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Composition of "Karma" based on the Gestalt Modeling of "Ponteio No. 29" by Camargo Guarnieri

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Abstract: This work consists of two parts, the first being the analysis of "Ponteio No. 29", by Camargo Guarnieri, based on the methodology called Gestalt Modeling (hereinafter GM). The analysis was carried out from the perspective of Gestalt Theory based on two laws of perceptual organization. It aimed to stipulate the general guidelines for the hypothetical system that created that work by Guarnieri and, finally, to generate subsidies for the planning of a new composition using this same compositional system. The compositional planning of the new work consists of the second part of this paper. The final conclusions indicate that GM is: 1) a useful and distinctive resource for the analysis of musical works and composition, as it coherently presents new ways of organizing musical elements; and 2) a possible methodology for compositional pedagogy, as it provides subsidies for a conscious practice and the development of students' own compositional language.

Keywords: Gestalt Modeling, Systemic Modeling, Musical Analysis, Guarnieri, Compositional Planning.

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The objective of this work is to identify and describe in Guarnieri's *Ponteio No. 29* the occurrences of the gestalt law of uniform destination, according to the musical applications of Scott Lipscomb (1993), and of the gestalt law of symmetry, according to the considerations of Fred Lerdahl and Ray Jackendoff (1983), and Luciana Souza and Tadeu Taffarello (2013). In addition, a suggestion of the law of good continuation was identified in a subsidiary way according to the work by Leonard Meyer (1956), which served to unveil a construction logic that would otherwise go unnoticed. The occurrence of the laws of symmetry and uniform destination were observed both in the form of their realization and in the form of deliberate breach of principle. The main objective here is to arrive at a set of definitions that characterize the hypothetical compositional system that generated *Ponteio No. 29* and, finally, to plan *Karma*, the fourth movement of *Suíte Gestaltina* by Helder Oliveira. This work is for solo piano and contains five movements planned according to the GMs of Guarnieri's five *Ponteios* (*Nos. 24*, *27*, *28*, *29*, *30*), one *Ponteio* for each movement of *Suíte Gestaltina*. These GMs are described in detail in the work by Helder Oliveira (2020). Certain laws of perceptual organization according to the Gestalt Theory were distributed to each of the five *Ponteios* based on a prospective analysis, whose purpose was to superficially observe where certain musical suggestions of these laws were more on display in the *Ponteios*.

1. Gestalt Modeling

GM is an analytic-compositional methodology that uses the structural dispositions of a previous work—which we call *intertext*—, according to Gestalt Theory, to produce new works. Comprehensively, GM consists of two phases: 1) analysis of a work from the perspective of Gestalt Theory; and 2) relational generalization, which considers only the relationships between the objects found in the analytical phase, ignoring their particular values (OLIVEIRA, 2020). A hypothetical compositional system of the analyzed work is formulated from this approach and is also used in planning a new composition. GM is the result of merging Systemic Modeling methodology with the Gestalt Theory applied to music. The foundations of both theoretical frameworks will be discussed in this section.

1.1. Systemic Modeling

This analytical-compositional methodology arises from the fusion of the Theory of Compositional Systems (PITOMBEIRA, 2020) and the Theory of Intertextuality (KRISTEVA, 2005) and "has as its objective the proposition of a hypothetical compositional system, or systemic model, that describes the structural functioning of a particular musical work."[1] (PITOMBEIRA, 2017a, p. 2).

A compositional system is "a set of guidelines, forming a coherent whole, which coordinates the use and interconnection of musical parameters and materials, with the purpose of producing musical works." (PITOMBEIRA, 2020, p. 47). This definition is mainly inspired by the works of Ludwig von Bertalanffy (2010), George Klir (2001), and Donella Meadows (2009). From the first author, the definition inherits the notion of coherence and the idea of a set of guidelines, considering that music is classified in Bertalanffy's theory as a symbolic system, which is coordinated by rules. The second author, Klir, contributes to the idea of objects (parameters and materials) and the relationships amongst them, i.e., their interconnection. Klir defines a general system as a set of things and relations, formally, S = (T, R). Meadows' contribution is related to the idea of function or purpose.

A compositional system is the deepest structure in a ternary hierarchy, which includes, besides it, a compositional plan, and the compositional act itself. The system provides a partial view of the functioning of specific musical parameters, whether abstract or surface, or raw materials. This compositional system can be created from scratch or modeled from the analysis of an intertext. Regarding the modeled system, the intention is not to recreate a previously analyzed work, but to determine a set of guidelines at a deep archetypical level that could lead a composer to a plan and, from that, to a new composition. It is worth mentioning that the objects of a compositional system are generic, which means that they have no specific values. The specification of the objects occurs only during the compositional planning. A compositional system (original or modeled) can be

[1] From the original: "tem como objetivo a proposição de um sistema composicional hipotético, ou modelo sistêmico, que descreva o funcionamento estrutural de uma determinada obra musical."

presented as a set of guidelines, tables, graphs, formal expressions or even as a computational algorithm.

The second field that contributes to Systemic Modeling is the Theory of Intertextuality. About Intertextuality, Flávio Lima states that it is defined:

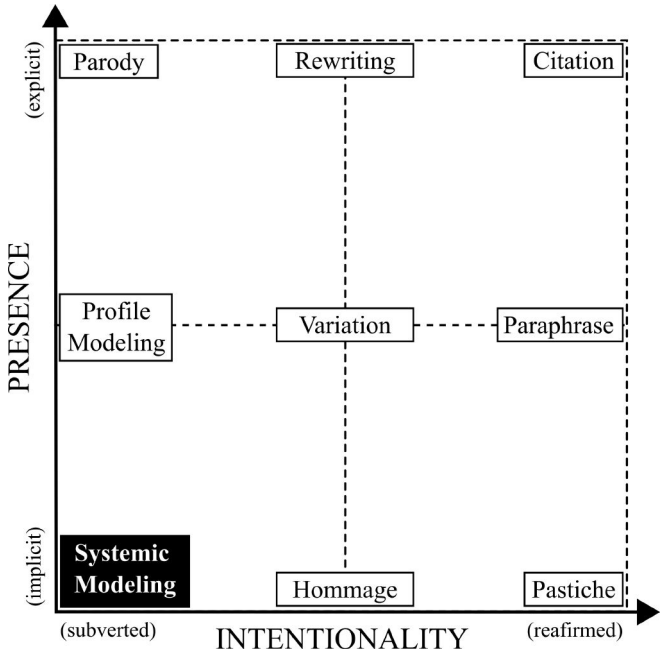
> [...] as a hybrid construction, a mosaic of citations, a procedure of textual borrowings in different types of abstraction, with the purpose of giving rise to another text, and where the existence of these borrowings, whether or not they are evident or obscure, they are only simple ingredients in the elaboration process.[2] (LIMA, 2011, p. 31).

The concept of intertextuality was proposed by Julia Kristeva (1969) in the field of literature. The musical application of intertextuality was suggested by Kristeva herself when mentioning the connection between literature and music. A vast body of research in the field of intertextuality and music has been created in 20th century scholarship. Noteworthy is the seminal text by Michael Klein (2005) which presents a survey on intertextuality in western art music. One of the most important theoretical landmarks on this subject is probably the paper by Kevin Korsyn (1991), which makes a strong point about the intertextual connection between works by Johannes Brahms and Frederick Chopin. Korsyn draws his theoretical basis from the work by Harold Bloom (2002), who defines six types of tools, or as he calls *revisionary ratios*, to determine the influence of a previous work on a new one. Joseph Straus (1990) also made a very significant contribution to the field of intertextuality in music, by proposing a series of strategies (also called revisionary ratios) to demonstrate the influence of the classical and romantic repertoire (especially Beethoven, Brahms, and Wagner) on the works by Schoenberg, Webern, Berg, Bartók, and Stravinsky. Those revisionary rations (of Korsyn/Bloom and Straus) can be used both for analytical and compositional purposes. One recent contribution to the field of musical intertextuality comes from a Brazilian researcher, Gabriel Mesquita (2018; 2023), who proposed a typological diagram to classify nine types of intertextual procedures. This diagram is an intertextual compass in two dimensions that classifies the intertextual procedures in terms of their materials, which he calls *presence*, and contexts, which he calls *intentionality* (Figure 1). It is important to observe that systemic modeling (contrarily to citation) is positioned in the most distant position

[2] From the original: "[...] como uma construção híbrida, um mosaico de citações, um procedimento de empréstimo textuais em diversos tipos de abstração, com a finalidade de fazer surgir um outro texto, e onde a existência desses empréstimos, sendo ou não evidentes ou obscuros, constituem apenas simples ingredientes no processo de elaboração."

from the intertext, i.e., it has basically no presence of materials and no original context. This happens because systemic modeling inherits only the relationships between parameters. So, systemic modeling is a type of abstract intertextuality that works at the deepest possible level. The contribution of intertextuality to the Systemic Modeling methodology is, therefore, the approach of using a previous work as the basis for the construction of a compositional system.

FIGURE 1 –The intertextual compass



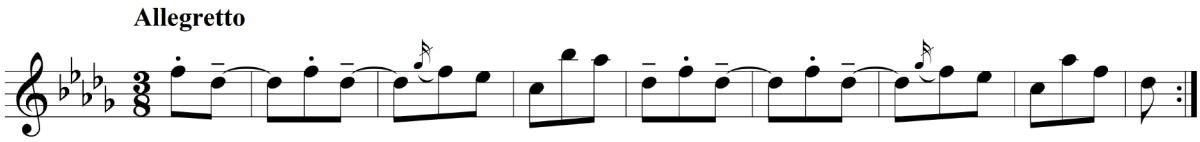
Source: MESQUITA (2018, p. 42)

The Systemic Modeling methodology consists of three main steps: 1) Parametric selection: after a prospective analysis, the intertext parameters that could yield the best results are chosen; 2) analysis: according to the chosen parameters, a large amount of information about the piece is collected; and 3) parametric generalization: the values of musical objects are removed, and the relations between these objects remain the only information to be considered. This gives rise to a model, which is a hypothetical compositional system for the intertext.

As an example of Systemic Modeling, let us take the piece of oral tradition entitled *Baiano de João Gurujuba*, from the *Bumba-meu-boi* of Rio Grande do Norte (ANDRADE, 1982, p. 87), shown in Example 1. After a prospective analysis of the excerpt, we have considered that the best parameter for the modeling is pitch. Then, we have proceeded to determine the relationships between those

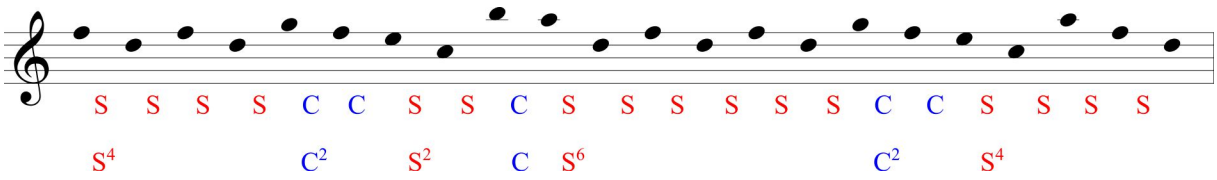
pitches in terms of types of movements: 1) Skip (S): an interval larger than two semitones; 2) Conjunct (C): an interval of one or two semitones; and 3) Repetition (R): a null interval. In order to focus on the pitch parameter, we have removed all the other parameters (duration, tempo, articulation, and metric). Then, we analyzed the movements between the pitches, which resulted in the pattern $S^4C^2S^2CS^6C^2S^4$ (Example 2). This is the systemic model for the excerpt in terms of movements between pitches.

EXAMPLE 1 – *Baiano de João Gurujuba* from the Bumba-meu-boi of Rio Grande do Norte



Source: THE AUTHORS (2024)[3]

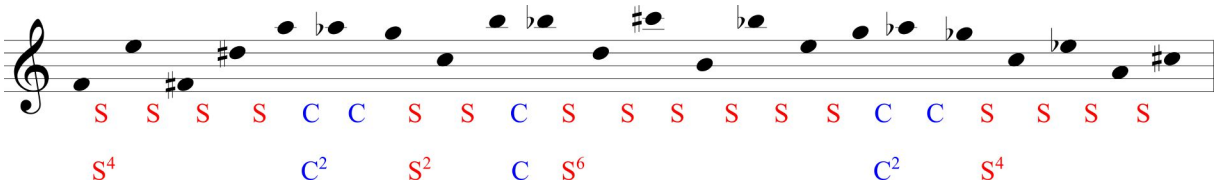
EXAMPLE 2 – Systemic model for the *Baiano de João Gurujuba*



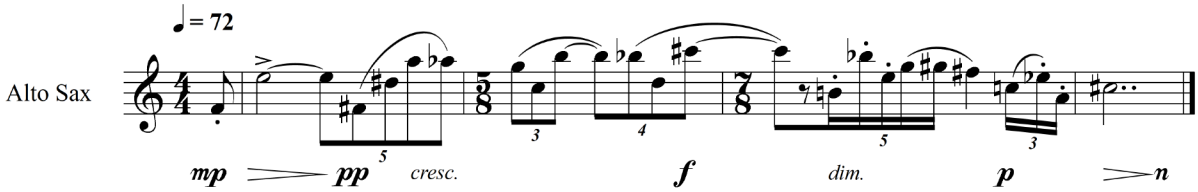
From this model, one can plan and compose a new work which keeps the same pattern. The compositional planning has three phases. In the first phase, *particularization,* we particularize the specific values following the relationship between the pitches, i.e., the model. This produces the skeleton shown in Example 3. The second phase of composition planning is called *application*. This phase is only necessary when the parameters are abstract, such as inversional axis, rhythmic partitions, contours, etc. Since here the results produced in the first phase are already on the musical surface, the application is transparent. The last phase of compositional planning—*complementation*—consists of filling the musical text with parameters not declared in the systemic model (rhythm, tempo, articulation, dynamics, timbre, etc.). The compositional result is shown in Example 4.

[3] The figures, examples and tables without indication of source were prepared by the authors of the present work.

EXAMPLE 3 – New sequence of pitches with the same systemic model of *Baiano de João Gurujuba*



EXAMPLE 4 – A new excerpt built from the same systemic model of *Baiano de João Gurujuba*



In GM, as previously stated, the first phase of Systemic Modeling is discarded, starting, therefore, in the analytical phase, but without emphasis on previously determined parameters. The last phase of the GM is also a generalization, although it is not parametric, since there was no focus on one or more specific parameters during the analysis. This methodology will be explained in detail in Sections 2 and 3.

It is of extreme theoretical importance to emphasize that GM is not simply the analysis of a work in light of the laws of Gestalt. That would be merely the use of an analytical tool. The crucial step in GM is the generalization of specific objects, relegating them to the status of generic objects coordinated by relationships. The search for these relationships is actually the goal of GM, which ultimately results in the proposition of a hypothetical compositional system or systemic model. The new work produced through this methodology belongs, at a profound level, to the same class as the original work. In other words, a system is a structure that establishes classes of works related through internal relationships, even if, on the surface, no obvious connection is apparent.

Another extremely important point to consider when dealing with modeling in general is that a model is always partial, meaning only the modeled object itself can have a completeness of all the factors that compose it, its ontology. Thus, an important methodological strategy in any modeling is to work with analytical and parametric focus, without worrying about describing a work comprehensively from all possible perspectives. In this analytical focus, many phenomena are

disregarded in favor of others that the modeler considers more important. Modeling is, therefore, a creative activity.

1.2. Gestalt Theory and music analysis

Gestalt Theory originated from a branch of perception studies conducted by Max Wertheimer (1997a) in Germany. He was inspired by the seminal article of the Austrian philosopher Christian von Ehrenfels (1890).[4] This theory is more specifically associated with the psychologists of the Berlin School, formed by Wertheimer and his associates Kurt Koffka and Wolfgang Köhler (SMITH, 1988, p. 11), and it emerged as a reaction to the psychological thinking of the early 20th century influenced by atomic physics, which considered the components of mental life as discrete, irreducible, and homogeneous sensations (OSBORNE, 1964, p. 214).

According to Barry Smith (1988, p. 14), Ehrenfels suggests the generalization of the German term *Gestalt* as a mold, form, and figure, and a Gestalt is perceived "[...] on the basis of a complex of sensations of individual elements having 'distinct spatial determinations'." (SMITH, p. 14, author's emphasis).[5] For Köhler, the word Gestalt has two meanings: "[...] besides the connotation of shape or form as an attribute of things, it has the meaning of a concrete entity *per se*, which has, or may have, a shape as one of its characteristics" (KÖHLER, 1992, pp. 177–178). The term is not limited to sensory experience but also includes learning processes, memory, effort, emotional attitude, thinking, action, and others (KÖHLER, 1992, p. 179). *Gestalten* are groups of objects formed by perception (KÖHLER, 1992, p. 160). In the field of industrial design, "[...] the term has become commonplace, meaning 'good form'." (GOMES FILHO, 2004, p. 18, author's emphasis).[6] The work of the psychologists of the Berlin School differs from Ehrenfels' work by shifting the emphasis from the qualities of a Gestalt (symmetrical, regular, harmonious, major or minor melodic character, etc.) to the organizational facts of *Gestalten* (segregated units) (KÖHLER, 1992, pp. 160 and 178).

[4] An English version of this paper can be found in Ehrenfels (1988).

[5] It is important to mention that A. B. Marx (1841), when establishing the foundations for the theorization of sonata form in the 19th century, mentions the term 'Gestalt', which, for him, means form. However, the context in which A. B. Marx uses this term is not related to the way it came to be used by psychology from the late 19th century onward.

[6] "[...] o termo se vulgarizou, significando 'boa forma'."

The issue raised by the philosopher Ehrenfels provided a significant impetus for Wertheimer's studies. Ehrenfels was a musician, studied composition with Brukner, and was a librettist. Thus, he grappled with the following question, as mentioned by Wertheimer (1997a, p. 4): "[...] we hear a melody and then, upon hearing it again, memory enables us to recognize it. But what is it that enables us to recognize the melody when it is played in a new key?"[7] Wertheimer continues:

> [...] I play a familiar melody of six tones and employ six new tones, yet you recognize the melody despite the change. There must be a something more than the sum of six tones, viz. a seventh something, which is the form-quality, the *Gestaltqualität*, of the original six. It is this seventh factor or element which enabled you to recognize the melody despite its transposition. (WERTHEIMER, 1997a, p. 4).

If we consider the relationships (intervals) between the parts as additional components of the total set, we will see that, even with new notes presented, the original melody is recognized due to the maintenance of the intervals between the notes. But, according to Wertheimer (1997a, p. 5), this explanation of the phenomenon is flawed because even when altering the interval relationships between the notes in some cases, the melody still remains recognizable. Although not mentioned by Wertheimer, contour relationships are an important factor in recognizing melodic lines. Dowling and Fujitani (1971, p. 524) mention that "memory for the contour is an important aspect of memory for melody."

"Gestalt starts from the assumption that visual objects can be grouped according to some laws of perception" (DESOLNEUX; MOISAN; MOREL, 2008, p. 13). According to Lerdahl and Jackendoff (1983, p. 36), "from a psychological point of view, grouping of a musical surface is an auditory analog of the partitioning of the visual field into objects, and parts of parts of objects." Gestalt Theory states, among other things, that there is an ordered arrangement of objects "[...] when every object is in a place which is determined by its relation to all others." (KOFFKA, 1936, p. 15). Certain factors (also known as laws or principles) govern this organization and determine how units (objects) come together and separate. Next, these gestalt factors will be listed.

[7] In another text, Ehrenfels asks: "is a melody (i) a mere sum [*Zusammenfassung*] of elements, or (ii) something novel in relation to this sum something that certainly goes hand in hand with but is distinguishable from the sum of element?" (EHRENFELS, 1988, p. 83).

Wertheimer (1997b, pp. 71–88) was the first to define the gestalt laws of perceptual organization. These laws are considered as classic laws of perception, and one of them, uniform destination (or common fate)—whose definition is: elements that move in the same direction constitute a grouping—was chosen for the GM of *Ponteio No. 29* of Guarnieri.[8] Another gestalt law selected for this GM, however non-classical, was the law of symmetry, which was explicitly defined in the works by Stephen Palmer (2002) and Dejan Todorovic (2008) as the tendency to group together symmetrical components. Figures 2 and 3 demonstrate visual examples of the laws of uniform destination and symmetry respectively. In Figure 2, the arrows indicate a hypothetical movement of the circles. In this case, there are two groups of circles because of the uniformity of direction between circles 1 and 3 and between circles 2 and 4, the first pair moving hypothetically downwards and the last pair moving upwards. In Figure 3, there are nine lines. Eight of them form four groups of lines, each group formed by two mirrored lines, that is, arranged symmetrically.

FIGURE 2 – Visual example of the gestalt factor of uniform destination

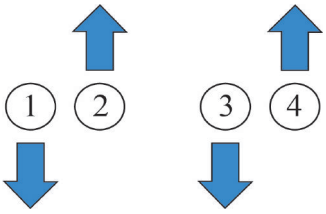
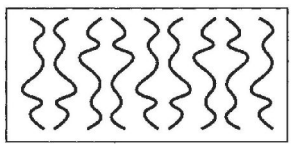


FIGURE 3 – Visual example of the gestalt factor of symmetry



Source: PALMER (2002, p. 192)

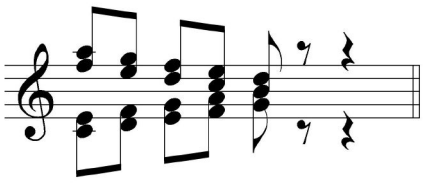
[8] The other classical laws are: proximity, similarity, segregation, closure, objective group, good continuation (or direction), and past experience, also called habit. Good continuation, a secondary law in the GM of *Ponteio No. 29*, is seen by Wertheimer (1997b, p. 83) as the continuation of the movement of successive parts. For this law, Jeffrey Longstalff (1996, pp. 236–237), who calls it continuation, states that "[...] a continual series of stimuli (e.g. a row or a column of separate objects) will tend to be grouped together as a single unit." In this way, the mind perceives a continuation of a line or curve, for example, even if there are other stimuli (elements) occurring simultaneously. In our previous works, the gestalt laws were used in the GMs of other *Ponteios* by Guarnieri. For example, the law of objective group was the basis for the GM of *Ponteio No. 30* (OLIVEIRA; PITOMBEIRA, 2022), and the laws of similarity, proximity, and segregation were used in the GM of *Ponteio No. 28* (OLIVEIRA; PITOMBEIRA; SANTOS, 2023).

Several authors have suggested applications inspired by gestalt laws of perceptual organization in the musical field.[9] Next, we will present how the laws of uniform destination and symmetry manifest themselves musically according to certain authors. These manifestations involve specific dispositions of form, texture and musical gestures, for example, which were used as a guide and model both for the analysis of *Ponteio No. 29* by Guarnieri, in order to verify its presence and absence, and for the new composition *Karma*.

1.2.1. Law of uniform destination in the musical field

Lipscomb (1996, pp. 147–150) makes simple analogies between gestalt laws and sound events. For the law of uniform destination (elements moving in the same direction form a grouping), he states that, musically, this occurs as follows: overlapping notes moving in the same direction form a unit, overlapping notes moving in different directions form different groups. Here, Lipscomb assumes that all other parameters are uniform, in such a way that only the pitch parameter is observed. In Example 5, each melodic line is considered as an element within the concept of the law of uniform destination. In this example, two melodic lines make the same movement in an upward direction, forming a grouping, while two other lines do the opposite, heading downwards, forming another grouping. Each grouping in this example involves parallel motion, in which the interval distance between notes (third interval) is maintained.

EXAMPLE 5 – Simple musical analogy of the law of common destination



Source: LIPSCOMB (1996, p. 147)

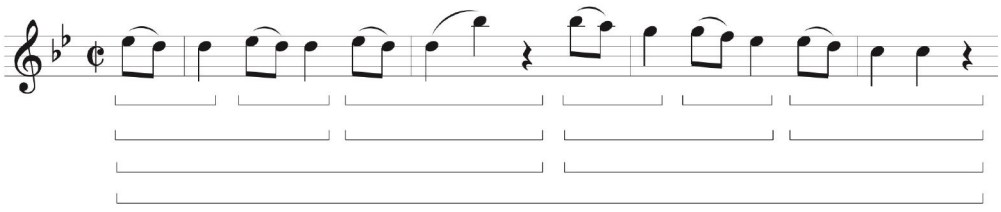
[9] It is important to mention that some fields of study, such as musical cognition and phenomenology, view with caution the use of gestalt laws from a structuralist perspective.

In general, based on Lipscomb (1996), we consider melodic lines in parallel motion as an example of a manifestation of the law of uniform destination for group formation, as well as lines in similar motion, in which there is no maintenance of a harmonic interval between the parts. In practice, this occurs through melodic doublings and the use of parallel chords. On the other hand, two melodic lines in opposite motion do not form a unit.

1.2.2. Law of symmetry in the musical field

Lerdahl and Jackendoff (1983), in their analysis of the musical surface (melody) of non-polyphonic tonal works, present Grouping Preference Rules, henceforth GPR, some directly related to the gestalt principles presented at the beginning of this paper. These rules establish which formally possible structures of a musical work correspond to the actual intuitions of the listener. Symmetry is GPR5 and is defined as a preference for grouping analysis involving optimal subdivision of groups into two halves.[10] Symmetry in this case, therefore, concerns length, formal analysis. In Example 6, this rule divides the melodic passage into two parts with equal lengths, each one corresponding to the length of eight quarter notes. While each of these parts divides into three groups—the first two being two quarter notes long each, and the last being four quarter notes long—the GPR5 merges the first two into one group four quarter notes long, producing an ideal (symmetrical) split of each half of the melody of the example.

EXAMPLE 6 – Musical example for the GPR5 in the first part of theme 1 of *Symphony No. 40* by Mozart

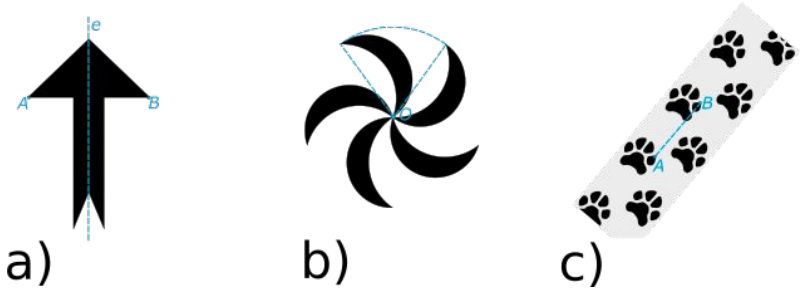


Source: LERDAHL; JACKENDOFF (1983, p. 48)

[10] The remaining GPR will be listed as follow. GPR1 is "strongly avoid groups containing a single event. [...] Avoid analysis with very small groups—the smaller, the less preferable." (LERDAHL; JACKENDOFF, 1983, p. 43). The other rules are: GPR2 (proximity); GPR3 (change), which can be related to the law of similarity; GPR4 (intensification); GPR6 (parallelism); and GPR7, which is the preference for a "[...] grouping structure that results in more stable time-span and/or prolongational reductions." (LERDAHL; JACKENDOFF, 1983, p. 52).

Souza and Taffarello (2013) suggested relations between different types of symmetry and the musical field. Although their suggestions have not taken Gestalt Theory as a reference, we used them in our research in order to expand the possibilities of applying the law of symmetry for the grouping of sound elements, considering some of the examples of musical symmetry proposed by these authors. Among the works that served as a basis for proposing the relationship between symmetry and musical phenomena, there is the article by Rita Bastos (2006) on symmetry in the field of Mathematics Teaching. According to this author, symmetry involves regularity and repetition, and it can be *reflection*, *rotation*, or *translation*, the last two achieved by movement. Figure 4a contains an *e*-axis reflection symmetry; Figure 4b has five rotation symmetries with center at O, that is, "if we rotate the plane with center at point O and an angle of 72° (or 144°, or 216°, or 288°, or even 360°), the transformed figure is exactly the same as the original"[11] (BASTOS, 2006, p. 10); and Figure 4c, which is assumed to be infinitely extended on both sides in the same direction, contains translation symmetries according to the AB vector and its multiples, that is, if we make a displacement of the plane according to this vector or its multiple, the figure transforms in itself.

FIGURE 4 – Reflection (a), rotation (b), and translation (c) symmetries

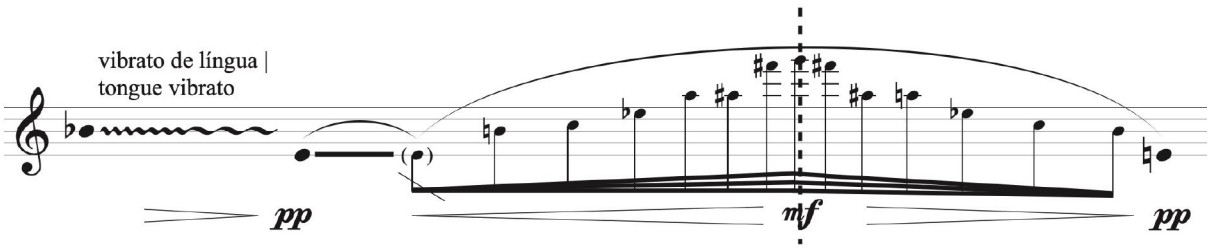


Source: BASTOS (2006, pp. 10–11)

According to Souza and Taffarello (2013), reflection symmetry on a vertical axis can be related to the immediate retrogradation of a melodic passage, called by these authors *temporal reflection symmetry*. As an example, the axis of symmetry found in Example 7 passes through the G note.

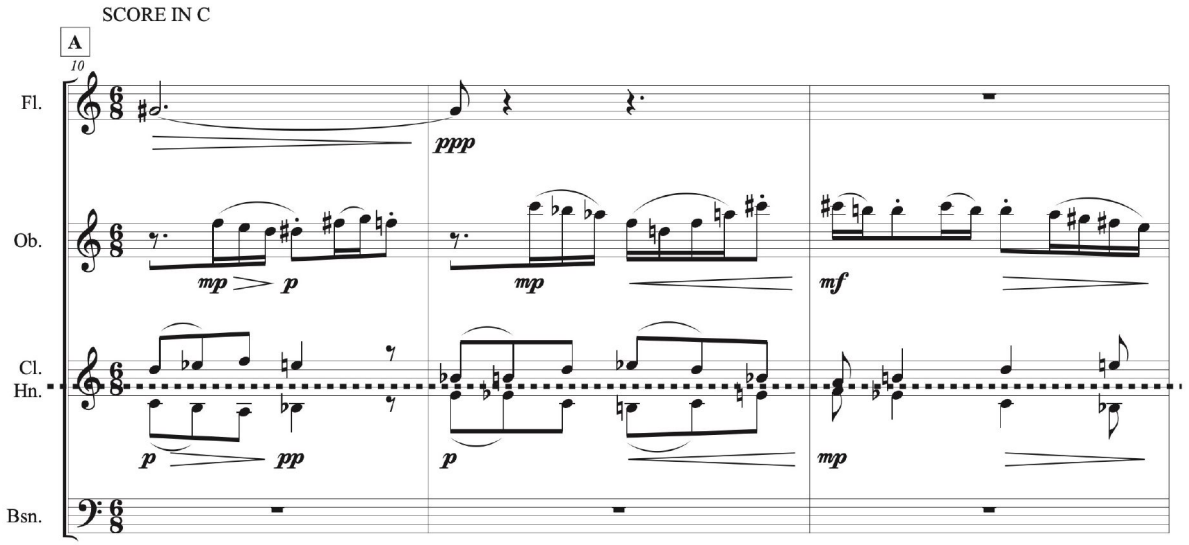
[11] The original text is: "se fizermos uma rotação do plano com centro no ponto O e ângulo de 72° (ou 144°, ou 216°, ou 288°, ou ainda 360°), a figura transformada é exatamente a mesma que a original."

EXAMPLE 7 – Temporal reflection symmetry in *Impressões – No. 5* by Helder Oliveira



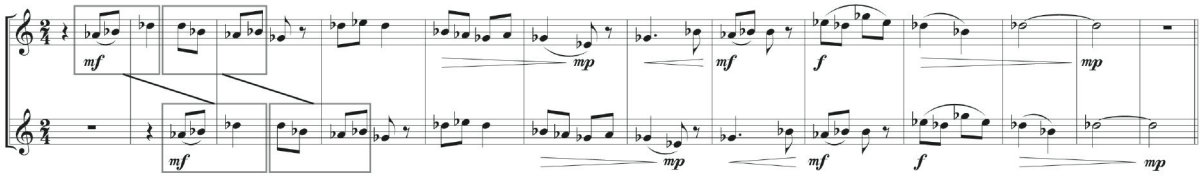
Reflection symmetry on a horizontal axis involves simultaneous notes in opposite motion. Although overlapping notes in different directions form distinct groups (law of common destination in music according to Lipscomb), two melodies that involve contradirectional, homointevalar and homorhythmic relationships—a textural type of mirror association according to Wallace Berry (1987, p. 192)—form a unity when inserted in a texture that combines or overlaps different textural types, called a composite texture (KOSTKA; SANTA, 2018, p. 231) or complex texture (PISTON, 1969, p. 414). The formation of unity is due, therefore, to the symmetry between the two melodies. In Example 8, the melodic lines of the clarinet and the horn form a unit in relation to the other voices in this passage, and the horizontal axis of symmetry passes between notes F and A, that is, it passes through the G note, not present in this musical moment.

EXAMPLE 8 – Horizontal reflection symmetry in *Flagelos* by Helder Oliveira, mm. 10–12



Although translational symmetry is infinite, Souza and Taffarello (2013) suggest this type of symmetry in the musical field in repeating patterns, such as exact repeating or transposed motives. Another musical suggestion for translation, according to Souza and Taffarello (2013), can be seen in a sequence of parallel chords. The use of this type of harmonic progression in parallelism, as presented earlier, is also suggested as a manifestation of the law of uniform destination. Another type of translational temporal pattern is one that results in a canon. There is repetition in this technique, even if in another voice, because of the melodic imitation. Example 9 presents a musical example of this type of symmetry, whose imitation occurs in a temporal observation window of two pulses.

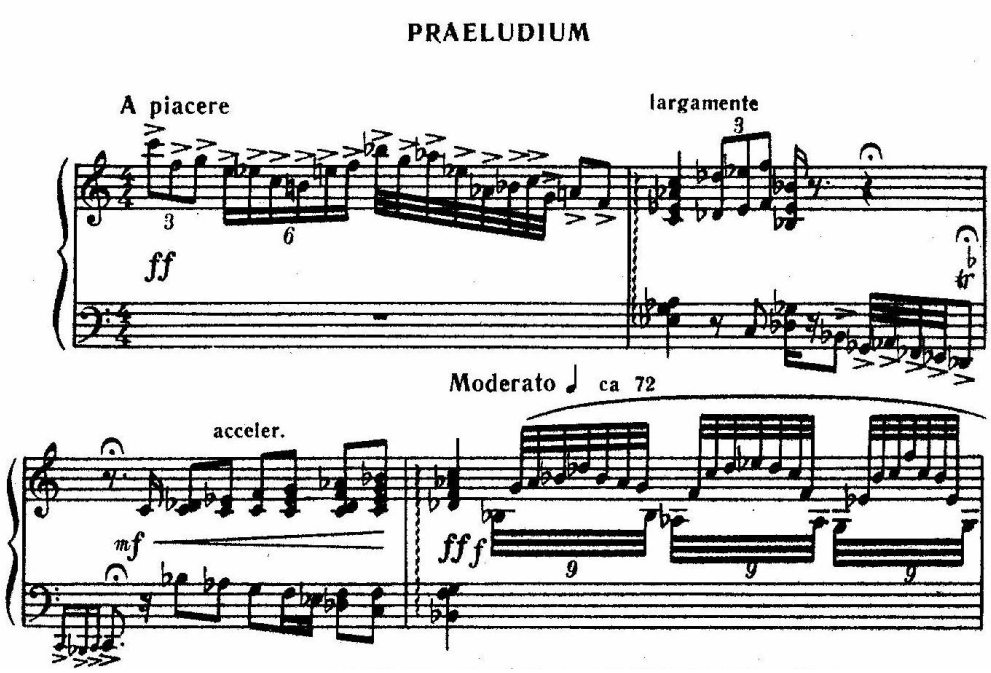
EXAMPLE 9 – Translational symmetry in a theme from *Hudhud* by Helder Oliveira, mm. 19–31



Finally, the type of rotational symmetry can be applied in music in the case shown in Examples 10 and 11, which correspond respectively to excerpts from the *Praeludium* and *Postludium* of the work *Ludus Tonalis*, by Paul Hindemith. Except for the final chord of the work, "the Postlude can be obtained from the Prelude by rotating it 180 degrees. If the performer turns the Prelude score upside down, he will have the Postlude score."[12] (SOUZA; TAFFARELLO, 2003, p. 65). Thus, there are two rotational symmetries in this example, that is, if we rotate 180° or 360°, the transformed figure is exactly the same as the original one. This rotation is called *composite*, which occurs in the given example only if there is a change of clefs for the 180° rotation. Thus, this symmetry in Hindemith's work does not resemble the variation of retrograde inversion with inverted counterpoint, as the intervals are not preserved.

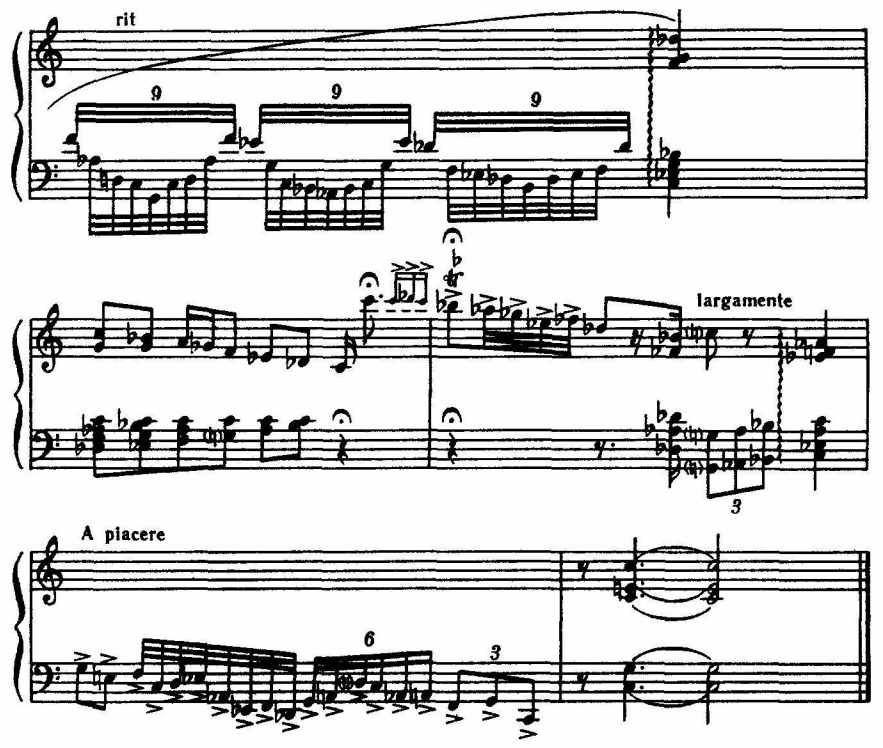
[12] The original text is: "O Poslúdio pode ser obtido do Prelúdio por meio de uma rotação de 180°. Se o executante virar a partitura do Prelúdio de cabeça para baixo, ele terá a partitura do Poslúdio."

EXAMPLE 10 – Opening passage from Hindemith's *Ludus Tonalis* (*Postludium*), mm. 1–4



Source: HINDEMITH (1980, p. 1)

EXAMPLE 11 – Closing passage from Hindemith's *Ludus Tonalis* (*Postludium*), mm. 44–49



Source: HINDEMITH (1980, p. 45)

The upper part of Example 12 shows what the retrograde inversion of the first measure of the *Praeludium* of *Ludus Tonalis* by Hindemith would look like, and the lower part shows what actually happens in the *Postludium* of this work, a rotation with changing clefs. The resulting pitch classes, placed in the F clef, are not the same as those derived from a retrograde inversion. Table 1 has musical suggestions for the symmetry law used in GM.

EXAMPLE 12 – Comparison between retrograde inversion and rotation of the first measure of *Ludus Tonalis* (*Praeludium*) by Hindemith

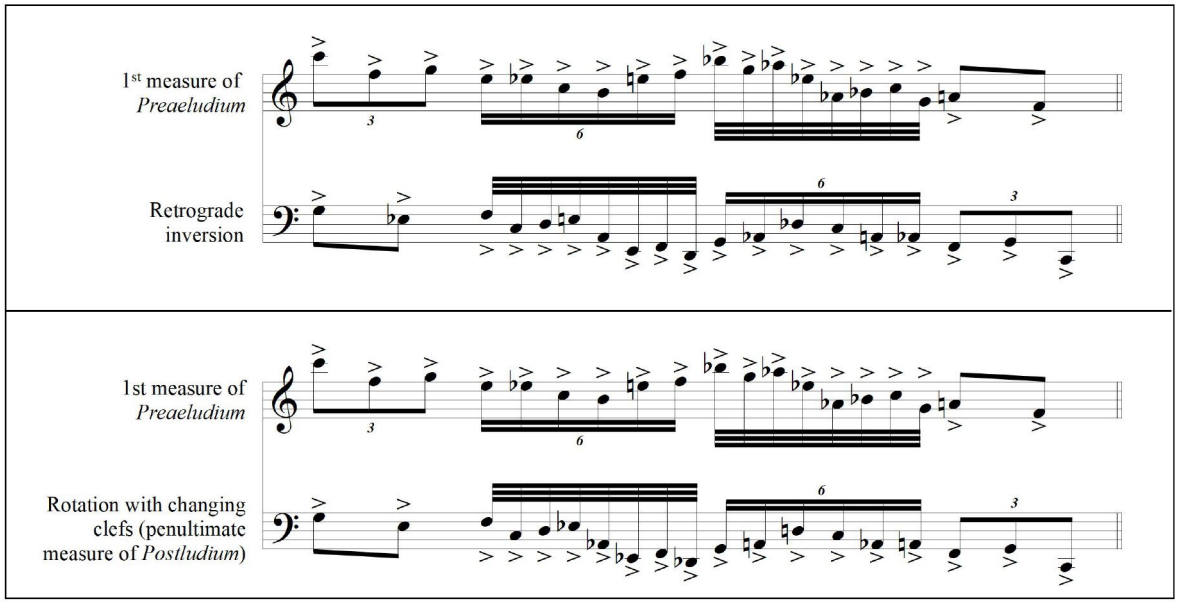


TABLE 1 – List of musical suggestions for the law of symmetry used in Gestalt Modeling

Scholars	Musical suggestions for the law of Symmetry
Lerdahl and Jackendoff	Ideal subdivision of groups into two halves
Souza e Taffarello	Immediate retrogradation of melodic passage; Two simultaneous melodies in mirror form a unit; Compound rotation; Translation through canon, exact or transposed repetition, and chord parallelism

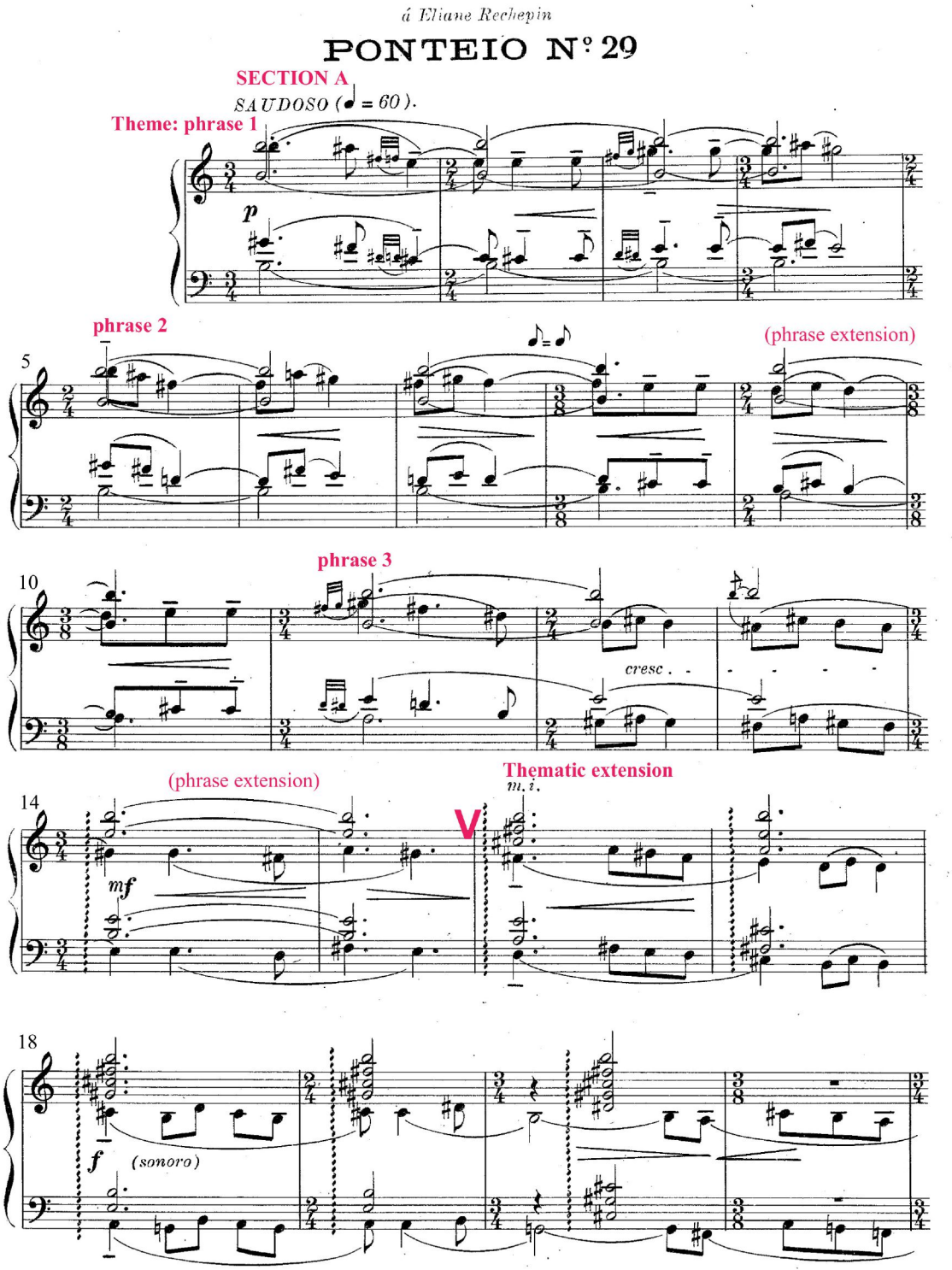
2. Gestalt Modeling of *Ponteio No. 29*

In *Ponteio No. 29* by Guarnieri, certain musical suggestions of the laws of symmetry and uniform destination presented below were identified, appearing according to their operating concepts and with cases of process breakage for purposes of musical interest on the part of the listener (most common use). Additionally, the law of good continuation was identified in a subsidiary way, that is, the use of this law in GM was not in the initial plans of the process. Its use was effective in unveiling a compositional logic that supports the musical manifestation of the law of uniform destination.

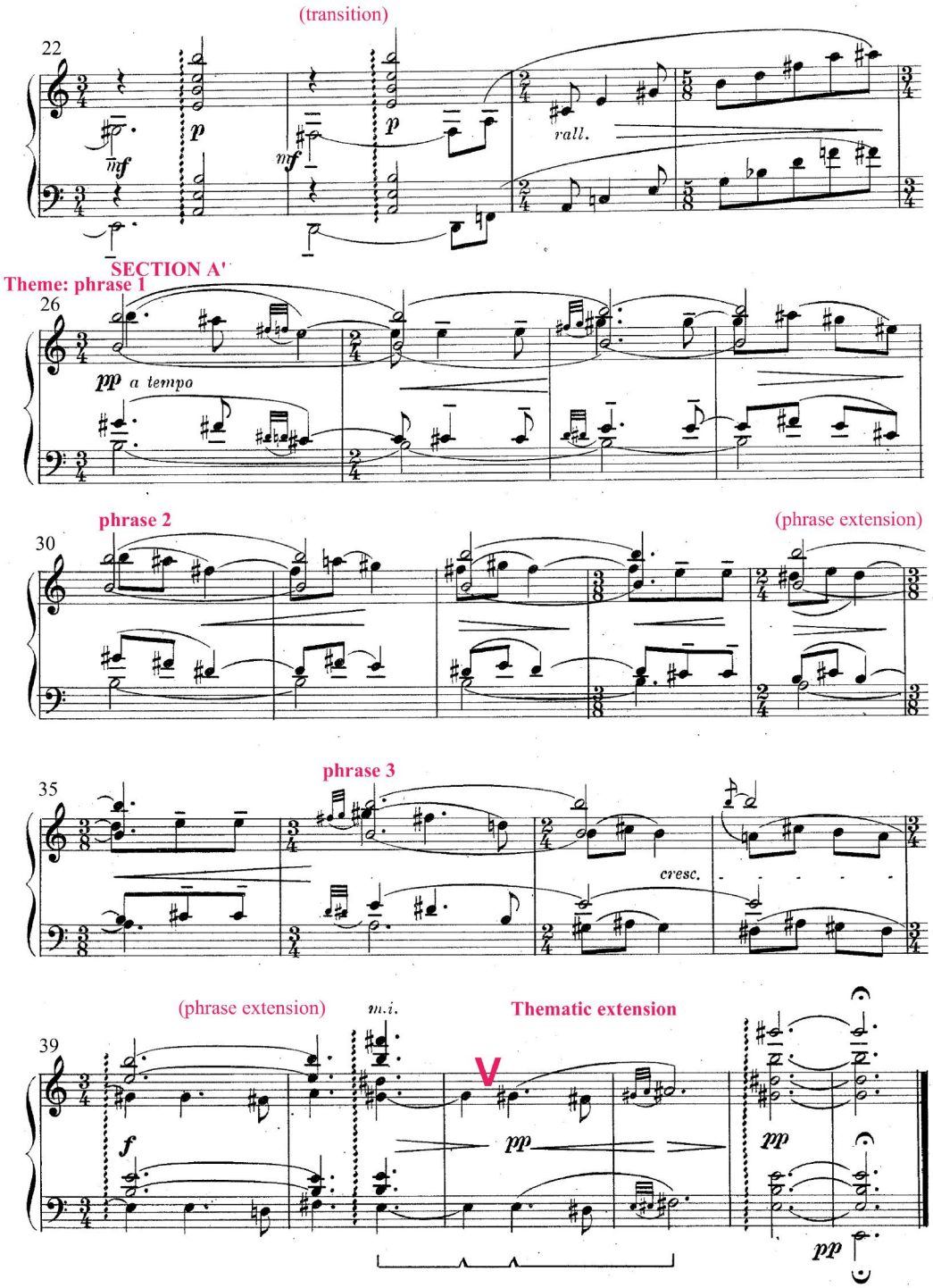
2.1. Symmetry in *Ponteio No. 29*

Some resources used in the musical work were observed to avoid the tendency towards formal symmetry (musical suggestion of ideal subdivision of groups into two halves). These features are seen as purposeful deviations from the psychological tendency toward symmetry. Guarnieri's *Ponteio No. 29* is in AA' form. On a large scale, the two sections are not the same size, as the repetition of the main melody is smaller than its first appearance. The formal analysis of the work is shown in Examples 13 and 14. As noted, measures 1–15 have their A' counterparts in measures 26–40. It will be considered that the original format of the theme corresponds to these two excerpts, and that the last four measures of the work (41–44) consist of a thematic extension, formed by the varied repetition of the two previous measures. Furthermore, what follows after measure 15 and up to measure 25 will be considered as another extension of the theme in the original format. The beginning of this extension, unlike what occurs in the thematic extension at the end of the musical work, is formed by the repetition of only three pitches of the immediately preceding measure and there is rhythmic condensation. This extension, which continues until the theme returns to its original form, behaves like a small-scale development that ends with a small transition (23–25) characterized by textural reduction (predominantly, without accompaniment), and no well-defined melody (only ascending motion with practically only thirds).

EXAMPLE 13 – Formal segmentation of *Ponteio No. 29* by Guarnieri, mm. 1–21



EXAMPLE 14 – Formal segmentation of *Ponteio No. 29* by Guarnieri, mm. 22–44



The theme in the original format (hereinafter theme) does not fit in the thematic types of classicism that contain symmetrical division, called *sentence* and *period*, according to Caplin (1998).[13] It can be seen that there are three phrases in the theme (see Example 13), since measures 1, 5, and 11 are parallel from a melodic perspective. It was expected, by the law of symmetry, that the number of measures of the first phrase (four measures, following the classical tradition) would be repeated afterward, as well as its subdivision into two subphrases of equal length. Phrase 2, however, contains three subphrases, as from measure 8 there is a varied repetition of the immediately preceding material. Thus, phrase 2 is irregular, containing a small extension at the end. This also occurs in phrase 3.[14] It is worth noting that the number of measures in each phrase is different. Respectively, the amounts are four, six and five. In addition, the phrases contain different numbers of quarter notes, respectively 10, 11 and 13, following the pattern $n, n+1, (n+1)+2$. The asymmetry of the phrases is aided by the alternation of measures and the alternation of time units.

Another type of symmetry was observed in *Ponteio No. 29*. In phrase 2, the passage of Example 15 (measures 7–11) contains symmetry of temporal reflection—considering only the pitch parameter—, with axis on the notes E and C♯ (note of the melody and its doubling in a compound third, respectively, measure 9). There is, however, a deviation from this symmetry in the melodic line of the lower voice. It is expected that, after the A note, following the symmetry of the passage, there will be a return of the B note, which does not occur. Finally, there is an addition of chromatic passing tones at measure 11, indicated in Example 15 by arrows. Table 2 shows the pitches of this symmetrical passage for each voice.

[13] Evidently, another analyst may think of other segmentations for the theme and even associate it taxonomically with some expanded type, using the traditional formal classification as a reference. However, here we choose to compare the passage with Caplin's terminology.

[14] About the regularity and irregularity of a phrase, Berry (1986, pp.12–13) states: "In traditional music, especially that of the eighteenth and nineteenth centuries, the phrase often consists of even-numbered multiples of 2 measures, and is very commonly 4 measures long (or 2 measures in slow tempo, 8 in quick tempo). [...] Many phrases are of irregular length—3, 5, or 7 measures [...]. This disruption of perfect symmetry has been discussed earlier as more than a rare exception even in the works of composers of the classical period. The irregular phrase may be a basically symmetrical one which has been extended in some manner. There may be internal extension by repetition of a pattern within the phrase [...], by repetition of the final pattern [...], by avoidance of cadence [...], or by repetition of the opening motive [...]."

EXAMPLE 15 – Temporal reflection symmetry (retrogradation) in *Ponteio No. 29* by Guarnieri, mm. 7–11. Arrows indicate chromatic passing tones

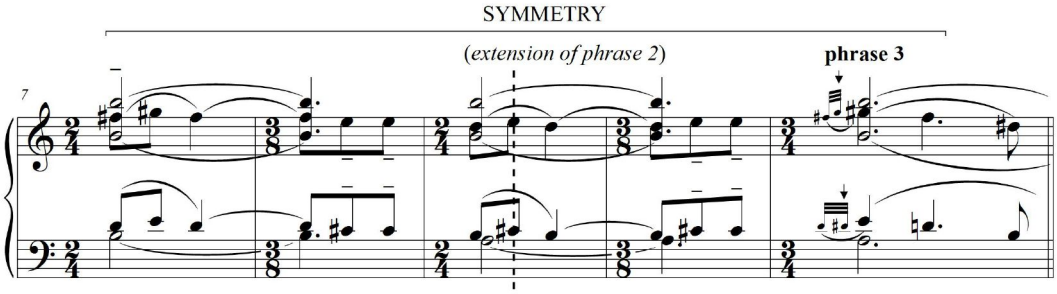


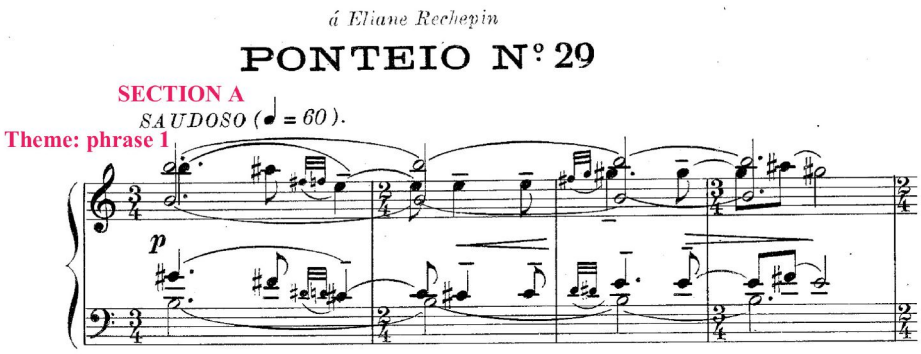
TABLE 2 – Pitches in vertical symmetry in *Ponteio No. 29* by Guarnieri

							Axis						
Upper pedal							**B**						
Theme	F♯	G	F♯	E	E	D	**E**	D	E	E	F♯	G	F♯
Doubling	D	E	D	C♯	C♯	B	**C♯**	B	C♯	C♯	D	E	D
Bass line				B			**A**			(A)			

2.2. Uniform destination in *Ponteio No. 29*

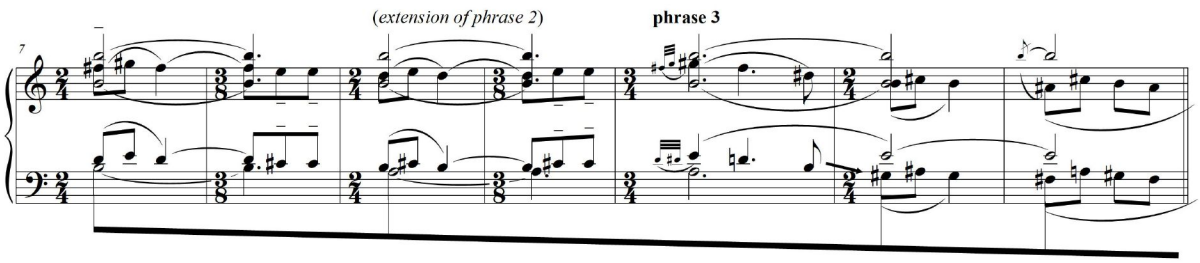
Regarding the law of uniform destination applied to music (overlapping notes that follow in the same direction form a unit), it is observed that in *Ponteio No. 29*, below the main melody, there is a melodic doubling in compound parallel thirds, typical of duets from the music of oral tradition, thus forming a unit (see Example 16). These two homorhythmic lines separate from a group of long notes that appear with different doublings throughout the work. The first pitch of the main melody is part of the same pitch class as the initial long notes (B), which are in octave doublings. In this way, there is the formation of two distinct melodic groups: one formed by static notes, and the other by dynamic notes.

EXAMPLE 16 – Thematic beginning of *Ponteio No. 29* by Guarnieri, mm. 1–4



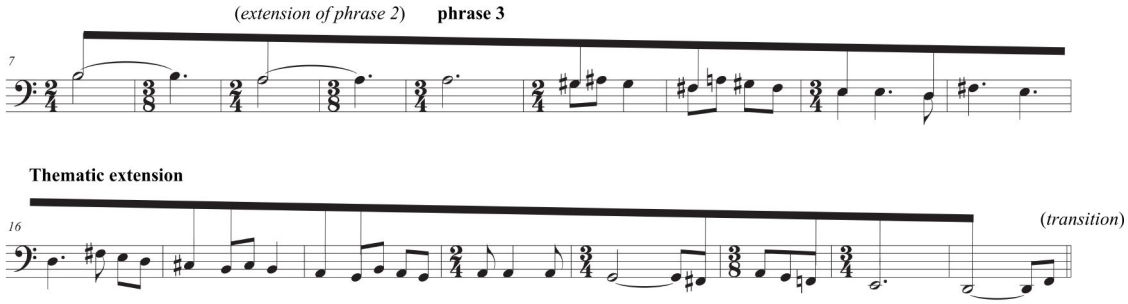
In the extension of the second phrase of the theme (measures 9–10), the B note of the bass follows in a descending stepwise motion towards the A note (see Example 17, measure 9). In the third phrase (that begins at measure 11), the compound thirds doubling the main melody assume the lowest voice of the work at measure 12, repeating the descending stepwise motion presented in the previous phrase, movement that continues until the last measure of section A (measure 23) and is presented in Example 18. The stepwise motion pattern of extreme notes of melodic lines is one of (Meyer's 1956) musical suggestions for the law of good continuation,[15] used in this modeling in a secondary way, since it was not part of the first intentions of the analysis.

EXAMPLE 17 – Change of function of the bass line in *Ponteio No. 29* by Guarnieri, m. 12.



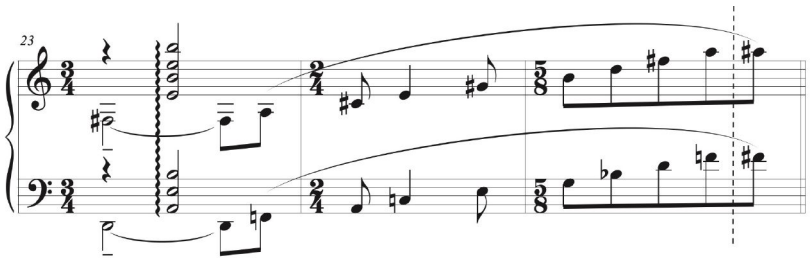
[15] In addition to stepwise motion, fixed intervals and intervals in a triad (*arpeggio*) can also be used as patterns for moving the extreme notes of melodic passages. Other musical suggestions for the law of good continuation, according to Meyer (1956), are: use of conjunction between melodic passages through common pitch class, transposed reiterations of previous material, maintenance of meter, and reiterations of rhythms according to prosody.

EXAMPLE 18 – Lower extreme notes in *Ponteio No. 29* by Guarnieri, mm. 7–23.



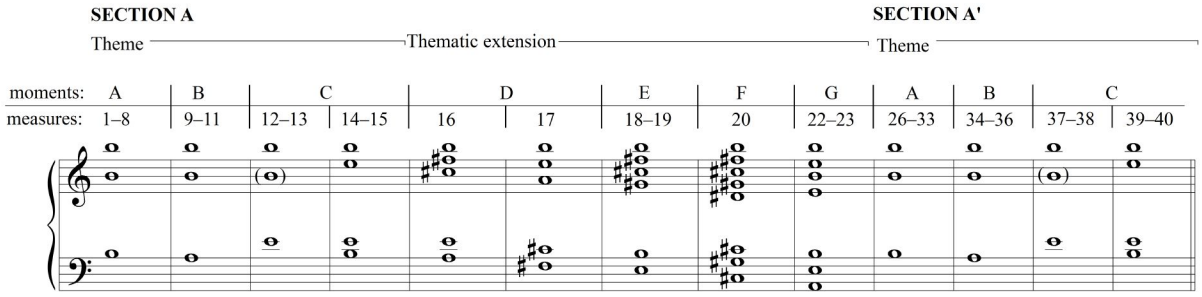
From measure 23 to the beginning of the A' section, the duet formed by the main melody and its doubling changes direction, and there is no longer the other grouping formed by the long notes. In this transition, shown in Example 19, in addition to having harmonic intervals of compound thirds, there are also melodic intervals of third, which, by the way, is the largest generalized interval throughout the main melody. This pattern runs until the penultimate note of the A section.

EXAMPLE 19 – Melodic intervals of thirds in *Ponteio No. 29* by Guarnieri, mm. 23–25



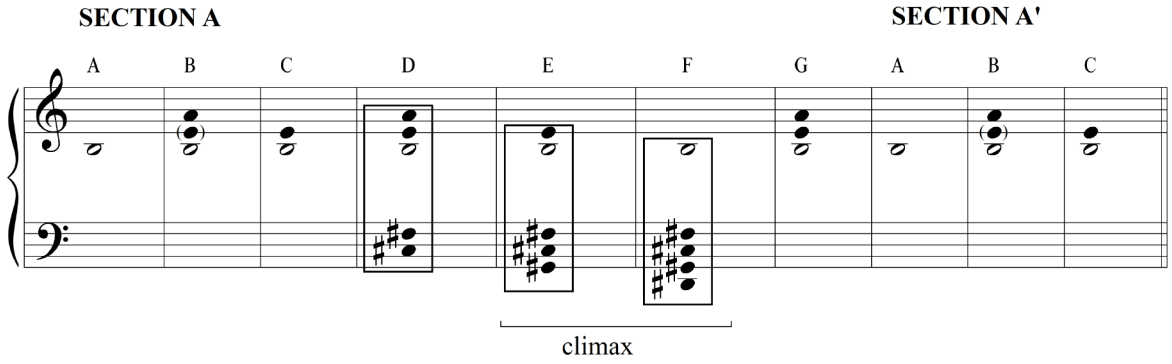
Parallel structures are also present in the melodic accompaniment of *Ponteio No. 29*. The accompaniment is predominantly based on the structure of long notes, a procedure that will be presented shortly. Example 20 contains the textural layer formed by long notes up to the first half of measure 40 of the *Ponteio* (the second half of measure 40 and measures 41–44, the last ones of the work, deviate from the harmonic structure). Measure 21 and measures 24–25 (transition between sections A and A') do not contain long accompanying notes, and measure 13 contains the virtual pitch B_4 for the maintenance of the intermediate voice of this textural layer. The harmonic structure is divided into moments with the same pitch class content. For example, measures 16–17 are part of moment D because the pitch classes used are the same: C♯, E, F♯, A, B. Finally, moments A–C occur in both section A and section A'.

EXAMPLE 20 – Accompaniment of *Ponteio No. 29* by Guarnieri, mm. 1–40. Pitches in parentheses are virtual



In this accompaniment, the maintenance of pitch B_5 is observed throughout the entire work. The other pitches that arise during the course of the musical discourse follow a pattern of fourths above or below the pitch class B, as demonstrated in Example 21 (the pitch E_4 in moment B is implicit and does not appear in the work). From the thematic extension (moment D), the following pattern of implementing the law of uniform destiny arises until moment F: a descending movement in perfect fourths of the five-note chords until there is a decrease in dynamics, observed as a climactic final moment.

EXAMPLE 21 – Harmonic relations in the accompaniment layer of *Ponteio No. 29* by Guarnieri, mm. 1–40. Pitches in parentheses are virtual.



Based on data from the gestalt analysis of *Ponteio No. 29* by Guarnieri, we propose a compositional system (P29 System, Table 3) that hypothetically would have given rise to this work.

TABLE 3 – Definitions of P29 System

1	The form of the work is AA', in which the A section is formed by the phrases $a_1,a_2,...,a_n$ and an thematic extension a_x, and the A' section is formed by the phrases $a_1,a_2,...,a_n$ and the extension a_x', reduced variation of a_x
2	Theme formed by an odd number of sentences (at least 3) with similar beginnings, the first in regular form with two subphrases, and the others in irregular form with three subphrases, containing extensions at the end
3	The number of quarter notes (q) for each phrase follow the pattern $\{q+C_{1,2}, q+C_{2,2}, q+C_{3,2},..., q+C_{n,2}\}$. The value of q is arbitrarily set during compositional planning. $C_{n,p}$ refers to the combination of *n* elements *p* to *p*
4	The number of measures for each phrase are different
5	Use of alternating measures and different time units
6	In the second phrase, only for the pitch parameter and excluding the extreme lower line, there is retrogradation with possible chromatic passing tones in the retrograde part. This retrogradation may slightly cross the phrase boundaries
7	After the theme, there is a long extension (or small development), whose beginning is similar to the end of the theme. Both (subject and extension) form the A section
8	Downward doubling of the theme into a generalized fixed interval (thirds, fourths, fifths, etc., without distinction of class—major, minor, perfect, augmented, diminished)
9	The largest interval of the melodic layer corresponds to the same interval as the doubling, but in a simple format (not compound) and in its widest version (e.g., Major 3rd). There is a preparation (transition) tune for the A' section that predominantly contains this interval in an ascending direction (the last two intervals are free)
10	The extreme lower line is initially formed by long notes (pedals) of melodic accompaniment. The lowest pitches of the lowest extreme line move downward in stepwise motion until the transition to the A' section begins
11	The starting pitch class of the extreme lower line and the starting pitch class of the upper part of the melodic layer are the same
12	Only from the extension of phrase 2 the pitch of the pedal descends in a stepwise motion to another pitch
13	In the course of phrase 3, the doubling of the main melody assumes the extreme lower line
14	A constant pitch and a fixed interval of superposition and subposition are determined. The harmonic structure is divided into ten moments: A B C D E F G A B C. A B C represents the theme, while D E F G represents the thematic extension. The climax occurs in moments E and F. From D to F, there are two descending movements by the fixed interval.

P29 System consists of a series of definitions that are restricted to the application of the laws of symmetry and uniform destination (and, secondarily, the law of good continuation). Note in the P29 System the absence of definitions in relation to certain elements of music, such as dynamics and articulation. The behaviors of these elements are not directly related to the musical suggestions of the selected laws, being, therefore, free to use for later application in the composition of new works based on this system.

3. Compositional planning of *Karma*

Based on the definitions of the P29 System (Table 3), we will present the compositional planning of *Karma*, the fourth movement of the musical work *Suíte Gestaltina* by Helder Oliveira. The word 'Karma' has origins in the religious and philosophical traditions of India, especially in Hinduism, Buddhism, and some Jainist traditions. Its definition may vary slightly among these traditions, but generally, the term refers to the law of cause and effect, where a person's actions influence their future experiences. Here, however, the title is limited to making an allusion to the

word 'destiny', which is associated with one of the gestalt laws used in the GM of *Ponteio No. 29*, the law of uniform destination. First, for the construction of the theme, it was chosen, according to Definitions 2–5, three phrases with the following characteristics (summarized in Table 4):

— Phrase 1: two subphrases, 14 quarter notes (arbitrarily defined value, according to Definition 3), four measures, and the following alternating meter (according to Definition 5): eighth note pickup (anacrusis), 4/4, 5/8, 3/4 and 4/4;

— Phrase 2: three subphrases, 15 quarter notes (value obtained by the formula stated in Definition 3, that is, $14 + C_{2,2}$), five measures (different from the previous phrase, according to Definition 4), and the following meter: eighth note pickup, 3/4, 4/4, 3/8, 3/4, 3/4;

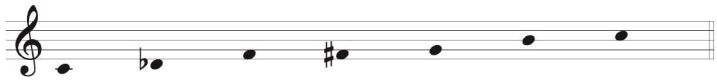
Phrase 3: three subphrases, 17 quarter notes (value obtained by calculation: $14 + C_{3,2}$), six measures (different from the previous phrases, according to Definition 4), and the following sequence of time signatures: eighth note pickup, 4/4, 3/4, 3/8, 3/4, 3/4, 2/4.

TABLE 4 – Characteristics of the theme of *Karma* according to Definitions 2–5 of the P29 System

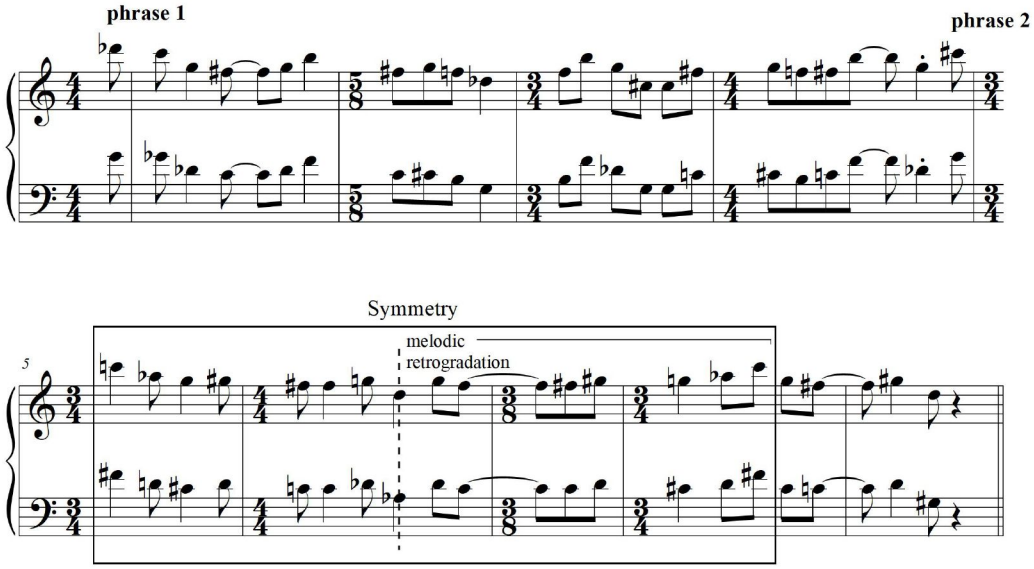
Definitions				
2	**2**	**3**	**4**	**5**
Phrase	**Number of subphrases**	**Number of quarter notes**	**Number of measures**	**Metric**
1	2	14	4	Eighth note pickup, 4/4, 5/8, 3/4 and 4/4
2	3	15	5	Eighth note pickup, 3/4, 4/4, 3/8, 3/4, 3/4
3	3	17	6	Eighth note pickup, 4/4, 3/4, 3/8, 3/4, 3/4, 2/4

The T_0, T_1 and T_2 transpositions of Messiaen's mode 5 (1993, p. 93) were used respectively for each of the thematic phrases. Example 22 presents this scalar set. Based on the decisions made for Definitions 2–6, 8 and 9, the melodic lines of the first two phrases were elaborated, shown in Example 23. The axis of symmetry for pitch retrogradation passes through the D note in the upper staff of measure 6 (Definition 6), and symmetrical material surrounds measures 5–8. According to Definition 8, a lower doubling is applied to the theme in intervals of compound fourths (11^{th}). The three thematic phrases contain doubling of augmented and compound fourths only. The largest melodic interval present in the melody is an augmented fourth, which is the largest version of the generalized fourth interval (Definition 9).

EXAMPLE 22 – Messiaen's Mode 5

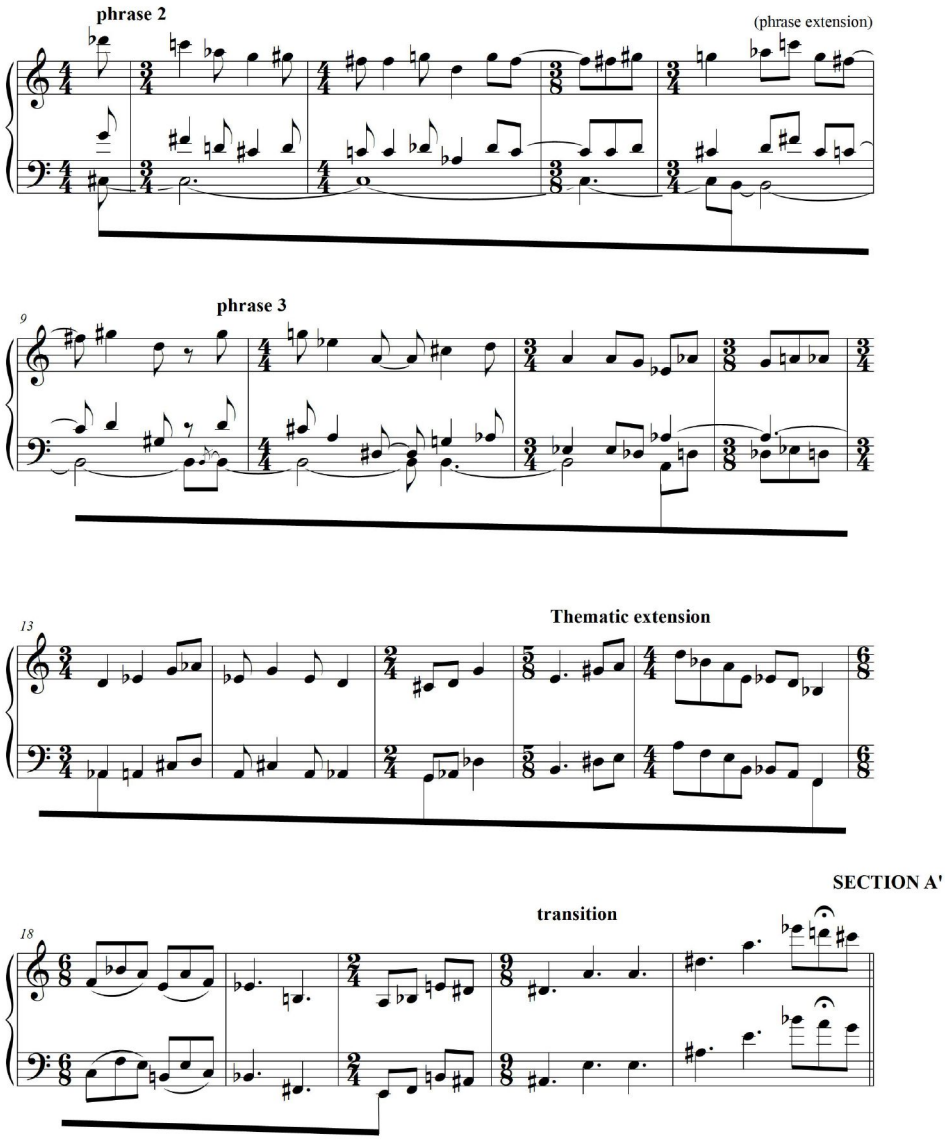


EXAMPLE 23 – Melodic lines of phrases 1 and 2 from *Karma*, 4th movement of *Suíte Gestaltina* by Helder Oliveira, mm. 1–9



Before proceeding to the creation of Phrase 3, a lower voice line was defined based on Settings 10–13. To satisfy Definition 11, the first pitch class of this lower extreme line was the same as the first pitch class of the theme (C♯). In this lower layer, after the pitch $C\sharp_3$, it was chosen the pitch B_2 so that it could connect in joint degree with the pitches $C\sharp_3$ and A_2 (Definitions 10 and 12). This last pitch is present in the T_2 transposition of Messiaen's Mode 5 (D, E♭, G, G♯, A, C♯, D), a transposition defined for the construction of phrase 3. From pitch A_2, the doubling of the main melody assumes the extreme lower line of the work (Definition 13), whose lowest pitches follow the pattern of descending stepwise motion (Definition 10). Example 24 presents the melodic layer (theme and its lower doubling) and the lower extreme line of both phrase 2 and thematic extension (Definition 7).

EXAMPLE 24 – Melodic layer and lower extreme line of *Karma*, 4th movement of *Suíte Gestaltina* by Helder Oliveira, mm. 1–22

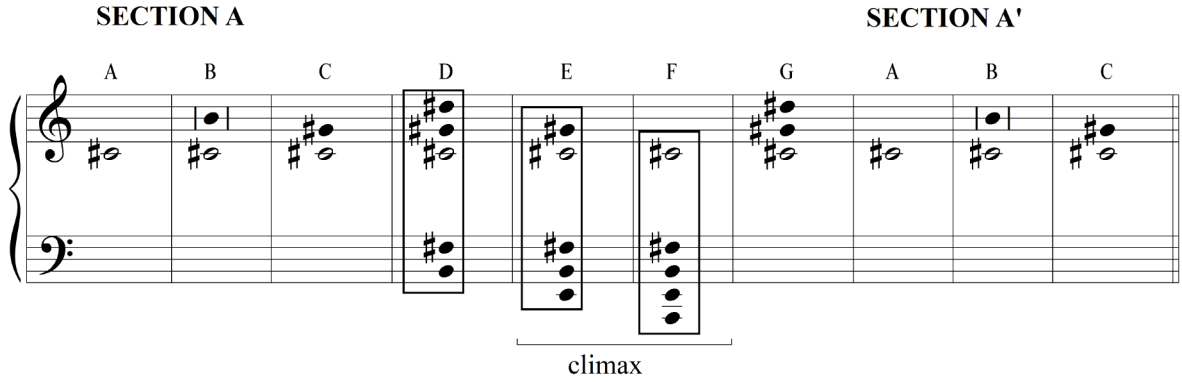


T_3 and T_4 transpositions of Messiaen's mode 5 were used in the thematic extension and transition (see Example 24). The thematic extension uses perfect fourth doubling, while the transition uses augmented fourth doubling, like the first three phrases of the work. Finally, all melodic intervals, except for the last two, are also augmented fourths (Definition 9).

From Definition 14, the harmonic basis of *Karma* was constructed. The constant pitch is C♯, and the different simultaneous pitches result from a superposition or subposition of perfect fifths from the pitch C♯. These new pitches will be freely distributed across the piano registers. In the composition, the constant pitch will be in a fixed register, and the quantity and arrangement of

different pitch classes for each harmonic sonority in the accompaniment layer are specified in Example 25 (its registers are hypothetical and were used to present the vertical relationships). At moment B, pitch B_4, simultaneous with C♯, is not part of the structure of superposition or subposition of perfect fifths. It was chosen earlier for the formation of the pattern of movement in the same direction by step of the lowest extreme notes in the piece. The Appendix contains the score of *Karma*.

EXAMPLE 25 – Harmonic relations in the accompaniment layer of of *Karma*, 4th movement of *Suíte Gestaltina* by Helder Oliveira



4. Aesthetic results and conclusions

Karma and *Ponteio No. 29* are similar in a profound way, that is, in aspects such as form, retrogradation, texture, abstract interval correspondences, melodic direction and motivic treatment. The difference between these two pieces lies in the particularities of these structural components—such as the duration of formal structures and the choice of recurrent intervals—and in the decisions regarding parameters not included in the system, such as the choice of the theory of pitch organization and of the contrasting tempo. One of the characteristics of the new author's compositional style, which defined the filling elements of the musical structures and the aesthetic differentiation, was the use of symmetrical scales, such as Messiaen's modes, in a pattern of gradual transpositions of pitch classes used in the course of the musical discourse in sequential parts. In general, many non-traditional aspects were included in the compositional planning of *Karma*, such as irregular formal structures, alternation of measures and different time units throughout the work.

Other contemporary characteristics defined the style of the new work, such as the use of exotic scales and non-tertian harmony. Some aspects of traditional music are still present, such as the melodic doubling and separation of the work into two large similar sections.

By providing consistent starting points for compositional planning and allowing the freedom to insert parametric elements both inside and outside the model structures, creating an original work with GM is feasible. Regarding the compositional practice of *Karma*, the quantity and nature of the compositional system definitions directly impacted creative freedom and difficulty. Concerning the nature of the definitions, the large number of musical elements and preserved characteristics considerably limited creative possibilities in the compositional planning phase of *Karma*. On the other hand, the constraints accelerated the compositional process by starting from generalized and pre-defined ideas. Additionally, the rigor of the system led to greater structural detailing in the compositional process. In general, the boundaries of the compositional system are reached when musical suggestions associated with gestalt laws are not detected.

GM can work concurrently with other modeling systems, including profile modeling (PITOMBEIRA, 2017b), for example, to complement the proposition of models for a work with high structural complexity.

Furthermore, this methodology can be used to teach music composition, as it provides subsidies for conscious practice and the development of original composition languages. In future work, we will conduct a survey of the pedagogical applications of this type of modeling (including other modeling modalities). In addition, the results show that this approach is effective in expanding the repertoire of compositional techniques, allowing a better understanding of the compositional language of the analyzed works and the creation of coherent compositional repositories.

The analytical phase of GM, which is methodologically supported by Gestalt Theory, can be very useful in understanding a musical work from the gestalt point of view. Therefore, this analytical phase can be established as a goal in itself.

Finally, there is interest in developing the GM by refining the terminology, defining a taxonomy in an objective way for the musical suggestions of gestalt laws, and creating and expanding computational applications for use in modeling canonical works.

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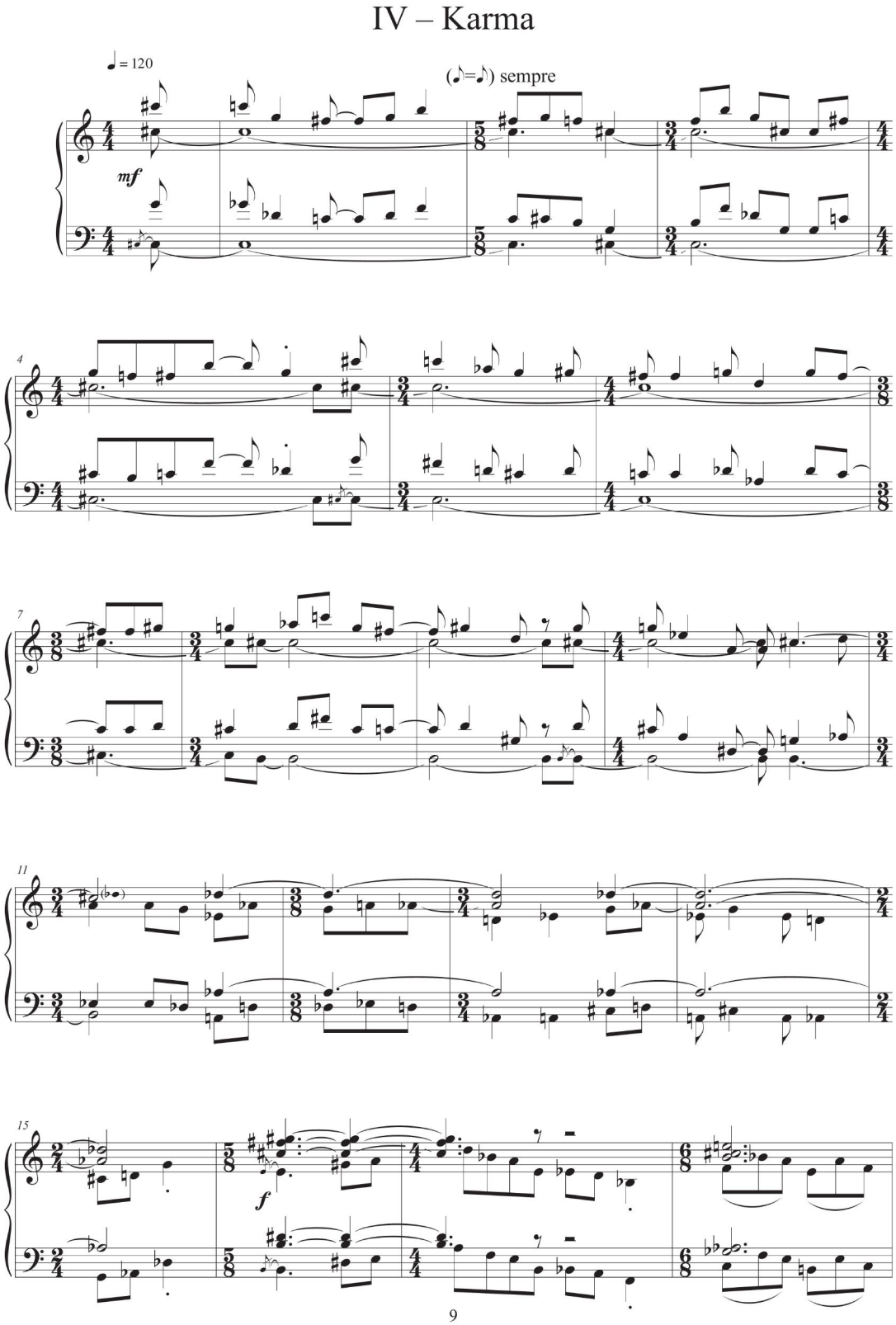
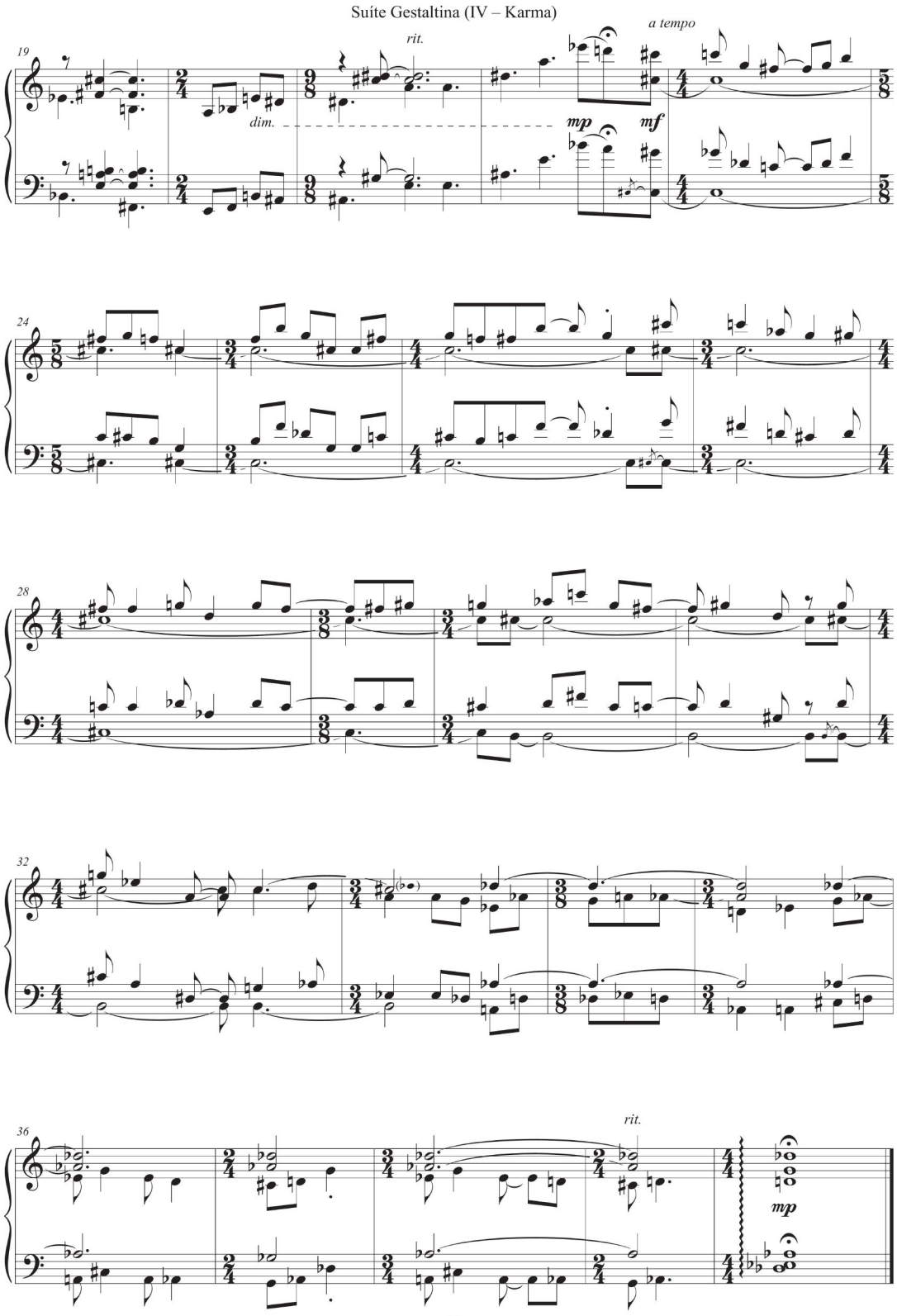
APPENDIX – Score of *Karma*, 4th movement of *Suíte Gestaltina* by Helder Oliveira




Suíte Gestaltina (IV – Karma)
19
rit.
a tempo
dim.
mp
mf
24
28
32
36
rit.
mp

10