing more nor less than a series of identical durations with regular accentuation—in other words, meter is a simple rhythm, spread out on a large scale. African rhythms are cyclical and repeating, but their lack of bar accentuation, as well as their speed and complexity, distinguish them from European rhythms and meters.

[3.3] For Ligeti, the absence of meter is nothing new. Typically, barlines in his music have functioned only as optical aids for the performers. In “Automne à Varsovie,” the same holds true: the listener perceives only chains of complex hemiolas, moving independently of any barlines. This metric freedom recalls not only African music, but Medieval and Renaissance music as well, and probably underlies Ligeti’s admiration for masters such as Ockeghem and Phillipe de Vitry, as well as the *ars subtilior* of the late fourteenth century.⁽⁴⁾

[3.4] Even though African rhythms do not rely on meter, they do resemble hemiolas, with different layers of accents occurring simultaneously. But only rarely do these accents fall into the European two-against-three grouping. More often they tend toward twelve beats, divided into three-against-four: one level of complexity higher, as it were, than their European counterparts.

Twelve-beat groups divided into three-against-four patterns and polymeters have occupied Ligeti a great deal in the past several years. Clear examples can be found in the first of the Nonsense Madrigals (“Two Dreams and Little Bat,” 1988), and the third and fifth movements of the Piano Concerto (1985–88), among other pieces.


4. Polyrhythm and Micropolyphony in Ligeti’s Music

[4.1] Although complex polyrhythms have appeared in Ligeti’s music ever since he came to the West—nearly every score abounds in simultaneous layers of triplets, sixteenth notes, quintuplets, and so on—the difference between the earlier pieces and the etudes lies in a different concept of pulse. In many earlier works, the pulse is divided into two, three, and so on—even thirteenth-tuplets occasionally appear. The effect of these different subdivisions, especially when they occur simultaneously, is to blur the sonic landscape, creating a micropolyphonic web of sound. The smallest common denominator of all these subdivisions is a microscopic fraction of a beat; no one can hear it, much less count it. (Watching someone conduct one of these works produces a curious sensation of feeling a pulse primarily from a visual, not auditory, cue. This “virtual pulse” is difficult to interpret: is it simply a visual by-product for the audience—much as Ligeti’s barlines are a by-product of the musical notation—or is it an integral part of the musical experience which is missing in a recording, like the final, long rests which mark the end of a typical Ligeti work?)⁽⁵⁾

[4.2] To a lesser degree, many of Chopin’s polyrhythms work in the same, “micropolyphonic” way. In the excerpt from the F-minor Ballade, for example, the left hand plays sixteenth notes, while the right plays sixteenth-note triplets. The “smallest common denominator” of this duple vs. triple pattern, especially at such a fast tempo, is vanishingly small: 1/12 of an eighth-note duration in length.

[4.3] On the other hand, the etudes, as well as some earlier Ligeti keyboard works including *Continuum*, *Conlee* and the “Self-portrait” from Three Pieces for Two Pianos, conceive of the pulse as a musical atom, a common denominator, a basic unit which cannot be divided any further. Different rhythms appear through *multiplications* of the basic pulse, rather than *divisions*. In effect, the blurred rhythmic patterns are now magnified; instead of out-of-focus landscapes, one perceives complex patterns with definition, almost like images of fractal coastlines. Ligeti writes, “In a piece such as *Continuum* where I (consciously) tried to create an illusionary rhythm, I came (unconsciously) close to the rhythmic conception evident in the music of sub-Saharan Africa.”⁽⁶⁾

[4.4] Ligeti describes how these “illusionary rhythms” contribute to the sixth Etude:

. . . the pianist plays an even succession of notes. The piece is notated in  (although the barlines as such are

not audible), with sixteen fast pulses per measure. There is however a place in the piece where the right hand accentuates every fifth pulse and the left every third. To the ear, these chains of accents blend together to form a super-signal consisting of two melodies: a slower one formed by the groupings of five and a faster one formed by the groupings of three. The ratio 5:3 is of course mathematically simple, but perceptually very complex. We do not count the pulses but rather experience two qualitatively different tempo levels.⁽⁷⁾

[4.5] The fast pulses form a kind of background ostinato, usually a single pitch class in arpeggiated octaves, as shown below in **Example 4**. Above this ostinato, notes are accented every five pulses, or three, or four, etc., to form melodies of descending, chromatic scales. This descending melody (or “Lamento motif,” as the composer has called it) plays a prominent role in Ligeti’s recent scores—indeed, the emotional directness of the motif is one of the hallmarks of Ligeti’s recent music.⁽⁸⁾ But it permeates “Automne a Varsovie” more than any other piece, giving the music a stark, almost obsessive air of grief. As Richard Steinitz writes, the etude “embodies anxieties stemming from the political unrest in Poland during the early 1980s (hence the dedication ‘to my Polish friends’ and the Chopinesque character of its arpeggiated figurations).”⁽⁹⁾

[4.6] From a compositional standpoint, Ligeti’s different tempo levels probably would not work with any melodic material other than simple scales. Without timbral differences to help the listener parse the various lines, a more complicated melody in different simultaneous tempi would sound like a succession of irregular arpeggios—in fact, pieces like Steve Reich’s *Piano Phase*, some of Nancarrow’s *Studies for Player Piano*,⁽¹⁰⁾ and Ligeti’s twelfth etude, “Entrelacs,” exploit a similar effect. Even in the sixth etude, the more contrapuntal passages are difficult not to perceive as subtly shifting arpeggios. The pianist requires a superb sense of touch to distinguish the densely woven lines.

5. Form and Tempo Fugue in “Automne a Varsovie”

[5.1] Ligeti has evocatively described the sixth etude as a “tempo fugue.”⁽¹¹⁾ This label, as we shall see, is not a mere metaphor, but actually describes the underlying form of the piece. Ligeti “disguises” this underlying form, though, in the surface of the composition. On the surface, the etude, 122 measures long, is a quasi-binary form. A brief, pianissimo interlude at the top and bottom of the keyboard (measures 55–62) splits the piece into two roughly equal parts (measures 1–54 and 62–122). The interlude stands out because of its registral extremes, soft dynamic, and the absence of the background ostinato, which is otherwise always present. (The interlude can be heard at the beginning of Example 7 below.)

[5.2] Both large parts of the piece end suddenly. Shortly before the halfway point, an enormous climax vanishes into the pianissimo interlude just mentioned, while in the final bars, constantly accelerating scales crash off the bottom of the keyboard with the classic Ligeti indication, “Stop suddenly as though torn off, dry (*aufhören wie abgerissen, secco*).” A closer look at the piece reveals similar gestures throughout: a crescendo to a climax, followed by subito pianissimo—or at the end of the piece, silence. As **Example 5** shows, there are seven climaxes in all, three in the first half of the piece and four in the second. These seven climaxes are the formal building-blocks of the etude. Although each climax consists of a crescendo followed by near or total silence, each is approached differently, through voice-leading, rhythm, and register—some climaxes propel themselves outward in contrary motion, while others focus inward in various registers. As we shall see, this variety of gesture is especially remarkable given the strict compositional limitations Ligeti sets for himself. Since each climax tends to be more violent than the ones preceding it, the form of the entire piece can be seen as a single crescendo of climaxes which ultimately vanishes.

[5.3] After the fifth climax, the most violent so far, the initial E \flat ostinato returns, but now on a single pitch notated as D \sharp (see Example 4 above). For the first time since the beginning of the piece the ostinato appears by itself, with no descending scales above it. The E \flat /D \sharp ’s reappearance thus produces a sense of return which complicates the two-part interpretation of the form discussed above, making it a kind of “rounded binary.” ([link to paragraph 5.18. . .](#))

[5.4] Underneath the form of progressive climaxes, divided halfway through by a pianissimo interlude, Ligeti employs a unique fugal technique. To understand how this fugue works, we must examine closely the opening section (or exposition, measures 1–24), in which Ligeti introduces the ideas for the entire piece.

“Automne a Varsovie,” measures 1–24 (Exposition)

[5.5] The opening section consists of three phrases: A (measures 1–9), B (measures 10–17), and C (measures 18–24). Each phrase contains three smaller phrases, each more elaborate than the one preceding; this increasing complexity propels the music to its first climax. The first sound is the above-mentioned ostinato of sixteenth notes, arpeggiated over four octaves on E \flat . Although no accents are marked, since the figure is always arpeggiated from the lowest to the highest, one hears a pattern of 4/16, articulated by register (see Example 4).

[5.6] After five repetitions of the arpeggiated background ostinato, the Lamento motif appears (measure 2), played in octaves in the upper register (see Example 4 above). Since the melody is accented in fives, while the ostinato is arpeggiated in fours, a five-against-four polyrhythm results. The aural result, though, is not a polyrhythm, but rather two separate entities juxtaposed: a background ostinato and a foreground, falling lament which sounds subtly “off;” not unlike a rubato performance of a Chopin nocturne. The tempo marking, “Presto cantabile, molto ritmico e flessibile” expresses the paradoxical nature of the music: it achieves a “super-Chopin,” illusory rubato effect through strict polyrhythm.

[5.7] The melody descends by half-steps except when it encounters the ostinato E \flat , which it skips over. For much of the piece, the melody carefully avoids the background ostinato pitch class. The melody’s opening F \flat (measure 2), a half-step above the ostinato E \flat , has the character of an appoggiatura—one, though, that misses its resolution (E \flat) and continues to slip away, to D, D \flat , then C (measures 2–3). Part of the music’s emotional impact derives from this “broken appoggiatura,” a falling dissonance which overshoots its resolution, never to return.

Phrase A (measures 1–9)

[5.8] In the first bars Ligeti introduces the intensifying processes that will drive the rest of the opening section. As mentioned above, Phrase A is subdivided into three sub-phrases, a1 (measures 2–3), a2 (measures 3–5), and a3 (measures 5–9—see the analytic reduction, Example 6). A doubled duration (10 sixteenths instead of 5) marks the end of each sub-phrase. In each sub-phrase, the melody descends farther, always skipping the ostinato E \flat . Also, each phrase is longer than its predecessor, although sub-phrase a3 is much longer—nearly the length of a1, a2 and the introductory ostinato combined.

[5.9] Sub-phrase a3 also differs from the first two in several other ways (marked by asterisks in the analytic reduction). The melody begins (measure 5) with a pitch and agogic accent: a long, accented F \sharp , a half-step higher than the beginning of phrases a1 and a2. The F \sharp is also harmonized with a lower major seventh (G \flat), strikingly dissonant compared to the octaves before. As the melody progresses downward, it is twice interrupted by small lifts (measures 7 and 8); each of these, too, is harmonized with a major seventh, emphasizing their delaying, intensifying function. The second interruption, C \sharp /D, is stronger than the first, thanks to its doubled duration. From a larger view, some of these “interrupting” notes contribute to a slow, background melodic ascent (these rising notes are circled in the analytic reduction).

Phrases B (measures 10–17) and C (measures 18–24)

[5.10] Phrases B and C repeat and amplify the intensifying processes begun in phrase A. Phrase B adds a lower perfect fifth to the melody’s octave; it also begins on F \sharp , a half-step higher than the highest pitch of Phrase A. The interrupting pitches in phrase b3 (measures 13 and 15) are more dissonant—[0 1 6]—than those in a3 (a major seventh). Also, phrase b3 embeds an ascending line into its harmonies (A \flat A B \flat B C, measures 15–16; ascents like this one will reappear in the second half of the piece). Finally, in phrase b2 a left-hand line starts on G, then “peels off” to become a line of its own, going down to low C. As Example 6 shows, this left-hand line gradually accelerates, at first appearing as half notes (eight 16ths), then moving to six, five and finally four 16ths.

[5.11] Phrase C begins on A \sharp (measure 18, a whole step higher than the highest pitch in phrase B), now harmonized in parallel tritones. In the middle register a new melodic voice appears on G \sharp , accented in threes (end of measure 18, marked in red in Example 6). This is the place described above by Ligeti (paragraph 4.4) in the ratio 5:3, a peculiar kind of mensural canon. The bass adds its own imitation in 4/16, in measures 20–21. Finally, the end of phrase c3 is truncated as the melody and its mid-register imitation coincide rhythmically in measure 24, producing the first climax of the piece. As after each climax, subito pianissimo follows immediately (in this case, with an echo of phrase c3 in 3/16, right hand of measures

25–26). The music relaxes for a moment before the next, large-scale crescendo.

[5.12] Having examined the threefold structure of the Lamento motif and its development in the opening section of the piece, we can now reconsider the etude's form. Following Ligeti's suggestion of a "tempo fugue," the threefold phrase (the Lamento motif) can be taken as the subject; whenever a melody does not fit the three-fold Lamento pattern, the passage is most likely some kind of "episode." The piece divides then into exposition and episode as shown below (see also [Example 5](#)):

1. measures 1–24 Exposition
2. measures 25–36 Episode 1
3. measures 37–54 Episode 2
4. measures 55–85 Re-exposition (Interlude)
5. measures 85–97 Episode 3
6. measures 98–122 Episode 4 (Return of E \flat /D \sharp ostinato)
7. measures 112–122 Coda

The exposition, in which imitative voices gradually enter at different tempo levels, is followed by two "episodes" (measures 25–54), in which chromatically descending scales, mostly in the tempo relationship 5:3, permeate the texture. They do not, though, divide into three clear phrases as in the exposition. Instead they seem to echo parts of the motif (Episodes 1 and 4), or else flow seamlessly, with no clear phrase divisions (Episodes 2 and 3). Unexpectedly, the section of the piece which sounds least like the others—the pianissimo interlude (measures 55–62)—actually begins a re-exposition, labeled as phrases D, E and F in the analytic reduction (see [Example 7](#)).

"Automne a Varsovie," Re-exposition (measures 55–85)

[5.13] Like the beginning, the re-exposition (measures 55–85) gradually builds to a climax. In Phrase D (which I first labeled as the interlude, measures 55–62—see [Example 5](#)), the ostinato drops out, leaving the melody in bare, parallel tritones in extreme registers. The phrase ends with a tritone F/B (measure 62), which dissolves into a new ostinato, quietly oscillating in the extreme upper register: the foreground becomes the background.

[5.14] Because of the ostinato's reappearance in measure 62, Phrase E (measures 62–72) sounds more like a new beginning than a continuation. It presents a new harmonization of the subject, in which lower voices climb as the melody descends (reminiscent of phrase b3 from the opening, measures 15–16). The melody is now in 7/16, a new, slower tempo. The background arpeggios are now in a 5/16 pattern, the former tempo of the melody.

[5.15] As Phrase E continues erratically downward, the ostinato hits the very top of the keyboard and starts to descend, like a marble bouncing off a wall (measure 73). At this moment Phrase F, a single line starting on C, enters in 4/16 (quarter notes—until now only the ostinato has used this speed). From here to the next climax (measure 85), all three tempo levels—5/16 (the ostinato), 7/16 (phrase E) and 4/16 (phrase F) continue together. To summarize, the re-exposition's surface differs from its underlying form: while Phrase D sounds like an interlude and Phrase E sounds like a new beginning, in fact Phrase D is the beginning of a fugal re-exposition. The texture of the surface obscures the compositional technique.

[5.16] Hidden techniques have occupied Ligeti since the days of his micropolyphonic works. *Lux Aeterna* (1966) and *Lontano* (1967), among other pieces, employ canons which are hidden by overlapping entries, each layered over the other so that one hears a slowly shifting mass of sound, rather than a melodic line being imitated.⁽¹²⁾ In "Automne a Varsovie," Ligeti adopts this disguising technique on the formal level to produce an "inaudible fugue."⁽¹³⁾

Episodes 3 and 4, Coda

[5.17] The fugal re-exposition is followed by a third episode (measures 87–98) in which the melody is again treated more freely. Now, imitative entries successively pile onto one another in a way which resembles a stretto. The melody enters first in 3/16, then 4/16, and finally 5/16, creating an accumulation of progressively slower voices. Once all the voices have entered,

though, they begin to accelerate and spread in contrary motion towards the fifth climax of the piece (fff+, measure 98).

[5.18] Then follows Episode 4 (measures 99–112), in which the opening pitch-class $D\sharp/E\flat$ returns. Again, this return to the bare ostinato (producing the “rounded binary” formal interpretation [discussed above](#)) helps obscure the fugal compositional technique. This section is also a quasi-stretto, but now the voices enter in progressively faster values, focusing inward to climaxes in the middle register. Finally in measure 112 the coda appears. A shortened Lamento motif, once again in 5/16, rises above a cacophony of other voices. Its last phrase takes the entire piece to its astonishing but inevitable conclusion: the constantly accelerating subject gathers each strand of melody and collapses through the piano’s lowest octave.

[5.19] To summarize Ligeti’s technique of tempo fugue in “Automne a Varsovie”:

- It has a subject (the Lamento motif) which is imitated at different tempo levels to make expositions, and varied in different ways to make episodes. Dynamic climaxes mark each exposition and episode.
- The different tempo levels appear in both exposition and episode and continue through most of the piece with only one major interruption (the interlude, measures 55–62).
- Since the perception of these tempo levels depends on simple scales (more complicated melodies would be too difficult to parse), there is no “countersubject” per se, only the descending scales of the Lamento motif superimposed over the background pulse.

6. Conclusion: Paradoxes of Perception and Style

[6.1] One of the issues running submerged through this essay has been the question of perception. Can a rhythm be “illusory?” Do Chopin’s complex polyrhythms really produce a rubato effect? The question is subjective, as any issue about perception must be to some extent.⁽¹⁴⁾ Hofstadter, though, writing about Chopin, suggests a solution which seems to ring true to Ligeti’s spirit:

. . . phenomena perceived to be magical are always the outcome of complex patterns of *nonmagical* activities taking place at a level below perception. More succinctly: the magic behind magic is pattern.⁽¹⁵⁾

Ligeti considers his earlier, pattern-based works—especially the notorious *Poeme Symphonique pour 100 Metronomes*—important precursors to the piano etudes. This “pattern-meccanico” style,⁽¹⁶⁾ combined with the melodic expressiveness of the Lamento motif and the rigors of fugue technique, produces (at least for this listener) a magical result.

[6.2] Finally, “Automne a Varsovie,” like most recent Ligeti, is both reminiscent of, and strangely alien to, music of the past. Ligeti does not attempt to continue in the “avant garde” style of his 60s works; nor is he assembling a post-modern collage of older styles. Instead, by synthesizing older musical styles through his own previously established, idiosyncratic techniques, Ligeti maintains his musical individuality—a goal which has long obsessed him. Or as he says, “By rejecting both the ‘retro’ and the former avant-garde, I declare for myself a modernism of today.”⁽¹⁷⁾ This reclaiming of the past, of harmony, melody, and finally form, is a well-documented process he began in the sixties, which I believe has started to see its full fruition since the 1980s. This stylistic evolution, as much as anything else, lies at the core of Ligeti’s recent music.

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Footnotes

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[Return to text](#)

1. Gyorgy Ligeti, “On My Etudes for Piano,” trans. Sid McLauchlan, *Sonus* 9/1 (1988): 4–5. An abbreviated version appears in the liner notes to Erato Compact Disc ECD 75555.

[Return to text](#)

2. Hofstadter, *Metamagical Themas: Questing for the Essence of Mind and Pattern* (New York: Basic Books, 1985): 177–78. This article originally appeared in *Scientific American*, April 1982. (At the time, Hofstadter was apparently unaware of the many 20th-century composers who have radically experimented with rhythm.)

[Return to text](#)

3. Trans. as *African Polyphony and Polyrhythm: Musical Structure and Methodology* by Martin Thom, Barbara Tuckett, and Raymond Boyd (New York: Cambridge University Press, 1991).

[Return to text](#)

4. Ligeti speaks frequently of his studies of earlier music; see for example Peter Varnai, “Beszelgetések Ligeti Györggyel,” translated by Gabor J. Schabert in *Ligeti in Conversation* (London: Eulenberg, 1983): 14–15.

[Return to text](#)

5. For this point, the author is indebted to editorial readers of this essay.

[Return to text](#)

6. Ligeti, “On My Etudes for Piano,” 5. Complex additive rhythms also characterize the music of Eastern Europe, Ligeti’s heritage. The fourth etude, “Fanfares,” as well as the Horn Trio’s second movement and the harpsichord piece *Hungarian Rock* (1978), pay homage to the rhythms of Ligeti’s homeland. But Eastern European rhythms still tend to fall into meters—3+2 or 2+2+2+3 are common examples—while sub-Saharan African (and Ligetian) rhythms do not.

[Return to text](#)

7. Ligeti, “On My Etudes for Piano,” 5–6.

[Return to text](#)

8. See the author’s dissertation, *The Lamento Motif: Metamorphosis in Ligeti’s Late Style*, (Cornell University, 1994). Also, Richard Steinitz has written at length about this motif in a recent series of three articles for the *Musical Times*: “Music, Maths, and Chaos,” (March 1996): 14–20; “The Dynamics of Disorder,” (May 1996): 7–14; and “Weeping and Wailing,” (August 1996): 17–22. Other examples of the motif occur in the last movement of the Horn Trio (1982), the second and third movements of the Piano Concerto (1985–88), and the fourth and fifth movements of the Violin Concerto (1990–92). Faster descending scales have also played an important part in the ninth piano etude, “Vertige” (1989), and the third movement of the Violin Concerto.

[Return to text](#)

9. Steinitz, “The Dynamics of Disorder,” 13.

[Return to text](#)

10. Nancarrow, another important influence on Ligeti’s music of the past fifteen years, employs an even more dizzying variety of polyrhythms than Ligeti does, thanks to his use of the player piano. For Ligeti, one important goal was to produce a rhythmic complexity comparable to Nancarrow’s using only a single, living interpreter (Ligeti, “On My Etudes for Piano,” 6).

[Return to text](#)

11. Gyorgy Ligeti, "Polyrhythmical Aspects in My Piano Etudes," lecture given at the International Bartok Seminar and Festival, Szombathely, Hungary, 26 July 1990, quoted in Lois Svard, "Illusion in Selected Keyboard Works of Gyorgy Ligeti" (D.M.A. dissertation, Peabody Conservatory of Music, 1990): 76.

[Return to text](#)

12. See two analyses by Jonathan W. Bernard published in *Music Analysis*: "Inaudible Structures, Audible Music: Ligeti's Problem, and His Solution," 6/3 (1987): 207–36; "Voice Leading as a Spatial Function in the Music of Ligeti," 13/2–3 (1994): 227–253.

[Return to text](#)

13. In the last movement of the Horn Trio (which marks the Lamento motif's first appearance in Ligeti's music), the underlying passacaglia is "hidden" by the motif in a similar way. See Ulrich Dibelius, "Ligeti's Horntrio," *Melos* 46/1 (1984): 44–61; and Taylor, "The Lamento Motif: Metamorphosis in Ligeti's Late Style."

[Return to text](#)

14. See Bernard, "Voice Leading as a Spatial Function in the Music of Ligeti," for additional discussion of perception-related issues.

[Return to text](#)

15. Hofstadter 174.

[Return to text](#)

16. See Jane Piper Clendenning, "The Pattern-Meccanico Compositions of Gyorgy Ligeti," *Perspectives of New Music* 31/1 (Winter 1993): 194–234. This article is drawn from her Yale dissertation, "Contrapuntal Techniques in the Music of Gyorgy Ligeti" (1989).

[Return to text](#)

17. Ligeti, "Ma Position comme compositeur aujourd'hui," *Contrechamps* 12/13 (1990): 8–9. Also published as *Ecrits* in the collection *Musique/Passe/Present* (Paris: Christian Bourgeois Editeur, 1985).

[Return to text](#)

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