VERTAISARVIOITU
KOLLEGIALT GRANSKAD
PEER-REVIEWED
www.tsv.fi/tunnus

MARCUS CASTRÉN

Aspects of pitch organization in György Ligeti's piano etude no. 8, *FÉM*

Introduction

There doesn't seem to be much of a disagreement about the status of György Ligeti's Piano Etudes: together, the 18 studies constitute a cornerstone of post-World War II piano music.[1]

When examining the particular object of this study, Piano Etude No. 8, *Fém*, composed in 1989 and belonging to Ligeti's Second Book of Piano Etudes, most analysts seem to be first and foremost interested in the rhythmic aspects of the piece.[2] As far as pitch organization is concerned, commentators often content themselves with rather general observations, meaning that relatively little is said in detail about the harmonic construction of *Fém*. An interesting reading of *Fém's* harmonic structure can be found in Polth 2016. He identifies two "whole-tone scales" of perfect fifths.[3] He then suggests, in a centric context, that one of the scales can dominate locally, followed by a modulation-like transition to the domination of the other scale; comparable situations can be observed for the two hands separately, and for the hands taken together (Polth 2016, 130–135). He also discusses *Fém's* relation to tonality and the overtone series. Yu, in turn, examines *Fém* with respect to interval classes 1 and 5 as the most important constructing materials, suggesting that they provide contrasting qualities to the music in various dimensions and levels, ranging from linear to vertical dimensions and small-scale to large-scale entities. As his viewpoint is IC1 and IC5 in all of Ligeti's Piano Etudes, he doesn't provide an extensive analysis of *Fém* (Yu 2014).

[1] For general introductions to the Etudes, see, for example, Toop 1999, 198–208, Steinitz 2011, 236–271 and Podgurski 2013, 19–43. For an introductory discussion on performing the Etudes, see Pace 2012.

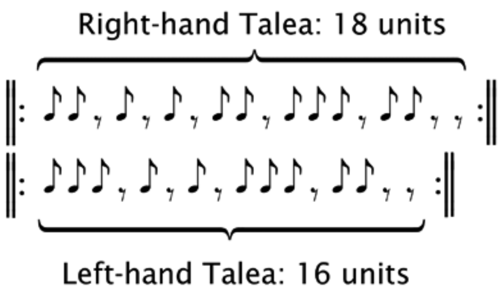
[2] See, for example, Wilson 1992, 66–71; Bauer 1997, 396–403; Bakker 41–81.

[3] Perfect fifths with Ab, Bb, C, D, E and F# as the lower elements form one such scale, while fifths with pcs Eb, F, G, A, B and C# as the lower elements form the other.

In this study, I attempt to examine the pitch organization of *Fém* in a relatively straightforward manner. I start from an all-pervasive aspect of the piece, *parallel fifths*, and study how they might be said to form larger entities in the music, and with what kind of strategies these entities are then used. I try to conduct my discussion without complicated concepts or terminology. The aim is that those without extensive knowledge in post-tonal music theory can also follow the argumentation. I do use some pitch-class set-theoretical concepts but try to keep these at a minimum.

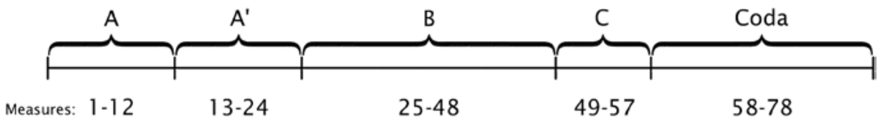
The two *Taleae*

When listening to *Fém*, the aspect most listeners probably pay attention to first is its relentless rhythmic energy. The three-minute piece is governed by two simultaneous and continuously repeated rhythmic patterns, one for the right hand, the other for the left. The patterns evoke the medieval concept of *Talea*, a constant configuration of durations whose repetitions introduce a recognizable element to the piece it is used in. The two *Fém Taleae* are of different lengths, meaning that they coincide at the beginning as pointed out below only after several repetitions (Ex. 1). This results in constantly changing combinations of strong and weak beats, producing a hypnotic kaleidoscope of limping and hacking impulses that seem to be predictable and unpredictable at the same time. The right-hand *Talea* is 18 beats long, the left-hand *Talea* 16 beats. When they begin simultaneously, the next time their starting points coincide is after 8 and 9 instances, respectively.



Example 1. The two Taleae of Fém.

The starting points of these 144-beat *complete cycles* often coincide with clear harmonic or registral changes. As a result, it is possible to use them to divide the piece into sections (Ex. 2). Sections A and A' constitute one complete cycle each. They are almost identical, apart from the latter being transposed an octave and a fifth down. B is twice as long as A, introducing changes in the *Taleae*. C, in turn, is a bit shorter than A, with only six right-hand *Taleae* and the left-hand part deviating strongly from its *Talea* pattern. In the Coda, the two *Taleae* are present in a highly altered form, making it texturally entirely different from the earlier sections.[4]



Example 2. *Fém*: the form (After Järvi 2011).

The two "harmonic families"

As far as pitch organization is concerned, *Fém* contains an element that is as dominant as the *Talea* patterns are in the realm of rhythm, the parallel fifths. In both hands and for most of the piece, these parallel intervals govern the surface of the music, to the extent that they almost seem to melt into the two *Taleae* and constitute two sides of the same coin. The fifths, like the *Taleae*, are no doubt a reflection of the composer's interest in the music of the distant past.[5]

An obvious question arises here: how do the fifths interact with larger-scale harmonic entities, and what might those entities be? My suggestion is this: the fifths, *stacking on top of each other in a few different ways*, form two "harmonic families". These, in turn, are the backbone of the pitch organization. Harmonic Family 1 consists of stacks of perfect fifths (the "Stack-of-Fifths family"). Harmonic Family 2 consists of stacks with alternating perfect fifths and tritones (the "Tritone-Fifth family").[6]

What, then, is the evidence in the music that would support this kind of categorisation? First, we have quite a number of *chords* that provide very "pure" examples, as their interval structures mirror the family definitions exactly. We see a handful of these chords in Examples 3a and 3b.

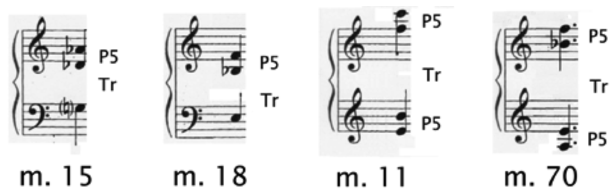
---

[4] A more complex formal structure is suggested in Wilson 1992, and also in Bakker 2013, 66.

[5] On Ligeti's relation to early music, see, for example, Bauer 1997, 41–96; Searby 2010, 160; Järvi 2011, 17; Steinitz 2011, 30, 104, 143, 145, 151, 267.

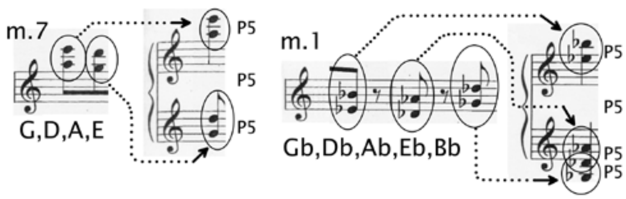
[6] Scholars have invested a lot of interest in fifths as important atomistic building blocks in the music of Ligeti and other composers. See, for example, Straus's fascinating study on Stravinsky: pairs of structural fifths, separated by some interval, help to provide far-reaching harmonic observations on a number of Stravinsky's essential works (Straus 2014). As far as interval cycles involving *all* intervals, not just fifths, are concerned, see Straus 2005, 154–157.

Example 3a. Chords consisting of stacked fifths.

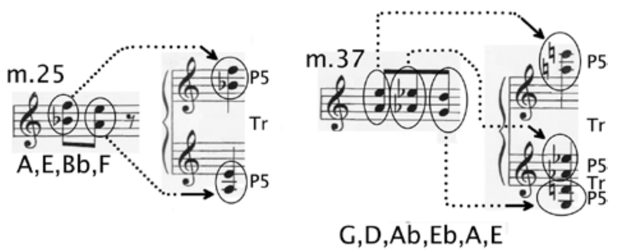


Example 3b. Chords with alternating fifths and tritones.

Then we have another category, namely successions that may *not* be in a "pure" interval stack formation, but can be arranged to one by transposing one or more fifths by an octave. See Examples 4a and 4b.[7]



Example 4a. Successions of fifths belonging to the Stack-of-Fifths family.



Example 4b. Successions of fifths belonging to the Tritone-Fifth family.

[7] In these examples and others to follow, the strings of note names associated with the pitch combinations are given in the "pure" interval stack ordering, to show the family membership in a more obvious manner.

In Ex. 4a, the left-hand case gives us the most common intervallic movement in the entire piece, between two fifths lying a major second apart. By transposing the second fifth an octave lower, we get a four-element stack of fifths. The right-hand case in turn gives a highly typical combination of three fifths. These three can be rearranged to a five-element stack of fifths. And in a similar fashion, the two Ex. 4b examples show how two typical two- and three-element combinations of fifths can be rearranged so that that they form four- and six-element members of the Tritone-Fifth family, respectively. *Fém* is jam-packed with fifth combinations reducible to the two harmonic families.[8]

Formally, let us define that if in a collection of notes the elements can be arranged so that there is a perfect fifth between all pairs of consecutive elements, the collection belongs to the Stack-of-Fifths family.[9] Family members can have from 2 to 12 elements. Correspondingly, if in a collection of notes the elements can be arranged so that in the succession of intervals between pairs of consecutive notes tritones and fifths alternate, the collection belongs to the Tritone-Fifth family. There are two variants of this family, as the first (lowest) interval can always be either a tritone or a fifth.[10] As the smallest family member must contain both a fifth and a tritone between pairs of consecutive elements, family members can have from 3 to 12 elements.

Ordering and registral positioning of the elements is free. The family membership of the collection is preserved even if the elements are not in the "pure" interval stack order. In other words, the collections are not defined to be chords or other pitch-space objects, but *pitch-class sets*.

Some Stack-of-Fifths family members are familiar from traditional music theory. Thus, the five-element family member is the *Pentatonic collection*, and the seven-element member is the *Major collection*. The eight-element family member is often called the *Diatonic Octad Class*.

In order to make the score examples below easier to read, I will use different colours to identify the two harmonic families. A collection of notes marked with *red* means that the collection belongs to the Stack-of-Fifths family (Ex. 5a). Correspondingly, a collection of notes marked with *blue* means that it belongs to the

---

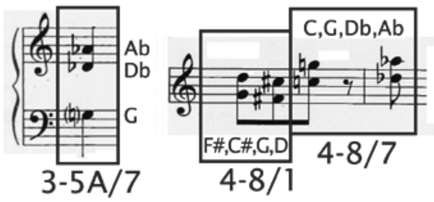
[8] No special analytical position or importance is suggested for the cases shown in examples 3 and 4. They were selected merely to illustrate the family-membership concept.

[9] A number of Ligeti studies identify the idea that (at least some of) *Fém*'s harmonic materials are based on stacked perfect fifths, and that the stacks may be rearranged registrally in more compact spacings without losing their status. The studies, however, do not develop this approach systematically. See Steinitz 2011, 258–260; Bakker 2013, 45.

[10] In other words, the interval successions are either of the form 7–6–7–6… or the form 6–7–6–7… In a post-tonal context, intervals are always given in *semitones*, meaning that a fifth spans seven semitones and a tritone six.

Tritone-Fifth family (Ex. 5b). Below the "boxes" representing the segmentations, each collection also gets a name from the *Forte classification*.[11, 12]

Example 5a. Stack-of-Fifths family members marked in red.



Example 5b. Tritone-Fifth family members marked in blue.

The *Talea* structure and the harmonic families

When testing the relevance of the harmonic-family idea, the *Talea* structure provides a natural starting point.

Ex. 6 gives the four first right-hand *Taleae* in bars 1–6. The notes in the first one form the Pentatonic five-element Stack-of-Fifths family member, set class 5–35. The *third* one, in bars 4 and 5, also produces a five-element member, but it is a different set in the class. The pcset of Talea 3 is a T5 transposition, a fourth up or a fifth down, of the Talea 1 pcset. The fourth *Talea*, in bars 5 and 6, is the eight-element family member 8–23, or the Diatonic Octad Class. The second *Talea*, in bars 2 and 3, contains

11 Forte 1973, 11–13, 179–181. In this study Forte's classification for T_n/T_nI-type set-classes is extended so that the two transpositional "halves" of an inversionally non-symmetric T_n/T_nI class get extra labels A and B to distinguish between them. This results in a classification for transpositional set classes. Thus, for example, the leftmost chord in Ex. 5b gets the name 3-5A. For details, see Castrén 1994, 1–2.

12 Persons not familiar with this classification can observe only the first number of the Forte name. It tells how many different pitch-classes ("note names") the collection contains. Ex. 5a, for example, has two five-element family members. The second number identifies the collection among other same-sized collections. The third number, not being a part of Forte's nomenclature, identifies the individual member set among all sets that are each other's transpositions. This corresponds to the way in which we in traditional theory identify, for example, C Major, C# Major, D Major, etc. In the numeric notation I use in this study, C = 0, C# = 1, D = 2, ... B = 11.

only six pitch-classes, as it is an incomplete version of the seven-element Stack-of-Fifths member, with a missing G. This is not a mistake but something I will examine in more detail below, in the context of what I call *family-member completion*.

Example 6. *Fém*, bars 1–6. Right-hand *Taleae* constituting Stack-of-Fifths Family members © SCHOTT MUSIC, Mainz – Germany.

Ex. 7 identifies the left-hand *Taleae* 5-9, starting from bar 6. The fifth *Talea* is the seven-element Stack-of-Fifths family member, particularly the C Major collection.[13] It is followed by the five-element member (set class 5–35, particularly the F Pentatonic) and the six-element member, set class 6–32. The next, ninth *Talea* is *not* a member of the harmonic family, but, interestingly, it has a very clear subset that is the same seven-element C major collection previously seen. The last *Talea* in the example is again a clear seven-element Stack-of-Fifths family member, this time something that in traditional music theory would be called a D major.[14]

[13] In the expression 7–35/11, the number 11 refers to the first element of the pcset when it is in a so-called *normal order*. Normal ordering is a uniform way to order all pcsets for identification purposes. The pitch-class it designates as the first element may be different from the pc traditional theory would identify as a starting point. Here, the starting point is 11 (B), instead of C, as in traditional theory.

[14] Wilson names *Taleae* 5 and 6 as D Dorian, *Talea* 7 as C Dorian and *Talea* 9 as E Dorian, identifying essentially the same collections as I do here, except that *Talea* 7 doesn't contain the Eb that would actually complete it to C Dorian /Bb Major. Wilson doesn't continue this kind of analysis in any systematic manner. Wilson 1992, 68.

Examples 6 and 7 suggest that in *Fém*, occurrences of Stack-of-Fifths family members may correlate with the *Talea* structure at a high level, but not without deviations. A certain pitch-selectional strategy may supersede an otherwise obvious family-member-per-*Talea* norm, or the composer perhaps just wants to momentarily introduce a disruptive element in an otherwise coherent context, as in the end of the left-hand *Talea* 8 in Ex. 7.

Example 7. *Fém*, bars 6–12. Left-hand Taleae constituting Stack-of-Fifths family members. © SCHOTT MUSIC, Mainz – Germany.

Family-member completion

It seems to me that in *Fém*, there are situations where the composer first creates expectations by introducing an incomplete family member, and then restores the "disturbed balance" by stating the missing element or elements in some prominent manner. This strategy also introduces something the strictly "*Talea*-bound" previous examples did not: family members extending over a single *Talea*.

Ex. 8 is again from the beginning of the piece. This time I'll concentrate only on the top line, marked with red circles. The top line of the first right-hand *Talea* constitutes an incomplete four-element Stack-of-Fifths member, with Bb missing. The Bb does indeed appear a while later, as the last element of the second *Talea* in bar 3 (follow the highest dotted line).

Example 8. *Fém*, bars 1–6. Completion of Stack-of-Fifths family members with "missing elements". © SCHOTT MUSIC, Mainz – Germany.

What makes this completion especially interesting is the top line pitch D in the middle of bar 3. It might seem at first that it disturbs the completion scheme of the four-element collection, but what I think it actually does is that before the completion of the first incomplete collection, it elliptically introduces another. The four-element Stack-of-Fifths collection Eb-Bb-F-C is extended by two more elements, G and D, out of which the G is initially missing. The G comes forcefully as the first element of the fourth right-hand *Talea* in bar 5. Before the G, however, we have the highest note so far, Ab, as the second top-line note in bar 5. It doesn't yet introduce another incomplete collection, but participates by extending the perfect-fifth stack from the "other end". A notion that especially emphasises the G is that while it completes one seven-element Stack-of-Fifths member, it also begins *Talea* 4, which contains another transposition of the same seven-element member.[15]

The situation we saw in Ex. 6, with the entire right-hand part involved, contained what is in my understanding just another variant of this same family-member completion: the second right-hand *Talea* misses a G, and the missing element is stated strongly in the beginning of the fourth *Talea* in bar 5. The five-element family member in *Talea* 3 does not disrupt the "G expectation" as it merely transposes the pitch classes of the *Talea* 1 collection a fifth down.[16]

In an alternative perspective, we might observe the accumulation of right-hand fifths over the opening bars: the initial *Talea* 1 stack of fifths Ab-Eb-Bb-F-C is expanded upwards with (the initially missing) G and D in *Talea* 2; in *Talea* 3, the resulting stack is expanded downwards with Db, and in *Talea* 4 again upwards with A, E and B (besides stating the G, of course). By the end of *Talea* 4 the accumulated stack of fifths contains 11 pitch classes, and the only so far unstated one, F#, comes very prominently in the end of *Talea* 5, as the third beat of bar 8 (see Ex. 9).

Harmonic families in determining level of dissonance

Ex. 9 identifies another type of case where Stack-of-Fifths family members may span over more than one *Talea*. Without the constraints of the *Talea* structure, it may be at times difficult to assess where one family member changes into the following one, as the two may share common pitches and create a sense of "gliding" from one member to the next. I compare two linear entities, one consisting of the top elements of the right-hand part, the other of the lower elements of the left-hand part. The former is again marked with red circles, the latter with red rectangles. The excerpt contains the same bars as Ex. 7, 5–12.

---

[15] As many scholars have noted, Ligeti composed non-tonal music, but associations with tonal concepts were still relevant to him. Here, concepts such as *suspension*, *resolution* and *modulation* might come to mind. For a thorough discussion on Ligeti's relation with tonality, see Cuciurean 2000; Drott 2003; Malfatti 2004; Searby 2010, 1–27, 151–158; Shaffer 2011; Podgurski 2013; Quinnett 2014; Polth 2016.

[16] In what is possibly another category of incomplete entities, Järvi notes that *Fém* contains chords of stacked fifths with missing elements, such as Gb–Db–(Ab)–(Eb)–Bb–F (Järvi 2011, 51). She also states that there are linear passages with parallel fifths so prevalent that in some cases single notes between them might even be completed into "illusory fifths" in the listener's mind (Ibid., 46–47, 52). Perhaps these various incomplete pitch formations might be a reflection of Ligeti's "Clocks-to-Clouds" thinking, away from perfect structures or entities to imperfect ones, with of the idea of a "scale between precision and imprecision". See Steinitz 2011, 168–169, 231–234.

Example 9. Bars 5–12. Long linear segments. © SCHOTT MUSIC, Mainz – Germany.

The top pitches in the right-hand *Talea* 4 and in most of *Talea* 5 (bar 5 to beginning of bar 8) constitute the seven-element Stack-of-Fifths class 7–35, and specifically in that class, the C major collection. In the left-hand *Taleae* 5 and 6, in bars 6–8, the line formed from the lowest elements produces the same pcset. Thus, in most of bar 6 and the entire bar 7, a "white key diatonic" situation is clearly established. This would not change even if we took *all* pitches into account, not just the outer ones.

Then, an interesting thing happens in bars 8–10. The top line introduces a new pitch, F#, in bar 8, and the right-hand *Talea* 6 and the first half of *Talea* 7 consist of pitches producing the G major member set of 7–35. This represents a seven-semitone transposition, T7, up from the previous C Major collection. The left-hand line, in turn, also introduces a new pitch, Bb, in the 7th left-hand Talea in bar 9, producing an F major member set of the set class 7–35. This represents a seven-semitone transposition *down* from the previous C major member set. The uniform initial C Major contents of the two lines are gradually differentiated with fifth-transpositions that introduce new elements as slowly as possible, one at a time. The prevalent element of the piece, the fifth, is again reflected also in the transpositional relations between the family members. Furthermore, as the G major and F major collections are T7-transpositions of C-major (up and down), the unions they produce with the latter will also be Stack-of-Fifths family members. The union of C major and G major is the eight-element Stack-of-Fifths member 8–23, the Diatonic Octad Class, and the union of F major and 8–23 produces the nine-element Stack-of-Fifths class 9–9.

Moreover, if we take into consideration all pitches, not only those in the outer lines, we see again that the pc contents of the fragment remain the same: the material from the beginning of bar 6 (or in the right hand already from the beginning of *Talea* 4 in bar 5) until the first half of the right-hand *Talea* 7 in bar 10 is reducible to the nine-element Stack-of-Fifths class 9–9.

The lowest-pitch line of the left-hand *Talea* 9, in bars 11–12 (and also the four previous pitches, marked with dotted lines), produces again the seven-element Stack-of-Fifths class 7–35. This time the member is specifically D major. The top-line pitches in the right-hand *Talea* 8, in turn, starting from bar 11, form the Pentatonic five-element Stack-of-Fifths class 5–35. Interestingly, the collection Db-Eb-F-Ab-Bb is the literal complement of the G major collection of the previous bars. Together with the dyad C-F in the 3rd and 4th beat of bar 11 (see the dotted line), the five-element collection expands into a member of the six-element Stack-of-Fifths class, 6–32. The process away from the diatonic "white-key" situation in bars 6–7 takes another step toward chromaticism, as the union of the D Major and 6–32 collections contain all 12 notes of the chromatic scale. This happens just in time for the beginning of the Section A' that repeats the material of Section A, with an octave-and-a-fifth transposition downwards. I will return to linear entities being reducible to Stack-of-Fifths family members again when discussing the Coda.

So far we have seen both harmonic-family integrity with respect to the *Talea structure* (Examples 6 and 7), and longer, more ambiguous presence of Stack-of-Fifths members over several successive *Taleae* – or between simultaneous *Taleae* in the two hands. Ex. 9, moreover, suggests a process from a relatively consonant situation to an increasingly dissonant one, with the help of family member selection: selecting instances of harmonic-family members with decreasing amount of common elements produces more chromaticism.

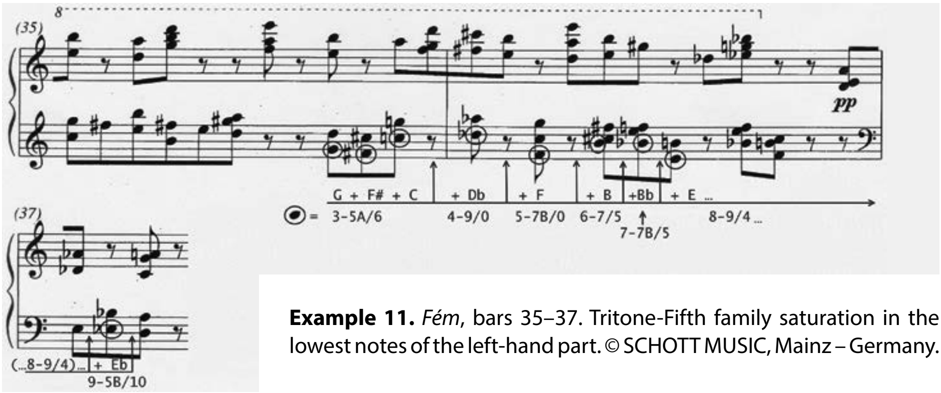
Ex. 10 gives an example of a dissonant pc set selection from bar 33, with two simultaneous instances of the seven-element Stack-of-Fifths family member 7–35. In traditional terms we would say that the right-hand part contains Bb Major and the left-hand part B Major. The number of common elements is two (pitch classes 3 and 10, or D#/Eb and A#/Bb), which is the least possible amount between any two Major scales. As Bb Major is the T11 of B Major (a major seventh up from B, or a minor second down), the corresponding elements in the two collections ("roots", "thirds", "fifths", etc.) are always separated by a sharp dissonance, and, consequently, the overall level of dissonance is high.

Example 10. *Fém*, bar 33. Two simultaneous instances of the seven-element Stack-of-Fifths family member. © SCHOTT MUSIC, Mainz – Germany.

It seems reasonable to assume that with pc set selection strategies such as this, it could have been possible for the composer to control the overall level of dissonance in the music. *Fém* seems to contain a harmonic process from relatively consonant harmonies in the beginning to highly dissonant ones at the end of Section C, and back to slightly milder levels of dissonance again in the Coda.

Harmonic-family saturation

Ex. 11 takes us to bars 35–37, and to the beginning of a left-hand *Talea*. I will first concentrate on the lowest notes only, marked with blue circles. Notes in the first three circles constitute a three-element member of the Tritone-Fifth family (F#-C-G). Adding a fourth element to these three, in the beginning of bar 36, produces a *four*-element family member (F#-C-G-Db). Adding the fifth element, F, produces a *five*-element Tritone-Fifth member (F-C-F#-Db-G), and so on, until we reach a *nine*-element member with the Eb in bar 37 (Eb-Bb-E-B-F-C-F#-Db-G). The few bassline notes without circles do not break the logic as they are merely second instances of pitch-classes already stated before. What we have here is an extremely clear case of what I call *harmonic-family saturation*: we start from small family members, and by introducing new pitch-classes gain larger ones. Such a process can be seen frequently in *Fém*.



Example 11. *Fém*, bars 35–37. Tritone-Fifth family saturation in the lowest notes of the left-hand part. © SCHOTT MUSIC, Mainz – Germany.

In Ex. 12 we have again the bars 35–36, but this time with the left-hand part taken in its entirety. We see a similar saturation process, now from a four-element member up to a ten-element member. The process is interlocked with the previous one but is formed from different combinations of pitch-classes.

Example 12. *Fé*m, bars 35–36. Tritone-Fifth family saturation in the left-hand part. © SCHOTT MUSIC, Mainz – Germany.

Ex. 13 gives yet again the same bars, but now the left- and right-hand parts are observed simultaneously. The saturation process is still there to be seen, extending from an eight-element member to a twelve-element member, but, incredibly, it has "changed families", as we are back with the red Stack-of-Fifths family.

Example 13. *Fém*, bars 35–36. Stack-of-Fifths family saturation, with both left- and right-hand parts. © SCHOTT MUSIC, Mainz – Germany.

Finally, examining the right-hand part alone, we have a short saturation process, from a four-element member to a ten-element member in bar 36 (Ex. 14).

Example 14. *Fém*, bars 35–36. A short Stack-of-Fifths family saturation process in the right-hand part (bar 36). © SCHOTT MUSIC, Mainz – Germany.

All in all, what we have here seems to be a kind of "musical crossword puzzle" that realises referential harmonic entities in many layers and dimensions simultaneously. I don't know if a constellation like this results from deliberate planning or from some intuitive stroke of genius, but I find it nevertheless astonishing.

The Coda

My final example is from the Coda. Initially, the Coda may seem quite enigmatic. The *Taleae* appear to be absent, and there are many chord types that are rare or non-existent in the earlier sections. The *Taleae* are present, however, but in a highly altered form.[17] I return here to a viewpoint we already examined earlier: linear formations spanning over more than one *Talea* and being reducible to harmonic family members.

Ex. 15 gives the last bars of the piece. As both Bakker and Polth note, there are similarities between materials in the end of the A section (bars 11–12; see Ex. 9) and the closing bars.[18] The Coda material is transposed a fifth down. The right-hand *Talea* 8 has its counterpart starting from the end of bar 71, and the 9th left-hand *Talea* has its counterpart starting from bar 72. (Examples 15 and 9). Moreover, besides the two *Taleae*, the beginning of bar 11 bear resemblance with materials in bars 69–70. The correspondence between the two fragments is evident, but not exact..

Ex. 15 shows three linear segments. The highest one, starting from the middle of bar 70 and marked with red triangles, produces the six-element Stack-of-Fifths member 6–32/1. The middle line, starting from bar 71 and marked with red rectan-

[17] See Bakker 2013, 76–80 for an interesting analysis of the rhythmic structure of the conclusion.
[18] Bakker 2013, 80; Polth 2016, 126–127.

gles, produces another transposition of the same six-element member, 6–32/2. The two 6–32 members lie a minor second apart, sharing only one pitch-class (F#) and providing another example of (the intentionally?) wide distribution of pitch-classes, with its potential for controlling the level of dissonance. The eight-bar long bassline, marked with red circles and combining the lowest notes of the left-hand part, produces the eight-element Stack-of-Fifths family member 8–23/4.[19] The three lines seem to produce a sort of curious pseudo-polyphony.

Example 15. *Fém*, bars 69–78. Simultaneous linear instances of Stack-of-Fifths family members. © SCHOTT MUSIC, Mainz – Germany.

Conclusions

As the starting point of this study, I suggested that two "harmonic families" play an important role in the pitch organization of *Fém*. Although the families actually consist of pitch-class sets (registral positioning and order between the elements is free), they can be easily described with the help of chords: one family consists of stacks of pure fifths, the other of stacks of alternating tritones and pure fifths.

I then tried to demonstrate how instances of family members permeate the music in numerous different ways. They may constitute clearly identifiable objects in the music – chords, phrases spanning a *Talea*, almost motive-like patterns of fifths that recur constantly, linear formations, combinations of linear formations – or they

[19] Because the note F in bar 72 does not have an exact counterpart in the corresponding left-hand line in bar 11 (an exact fifth-down transposition would have an E here), the end result is different from its counterpart in bars 11–12, producing the Diatonic Octad Class instead.

may exist as more ambiguous, "cloud-like" entities. Or, a family member may first be given with a missing element, and the completion then realised in some pronounced way that restores the balance, perhaps evoking associations with tonal procedures. An instance of a given family member may be shared by both hands, or the hands may have separate instances of their own. In the latter case, transpositional relations between instances seem to point to the idea of deliberate control of common elements between the instances, and, via this, to the control of the overall level of dissonance in the music. Furthermore, family members may participate in dense saturation processes where new pitches expand smaller family members into larger ones in a stepwise manner.

A logical next step would be to apply the idea of harmonic families to Ligeti's other *Etudes,* examining whether this approach could complement existing observations made by other analysts. Another, more theoretical approach, would be the study of harmonic families in general: what kind of properties could a given family be said to possess in terms of its chordal, linear, polyphonic, etc. potential?

I have the feeling that the observations I have just offered have merely scratched the surface of *Fém*. The harmonic structure of this piece of modest proportions is tremendously rich. It is also elusive: just when you think that you have found regularities or consistencies or logic, something comes up and pulls the rug from under your feet.

The harmonic organization has exactly the same life and vigour and complexity as the more famous and obvious rhythmic parameter does. *Fém* is a small masterpiece, a worthy successor to the grand tradition of the virtuoso piano *etude.*

REFERENCES

Bakker, Sara 2013. *Playing with patterns. Isorhythmic strategies in György Ligeti's Late Piano Works.* Ph.D. diss. Indiana University.

Bauer, Amy 1997. *Compositional Process and Parody in the Music of György Ligeti*. Ph.D. diss. Yale University.

Castrén, Marcus 1994. *RECREL. A Similarity Measure for Set-Classes.* Doctoral diss. Studia Musica 4. Helsinki: Sibelius Academy.

Cuciurean, John 2000. *A Theory of Pitch, Rhythm, and Intertextual Allusion for the Late Music of György Ligeti*. Ph.D. diss. University of New York at Buffalo.

Drott, Eric 2003. The Role of Triadic Harmony in Ligeti's Recent Music. *Music Analysis*, 22(3), 283–314.

Forte, Allen 1973. *The Structure of Atonal Music*. New Haven and London: Yale University Press.

Järvi, Elisa 2011. *Kääntyvä kaleidoskooppi. Näkökulmia György Ligetin pianoetydiin nro 8 Fém (1989).* EST-julkaisusarja 21. Helsinki: Sibelius Academy.

Malfatti, Dennis 2004. *An analysis of György Ligeti's Nonsense Madrigals*. Ph.D. dissertation, Louisiana State University.

Pace, Ian 2012. Maintaining Disorder: Some Technical and Aesthetic Issues Involved in the Performance of Ligeti's *Études* for Piano. *Contemporary Music Review*, 31(2–3), 177–201.

Podgurski, Barbara 2013. *Polymetric Layering and Tonal Language in the Piano Etudes of György Ligeti*. DMA diss. The City University of New York.

Polth, Michael 2016. "nicht tonal und nicht atonal": Zur Bedeutung der Quinten in Ligetis Etüde Nr. 8 "Fém". *Studia Musicologica; Budapest,* 57(1–2), 121–138.

Quinnett, Lawrence 2014. *Harmony and Counterpoint in the Ligeti Etudes, Book I: An Analysis and Performance Guide*. DM treatise. Florida State University.

Searby, Michael 2010. *Ligeti's Stylistic Crisis. Transformation in His Musical Style 1974–1985*. Lanham, Maryland: The Scarecrow Press.

Shaffer, Kristen 2011. *"Neither Tonal nor Atonal"?: Harmony and Harmonic Syntax in György Ligeti's Late Triadic Works*. Ph.D. diss. Yale University.

Steinitz, Richard 2011. *György Ligeti. Music of the Imagination*. London: Faber and Faber. ebook edition.

Straus, Joseph N. 2005. *Introduction to Post-Tonal Theory*. Third edition. New Jersey: Pearson Prentice Hall.

Straus, Joseph N. 2014. Harmony and Voice Leading in the Music of Stravinsky. *Music Theory Spectrum*, 36(1), 1–33.

Toop, Richard 1999. *György Ligeti*. London: Phaidon.

Wilson, Peter Niklas 1992. Interkulturelle Fantasien. György Ligetis Klavieretüden Nr. 7 und 8. *Melos: Jahrbuch für zeitgenössische Musik* 51, 63–84.

Yu, Man-Ching 2014. Pitch-Class Analysis: Some Aspects of IC5 and IC1 Design in György Ligeti's Piano Études. *New Sound International Journal of Music*, 43, 173–190.