

Expanded Tonality in Quartal Space: Back to Debussy's *Étude pour les Quartes*

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Abstract: Considering the hypothesis that intervals of fourths work in Debussy's *Étude pour les Quartes* as an every-level structuring cell, this article proposes a harmonic analysis where all chords are drawn from a twelve-tone quartal space. The hypothesis is that Debussy tests the capacity of the quartal matrix to supersede conventional triadic harmony. On another hand, because of this novel networking, the high-level formal articulation demands complementary resources to be more effective, especially concerning perception. For this reason, in a second phase, an analysis of secondary dimensions, such as density and relative range, is attempted to highlight their function. The conclusion points to "unsolved" interactions between the lower-level harmonic system, which recycles some aspects of the tonal rhetoric, although in an experimental quartal space, and a surface that avoids sensation of both continuity and causality.

Keywords: Debussy. *Étude pour les Quartes*. Harmony. Expanded Tonality. Twelve-Tone Quartal Space.

Título: Tonalidade expandida em espaço quartal: de volta ao *Etude pour les Quartes* de Debussy

Resumo: Considerando a hipótese que o intervalo de quarta funciona, no *Etude pour les Quartes* de Debussy, como célula estruturante em todos os níveis, este artigo propõe uma análise harmônica em que todos os acordes se encontram incluídos em um espaço quartal de doze sons. A hipótese é que Debussy pode ter desejado testar a capacidade da matriz quartal em superar a harmonia triádica convencional. Por outro lado, por causa deste novo *networking*, a articulação macro-formal demanda recursos complementares para se tornar mais efetiva, no que diz respeito, especialmente, à percepção. Por esta razão é que, numa segunda etapa, fazemos uma análise de algumas das dimensões secundárias, tal como a *densidade* e o *âmbito relativo*, em uma tentativa de realçar a sua função. A conclusão aponta para interações "não resolvidas" entre o sistema harmônico de nível inferior, e uma superfície que evita sensações de continuidade e causalidade.

Palavras-chave: Debussy. *Étude pour les Quartes*. Harmonia. Tonalidade expandida. Espaço quartal de doze sons.

Considering the hypothesis stated by Paul Roberts (2003: 305) that the interval of the fourth works as a structuring cell at all levels in Debussy's *Étude pour les Quartes* (1915), we attempt to locate and apply a fourth-based system that could fit the actual chord content of the piece. Moreover, one might expect that Debussy may have hidden in the piece pseudo or expanded tonal functions behind a colorful, exotic-sounding (since non-triadic) harmony, which will also guide our investigation.

Fourth Circles

At first glance or listening, the *Étude* quickly reveals the recurring pitch-class of F as a melodic or harmonic center. However, it is important to note that these recurrences occur almost exclusively in the beginning and end of the piece coinciding with sections in F major. Although key signatures are to be taken with caution in Debussy's music, one may assume from this observation that it could indicate centricity. More precisely, F major appears in the beginning of the piece at measures 3-4, 7-12, and 18 (where it forms the bass of the only major triad in the entire piece—a noteworthy event), and at measures 25-26; then, appearing again in the end of the piece at measures 62-71, 75-76 and 82-85.

Another indicator of centricity is that the actual position of both the F major chord at measure 18 and the final arpeggiated chord at measures 82-85 highlight these elements suggesting a strong structural function. Extracting their pitch-classes, a pentatonic collection forms a perfect fourths' scale (A-D-G-C-F) (fig. 1, left). Therefore, the F triad in measure 18 can be described as a subset of the perfect fourth, while the final chord, its plain expression. Another analogy is thus possible with traditional tonal harmonic structures that usually utilize weak cadences during the course of the music while reserving the strongest to conclude the piece. The point here demonstrates an inversion of values, since the "perfect" structure is a quartal chord and the "imperfect" a pure triad.

These preliminary observations lead to the possibility of a bipolar harmonic system based on a circle of perfect fourths, with F as its pole. In this circle, descending fourths on the left of F down to A form the main pseudo-tonic pitch field, while the ascending fourths right from B^b up to F^b forms the pseudo-dominant pitch field. This asymmetrically divided harmonic circle—as the tonic and dominant fields do not equally share the surface—is shown in Fig. 1 together with an unfolded representation in conventional musical notation where colors are used to identify the respective pseudo tonic and dominant pitch fields.

Another incidental fact to support this hypothesis is the way Debussy notates accidentals which appear to be suitable for this type a system since he undoubtedly favors flattened pitches (see for instance, the melody at measures 25-28, the six flat key signature section at measures 29-42, and the final section at measure 59 onwards). In such a context, the rare sharp notes, as well as the natural notes not included in the tonic field, will be analyzed as not-harmonic, altered, or not-systemic¹.

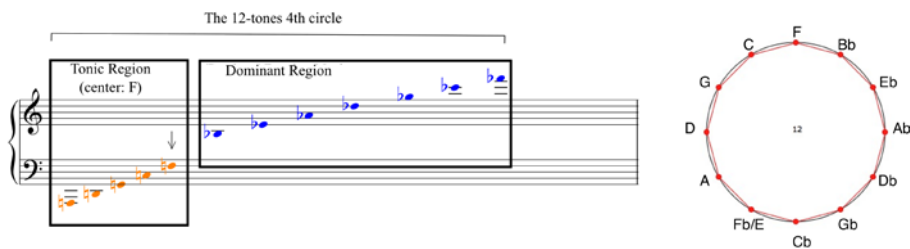


Fig. 1: The harmonic circle of fourths for *Pour les Quartes*.

Selection Rules

To build a reduced-chord sequence of the *Étude* the following rules were applied: (a) only explicitly written chords from tri-chords upwards were computed, meaning chords that could eventually be deduced from grouping parallel melodic lines were not considered²; (b) from these chords, we selected those that have some outstanding setting, either on the time axis, where they should contribute to a temporary prolongation or suspension of the streaming of the current event, as in the 1st section, or to its amplitude (including some kind of accentuation, as from measures 49-60); (c) independent layers or parallel melodic motions were not constrained to be fused into chords, for example, the independent C in measures 5-6, the low tones under the tetra-chords at measures 49-54³, the autonomous *lointain* gesture in measures 77-78, the parallel melodic motions in

¹ See however footnote 7 for a possible inclusion of all pitches into the system.

² Although, obviously enough, the melodic content of this *Étude* almost always fits quartal structures, especially in pentatonic shape. [On pentatonicism in Debussy, one may read, although not mentioning *Pour les Quartes*, Day-O'Connell (2009)].

³ We consider these tones as part of the harmonic-independent bass melodic motion. Debussy's music offers many examples of such non- (or counter-) harmonic basses (PARKS, 1989. GUIGUE, 2011).

measures 1-4 or 32-37, etc.; (d) exact adjacent repetitions of chords were omitted (measures 51-52, 59-60, 70-71, 79-81, 82-85)⁴; (d) arpeggiated chord sections were clustered (measures 8-9, 11-12, 38-39, 41-42, 62-64, 80-81, 82).

This mapping resulted in a collection of 36 chords displayed in order of appearance in figure 4, top staff system. The analysis handled the chords in two ways: in their original written configuration, respecting actual pitches and doublings, and in a reduced quartal "prime" form (QPF). To obtain the latter, the chord pitches were rearranged for better matching the fourths vector. It is common to have more than one reduction solution to choose from⁵.

To facilitate reading of figures 4 and 5, they are also presented in musical notation along with their successive-interval arrays (SIAs) typed inside brackets below the staves. As defined by Parks, a SIA is a list of the chords' interval content, bottom-top⁶.

Chords are labeled by their measure number (in italics above the staves in the figures). In case of more than one chord per measure, gross decimal subdivision is appended.

When the gap between two intervals can be fulfilled by some fourth inner complementary interval ([4], [5] or [6]), that is, it can be interpreted as the sum of two superposed fourths, this filling in is placed inside parenthesis and the inserted pitch-class is marked with a notehead cross. Thus, a real SIA [5 10 5] is rather transcribed as [5 (5+5) 5]. This convention allows a broader inclusion of chords into the quartal frame.

It is worth knowing that the pitch-classes in such "prime" form are not necessarily written in their actual pitches. However, they are not to be considered as pitch-classes in the common sense either. This is due, on one hand, to their distribution along a fourths-scale space which cannot be reduced to the octave modulus, and, on the other hand, to the principle of non-equivalence of enharmonic pitches. This is why the use of Temperley's

⁴ However, the reiteration of the measures 65-67's sequence at measures 68-69 need to be maintained because of the changing of two pitches in the last chord.

⁵ See for instance fig. 3. This multiplicity implies a subjective choice, which deserves to be removed in a further development of the model, by refining the reduction rules in such a way a unique QPF is to be declared.

⁶ Cf. Parks *op. cit.*: 312 *et sq.* Another quite equivalent labeling could be the twelve-tones theory term AIS (adjacency interval series).

terminology is preferred, where "tonal pitch-classes" (TPCs) are "opposed to the twelve 'neutral pitch-classes' (NPCs) of atonal set theory" (TEMPERLEY, 2000: 289)⁷.

Non-equivalence is mandatory for the analysis of Debussy's language where flats and sharps are not used in random and should not be freely exchanged facilitate analytical fit. This means that in the proposed model, while D flat, for instance, is absorbed into the harmonic "dominant" region, C sharp is not. Fig. 2 quotes two examples of the non-inverting quality of Debussy's chord writing.

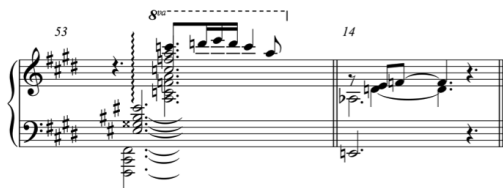


Fig. 2: Two excerpts from the *Étude Pour les Sonorités Opposées* (DEBUSSY, 1915): (measure 53) the Major E# chord has its own syntax, identity and function which should not be diluted into the Major F#; (measure 14) the A $\flat$ prevents a V^{7/9} chord to be formed.

The reduction model used for the *Étude* is illustrated in figure 3 which provides two examples, while figure 4 presents the entire harmonic content in both its actual and quartal prime forms, including their SIAs.

⁷ Temperley proposes a general model for tonal analysis that represents the pitch space on a "line of fifths", which is "similar to the circle of fifths, except that it extends infinitely in either direction" (TEMPERLEY, 2000: 290). Adapting this model to fourths, and, consequently, including *all* the pitch content into a single frame, would lead to another undoubtedly interesting perception of the harmonic syntax of the work.

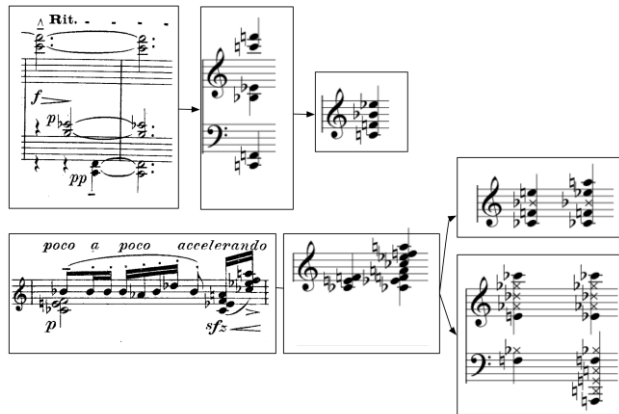


Fig. 3: Two samples of the reduction model for the *Étude*: from left to right: original, chordal reduction, and Quartal Prime Form; top: measures 8-9; bottom: measure 53, showing two possible QPFs' reductions⁸. Notehead crosses are explained in the main text.

Chords sequence (actual pitches)

5 6 8 11 18 38 41 49.1 49.3 50.1 50.3 51.1 51.3

A B C

Chords' Quartal Prime Forms

SIA8 [4 (5+5) 6] [5 5 5] [(5+5+5) 5] [5 5 5] [6 5 4] [6 5 5] [6 5 5] [6 5 5] [5 6 5][5 6 5]

[5 (5+5) 6] [5 6 5 5 5] [5 (5+5) 5 5 5]

⁸ The 1st reduction orders the pitches the closer way on an ascending fourths scale. The 2d reduction includes all pitches in the fourth-scale domain, thus avoiding any "foreign" tone. For this study, the 1st reduction process was applied.

53.1 53.3 55.1 55.3 56 57 58 59.1 59.2 62-64

[6 (5+6)] [6 (5+5) 6] [5 (6+5)] [6 5 5] [5 6 5] [5 6 4] [6 5 5] [(5+5) 5 5] [5 5 5] [5 (5+5) 5]

65 67.1 67.3 68 69.2 69.3 70.1 70.3 72 77 78 79-81 82

[5 5 5] [5 (5+5) 5] [5 5 5] [5 5 5] [5 (5+5) 5] [5 (5+5) 5] [5 5 5] [5 (6+5) 5] [5 5 5] [5 5] [5 5 5] [6 5 (5+5)] [5 (5+5) 5]

Fig. 4: The mapping of *Pour les Quartes* harmonic content in chordal format: on top of staves: chord sequence with actual pitches and doublings; at bottom staves: Quartal Prime Forms with SIAs. Legend: on top staves: measure numbers also used to identify chords; A to D "rehearsal" letters label the macro-formal sections; Notehead crosses and SIAs data: see main text for explanations.

Analysis

Statistical Overview of Chord Sequence

The most prominent closures may suggest a four-section structure: A (1-19), B (20-42), C (43-64), D (65-85). Although smaller units arise from other indications, such as pauses or tempo markings, thereby increasing the complexity of the overall layout, this larger articulation will prove to be coherent with the harmonic structuring. Correlation between chords and sectioning is shown in figure 4. Comments follow.

- . All chords can be reduced to some Quartal Prime Form built on either perfect [5], augmented [6] or diminished [4] fourth(s).
- . The A, B and D sections are mostly composed of perfect-fourth QPF chords, as almost all SIAs fit the $[5^*n]$ format⁹.
- . In contrast, the central (C) section avoids this form and makes use of mixed QPFs mainly through the blend of perfect and augmented fourths, such as [6 5 5] or [5 6 5]. The densest chords of this central section appear between measures 53 and 55. They also get the most complex SIAs — [6 (5 +6)], [5 (6 +5)] and [6 (5+5) 6]. Suggesting a symmetrical design, the ending of the section brings back $[5^*n]$ QPFs (measures 59 to 64).
- . This global harmonic behavior emphasizes the strong balance of the last section (D) where a sequence of nine perfect QPF tetra-chords (measures 65-72) lead to a final closure in three steps (measures 77-82, read more below).

Some statistical data about the collection of 36 chords according to their SIAs are displayed in Table I. The quantitative survey of each category clearly shows that "perfect" QPF chords are by far the most common units.

C	Description (SIAs)	N.	%
1	$[5^*n]$ (exact stacking of perfect fourths without doublings)	10	27,78
2	$[5^*n + 10]$	7	19,44
3	$[15 + 5]$	1	2,77
4	$[5^*n + 6]$	9	25,00
5	$[5^*n + 11]$	2	5,55
6	$[(5,6,4)^*3]$ (stacking of three among any of the three forms of fourths)	2	5,55
7	$[(4,5,6) + 10 + 6]$	4	11,11
8	$[6 + 11]$	1	2,77

Table I: the collection of 36 chords and their quartal structure described by their SIAs.

C: category (1-8); N.: number of chords, from a total of 36; %: percentage.

⁹ This formula describes a chord built on the stacking of [5] without any doubling.

The data can be summarized in the following manner: (a) "perfect" chords (i.e. consisting of only perfect fourths or their doublings) (cat. 1-3 of the Table): 18 (50%); (b) "imperfect" chords (three kinds of fourths, including at least one [5] (cat. 4-6): 13 (36.1%); (c) "imperfect" chords (at least one of the three kinds of fourths) (cat. 7): 4 (11.1%); (d) only [6] (cat. 8): 1 (2.77%).

This survey brings some first evidence of a rather strong tying of chords inside a coherent functional system based on the fourth space. Setting up such a system constitutes the next step of this project.

A Functional Analysis of Harmony

Primary level

First, the articulation of chords is realized according to their Quartal Prime Form as part of the directed harmonic motions towards either the tonic or the dominant poles. This is the primary stage of low-level chord articulation. Symbolic-graphical resources are used to represent this frame (fig. 5).

Chords and sections are labeled as in figure 4. Coherently, per the convention established for figure 1, pitches that belong to the tonic region are enhanced by the color orange, while blue is designated for those from the dominant. Other (i.e. "foreign") pitches remain in black. Oblique lines emphasize parallel motions whereas slurs point to the prolongation of functions.

1st Directed Motion to Closure

[A] 5 6 8 11 18

[4 (5+5) 6] [5 5 5] [5 6 5 5 5] [(5+5+5) 5]
[5 (5+5) 6]

Suspension on 'Dominant'

[B] 38 41

[5 5 5] [5 (5+5) 5 5 5]

'Undirected' Motion

based on parallel chord motions

Closure

C

49.1 49.3 50.1 50.3 51.1 51.3 53.1 53.3 55.1 55.3 56 57 58 59.1 59.2 62-64

[6 5 4] [6 5 5] [6 5 5] [5 6 5] [6 (5+6)] [5 (6+5)] [5 6 5] [5 6 4] [6 5 5] [5 5 5] [5 (5+5) 5]

2nd Directed Motion to Final Closure

D

65 67.1 67.3 68 69.2 69.3 70.1 70.3 72 77 78 79 82

[5 5 5] [5 (5+5) 5] [5 5 5] [5 (5+5) 5] [5 (5+5) 5] [5 (6+5) 5] [5 5 5] [5 5] [5 5 5 5] [5 (5+5) 5]

Fig. 5: A functional harmonic analysis of *Pour les Quartes*. See fig. 4 for legend;
Colored pitches (related to "tonal" function): see fig. 1 and main text.
Prolongation slurs and oblique lines: see main text.

This mapping shows four successive harmonic motions, each corresponding to one formal section, as defined above. All of them point towards closure.

Due to the bipolarity of our model, the chords are self-structuring into a finite network where perfect closures are expressed, as in a conventional tonal space, by a motion from the Dominant to the Tonic region, while imperfect closures avoid or delay such resolutions.

Thus, the first motion which sustains the A section (measures 1-18) is a rather direct step motion to F major that can eventually be reduced to the cadenza bVI-bII-IV (measures 6-11) to III-V-I (measure 18) as a substitute of the classical V-to-I closure (Audio example 1)¹⁰.

¹⁰ The first chord of this cadence can also be interpreted as a subdominant prolongation of F (III-VI-I in Bb).



Audio example 1: The chords' progression in section A: directed motion

In the formal scheme, section B contrasts A by almost exclusively using contrapuntal textures. Nonetheless, it is firmly closed by two chords (measures 38-39 and 41-42), both asserting the dominant field (Audio example 2).



Audio example 2: The harmonic conclusion of section B: suspension on the dominant

The explicit avoidance of any tonic pitch enforces a shift of gravity into that field. This moving is confirmed and reinforced in the following section C (measures 43-64), where chords no longer suggest a clear direction. This is exactly what usually occurs in the development section of a sonata-form archetype. In section C the harmony consists of mixed chords¹¹, mostly tetra-chords, in parallel motion—a standard Debussy chord voicing. However, this central episode ends on an interesting ambiguous chord (measures 62-64). Ambiguity here refers to the fact that pitches are equally distributed between both fields (Eb-Ab and C-F, respectively), a refined way to prepare the return of the tonic field (Audio example 3).



Audio example 3: Vagrant harmonic sequence of section C

The last section's harmonic content (measures 65-85) recovers a plain functionality which can be embedded into a full closing I-V-I pattern. All verticalities from

¹¹ Mixed chords, in the present study, define chords whose content mixes pitches from tonic and dominant fields.

measures 65 to 72 are made of balanced mixed tetra-chords with no non-harmonic TPCs—the contrary of C section. That means that all of them share both tonic and dominant pitches. Prolongation slurs in the figure show how strikingly the harmony, in frank contrast with the "vagrant" sequence of section C, finds back its gravity center, becoming an agent of stability and stasis (Audio example 4)¹².



Audio example 4: Chord progression in section D: directed motion.

This sequence leads to perfect closure in three steps: measures 77-78 (dominant-only chord), 79 (transitory mixed chord) and 82-85 (tonic-only tetra-chord). It is worth noting that Debussy formulates this "perfect cadence" inside a quartal framework (Audio example 5).



Audio example 5: Harmonic final closure.

As a conclusion thus far, the chord material is thoroughly connected to functional syntax where conventional triadic relations are substituted by an appropriate alternative system. A secondary effect of this system is the elimination of the composer's otherwise so-called coloristic, non-functional chords. On the other hand, it draws attention to Debussy's in depth search for new harmonic resources in a context of expanded tonality.

¹² "Vagrant" is applied here in the way Schoenberg used to qualify non-directed harmonies in tonal music (SCHOENBERG, 1954: 44 et sq.).

Secondary level

At this stage, the study is furthered to consider the secondary level of analysis of the chords to include their actual sounding pitches and doublings as shown in figure 4¹³. Special attention is drawn to the relative linearity (henceforth relative linearity) of pitch distribution, as well as the relative density of the chords, their relative cognitive sonance (henceforth relative sonance) and relative range.

Relative linearity measures how equidistant the pitches are distributed. The interval between the contiguous pitches is factored by a paradigmatic interval which corresponds to the interval that would make pitches equidistant. The higher the resulting value (i.e. the closer to 1.00) the lesser the linear distribution of pitch. For example, the tri-chord 55.1 in figure 4 receives the maximum weight because it has the most irregular distribution within the boundaries of a tri-tone, i.e. [5] + [1]¹⁴.

Relative density is obtained by dividing the total number of pitches by their maximum possible number within the actual range of the chord. Thus, a chromatic cluster would receive the maximum weight of 1.00. In solo keyboard music, close positioned chords tend to receive a heavier weight than wider ones.

A good example of how active this dimension is for the high-level structuring of harmony is achieved by comparing the low relative densities of the two last chords ((0.13) and (0.10))—a way to express their resting, relaxing function—once again with the tri-chord at measure 55.1 (0.50).

A vector from "maximum consonance" to "maximum dissonance", relative sonance evaluates the contiguous dyads of the chord on the basis of weighting their relative dissonance according to a pre-defined cognitive background. It also extracts an average

¹³ The *secondary level* encloses some statistical aspects of the building of sonic structures (GUIGUE, 2011). It borders some topics of Berry's analytic proposals (BERRY, 1987), Meyer's *secondary parameters* concept (MEYER, 1996), and Parks' *form-defining parameters* category (PARKS, 1989), among others.

¹⁴ The extreme adjacent contrasts of relative linearity weights observed between measures 53 and 55, although very impressive on the graph 6a below, are part of Debussy's usual vocabulary when he wants to bring the secondary-level dimensions at the top of structuring hierarchy, by creating successive strong contrasts (See also relative range, fig. 6e). At the same time, usually (but not in the case of this Étude), low-level material remains unchanged (cf. GUIGUE, 2011).

value for the entire chord, being its relative sonance rate. The weights used for this project are shown in Table 2¹⁵.

Interval	H	Oct.0	Oct.1	Oct.2	Oct.3	Oct.4
12	2	0.00	0	0	0	0
7	3	0.09	0	0	0	0
5	4	0.18	0.09	0	0	0
4	5	0.27	0.135	0	0	0
9	5	0.36	0.18	0	0	0
8	5	0.45	0.225	0	0	0
3	6	0.54	0.27	0	0	0
6	7	0.63	0.315	0	0	0
10	7	0.72	0.36	0	0	0
2	9	0.81	0.54	0.27	0	0
11	15	0.90	0.60	0.30	0	0
1	17	1.00	0.75	0.5	0.25	0

Table 2: The *relative cognitive sonance* table used for this study.

Column "Interval": default cognitive dissonance map of dyads from [1] to [12], ordered top-bottom from the most consonant to the most dissonant. Column "H" gives the partial range which put the dyad's upper tone in a harmonic relation with the lower tone, thus cancelling the dissonance feeling. Col. "Oct. 0": prime intervals sonance quality weight. Columns "Oct. 1-4" show the gradual decrease of this prime quality according to octave distances between the two pitches.

This is why the consonant F major triad on measure 18 carries an almost zero weight—precisely (0.09)—while the dissonant chord at measure 57 reaches (0.72).

Finally, relative range divides the chord's ambitus by the piano's range. This simple operation allows weighting the chord according to its relative size.

The data obtained from these statistical evaluations¹⁶ are shown in figure 6 (a, b, c, d, e), with red vertical lines marking the four A-D sections. For a complementary representation and analysis, these graphs may be compared to the chord mapping in figure 4.

¹⁵ This dissonance ranking of intervals, taken from Guigue (1996: 229 et sq.), is based on a survey of a large number of sources which include Fétis, Hindemith, Plomp & Levelt, and Parncutt, among others. The average correlation between these data and the proposed synthesis is (0.62). The computer application that implements this function allows the user to customize this ranking (see next footnote).

¹⁶ *SOAL – SonicObjectAnalysisLibrary* – is the *ad hoc* software the Mus³ lab developed to perform these calculations. It is freely available at the *OpenMusic* library at <http://ccta.ufpb.br/mus3>.

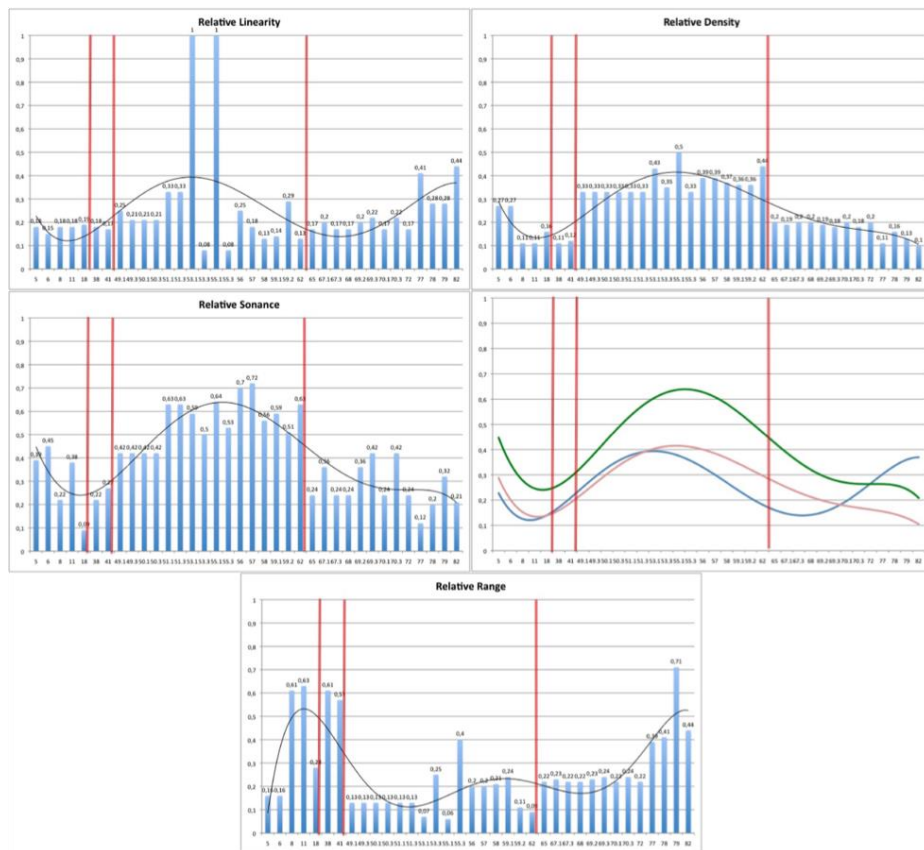


Fig. 6: Evaluations of a selection of secondary-level sonic dimensions of chords. Top down: (a) *relative linearity*, (b) *relative density*, (c) *relative cognitive sonance*, and (e) *relative range*.

Graph (d) plots the tendency lines of graphs a, b, and c.

This set of data outlines a cyclic behavior. The low chord weights of section A obtained from linearity, density and sonance implies that harmony begins with simpler structures—a fact that can be verified in figure 4. At the same time, the evaluation of relative range shows that those chords tend to cover quite a wide ambitus.

As the music progresses from section B on, the weights of the first three dimensions gradually increase to reach their highest values, therefore implementing the chords with upmost complexity in the central *momentum* of section C¹⁷. Meanwhile, the relative range goes exactly in contrary motion, which is mathematically translated by a pronounced negative correlation with the other dimensions¹⁸. That means that the more complex (nonlinear, dense, dissonant) chords are also the most narrow ones¹⁹.

The final (D) section would correspond to a concluding phase in a tonal context. We have already found out that, inside the quartal frame, the primary level structure fulfills this principle. And it is exactly in this way that the density and sonance weights evolve, with simpler sonorities characterizing the last harmonic sequence, as it is clearly shown in the graphs contained in figures 6b & 6c. It is quite tempting to interpret this composing feature as a supporting device to increase, or even to warrant, the sense of closure, since the non-triadic challenge obviously embodies, as already pointed out, a loss of tonal strength.

However, it is worth noticing that the two remaining dimensions—linearity and range—work in contrary motion. Observing figure 4, or the score, the overall structuring is, in fact, the result of a Debussy's typical writing for the piano as found in several Preludes, not to say a cliché, especially in opening or concluding passages. Indeed, the composer frequently unfolds a very wide sonic space through the activation of the extreme regions of the instrument with relatively few notes inside, at a low dynamic (pp) amplitude.

The key aspect of this stage of analysis is that the selected secondary-level dimensions actively contribute to strengthening the cyclic pattern already expressed at the primary level. Accordingly, the three-step rhetoric background—statement, contrast, and resolution—is supported by both levels.

¹⁷ This amazing, since quite rare, positive triple correlation is shown in the tendency lines graph (fig. 6d), between measure 38 to 55.

¹⁸ The coefficient of correlation returns an average value of (-0.51) when comparing the three first dimensions with *relative range*, reaching down to (-0.75) for the paired lists *densities* – *ranges*.

¹⁹ Although interesting, this behavior is far from exclusive of this work, as we have shown elsewhere (GUIGUE, 2011). In fact, this is, to some extent, due to the instrument interface—wide chords on the piano can hardly have a larger number of notes, unless in *arpeggiato* or *cluster* form—and psycho-acoustic invariants, for narrow-ranged chords are likely to produce harsher sensations, especially if located at the border regions and played at high amplitude levels.

Discussion—Essentials of Debussy's Post-Tonalism

This experimental study highlights two complementary properties of harmony in *Pour les Quartes*.

First, all the chords are drawn from a twelve-tone quartal non-enharmonic space, where the work is centered on F. Given this framework, F can be mapped into a functional network which, although borrowed from the tonal triadic domain, transcends this space while promoting new pitches and chords relations.

Also, because of this networking and the lack of triadic structures, the higher-level formal articulation demands complementary resources to be more effective, especially concerning perception. This is the reason why secondary dimensions turn to play a decisive role, for they help to improve the design of both the harmonic directed motions and the overall cyclic form.

As already mentioned, such a harmonic functional network is not regarded as usual in Debussy's output. There is at least one good reason for this presumed exceptionality. In several opportunities, the composer declared that, besides the keen piano playing challenge and aesthetical considerations, the *Études*' project was intended to be a laboratory for experimenting new compositional techniques (DEBUSSY, 2005: 1925, *passim*). Among his concerns was the somewhat over quoted purpose of not giving up neither going beyond tonality, but rather getting "drown" it. The *Études* impelled him to follow unexplored paths in the search of an expanded tonal syntax—in which experiences with non-triadic structures had to take a crucial place—and of alternatives to romantic organicism and narrative. His experiments led the formerly dependent and non-structuring dimensions—such as amplitudes, densities, orchestration, and so on—rise to the top level of structuring vectors.

However, this article is restricted to harmony and does not embrace other structuring forces. As stated in related literature, Debussy's answer to the narrative issue is a category of forms based upon adjacent discontinuities, in order to avoid expected relations between successive moments. This results in fragmented, unconnected surfaces, which in some cases have been compared to the dreams' structure (JANKÉLÉVITCH, 1976, *passim*).

As a matter of fact, the overall layout of *Pour les Quartes* does follow this composing premise. The movie below (fig. 7) reproduces the first nineteen measures of the piece. It consists of a sequence of nine contrasting moments, each one with its own sonic design. Colors and letters help the reader to observe that none of them is repeated—

except the 3rd and the 4th. Furthermore, no such things as themes or development of "ideas" arise.

The image displays a musical score for Debussy's *Étude pour les Quartes*, measures 1-19. Above the score is a horizontal bar divided into nine colored segments, each labeled with a letter: a (yellow), b (light green), c (orange), d (yellow), c (orange), d (yellow), e (light blue), f (light green), and g (red). The musical score is written for piano and features various dynamics and markings: *Andantino con moto*, *p dolce*, *p*, *pp*, *ppp*, *Rit.*, and *piu p*. The score is presented in two systems, with the first system containing measures 1-10 and the second system containing measures 11-19. The notation includes treble and bass staves with various musical symbols such as notes, rests, and accidentals.

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Fig. 7: *Étude pour les Quartes*, mesures 1-19. Colors enhance successive and contrasting sonic units, labeled above. Movie by the Author.

In such a context, the lower-level harmonic system recycles some aspects of the old tonal rhetoric, interacting in a contradictory way with a modernist technique of structuring. While the former builds, in the background, a pseudo tonal syntax based on the continuous progression from one reference region to its opposite one, then going back home, with harmonies moved by an internal bipolarity, the latter, on the surface, avoids any sensation of continuity and causality. Such dialectic, embedding unsolved interactions, marks Debussy's most progressive search. This is why this *Étude* can be seen as a miniature of some of the essentials of his language²⁰.

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