

Compositional Planning Based on Scalar Modulation Techniques

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Abstract. This article aims to describe the compositional planning of *Prelude* from *L'appel du vide* based on the scalar techniques, proposed by Tymoczko (2011) for his analysis of the 20th century compositions, mainly in certain works by Debussy and Shostakovich. The treatment given to such techniques by these composers inspired the elaboration of gestures and musical structures of the new original work. The scalar techniques and their specific approaches showed significant potential for planning new compositions, expanding and diversifying the repertoire of compositional techniques.

Keywords. Scalar Techniques. Compositional Planning. Debussy and Shostakovich. Homage.

Planejamento composicional a partir de técnicas de modulação escalar

Resumo. Este artigo visa descrever o planejamento composicional de *Prelude*, da obra *L'appel du vide*, baseado nas técnicas escalares, propostas por Tymoczko (2011) para a sua análise das composições do século XX, principalmente em determinadas obras de Debussy e Shostakovich. O tratamento dado a tais técnicas por esses compositores inspirou a elaboração de gestos e estruturas musicais da nova obra original. As técnicas escalares e suas abordagens específicas mostraram potencial significativo para o planejamento de novas composições, ampliando e diversificando o repertório de técnicas composicionais.

Palavras-chave. Técnicas escalares. Planejamento composicional. Debussy e Shostakovich. Homenagem.

1. Introduction

In this work, I will present some procedures used in my work *Prelude* (which is the first movement of a larger work entitled *L'appel du vide*, 2018) based on the scalar techniques used prominently by certain composers of the beginning of the 20th century. These techniques are based on the scalar analysis proposed by Tymoczko (2011). The fundamentals of this analytical methodology will be covered in the following section.

L'appel du vide, a tribute to Debussy and Shostakovich, fuses the composer's compositional style with certain characteristics of the honoree's compositional language (BARRENECHEA, 2009, p. 627).¹ *L'appel du vide* evokes certain characteristics of their works, especially Debussy's *Des pas sur la neige*, and Shostakovich's *Prelude and Fugue in F# minor, Op. 87*. There are many characteristics of the compositional language of these composers used in *L'appel du vide*, but only those related to some scalar techniques will be addressed in this work. First, the scalar techniques will be presented with examples and, finally, the compositional planning of *Prelude* from *L'appel du vide* will be presented in detail.

2. Scalar modulation techniques

According to Tymoczko (2011), the 19th century left a problem to be solved urgently by the composers of the following century. The problem was to combine chromatic contrapuntal innovations with the five components that contribute to the sense of tonality:

1. *Conjunct melodic motion*. Melodies tend to move by short distances from note to note. 2. *Acoustic consonance*. Consonant harmonies are preferred to dissonant harmonies, and tend to be used at points of musical stability. 3. *Harmonic consistency*. The harmonies in a passage of music, whatever they may be, tend to be structurally similar to one another. 4. *Limited macroharmony*. I use the term “macroharmony” to refer to the total collection of notes heard over moderate spans of musical time. Tonal music tends to use relatively small macroharmonies, often involving five to eight notes. 5. *Centricity*.² Over moderate spans of musical time, one note is heard as being more prominent than the others, appearing more frequently and serving as a goal of musical motion. (TYMOCZKO, 2011, p. 4).

These characteristics form the central axis of Tymoczko's book, whose aim is to investigate the different ways that composers can use them in the production of interesting musical effects. The solution found by certain composers for that problem was to use scales to ameliorate the lack of stability promoted by the chromatic motion. The result is a different kind of tonality, in which the structure of scales plays a fundamental role. Tymoczko (2011) presents three scalar techniques that 20th century composers used to neutralize the attraction to chromaticism typical of the end of the previous century: *chord-first composition*, *scale-first composition*, and *subset technique*. Before defining such techniques, referred to in this work as *scalar modulation techniques*, henceforth SMT, the author emphasizes the *principle of chord-scale compatibility*, in which chords are perceived as subsets of scales of five to eight notes. In this central context for all SMT, the musical logic of creative thinking can have either chords or scales as guides, that is, one of them can be the starting point of the musical structure.

Chord-first composition is the first scalar modulation technique (SMT1). It does generate a sequence of scales that could not be related in any way other than through the *efficient voice leading* between chords (TYMOCZKO, 2011, p. 79), in which the motion must not exceed two semitones.³ The chord level, then, prevails in the musical logic, directing the construction of the scales. The term *chord-first composition* can refer, therefore, to the hypothesis that a composer created the efficient voice leading between the chords before creating the scalar sequence. As an example, in Figure 1 the upper voices form three triads connected by efficient voice leading in the chromatic space. The progression of these chords— isolated from the lower staff—is Dm, B_bm, and C^{7M(no5)}, which is an incomplete major seventh

chord. The lower voice, in turn, consists of different scales, one for each chord. Modulations between these scales are produced through the use of efficient voice leading between chords.



Figure 1: Initial excerpt from *Prelude Op. 48, N.º 2*, by Alexander Scriabin (TYMOCZKO, 2011, p. 309).

SMT2 is *scale-first composition*. It uses efficient voice leading to connect the scales themselves instead of chords. This is similar to one of the types of modulation between tonalities mentioned by Kostka, Payne and Almén (2018, p. 322), called *monophonic modulation*. This modulation, produced in a single melodic line, occurs by inserting or highlighting pitch-classes that are found in the second key, but not in the first.⁴ As an example of SMT2, Figure 2 presents an excerpt that suggests a sequence of familiar scales connected by semitone voice leadings in just one scale degree. This transformation is shown in the figure by arrows between the pitch-classes.



Figure 2: Initial excerpt of *Ondine*, from *Gaspar de la nuit*, by Maurice Ravel (TYMOCZKO, 2011, p. 310).

Although not shown in Figure 2, there are also efficient chromatic voice leadings between two scale degrees at a time later in the piece. In general, the scalar modulations of Figure 2 occur by the rise of a semitone between them in sequence, as shown in Figure 3. The B acoustic scale is also known as the Lydian $\flat 7$ mode. The term *mode II* means that the scale starts with its second degree. In relation to the compositional technique, a logic is perceived here, in which scalar treatment is the most important. The composer creates motion between similar scales by changing one or two pitch-classes. Unlike SMT1, in SMT2 the efficient chromatic voice leading applies to scales instead of chords.



The figure displays four staves of musical notation, each representing a different scale. The scales are: G# acoustic (mode IV), C# diatonic major, C# harmonic major, and B acoustic (mode II). Each staff shows a sequence of notes with arrows indicating chromatic voice leading between adjacent notes.

Figure 3: Scalar modulation due to the rise of just one semitone in the first four measures of *Ondine* from Ravel's *Gaspar de la nuit*.

SMT3 is called *subset technique*, in which the scales are connected by a group of common pitch-classes (subsets) that are quite prominent in the musical flow, as a theme for example. In Figure 4, the first six pitches of *Les collines d'Anacapri*, by Claude Debussy, act as a theme, that is, they have importance as the guiding thread of musical discourse. These pitches, in the same order and at the beginning of each staff of Figure 4, appear in three different scalar contexts in the following order: B diatonic major (a), E diatonic major (b), and E acoustic (c). In Figure 5 these scales are arranged in connection. Alternatively, in general, this work by Debussy was built on the basis of a scale in the key of B that contains five *fixed* scale degrees (black pitch-classes in Figure 5) and two *mobile* degrees (white pitch-classes in Figure 5). In this context, fixed degrees are those that always appear the same way in a musical composition, while mobile degrees may or may not be inflected chromatically. This change aims at the possibility of using different collections of pitch-classes in the same musical work. Although the three scales used in *Les collines d'Anacapri* are connected by efficient voice leading, Tymoczko (2011, p. 311) considers SMT3 as a determinant in the modulations of this work because there is a fixed group of pitch-classes that form the main theme. The subset

relationship, in this example, is more important than the voice leading. This is the difference between SMT2 and SMT3. Scalar modulation in SMT3 is produced through common pitch-classes that are important for musical discourse.



Figure 4: Appearances of the six-tone theme (B, F#, C#, E, G# and B) in *Les collines d'Anacapri*, by Debussy (TYMOCZKO, 2011, p. 312).



OR

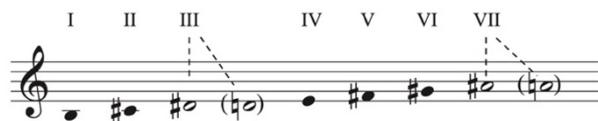


Figure 5: Upper part of figure: Scalar relations in *Les Collines d'Anacapri*, by Debussy. Lower part: The general scalar collection of this work.

3. Compositional planning of *Prelude from L'appel du vide*

Having presented the theoretical basis of this paper, I will describe in detail from here the compositional planning of my work *Prelude from L'appel du vide*, which was based on two of the three SMT described by Tymoczko (2011), namely SMT2 and SMT3, used simultaneously. In terms of SMT2, *Prelude* is based on scalar modulation by lowering degrees per semitone, with the F# natural minor scale as a starting point. The lowering of degrees gives rise to scales that are mostly unfamiliar. This technique was used by Shostakovich in his *Prelude and Fugue in F# minor, Op. 87*. The *Prelude from L'appel du vide*, therefore, uses the same original scale used in this work by Shostakovich. Third and sixth degrees are not lowered because they would produce a doubling of pitch-classes. For example, A (third degree) lowered chromatically becomes G#, which is the same pitch-class as the second degree. The first degree is also not lowered in order to avoid changing the key. Thus, the set of F# minor scales from the semitone lowering of degrees II, IV, V and VII (including the F# natural minor itself) contains sixteen possibilities, of which twelve were deliberately selected in the planning of all movements of *L'appel du vide*. The twelve scalar arrangements were structured according to the number of chromatically altered scale degrees at a time. Table 1 shows this organization. The acronym NM stands for F# natural minor scale, and the acronym TI-0, whole tones that include the pitch-class C.

Table 1: F# natural minor (NM) and the twelve derived scales used in *L'appel du vide*, by Helder Oliveira.

Lowerings at a time	Amount used/ total amount	Scales in <i>L'appel du vide</i>
0	0/1	NM
1	2/4	NM $\flat 4$
		NM $\flat 7$
2	5/6	NM $\flat 4$ + Phrygian ($\flat 2$) = D harmonic major (mode III)
		NM $\flat 4$ + D acoustic ($\flat 5$) (mode III) = TI-0 (+ A)
		NM $\flat 4$ + NM $\flat 7$ = D Purvi ⁵ (Hindustani music)
		NM $\flat 7$ + Phrygian ($\flat 2$) = Phrygian $\flat 7$
		NM $\flat 7$ + D acoustic ($\flat 5$) (mode III) = incomplete octatonic
3	4/4	D harmonic major (mode III) + D acoustic ($\flat 5$) (mode III) = Locrian $\flat 4$
		D harmonic major (mode III) + NM $\flat 7$ = G melodic minor ascending (mode VII)
		TI-0 (+ A) + NM $\flat 7$ = C Asian-Bartók $\sharp 5$ (mode IV) or D Jewish $\sharp 4$ (mode III) ⁶
		Phrygian $\flat 7$ + D acoustic ($\flat 5$) (mode III) = Locrian $\flat 7$
4	1/1	Locrian $\flat 4$ + NM $\flat 7$ = G harmonic minor (mode VII)

As an example, Figure 6 shows the four scales resulting from the modulation by lowering scale degrees by a semitone, one degree at a time.

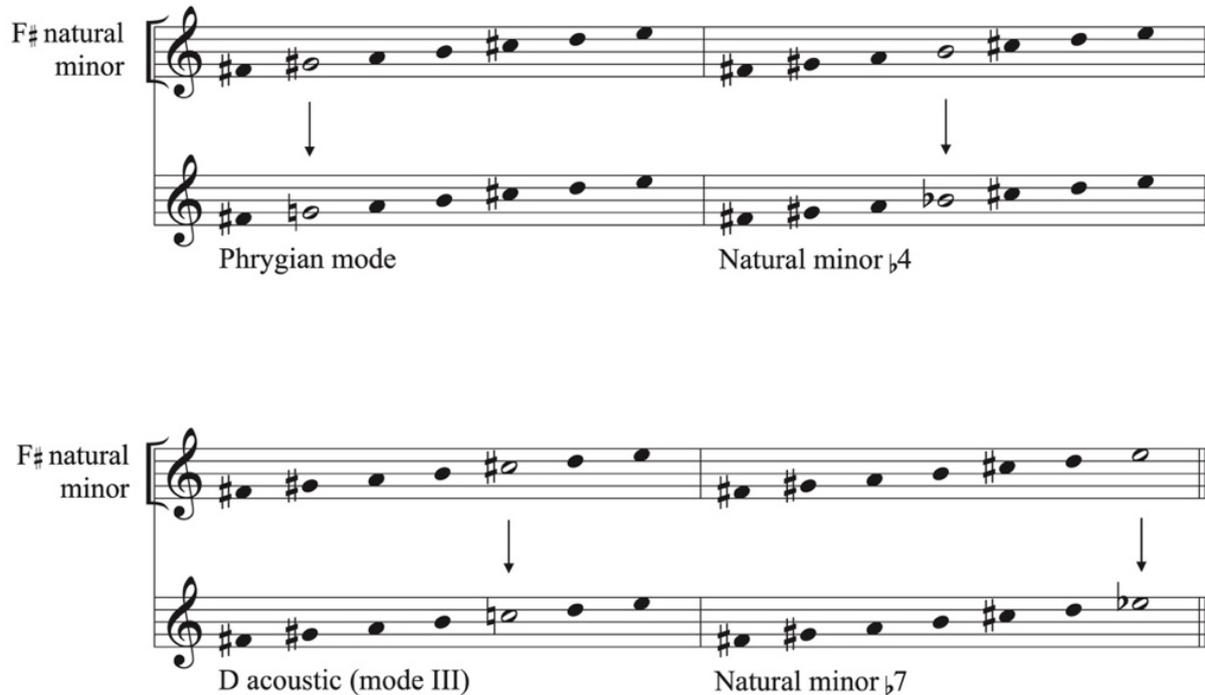
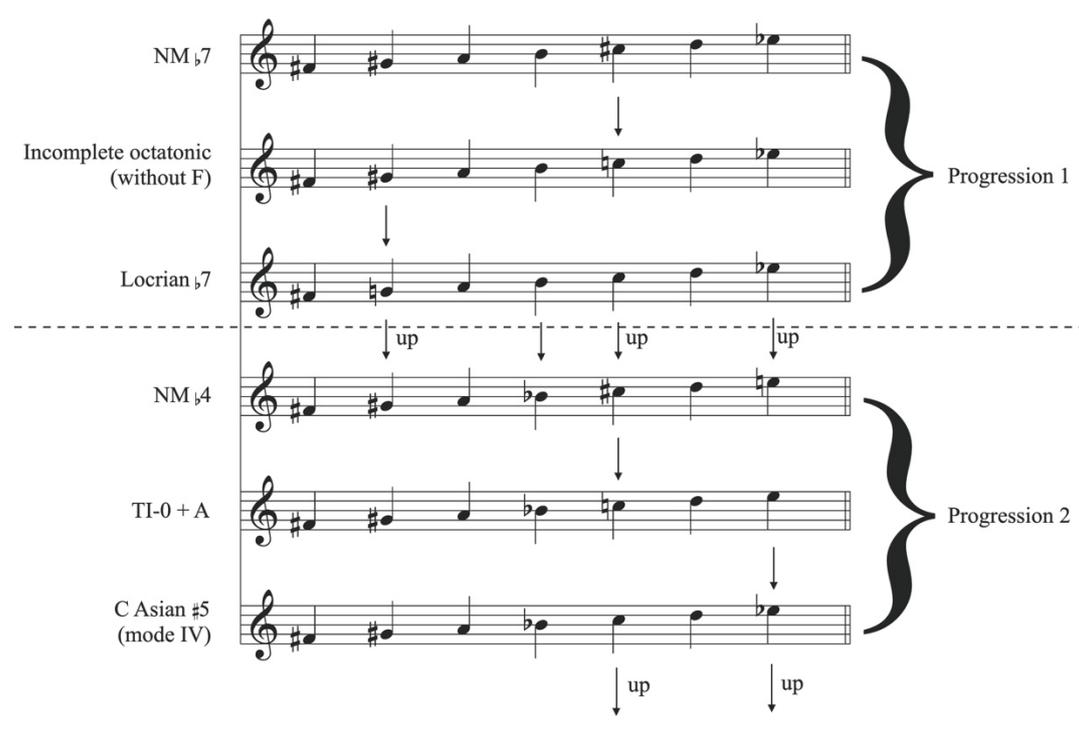


Figure 6 illustrates the modulation of the F# natural minor scale by chromatically lowering one scale degree at a time. The top staff shows the F# natural minor scale. The first modulation (lowering the 6th degree) results in the Phrygian mode. The second modulation (lowering the 5th degree) results in Natural minor $\flat 4$. The third modulation (lowering the 4th degree) results in D acoustic (mode III). The fourth modulation (lowering the 3rd degree) results in Natural minor $\flat 7$.

Figure 6: Modulation by chromatic lowering one scale degree at a time from the F# natural minor scale.

In the compositional planning of *Prelude*, nine of the twelve scalar possibilities of F# minor chosen for *L'appel du vide*—the larger work of which it is a part—were used in addition to the scale formed by the chromatic lowering of the sixth degree after the chromatic lowering of degrees II, IV, V and VII in F# minor. These ten scales were organized into three juxtaposed progressions of scales whose modulations occur by lowering a scale degree by a semitone, one degree at a time, as seen in Figure 7. The arrow with the word *up* denotes the chromatic rise of a scale degree, which is the main motion used to join the juxtaposed progressions. They start with either NM $\flat 4$ or NM $\flat 7$. Progression 1 starts with NM $\flat 7$, while both progressions 2 and 3 start with NM $\flat 4$, presenting two possibilities of scalar modulation by chromatic lowering of one degree at a time from the same scale. The three progressions are the basis for the macrostructure of the musical work and are divided into two sections: A (progressions 1, 2) and B (progression 3). Although there is no predominantly lowering of scale degrees between the three progressions, nor the use of chromatic alteration of only one degree at a time, the transitions between them still occur through efficient voice leading.

SECTION A



SECTION B
(Progression 3)



Figure 7: Progressions between scales in sections A and B of *Prelude* from *L'appel du vide*, by Helder Oliveira. The acronym NM stands for natural minor, TI-0 for whole tones which includes the pitch C, and *up* for chromatic rise of a scale degree.

The ten scales used in the compositional planning of *Prelude* were systematically distributed among the measures of this work according to Table 2. Measure 1 do not contain all pitch-classes of the NM $\flat 7$ scale. This pitch collection was only entirely used from measure 2–

4, therefore in a total of three measures. For the two following scales, a regular, progressive decrease in quantity of measures was planned until, from the fourth scale onwards, a progressive increase in quantity of measures occurs, with the exception of the C Asian scale #5, which lasts for only one beat of measure 12. Thus, in relation to the scale types, section A contains a symmetrical distribution (3–2–1–2–3) for the quantity of measures. As for section B—excluding measure 13 that do not contain all pitch-classes of the NM $\flat 4$ scale—, the sequential pattern 3–2–2 for the quantity of measures was planned, despite the lack of the last number of the pattern in its repetition.

Table 2: Patterns in quantity of measures in *Prelude* from *L'appel du vide*, by Helder Oliveira.

Section	Progression	Scale	Quantity of measures	Measure numbers
A	1	NM $\flat 7$	3	2–4
		Incomplete octatonic	2	5–6
		Locrian $\flat 7$	1	7
	2	NM $\flat 4$	2	8–9
		TI-0 + A	3	10–12
C Asian #5		–	12	
B	3	NM $\flat 4$	3	14–16
		D harmonic major	2	17–18
		Locrian $\flat 4$	2	19–20
		G harmonic minor	3	21–23
		G harmonic minor $\flat 5$	2	24–25

In terms of SMT3, there are two pitch organization groups in *Prelude*, shown in Figure 8. Group 1 is used in section A of the work and consists of a generalized scalar set (called general scale 1), in F# minor, formed from a combination of fixed degrees (black noteheads) and mobile degrees (white noteheads)—the latter change chromatically in moving between different scale types. The general scale complement 1—that is, the remaining pitch-classes that together with the pitch-classes of the general scale 1 form a twelve-tone chromatic aggregate—were used as grace notes during the entire section A. The fixed degrees of general scale 1 were used to form the ostinato/subset 1, that must deliberately appear only during scalar progression 1. Group 2 is used in section B and consists of general scale 2, in F# minor, also formed from a combination of fixed degrees and mobile degrees. The fixed degrees of general scale 2 were used to form the ostinato/subset 2 (variant of ostinato 1), used throughout section B, with the exception of the final measures to avoid monotony. Grace notes in this section derive from general scale complement 2, used in Group 2. The idea of a subset for scalar modulation using ostinato was inspired by Debussy's *Des pas sur la neige*, which contains a brief ostinato.

GROUP 1



GROUP 2



Figure 8: Pitch organization groups in *Prelude* from *L'appel du vide*, by Helder Oliveira

Figure 9 summarizes the relationships between the scales of *Prelude*, including the original scale (F# natural minor–NM), the pitch-classes lowered during the modulations, the scales that were left out of the compositional planning of this movement, the route of the scalar sequence used in the work indicated in circled lowercase letters, and the formal structure and pitch organization groups (Groups 1 and 2).

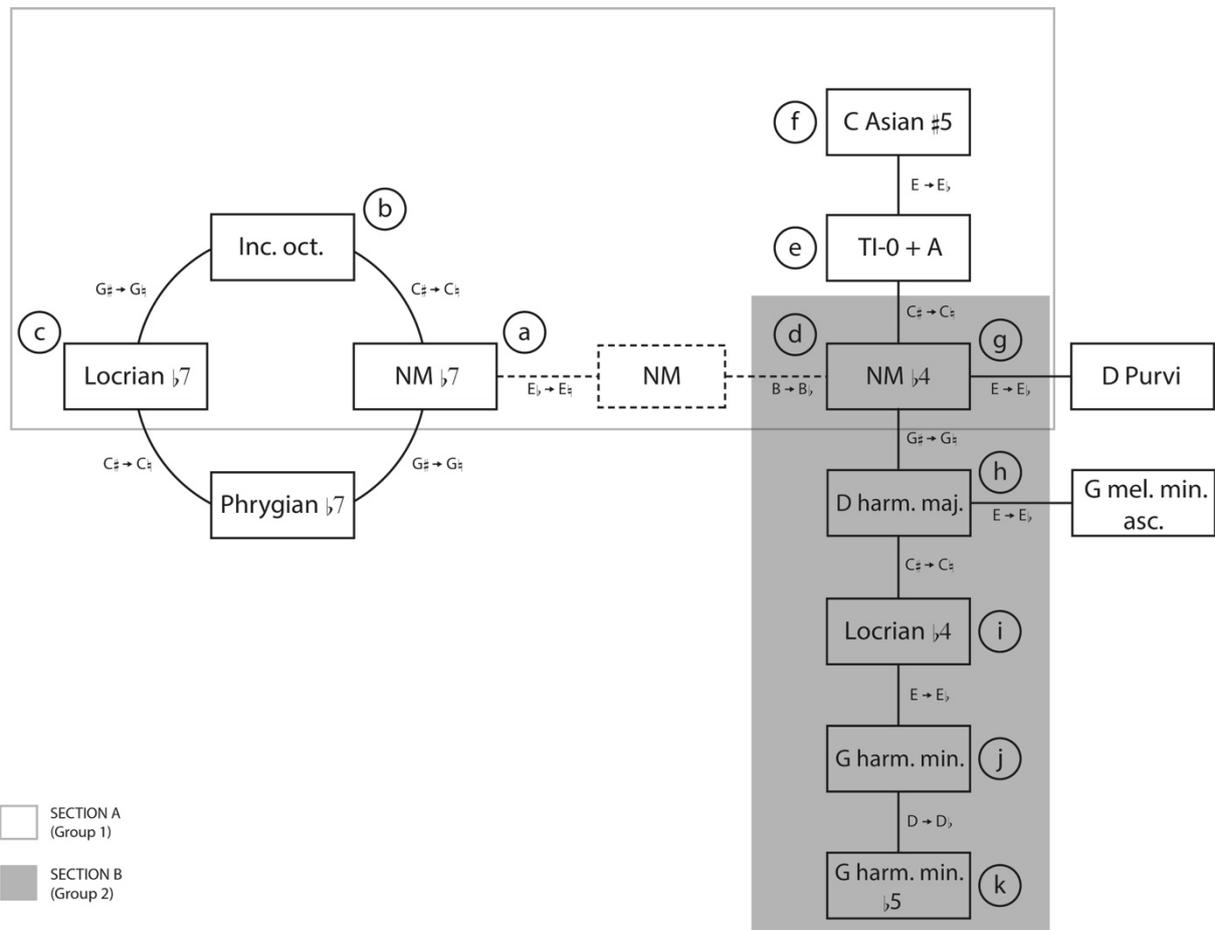


Figure 9: Scalar structure in *Prelude* from *L'appel du vide*, by Helder Oliveira. The acronym NM stands for natural minor, and TI-0 means whole tones including C.

The first change of scales in section A marks the point in which there are addition of one more voice, and the ostinato 1 starts to run through all voices from that point. Moreover, the progression 2 presents the ostinato 1 with variations. Long notes are used along with the last two scales of section A to reinforce the segmentation of the piece. The first change of scales in section B marks the beginning of climax preparation. After the use of two scales, occurs the climax (measure 21), whose digression is marked by the use of another scale. This scale can be interpreted as well as part of a coda. Finally, it is important to inform that less variation was utilized for ostinato 2 to create more expectation toward the climax.

4. Conclusion

This article demonstrates the application of SMT in the compositional planning of *Prelude from L'appel du vide*, which uses scalar structures similar to certain works by Debussy and Shostakovich. The objective was to use a scalar analysis of Tymoczko prescriptively to systematize the coordination of ideas, gestures and musical structures in a new original work. As a result, the set of SMT proved to be an effective compositional procedure for the creation of pitch repositories and musical structures that progress logically in the course of the new work, interconnecting the musical parts and guiding the organization of form, texture, points of variation and other musical aspects. This procedure, therefore, can be satisfactorily added to the varied set of compositional techniques available for creators. Moreover, the SMT can be possibly included in the teaching of composition, since they can embrace fundamental aspects of parameter management. Besides, the set of SMT would be an effective methodology of teaching composition by the fact that it uses as a starting point some knowledge that most of the students are very familiar: the scalar formations, used in their daily routine. Finally, further developments of SMT will include other modal systems—such as the Messiaen's modes, Chinese system, and more scales of Indian music—and a computational application to provide all possibilities of scalar connectivity and automatize the job of planning new works.

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Notes

¹ Mesquita (2018) considers musical homage as one of the various intertextual typologies in the musical field, also including citation, parody, pastiche, systemic modeling, profile modeling, rewriting, paraphrase and variation. For him, in the tribute there is no use of thematic materials of a particular work of the honored composer, but certain characteristics of the style of that composer.

² The materials and devices that define the tonal center are: diatonic pitch material, tertian harmonies, dominant-tonic harmonic progressions, dominant-tonic bass lines, resolution of leading tones to tonics, resolution of dissonant sonorities to more consonant ones, and pedal points (Kostka; Santa, 2018, p. 8).

³ Term coined by Tymoczko (2011, p. 79), *efficient voice leading* is similar to *parsimonious voice-leading* transformation as defined by Derfler (2010, p. 40), according to whom a parsimonious voice-leading transformation involves a voice-leading mapping that consists of no more than two consecutive applications of a *single-semitone transformation* (SST) affecting the same voice. Thus, each member of a chord can move up to two semitones. In conclusion, two consecutive pitch-classes are in parsimony if the unordered pitch-class interval between them is equal to 0, 1, or 2.

⁴ The other types of modulation between tonalities according to Kostka, Payne and Almén (2018) are: 1) by common chord, 2) sequential, 3) by common tone, and 4) direct modulation.

⁵ The Purvi scale is the fifth mode of the scalar system of North Indian music (Hindustani). The melodic concept of this music is based on ten types of heptatonic scales known as *that-s* (Suvarnalata Rao; Preeti Rao, 2014, p. 26–28). The modes 1, 2, 3, 7, 8 and 9 of this scalar music system are equivalent to the Lydian, Ionian, Mixolydian, Dorian, Eolian and Phrygian modes respectively. Mode 4 corresponds to the harmonic major scale $\flat 2$ or to the fifth mode of the C gypsy scale (Tymoczko, 2011, p. 186). The gypsy scale is equivalent to a harmonic minor scale with raised fourth degree ($\sharp 4$). Mode 6 is equivalent to the Lydian $\flat 2$, and Mode 10 is equivalent to the gypsy scale $\flat 2$.

⁶ The Asian-Bartók and Jewish Ahavoh-Rabbah scales (Cope, 1997, p. 27) correspond to modes IV and V of the harmonic minor scale, respectively.