

“Potential” Complexities in the Interpretations of *Aguas de Março* by Antônio Carlos Jobim

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The present contribution is dedicated to the analysis of one of the most famous examples of the bossa nova genre: *Aguas de Março* by Antônio Carlos Jobim. Firstly, the historical context in which the song came into being will be defined, together with some reflections upon the versions taken into consideration here, and a description of the analytic tools used. An analysis will then be put forward with the aim of demonstrating that *Aguas de Março* is characterized by the use of a very small number of elements, continuously combined and reiterated in a musical discourse that is poor or rudimentary only in appearance. By means of a close examination of the micro-elaborations of the musical material, our intention is to disclose certain complexities that lie below the relative simplicity of the surface level. Such complexities – already present in the original version, albeit in an embryonic state – are to be held as “potential”, insofar as they are completely brought to light only in later interpretations.

1. The bossa nova genre

The bossa nova – expression which literally means “new tendency” – is a musical genre born at the end of the fifties in the refined cafés of Ipanema and Copacabana, derived from various musical experiences: its origins are in the samba and hence in the popular repertoire, contaminated however by jazz influences, cool jazz in particular. The jazz influences can be ascribed to the rapid diffusion of North American music in those years. In particular, the new generation of Brazilian singer-songwriters and instrumentalists absorbed some of the formal characteristics of jazz, bringing them together in a new type of expression destined to have a strong influence not only on future generations of Brazilian musicians, but within the international popular music and jazz scene as well.

By 1972 (the year in which *Aguas de Março* was created) the bossa nova phenomenon had been alive and well for over a decade, and Jobim’s fame as a singer-songwriter had reached well beyond the boundaries of Brazil, thanks to pieces such as *Garota de Ipanema* and *Desafinado*, which stand even today among the most noble and well-loved examples of the song genre. *Aguas de Março*, which appeared for the first time on the single *Disco de Bolso* [Jobim 1972], did not immediately attain the international prestige it would later enjoy; it did however arise the curiosity of interpreters and arrangers, who in a very short period of

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time published new versions of the piece. Among these the interpretation of Elis Regina [1] with arrangement by Cesar Camargo Mariano [2] on the record Elis [Carvalho Costa 1972] stands out, while the following year Jobim himself reinterpreted the piece in a collaboration with the arranger and composer Claus Ogerman [Jobim 1973]. To remain within 1973, a new record of João Gilberto also came out, [3] in which this musician presented a new version of the piece [4] [Prado De Oliveira 1973]. The year 1974, in which Elis & Tom [Carvalho Costa-Jobim 1974] was published, with arrangements by Jobim and Camargo Mariano, is a pivotal moment in the history of *Aguas de Março*: on this record Jobim and Elis Regina synthesise their respective interpretative experiences, producing a new interpretation of the song in a vocal duo; the success of this version was so widespread as to have it improperly believed to be the original version of the piece.

2. Analytic methodology

For analytic purposes, three interpretations-arrangements of the piece have been taken into consideration here: the original version [Jobim 1972], the interpretation of the Elis Regina-Jobim duo [Carvalho Costa-Jobim 1974], and the recent sophisticated re-reading of Rosa Passos [Passos 2001]. Alongside procedures that are currently staples of analytical practice, such as the paradigmatic method put forward by Nicolas Ruwet [1972], new instruments of research have been used which allow us to broaden the field of research so as to include the evaluation of the reception of the musical work on behalf of the listener.

Ruwet's method, which as a rule foresees a separate analysis of the diverse parameters, [5] has been used here in a parallel observation of two levels, in order to make the principles according to which harmony and melody are combined explicit. Placing the harmonized melodic figures and their repetitions on the vertical (paradigmatic) axis, one can in fact individuate a normative system which consists in the commutation of interchangeable harmonic modules over melodic modules characterized by frequent reiteration. This allows us to grasp the ways in which complex elaborations of one parameter (harmony) balance the relative simplicity of another (melody). Subsequently, borrowing the idea of a summary able to visualize the combinations between parameters from Simha Arom, it has been possible to compare the different versions of the piece, and to evaluate the extent to which each one takes advantage of its harmonic potentialities.

A further phase of the analysis has been carried out in referral to the General Model of Melodic Segmentation (hereafter GMMS) elaborated by Fabio Cifariello Ciardi on the basis of results in experimental psychology [Cifariello Ciardi 2003]. The model is based on the hypothesis that the act of listening to a melodic line is influenced by the subdivision of the flow of sound into segments, based on elements of discontinuity and continuity within the flux itself; the GMMS puts at our disposal a representation that, beginning with the discontinuities and continuities of the sound event, "... endeavours to produce segmentation hypotheses considered to be the most probable" [Cifariello Ciardi-Curinga 2004, 64] among those advanced while listening to a melody. Many studies have demonstrated how micro-variations in duration, intensity, and timbre can imply extra information that, helping the segmentation, facilitates the listener's cognitive elaboration. This model has thereby shown itself to be particularly fruitful in revealing the criteria of melodic subdivision in the diverse interpretations considered here, and has allowed us to verify how the arrangement has the possibility of amplifying, above all through

choices in timbre, discontinuities and continuities perceived by the listener.

Before beginning the exposition of the analytic research, it is necessary to give some consideration to the importance of the phase of interpretation in musical genres that do not belong to the sphere of "art music". In a piece of popular music, interpretation is never a mere reproduction of the intentions of the composer, it is rather part and parcel of the creative process [Russo 1992]. The practice of arrangement takes on the value of an "... art form in itself, able to determine on its own the destiny of a piece, its impact on the public, and therefore to dictate its commercial success, its durability in the folds of memory" [Ibid, 199]; as a consequence, a comparative study of differing arrangements turns out to be extremely profitable in analysing popular music phenomena. Furthermore, it is worthwhile to remember that while studying these pieces, the recordings are the only truly complete and fully available testimony of the arrangement, to the point of being the "main source" for analysis. From this point of view, the recordings have been transcribed and scores have drafted been that are analytically functional; these transcriptions do not attempt to indicate all acoustically perceptible phenomena, but, taking into account the ample margins of tolerance in interpretation, exclude melodic and rhythmic deviations held to be non-significant. The principle objective is to standardize the melodic material of the diverse versions of the piece and thus to individuate a common ground on which to compare the different interpretations.

3. Paradigmatic analysis

Fig. 1a shows the opening bars of the original manuscript,[6] written in B major, and Fig.1b offers a transcription obtained by listening to the first part of the original version in C major [Jobim 1972][7]. In Jobim's manuscript the notation habitually used in these circumstances is slightly modified in two places: in the indication of the note assigned to the bass (indicated by a small number placed below the letter of the fundamental (see b. 2) and the use of "+" instead of "maj" to indicate an interval of a major seventh (b. 5).[8]

In the transcription, the horizontal parentheses above the pentagram with upper case letters indicate the four-bar melodic modules; they are further subdivided in motives indicated by lower case letters, while the parentheses below the pentagram, with numbers, show the relative harmonic modules. Although the four bar modules are clearly perceptible while listening, it is necessary to explain the relative criterion of segmentation. The melodic construction of the piece is fundamentally based on two melodic motives that are constantly reiterated and varied by diminution. The first, indicated as "a" in Fig. 1b, is varied first by the repetition of the first E and the addition of the passing note D (see b. 2, a'), while later a further addition of harmonic notes as well as passing notes allows the transformation of the original profile of crotchets into quavers (see b. 17, a"). The second motif, indicated as "b", consists in the repetition of a single note followed by a leap, initially a 4th (see bar 9) and later varied (see b. 10, indicated as b', and bb. 15 and 16, b" and b''').

The most important divisions – that emerge through motivic analysis – are those which we perceive at b. 9 and at b. 13, where the melodic figuration passes from motif a to motif b, and at b. 17 where motif a is definitively taken up again (see fig. 1b). In this sense, the first formal articulation that we can point out can be indicated by the sequence ABB'A"

Figura 1a. Manoscritto di Jobim.

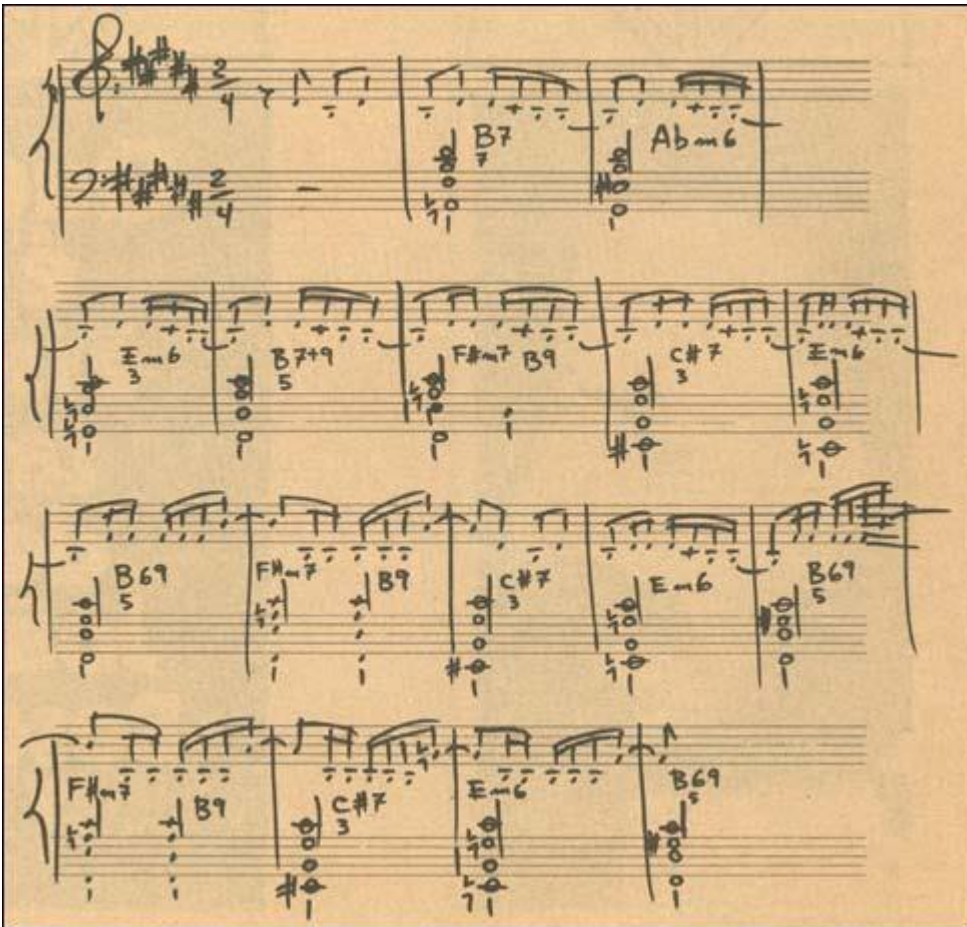


Fig. 1b. Original Version [Jobim 1972].

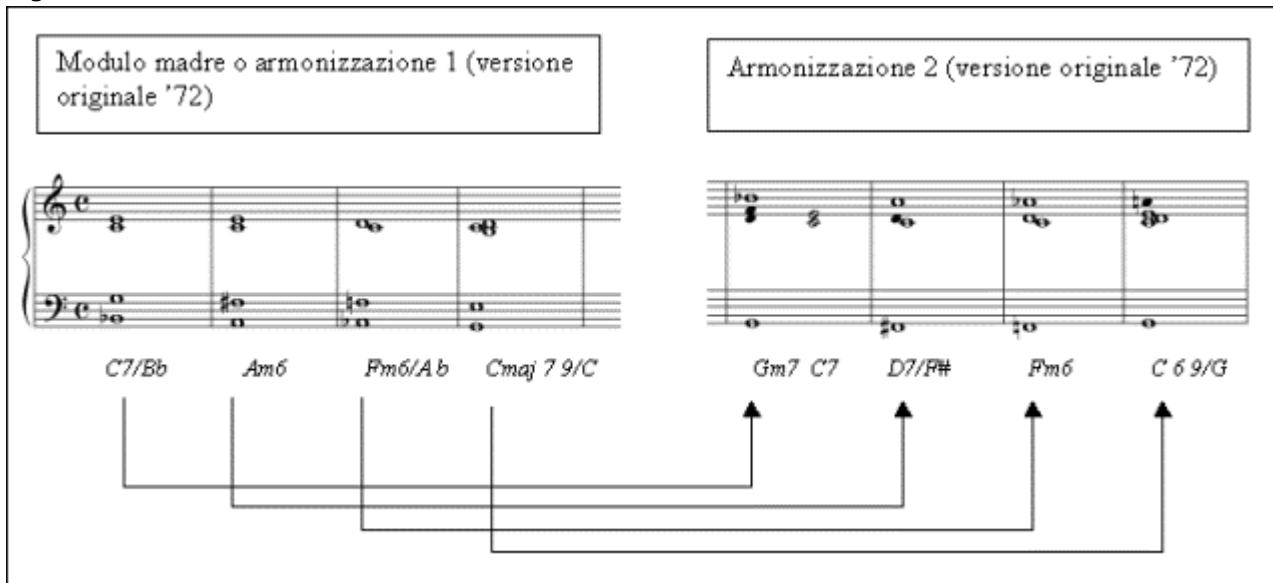


The musical score consists of four systems, each with a vocal line and guitar chords. The first system is labeled 'A' and 'A'' with notes 'a' and 'a''. The second system is labeled 'B' with notes 'b' and 'a'. The third system is labeled 'B'' and 'A'' with notes 'b', 'b'', 'b''', and 'a'''. The fourth system is labeled 'A'' with notes 'a'''. The guitar chords are: System 1: C7/Bb, Am6, Fm6/Ab, Cmaj7 9/G, Gm7, C7; System 2: D7/F#, Fm6, C 6 9/G, Gm7, C7, D7/F#, Fm6; System 3: C 6 9/G, Gm7, C7, D7/F#, Fm6, C 6 9/G, Gm7, C7; System 4: D7/F#, Fm6, C 6 9/G, Gm7, C7, D7/F#, Fm6, C 6 9/G. The score is divided into two measures per system, with a '1' and '2' indicating the first and second measures respectively.

► [Example audio 1](#)

A further formal articulation in groups of four bars becomes evident observing the harmonic structure of the piece. This structure is marked by the presence of four-bar harmonic sequences, as can be seen observing the final A section, which repeats a harmonic module made up of a sequence of chords (Gm7 C7 – D7/F# – Fm6 – C 6 9/G), and the first A section, where the same module had been used to harmonize the repetition of the section A' (bars 6-9). The harmonic sequence with which the song begins will from here on be called the mother module, or harmonization 1, while the second sequence will be defined as harmonization 2.

Fig. 2.



The figure shows two musical staves side-by-side. The left staff is titled 'Modulo madre o armonizzazione 1 (versione originale '72)' and contains four measures of music. Below it are the chords: C7/Bb, Am6, Fm6/Ab, and Cmaj 7 9/C. The right staff is titled 'Armonizzazione 2 (versione originale '72)' and contains four measures of music. Below it are the chords: Gm7 C7, D7/F#, Fm6, and C 6 9/G. Arrows indicate the derivation: from the first bar of the mother module to the first bar of the second; from the second bar of the mother module to the second bar of the second; from the third bar of the mother module to the third bar of the second; and from the fourth bar of the mother module to the fourth bar of the second.

Fig. 2 shows how the second harmonic sequence (harmonization 2) is derived from the first (harmonization 1) following precise criteria. The first bar of harmonization 2 is derived from the first bar of the mother module through the addition of the relative II degree. In fact, in jazz harmony, a dominant seventh chord can be substituted by a II-V degree sequence that, while it accelerates the harmonic rhythm, maintains a cadential function. The second bar of harmonization 2 is derived from the second bar of the mother module through the substitution of a note (E is replaced by D). In this case in the mother module the Am6 can also be interpreted as the first inversion a third species seventh chord that in jazz jargon is called a semi-diminished chord (with F# as its root). This chord can be substituted by a dominant seventh chord whose root is found a major third below; the reason for this procedure is to be found in the fact that the semi-diminished chord can be interpreted as a dominant ninth (D-F#-A-C-E) without the root in the bass. The third bar of harmonization 2 is derived from the third bar of the mother module through a change in the bass; that is, the substitution of a first inversion chord with the same chord in root position. The fourth bar of harmonization 2 is derived from the fourth bar of the mother module by substituting the major 7th with a 6th. In this case the substitution is a kind of new harmonic nuance that does not change its function as tonic.[9]

The overall form of the section, obtained by considering both motivic aspects and the individuation of the four-bar harmonic modules, is shown in Table 1.

Table 1.

A	a- a'-a'-a'	armonizzato con 1
A'	a'-a'-a'-a'	armonizzato con 2
B	b- b'-a-a'	armonizzato con 2
B'	b- b'-b''-b'''	armonizzato con 2
A''	a''-a''-a''-a''	armonizzato con 2
A''	a''-a''-a''-a''	armonizzato con 2

As we have seen, the first four chords, corresponding to the first module, are followed by a second nucleus consisting in chord substitutions of the first, whereas the melodic phrase is repeated and therefore harmonized according to both modalities proposed; when the melody is modified, the second harmonic module is newly introduced. This procedure can be considered a kind of combinatory game involving harmonic and melodic elements, that opens up many possibilities of variation in all later interpretations of this piece.

The paradigmatic analysis of the transcription of the original version of the piece [Jobim 1972] reveals how the whole song emerges from the combination of two different harmonic modules (one of which derived from the other) and two different melodic sections (A and B) suitably reiterated and varied, following a compositional idea introduced in the first 8 bars and simply applied during the course of the entire piece: in other words, if substantially identical melodic fragments can be harmonized with differing harmonic sequences, then identical harmonic sequences can be used for differing melodic fragments.

Fig. 3.

The figure displays a series of musical staves, each representing a different melodic module. The modules are labeled with letters and numbers to indicate their structure and repetition. The chord progressions are as follows:

- Module A (Staff 1):** C7/Bb, Am6, Fm6/Ab, Cmaj7 9/G
- Module A' (Staff 2):** Gm7, C7, D7/F#, Fm6, C6 9/G
- Module B (Staff 2):** Gm7, C7, D7/F#, Fm6, C6 9/G
- Module B' (Staff 3):** Gm7, C7, D7/F#, Fm6, C6 9/G
- Module A'' (Staff 4):** Gm7, C7, D7/F#, Fm6, C6 9/G
- Module A'' (Staff 5):** Gm7, C7, D7/F#, Fm6, C6 9/G
- Module A (Staff 6):** C7/Bb, Am6, Fm6/Ab, Cmaj7 9/G, Gm7, C7, D7/F#, Fm6, C6 9/G
- Module A'' (Staff 7):** Gm7, C7, D7/F#, Fm6, C6 9/G
- Module A (Staff 8):** Gm7, C7, D7/F#, Fm6, C6 9/G, Gm7, C7, D7/F#, Fm6, C6 9/G
- Module A' (Staff 9):** Gm7, C7, D7/F#, Fm6, C6 9/G, Gm7, C7, D7/F#, Fm6, C6 9/G
- Module A'' (Staff 10):** Gm7, C7, D7/F#, Fm6, C6 9/G
- Module A' (Staff 11):** Gm7, C7, D7/F#, Fm6, C6 9/G

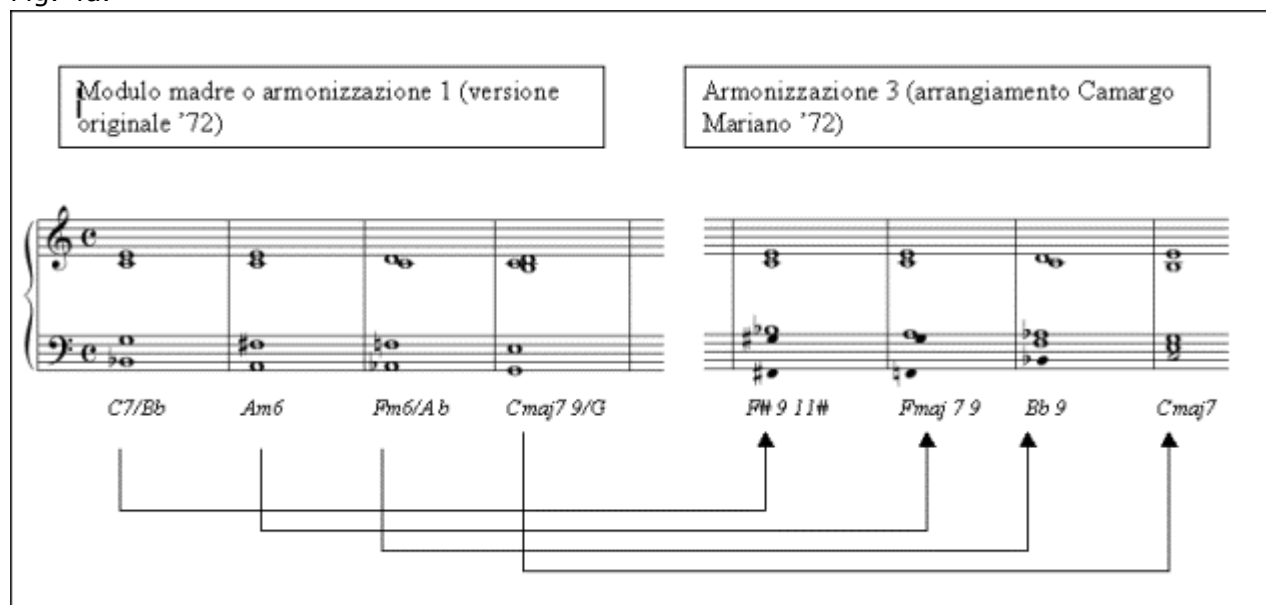
In Fig. 3 the upper square brackets indicate the distinction between the A and B parts of the four-bar melodic modules already shown in Fig. 1b, while the horizontal square brackets below

the pentagram show the harmonic modules, the Mother module (harmonization 1) and its derivate (harmonization 2).

Ruwet's model of analysis, based on the vertical collocation of identical or similar melodic segments, in order to highlight melodic repetitions, is well suited to the specific demands of the present research. Paradigmatic analysis begins with the assumption that among all parameters that might have bearing on segmentation, pitch and duration are the most relevant. However, in our case the parameter of reference turns out rather to be harmony, which divides the entire piece in four-bar segments. The episodic presentation of dissimilar brief melodic segments (for example the first bar of module A and the first bar of A') therefore derives from the necessity of conserving the length of the four bars of the harmonic segment as a base for the observation of the principles of melodic resemblance. This analysis does not foresee a literal application of the paradigmatic method, but it does maintain its spirit, in order to appreciate the degree to which identical or similar melodic modules can be harmonized with potentially substitutable harmonic modules. As can be seen, the derivate module (harmonization 2) is applied both in the A section and in the B section, whereas the mother module (harmonization 1) is only used to harmonize melodic section A. It is therefore all the more evident that the piece is based on two melodic modules and on a single varied harmonic module.

The 1972 version of *Aguas de Março* del 1972, by Elis Regina with arrangement by Camargo Mariano [Carvalho Costa 1972], and the 1973 Jobim version with arrangement by Ogerman [Jobim 1973], have a decisive importance for the later evolution of the song. It can be shown that the contributions of both of these new arrangements came together in the '74 version (Elis Regina and Jobim with arrangement by Camargo Mariano and Jobim) [Carvalho Costa-Jobim 1974]; the contributions are of a harmonic nature, in particular two new four-bar harmonizations that are put forward as potential alternatives to the mother (harmonization 1) and the derived (harmonization 2) modules of the original version.

Fig. 4a.



The diagram illustrates two four-bar harmonic modules. The first module, labeled 'Modulo madre o armonizzazione 1 (versione originale '72)', consists of the following chords: C7/Bb, Am6, Fm6/Ab, and Cmaj7 9/G. The second module, labeled 'Armonizzazione 3 (arrangiamento Camargo Mariano '72)', consists of the following chords: F# 9 11#, Fmaj 7 9, Eb 9, and Cmaj7. Arrows indicate the derivation of the second module from the first: C7/Bb and Am6 are combined to form F# 9 11#; Fm6/Ab and Cmaj7 9/G are combined to form Fmaj 7 9; and the final chord of the second module, Cmaj7, is derived from the final chord of the first module, Cmaj7 9/G.

Fig. 4a shows how the new harmonization (3) is derived from harmonization 1 (mother module) according to precise criteria. The 1st bar of harmonization 3 is derived from the 1st bar of the mother module by chord substitution and addition of a 9th and an 11th#. The 2nd bar of harmonization 3 is derived from the 2nd bar of the mother module by changing one note (F# becomes F) and adding a 9th. In this way, substituting both the first and the second bar, harmonization 3 presents, with respect to the mother module, a different chromatic succession (IIb-I), in other words negates the dominant (C) in favour of the tonic (F) [10].

The 3rd bar of harmonization 3 is derived from the 3rd bar of the mother module, following the same procedure that we have previously described; in fact, the chord of the mother module can be considered as a second inversion of a semi-diminished chord with D as its fundamental, that is substituted with a dominant ninth chord, found a third below. Lastly, the 4th bar of harmonization 3 is derived from the 4th bar of the mother module by simplifying the chord: the elimination of the major 9th and the use of the root position does not however modify the tonic function. [11]

Fig.4b: New harmonization (4).

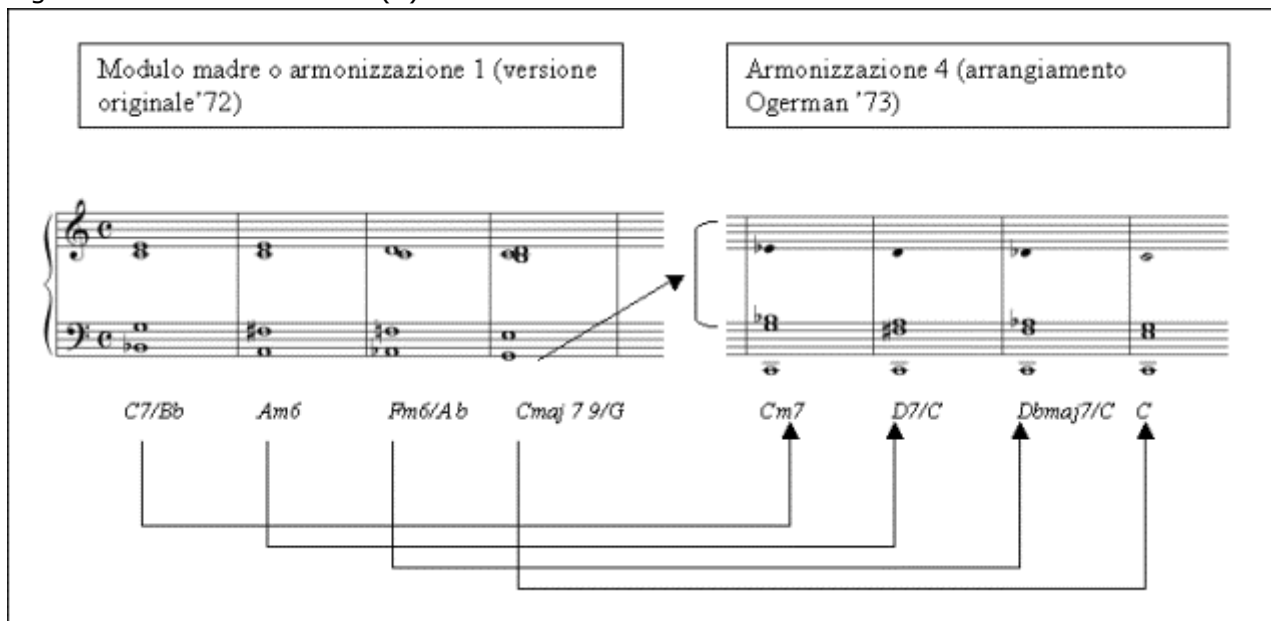
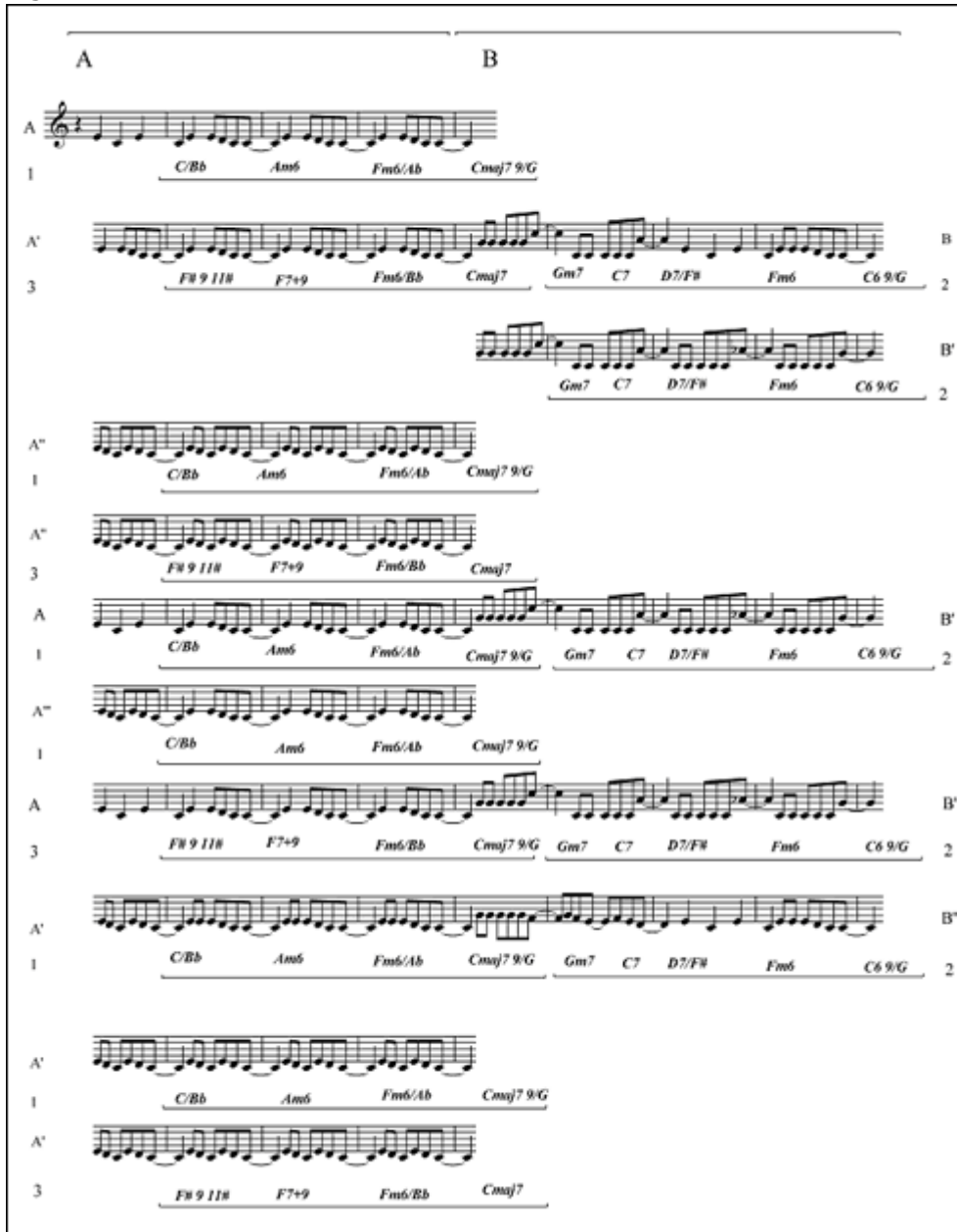


Figure 4b shows the criteria according to which harmonization 4 is derived from harmonization 1 (mother module). The chromatic bass used in the mother module may well be at the origin of the new harmonization: indeed, the roots of the last three chords of harmonization 4 proceed by descending semitone, and to complete the chromatic sequence in the upper voice the E of the first bar is replaced with an Eb. In the same way, to give the fragment greater harmonic stability, a tonic pedal is placed in the bass (C), which is the only note in common among the four chords of the mother module. Consequently, the relationship between the two harmonizations in this case is not due to a functional analogy between the single chords that make up the modules, as observed previously, but from the fact that in each bar of harmonic module 4 no less than three notes of the mother module appear. It is interesting to note that this harmonization is placed in the final part of the piece, as though it represented the imminent conclusion.

In the '74 version [Carvalho Costa-Jobim 1974] all four possible harmonizations of the two melodic modules are used. The melodic modules and the new harmonizations are combined in a pattern clearly shown by paradigmatic analysis (Fig. 5).[13]

Fig 5. Elis & Tom [Carvalho Costa-Jobim 1974].



The figure displays a musical score for Elis & Tom, illustrating the combination of two melodic modules, A and B, with various harmonizations. The score is organized into several systems, each representing a different combination of the modules and their harmonizations. The modules are labeled A and B, and the harmonizations are indicated by chords and their corresponding numbers (1 or 3). The score is written in treble clef and 2/4 time.

The melodic modules are:

- Module A:** C/Bb, Am6, Fm6/Ab, Cmaj7 9/G
- Module B:** Gm7, C7, D7/F#

The harmonizations used are:

- Harmonization 1:** C/Bb, Am6, Fm6/Ab, Cmaj7 9/G
- Harmonization 2:** Gm7, C7, D7/F#
- Harmonization 3:** F#9 11#8, F7+9, Fm6/Bb, Cmaj7

The score shows the following combinations:

- A:** 1 (C/Bb, Am6, Fm6/Ab, Cmaj7 9/G)
- A':** 3 (F#9 11#8, F7+9, Fm6/Bb, Cmaj7)
- A'':** 1 (C/Bb, Am6, Fm6/Ab, Cmaj7 9/G)
- A''':** 3 (F#9 11#8, F7+9, Fm6/Bb, Cmaj7)
- A''':** 1 (C/Bb, Am6, Fm6/Ab, Cmaj7 9/G)
- A''':** 3 (F#9 11#8, F7+9, Fm6/Bb, Cmaj7)
- A''':** 1 (C/Bb, Am6, Fm6/Ab, Cmaj7 9/G)
- A''':** 3 (F#9 11#8, F7+9, Fm6/Bb, Cmaj7)
- A''':** 1 (C/Bb, Am6, Fm6/Ab, Cmaj7 9/G)
- A''':** 3 (F#9 11#8, F7+9, Fm6/Bb, Cmaj7)
- A''':** 1 (C/Bb, Am6, Fm6/Ab, Cmaj7 9/G)
- A''':** 3 (F#9 11#8, F7+9, Fm6/Bb, Cmaj7)

Fig 5. Pag. 2.

solo strumentale



The musical score consists of six systems of notation. Each system features a melodic line on a staff and a corresponding chord progression below it. The chords used are Gm7, C7, D7/F#, Fm6, C6 9/G, Cm7, D7/C, Dbmaj7/C, C, and Cmaj7. The systems are labeled with letters A, A', and B, and numbers 2 and 4, indicating different harmonic modules or sections.

► [Example audio 2](#)

The synopses that follow allow an overall comparison of the two arrangements just described, together with a recent version by Rosa Passos [14] recorded in 2001 and first presented on the international market in the recording *Me and My Heart* [Passos 2001], and later in Brazil on *Eu e Meu Coração*.

Fig. 6a [Jobim 1972].

Fig. 6b. [Carvalho Costa -Jobim 1974].

Figura 6c. Rosa Passos [Rosa Passos 2001].

In figures 6a, 6b, and 6c, the alphabetic symbols correspond to the melodic segments, while the numbers indicate the harmonic modules (the numbers 1, 2, 3, and 4 correspond to the harmonic modules indicated above as mother module, harmonization 2, harmonization 3, and harmonization 4). The coloured squares correspond to the harmonic-melodic combinations actually used (click to listen) whereas the white ones indicate combinations between the two parameters that have remained unexplored. In figures 6a and 6b two squares are presented; the first explains in detail all of the melodic variations, and the second, with greater synthesis but with respect to the same variations, presents only the divisions between the modules A

and B. It indicates all combinations actually put into practice: in the case of fig. 6a, harmonization 1 is used only for fragment A, while harmonization 2 is used both for A and for B.

While the original version [fig. 6a, Jobim 1972] presents a limited combinatorial game and a small number of harmonic elements, the '74 interpretation [fig. 6b, Carvalho Costa-Jobim 1974] adds new harmonizations and substantially maintains the melodic asset of the song, exploiting in a more extensive way the idea of combining the melodic and harmonic elements available. The only possibilities left unexplored are the combinations B1 and B3 (synopsis). Rosa Passos' recent interpretation [fig. 6c, Passos 2001] shows how it is possible to interact with the preceding versions of the piece, while at the same time maintaining distinctive traits: [15] having chosen to use only the harmonizations 1 and 3, the arranger combines them with the melodic modules A and B, getting the most out of every possibility, and at the same time explores some solutions left unused by the preceding versions, such as B1 and B3. [16]

Taking advantage of the "potential complexities" present in the system outlined means combining the different harmonisations with the melodic modules in such a way as to enrich the relative simplicity of the melodic discourse, through a complexly conceived harmonic structure, which however remains in close correlation with the original version of the piece. Under this light, *Aguas de março* lends itself quite well to new interpretations, which in their heterogeneity show a strong continuity with the compositive ideas that gave way to its creation.

4. Analysis with the GMMS

Before beginning analysis with the GMMS, we will introduce here some aspects of Cifariello Ciardi's method, as well as some indications as to its application.

The analytical system that we are about to describe considers the perception of the sound object "melody", above and beyond the compositional language used, which excludes any particular harmonic framework from our consideration. In other words, that which is hypothesized on behalf of a listener is the perception of melody, without further elements. If on one hand such a definition could represent a limit as regards the present research, in as much as melody is considered by this model as a sound event devoid of context, on the other hand this does not prevent the model from revealing certain peculiarities of the melodic material, through the simulation of those paths by means of which a sound event is grasped by our perceptive system.

The model hypothesises that the listener's strategy is influenced by noting the changes and regularities present in one or more dimensions of the melodic sound event. The concepts of change and regularity are associated with the homologous ones of discontinuity and continuity: they act as independent forces that, in their interaction, contribute to the organization of the sonorous flow. Noting discontinuity can depend, for example, on a rapid variation of pitch or on the inversion of the melodic profile, whereas a continuity could be detected by the absence of variations or by the presence of variations that are limited from a perceptive point of view. Furthermore, noting continuity can also arise from a regularity in the variations perceived (continuity in discontinuity). The model intends to individuate a finite set of segmentations,

commencing from discontinuities detected in three parameters: duration, pitch, and melodic profile. One further factor considered by the model is the metric pulsation. Meter is considered as a non-autonomous dimension of the sonorous event, in that its perception depends on the individuation of a periodicity in the variations perceived in other dimensions of the acoustic event. Metric pulsation is therefore defined as a continuity caused by the periodic return of discontinuities detected in pitch, duration and melodic profile. In order to establish a metre it is necessary to bear in mind that a continuity, derived from a constant pulsation, can be caused by discontinuities over regular intervals of time, whereas the mutability of the pulsation depends on noting non-regularly distributed discontinuities. Each discontinuity is assigned a strong or weak degree of relevance indicated respectively by the symbols x and o below the pentagram, while the continuities deriving from the pulsation are indicated by an x above the pentagram.

Table n. 2 illustrates the criterion according to which, for each dimension taken into consideration, it is possible to detect discontinuity or continuity in each note, as well as the relative degree of intensity.

A) Discontinuità considerate

Altezza (intervalli)

Dati due suoni separati da un intervallo melodico (per una velocità d'articolazione maggiore di 100 millisecondi)			
intervallo rilevato	unisono, 2m, 2M	3m, 3M	>3M
tipo di discontinuità	non rilevante	debole sul secondo suono	forte sul secondo suono

Durata

Dati due suoni (per una velocità di articolazione tra 120 e 1800 millisecondi)			
differenza di durata rilevata	la differenza fra le durate è uguale o inferiore a 1/8 del suono più breve	il secondo suono è più breve del primo	il secondo suono è più lungo del primo
tipo di discontinuità	non rilevante	debole sul secondo suono	forte sul secondo suono

Profilo

Dati tre suoni (s1, s2, s3)					
rilevazione del profilo	assenza di direzionalità (unisoni successivi)	s3 conferma il profilo affermato da s1 e s2	s3 inverte il profilo affermato da s1 e s2 ed è stata rilevata una discontinuità di altezza tra s1 e s2.	s3, ripetendo l'altezza di s2, interrompe la direzionalità definita da s1 e s2	S3 definisce una nuova direzione melodica dopo un'assenza di direzione
tipo di discontinuità	non rilevante	non rilevante	debole sul secondo suono (s2)	forte sul secondo suono (s2)	forte sul terzo suono (s3)

B) Continuità considerate

Raggruppamento metrico

Dato un suono (dopo un minimo di due suoni marcati da una discontinuità)		
rilevazione	in assenza di discontinuità	con discontinuità rilevate se il suono è il primo di un gruppo binario/ternario
tipo di discontinuità	non rilevante	forte sul suono

The model proceeds by individuating all possible segments delimited by one or more discontinuity/continuity, with however certain limits in duration. The segments to be considered perceptibly significant turn out to be those distributed over a temporal space between 250 ms and 15 seconds, and within this course one must work with two different levels of duration: the "first level", which one can place in a time span between 250 milliseconds and 4-5 seconds, and the "second level", with an absolute duration of between 4 and 15 seconds. The GMMS foresees criteria of temporal organisation of the segments in as far as it hypothesises that the listener tends to collocate similar segments of duration on one and the same level.

Figure n. 7 shows the segmentation of *Aguas de Março*. In order to establish the continuity of the pulsation, an initial perceptively significant change has been identified on the second note of b. 2. The periodic return of this set of discontinuities in all bars until b. 9 establishes a "metric grouping" that is contradicted only at the end of b. 9, by the indication of discontinuities no longer in line with the preceding ones: the non-coincidence between the pulsation indicated until here, and the new discontinuities, creates a need for a new hypothesis of pulsation. While actually listening to a song, the metre that emerges from the melody is to be considered a virtual rhythmic system in as far as the presence of the rhythmic section, and

the rhythm produced by the alternation of the chords, conceal its perception. The rhythmic section is produced by a bass instrument (double bass or electric bass), drums, and guitar: while the guitar plays a rhythmic formula typical of the bossa nova genre, bass and drums articulate a series of pulsations and a metre that orients the listener. The metre that emerges from the melodic interweaving can therefore emerge only if the arrangement and the interpretation allow it to become explicit.

For the purposes of segmentation, the model initially identifies all segments that are not further divisible (made up of a minimum of two notes) in which both the final note and the initial one are marked by one or more discontinuity/continuity. Using such a procedure one often obtains segments that are quite brief, and that define the so-called "provisory level" [17]. This level, due to the brevity of the segments that it produces, does not prove to be perceptibly significant, but functions in defining the two principal levels: the "first level", made up at most of three segments of the provisory level, and the "second level", made up of two or three "first level" segments. The segmentations are indicated below the pentagram by overlaying groups of horizontal square brackets; each segmentation hypothesis comprises a system of two horizontal braces that represent the first and the second level. [Cifariello Ciardi 2003].

Fig. 7. Aguas de Março according with MGSM.

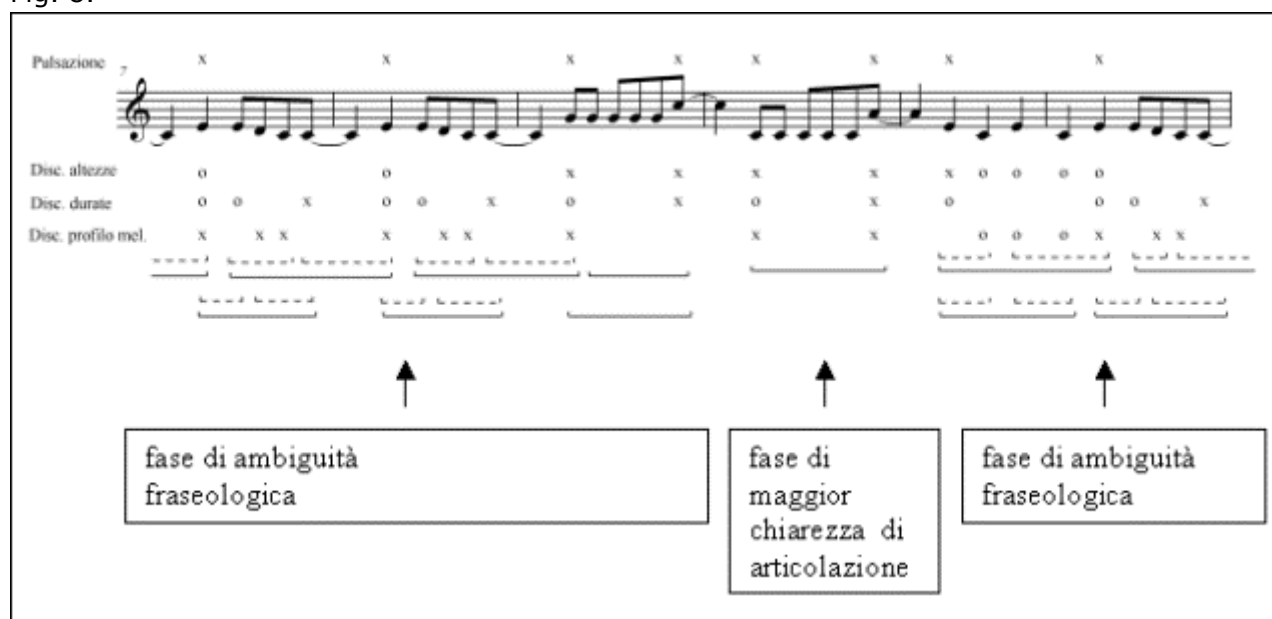


The figure displays four systems of musical notation for the piece 'Aguas de Março'. Each system consists of a musical staff in treble clef with a 2/4 time signature, followed by three rows of analysis: 'Pulsazione', 'Disc. altezze', and 'Disc. durate'. The 'Pulsazione' row contains 'x' marks above the staff. The 'Disc. altezze' row contains 'o' marks. The 'Disc. durate' row contains 'o' and 'x' marks. Below these rows are two horizontal lines with brackets indicating segmentations. The systems are numbered 1, 7, 13, and 19.

Due to the evaluation of non coinciding discontinuities/continuities, at times two hypotheses of segmentation have been identified, while in other cases only one segmentation hypothesis appears, to be considered more probable from a perceptive point of view. One may suppose that these two cases may bring to light an aspect that is also perceptible while listening, namely a certain ambiguity from the point of view of the phraseological articulation in the phases with two segmentation hypotheses and a greater clearness in articulation in the phases

with only one segmentation hypothesis. One consideration that comes out of the analysis done hitherto therefore concerns the passage from a phase of phraseological ambiguity towards a phase of greater clearness in the segmentation. Fig. 8 allows us to observe how non coinciding discontinuities can bring out differing segmentation hypotheses (see the first three bars), whereas if the discontinuities and the continuities tend to mark the same notes, the segmentation turns out to be univocal (fourth bar). A first phase, that could be received by the listener as a constant but formally uncertain repetition of a three-cell melodic cell, is followed by an episode that is perceptively clearer in its phraseological articulation.

Fig. 8.




The contact between the analytical method put forward here and the concretely realized versions of the song consists in the hypothesis that the arrangement offers the possibility of amplifying, through choices in performance and timbre, discontinuities and continuities perceived by the listener. In some cases it will be possible to verify whether the segmentation proposed by our model coincides with the one proposed by the arrangements, while in others some potentialities implicit in the melodic material are made explicit by the versions taken into consideration.

5. Potentialities in the material and arrangement

In the interpretations taken in consideration, taking advantage of the potentialities inherent in the melodic material of the piece also involves underlining the areas of phraseological transformation; i.e., showing the passage towards the phase of greater clearness of the segmentation, as well as bringing to light the specific qualities that characterize the various phases through the arrangement and the details of the instrumental and vocal performance. It is not the case here to formulate judgements regarding the quality of the versions considered, but simply to underline how arrangers and interpreters have the opportunity to build upon information already present in the melodic material of the piece, revealed through analysis with the GMMS. Fig.9 shows quite an interesting passage which corresponds to the last

melodic segment inserted in the first of the two conclusive A sections. The strong discontinuities uncovered in the dimensions of pitch and melodic profile can make the melody take on a polyphonic aspect; the distance in the intervals and the continuous inversion of the melodic profile make a new hypothesis of segmentation plausible. The last two pentagrams towards the bottom show the harmonic module, with the notes that emerge from the melodic intertwining in black. The substitution of the C (last quaver of the first bar) with a Bb (done by Jobim and Elis Regina in the '74 version [Carvalho Costa-Jobim 1974]) is coherent with the harmonic module of reference.

Fig. 9.



Three cases seem to be particularly illustrative; the first involves a vocal-instrumental transformation, while in the second the metric pulsation that emerges from the material becomes explicit, and in the third the melodic line is divided into two perfectly distinct voices. In the first case a vocal-instrumental transformation can show the passage from a phase of phraseological ambiguity to a phase in which the segmentation is clearer (see fig.9). Listening to audio examples 3, 4, 5, and 6 it is possible to verify if and how the various versions of the piece amplify the feature observed in the melodic material. The version contained in Elis & Tom [Carvalho Costa-Jobim 1974] underlines the moment of change in b. 9 through the instrumentation and the distribution of the melody between the two voices: the entrance of the piano, and the change in vocal timbre that comes about with the entrance of the male voice, mark the passage to the new phase.

► [Example Audio 3](#)

In a successive passage, the same arrangement makes evident such a change with even greater emphasis: the double suspension following the instrumental intermezzo accentuates the difference between the first phase, quite homogeneous and not at all differentiated from the point of view of timbre, and the second, richer and more diversified in timbre.

► [Example Audio 4](#)

In *Me and My Heart* [Passos 2001], the phase of phraseological ambiguity (where one notes an almost complete loss of identity in the initial melodic module) is characterized by a large degree of melodic and rhythmic freedom on behalf of the interpreter, while in the following phase the melody is faithfully reproduced.

▶ [Example Audio 5](#)

The original version, on the contrary of the versions just observed, does not in any way mark the passage from one phase to the other. In other words it contains a unexpressed potentiality of the melodic material.

▶ [Example Audio 6](#)

The second case considered consists in making explicit, through interpretative freedom, the metric pulsation that emerges from the basic melodic material.

In João Gilberto's version [Prado De Oliveira 1973] the interpreter produces a temporal slippage of the melodic modules that in the end makes the metre suggested by the melodic analysis coincide with the harmonic metre and the pulsation of the rhythmic section. This makes the metric ambiguity contained in the melodic segment evident.

▶ [Example Audio 7 i](#)

A third observable case is the fission of a melodic line in two distinct flows. The strong discontinuities pointed out in the pitches and the melodic profile can have the melody take on the form of a "virtual" polyphony.

In the version contained in *Elis & Tom* [Carvalho Costa-Jobim 1974] the two singers' interpretation puts into act the division of the melody into two distinct melodic lines, suggested by the relative harmonic module and based on the discontinuities implied by the distance in the intervals and the continuous inversion of the melodic profile (see also Fig. 9).

▶ [Example Audio 8](#)

7. Conclusions

Agua de Março is an example of how it is possible to enhance the complexity of a piece not through the juxtaposition of new elements, but simply exploiting possibilities already inherent in the original version and not completely expressed by it. Just such a progressive development of potential elements, observed in the interpretations considered here, may have contributed to making the piece in question aesthetically persuasive enough to create a consensus that goes well beyond its first years.

From a methodological point of view, we must note that the plurality of interpretative solutions present in the diverse versions entails, as the text of reference for the analysis of a song, not only the written testimony of the work but above all the sound recordings of the piece itself. In this light the observations put forward here could be further refined with a close analysis of aspects of timbre, in order to define further micro-variations regarding the form. Taking these considerations as a basis, research on similar repertoires will have to be carried out following a multidisciplinary approach which employs traditional analytical tools as well as others, that arise for example from the encounter between analysis, electro-acoustic research and the psychology of perception.

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NOTES

- [1] Elis Regina Carvalho Costa (1945-1982) was a major interpreter of Brazilian music, active in the sixties and the seventies.
- [2] César Camargo Mariano (1943-viv.), pianist and arranger, collaborates with many interpreters of Brazilian music; at the time of the recording Elis e Tom he was Elis Regina's companion.
- [3] Claus Ogerman (1930-viv.), composer, arranger, and conductor, is known above all for having written memorable arrangements of jazz pieces for large orchestra.
- [4] João Gilberto Prado Pereira de Oliveira, guitarist and singer, is considered together with Jobim to be the creator of the bossa nova genre.
- [5] See the "tableaux des commutations possibles" [Arom 1985, 725-726].
- [6] http://jobim.com.br/partituras/aguas_de_marco/aguasmarco_part.html
- [7] In order to facilitate comparison, all following transcriptions will also be presented in C major.
- [8] The chord symbols follow traditional jazz practice, in which the content of a chord is represented by a letter – the root of the chord, written in Anglo-Saxon alphabetic notation (A, B, etc...) – and by numbers which indicate the

intervals added to the basic triad. Thus, three-note chords are represented by the name of the root without further signs if the triad is major (C), followed by an "m" if the triad is minor (Cm). The symbols "6" e "6 9" indicate respectively that a major sixth, or a major sixth and a major ninth, are added to the triad (Fm6) (C 6 9). A "7" indicates that a minor seventh is added to the triad, whereas "maj7" adds a major seventh (D7) (Cmaj7). Often, when an added ninth (major or minor) is indicated, a minor seventh is implicit. Otherwise, in order to indicate a ninth chord with a different note than the minor 7th, it must be stated: for example B maj7 9. The symbol "#" after a number indicates that the interval referred to by the number must be raised by a semitone; for example B 9 11# means that the B major triad takes a minor 7th, a major 9th, and an augmented 11th, that is an augmented 4th. The sign "/", placed after the chord symbol and followed by a note, indicates that the note must be placed in the bass (in C7/Bb the minor 7th, B flat, is in the bass).

[9] De Rose 2002.

[10] This chord substitution is based on the equivalence between a dominant chord with diminished 5th, and a similar chord whose root is placed at a diminished 5th. This rule is extended to dominant seventh chords without diminution of the 5th by way of their identical harmonic function [De Rose 2002]. In a dominant-tonic passage, one of the effects of such a substitution is the transformation of the bass, no longer a leap (V-I) but a chromatic succession (I**II**-I).

[11] De Rose 2002.

[12] De Rose 2002.

[13] In this version a new melodic module, which originates in B but clearly differs from it, appears only once. It replaces the B" of the original version and is here called B'", even though it could be indicated as A or even as C, precisely because it substitutes a B module of the original version. Furthermore, it is necessary to retrace to a common norm some of the variations due to the interpreters' freedom in performance, so as to be able to compare the diverse versions of the piece. It is interesting to note how the melodic variation just described has historically become habitual, never subsequently put into question, which confirms the great success of the '74 interpretation [Carvalho Costa-Jobim 1974].

[14] Rosa Passos is a Brazilian composer and singer who, while remaining in the wake of bossa nova tradition, proposes some interesting stylistic evolutions in this genre.

[15] This version, given the interpreter's ample melodic freedom, can be compared with the others only by referring to the melodic divisions A and B; we have therefore omitted the synopsis with the most minute melodic variations.

[16] The last chord of harmonization 3 (C maj7) is further substituted by Am 11 (a minor triad with added 7th, 9th and 11th), probably to avoid the conclusion of the module on the tonic chord.

[17] The provisory level is not explicit in figure 7; in the following example it will be represented using broken square parentheses.