



HAL
open science

Theory and Practice of Psaltiki: Why do they not coincide?

Amine Beyhom

► To cite this version:

Amine Beyhom. Theory and Practice of Psaltiki: Why do they not coincide?. 3rd International Musicological and Psaltic Conference “... ν πιγνωσει μνο ντ ς Σε...” (= chanting consciously in praise to Thee) Prerequisites and Skills for Sacred Chanting in Orthodox Worship *Τετ ρτη 30 Μα ου – Σ ββατο 2 ουνιου 2018 Συνεδριακ Κ ντρο “Θεσσαλια” – Μελισσι τικα Βλου*, 2020. hal-03108184

HAL Id: hal-03108184

<https://hal.science/hal-03108184>

Submitted on 13 Jan 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Theory and Practice of Psaltiki: Why do they not coincide?

AMINE BEYHOM

Centre de Recherche sur les Musiques Arabes et Apparentées
(CERMAA – affiliated to the FOREDOFICO foundation), Lebanon

amine.beyhom@foredofico.org

Abstract. Psaltiki follows since the late 19th century a theory of the scale established by the 1881 Musical Committee under the Patriarchate of Constantinople. Tonometric analyses show that praxis and theory barely coincide, and that the latter should be considered as a mere guide for cantors, and not a binding procedure.

The structural differences between the scale of the First and Second Reforms of the 19th century are underlined. A series of short examples – from Lebanese as well as Greek cantors – demonstrate the discrepancies between theory and praxis. Explanations about the role of heterophony in Psaltiki are provided as well as an example of reconstruction of a Byzantine choir.

In conclusion, the speaker shows how recent trends in Psaltiki theory tend to reconcile even more Psaltiki with theories of the scale of (Classical) Western music, at the expense of its, as stated in the text of the Musical Committee of 1883, “Oriental” roots.

A SHORT REMINDER ON THE SCALES AND INTERVALS OF THE TWO REFORMS OF LITURGICAL CHANT IN THE 19TH CENTURY¹

The First theoretical reform of Byzantine chant in the 18th century took place in 1814-1818. It is based on the division of the tambour (*pandouris*) by Chrysanthos in the seminal *Theoretikon Mega*² (Figure 1).

A detailed explanation of the results of this division is shown on Figure 2. In its essence, the resulting diatonic scale from lower $\Delta\iota$ to its upper octave $\delta\iota$ is similar to the quarter-tone *Yākā*³ scale – or 4 3 3 4 3 3 4 in multiples of the quarter-tone – based on the degree *YĀKĀ* in Arabian *maqām* music. In Şafiy-y-a-d-Dīn’s⁴ conception of the scale, however, the smaller tones (from $\kappa\varepsilon$ to $\zeta\omega$ and from $\zeta\omega$ to $\nu\eta$ for example, equivalent theoreti-

¹ The original presentation relied on power point animations for the analyses – with the Praat program available at <http://www.fon.hum.uva.nl/praat/> – of scale and chants. These are partly reproduced as mp4 videos in the accompanying DVD-R. Two video-analyses are also proposed in this DVD-R, also published as by-products of an article in NEMO-Online No. 7 [Beyhom, 2018d], and entitled “MAT for the VIAMAP – Music Analysis Tools for the Video-Animated Music Analysis Project”.

² [Chrysanthos (de Madytos) and Pelopidēs, 1832].

³ Many *maqām*(s) have homonymic degree or polychord names: to avoid confusion, I use an initial capital letter for *maqām*(s) and scales, lower case for polychords and *geni* as well as upper case for degree names. Thus the tonic (initial) degree *RĀST* of the polychord *rāst* (4 3 3 in multiples of the quarter-tone) as well as of the scale of *maqām Rāst* (4 3 3 4 4 3 3).

⁴ Şafiy-y-a-d-Dīn al-Urmawī is a 13th-Century theoretician whose theories became predominant in the Ottoman realm beginning approx. with the 15th century.

cally and respectively to 151 and 143 cents) are theoretically differentiated as two different forms of *mujannab* (or “medium tones”) with one being bigger than the other.

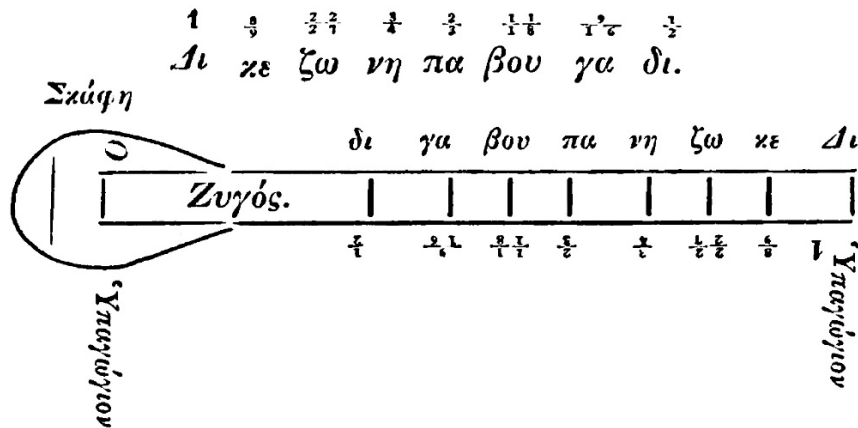


Figure 1: Division of the tambour (*pandouris*) by Chrysanthos in the *Theoretikon Mega* (1832), [Chrysanthos (de Madytos) and Pelopidēs, 1832, p. 28]

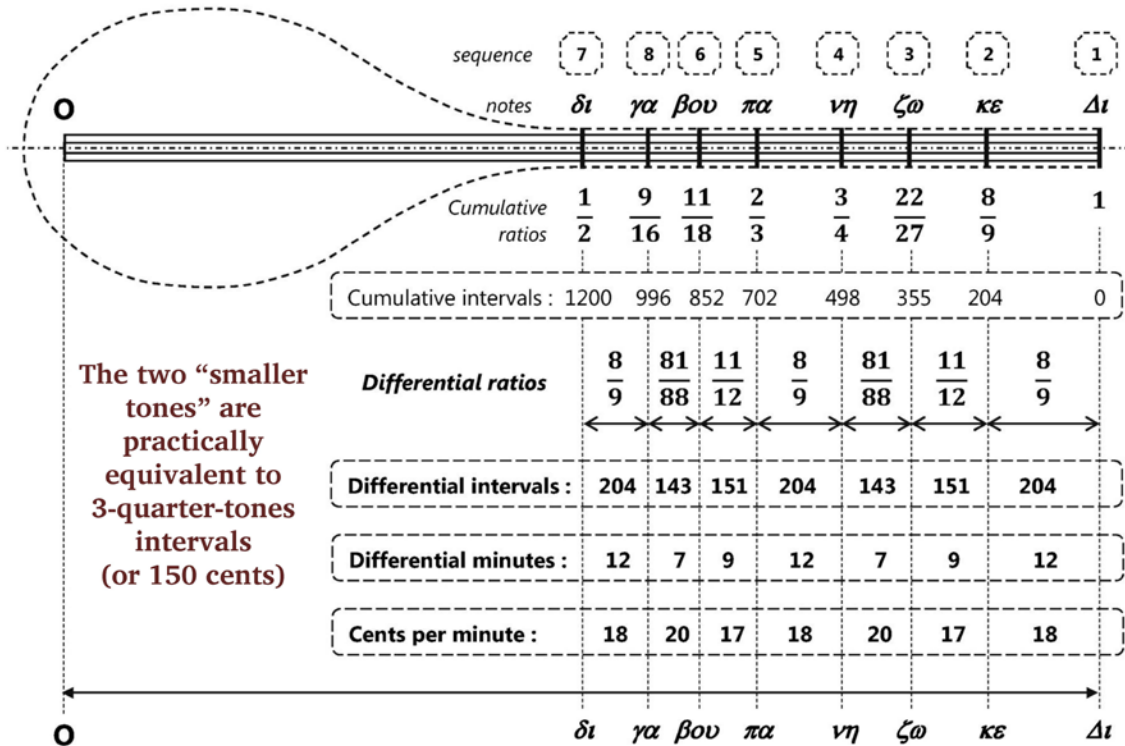


Figure 2: Detailed explanation of the results of the division of the tambour (*pandouris*) by Chrysanthos (Figure 1) in the *Theoretikon Mega*

In his arithmetical division of the octave in 68 *moria* (Figure 3 – Left), Chrysanthos uses respectively 9 and 7 *moria* in order to identify and differentiate (but not measure)⁵ these intervals with the help of simple numbers.

The 68 *moria* of Chrysanthos are equivalent to the division by 4 of the intervals of the 17-Intervals scale of Urmawī (17x4=68),⁶ an asymmetrical division of the octave based,

⁵ As these intervals have nearly equal sizes.

⁶ See [Beyhom, 2015b] for a detailed review of the two theories and explanations completing the following paragraphs.

theoretically, on a *comma-leimma* structuring of the intervals (whole tone = *LLC* – or *leimma leimma comma*; medium tones – or *mujannab* = either *LL* or *LC*). In practice, Urmawī’s scale uses two “medium” tones between the semi-tone (equated to a *leimma*) and the whole tone.

The Music Committee of the Second Reform of the 19th century under the patriarchate of Constantinople⁷, although it based theoretically – and mainly – its division of the octave on “harmonic” intervals (superparticular intervals of the form $[n+1]/n$ – see Figure 34)⁸, adopted in practice a 36-intervals division of the octave compatible with the Western equal-tempered 12-semi-tones division (Figure 3 – Right)⁹.

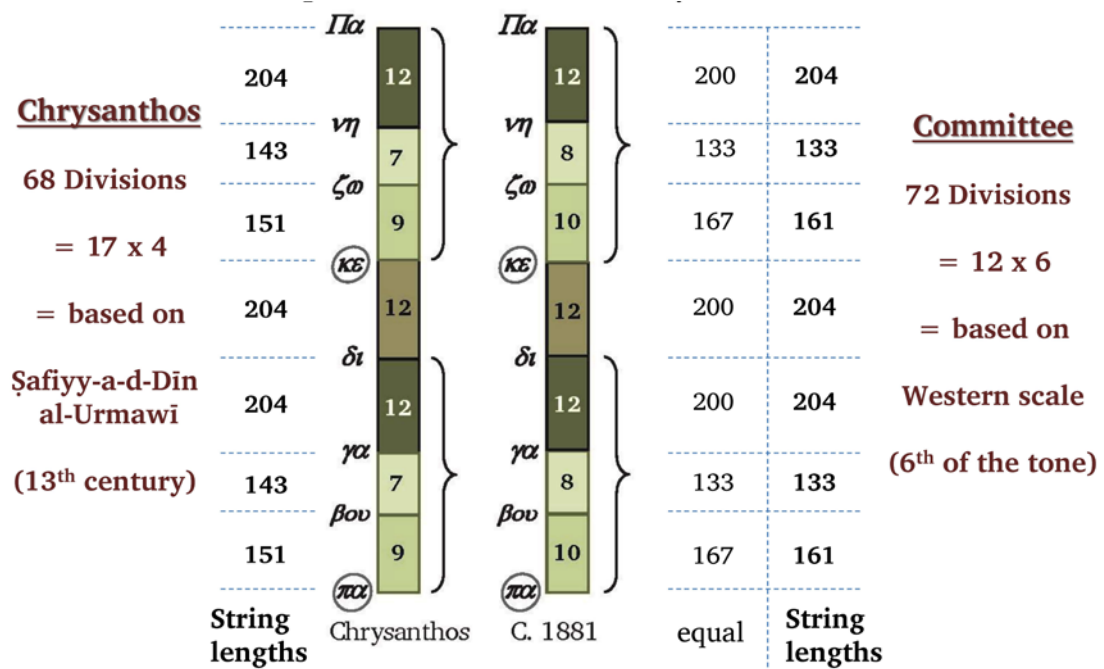


Figure 3: Comparing the “diatonic” systems (1818-1881)

Compatibility with Western scales is evident for the *enharmonic systems* (Figure 4) in which, whenever Chrysanthos – and other theoreticians like Chourmouzius and Philoxenus – used (approximate) quarter-tones (or thirds of the tone), the Music Committee used plain semi-tones as small intervals for such scales.

The half tones are also present in the *chromatic systems* (Figure 5) despite the use of bordering thirds of the tone by the Music Committee of 1881. This is one – among others – indicator that the sole purpose of the Second Patriarchal Reform of the 19th century was, as a sequel of Greek independence in 1832 and of the changes which took place in it till the 1880s, to conform the theory of Byzantine chant with Western theories of the scale and avoid theoretical connections with the Ottoman-branded Şafiyy-a-d-Din al-Urmawī scale.¹⁰

The author will show that this was but one step on the path of the westernization of Byzantine chant theory, and that Byzantine chant itself, due to its intrinsic modal nature

⁷ From this point on the “Music Committee”.

⁸ See [Beyhom, 2015b] for a detailed review of the two theories and explanations completing the following paragraphs.

⁹ While the arithmetic division adopted by the Music Committee is based on 72 intervals to the octave (as per 12×6 tones, or the division of each tempered whole-tone in 12 equal parts), all indications about the dimensions of the intervals are given in even numbers.

¹⁰ This is further explained in the concluding part of this paper.

and to the essential role of heterophony, does not conform to theories – be it the theory of Chrysanthos or the theory of the Music Committee of 1881.

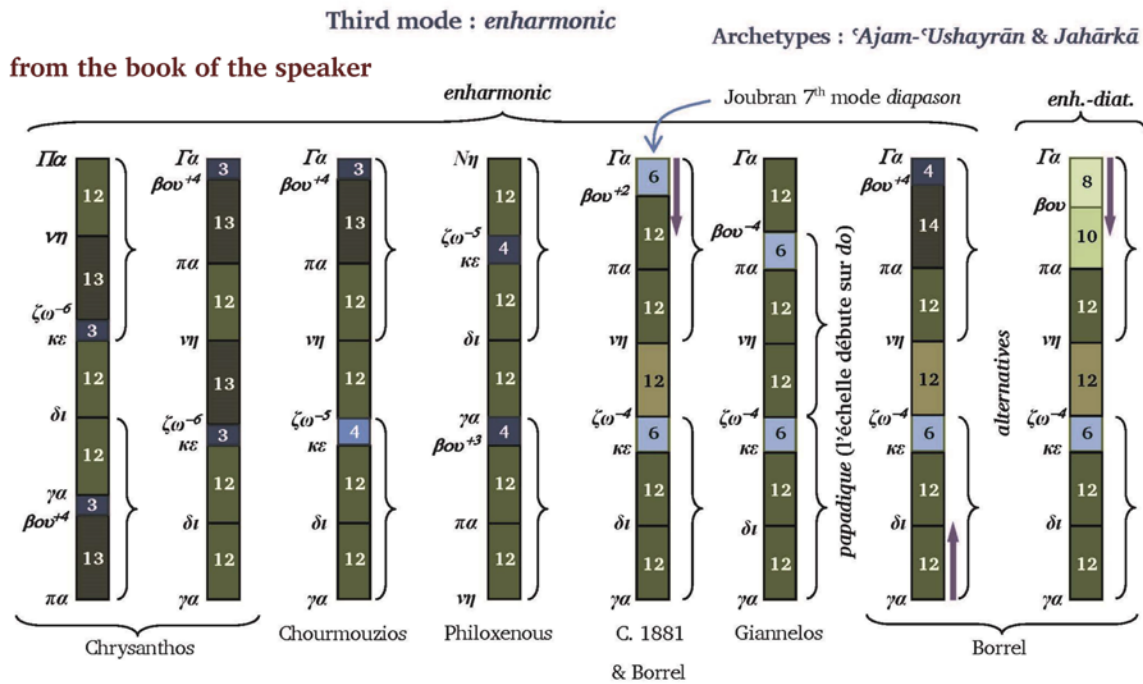


Figure 4: Comparing the “enharmonic” systems (1818-today)
Arrows show the ascending or descending direction of the scale

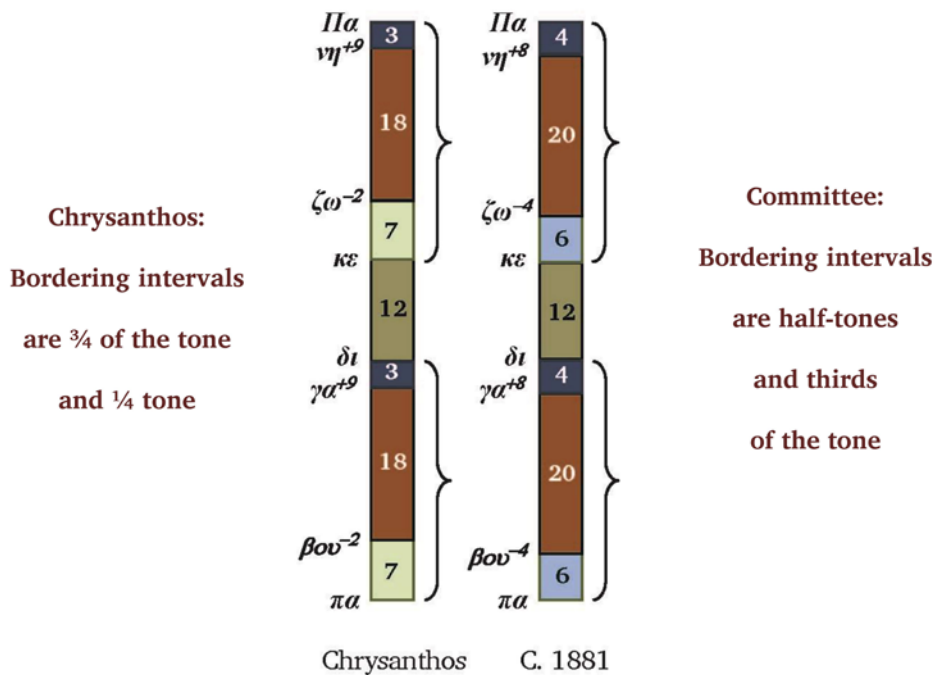


Figure 5: Comparing the “chromatic” systems (1818-1881)

A preamble of this demonstration consists in the following definition of heterophony.

A DEFINITION OF HETEROPHONY¹¹

Heterophony¹² is a multi-faceted musical process for which I propose the following definition.¹³

Heterophony may include a group of rhythmical, intonation, temperament, or temporal references – which may be formulaic¹⁴. This is often characteristic of modality and an integral part of living melodic music.

Heterophonic musics share some, if not all, principal characteristics, which together define **Generalized heterophony**:

1. Restricted pitch and beat variations within melodic or rhythmical phrases either by means of spontaneous variations of intonation and register (whether consciously or

¹¹ Extracted and adapted from [Beyhom, 2016].

¹² The term “heterophony” is not, from my point of view, the most adequate for the description of its constitutive phenomena: while still searching for a better denomination, I am compelled to use it here as is. Further: the proposed definition goes from the general (heterophony) with various techniques such as the “bourdon”, overlapping voices, variants, and polyphony being particular cases, far from the evolutionary scheme still found in modern and contemporary musicological literature. (See for example [Gerson-Kiwi, 1964, p. 50] in which the “bourdon of the East” is a rudimentary polyphony which “found its possible continuation [...] in medieval Spain and Italy [...] where the old Oriental Bourdon was finally succeeded by the new Occidental Faux-bourdon”.)

¹³ Compare with [Sachs, 1943, p. 48]: “When in musical ensembles several singers or players perform the same melody, either successively or simultaneously, they actually claim the freedom of varying in minor details. Repetition of a melody seldom agrees with its first form, nor do the voices of a chorus or the parts of an accompanied song agree with each other. Each participant realizes the melodic idea according to personal taste and ability and to the special conditions of voices and instruments. **Nobody minds the chance collisions that result from such discrepancies, nor is anybody concerned about their consonant, or at least pregnant, character.** An agile singer would dissolve his partner’s slower third steps into faster seconds, a less-well-trained voice might replace excessively high or low notes by some bend or break, a premature need for breath would cause an unseasonable cadence among the parts. Such **heterophony is certainly a rather negative form of co-operation—neither polyphonic nor harmonic**, and seemingly anarchic. But the willful **maladjustment** often has a particular charm, and nobody who has heard the rich and colorful symphonies of Balinese and Javanese orchestras can deny that, once more, freedom is a good root of organization in art” (bold font is mine). Whatever Sachs’ approach is, I would say, “compassionate” to heterophony, his worship of polyphony is tangible in this quote, as it is in the whole chapter from which it is taken (entitled “Polyphony”). It is a real wonder how prominent 20th-century musicologists could show so clearly their disdain and lack of understanding of the essence of heterophony, while seemingly trying to rehabilitate it: see for example Schaeffner’s chapter entitled “Variations sur deux mots : polyphonie; hétérophonie” (why should “polyphony” come before “heterophony”, I wonder?) in [Schaeffner, 1998, p. 147–175] (in fact an article for the *Revue belge de musicologie*), in which heterophony is scarcely mentioned on the first page then on four other pages, whenever polyphony and other “harmonies” and chords are mentioned between 5 and 10 times on each page. Note also in [Massoudieh, 2017, p. 82–83] the use by autochthonous researchers of the term “polyphony” (seemingly more gratifying than “heterophony”) for the characterization of heterophonic techniques in the *radif* as well as in popular music in Iran. See also the very interesting discussion on heterophony in [Napier, 2006] (in which Sachs is notably criticized [p. 12] for his “condescendence” in defining heterophony) with this remark [*ibid.*]: “A delight in (what are thought to be) superb levels of coordination so underlies our discourse about music (though, as I have suggested, not necessarily our enjoyment of it), that avoiding the pejorative in discussing heterophony may seem at times to be beyond grasp”.

¹⁴ Based on variations of the melodic formula – or particular arrangement of a number of successive pitches giving the essence of a melody, mode, etc. (See the first “secondary characteristic” of heterophony farther.)

unconsciously), or by fluctuations of the degrees and of the tonic – (“*localized pitch heterophony*”) or of rhythmic components (“*localized beat heterophony*”)¹⁵.

- a. Music which uses more or less constant and controlled nearly imperceptible variations in pitch and rhythm for similar music instruments (including human voices) can be called “*sound density heterophony*” (this can be found for example in the large string ensembles of Egyptian music of the “Golden Era” – 1950s-60s – or in the traditional – “monophonic” – Russian choirs).

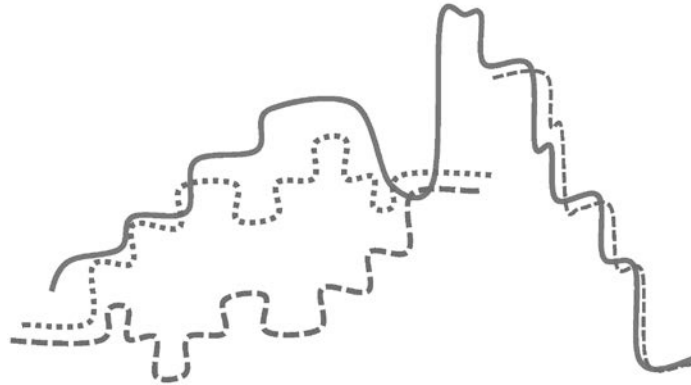


Figure 6: Computer drawn sketch by the author used in presentations to illustrate some of the aspects of melodic and rhythmic heterophony.

2. Modulations which initiate variations in the size of the intervals or of the relative or absolute position of the degrees, notably by means of tuning methods (temperament) or differences of intonation dependent either on the voice or on the instrument or the musician (“*generalized pitch heterophony*”), of regular or irregular accelerations, variations, lags or superimpositions and transformations of rhythmical elements, used as compositional means either consciously or unconsciously – (“*tempo or rhythm generalized heterophony*”).¹⁶

Moreover, heterophony may have secondary (or additional) characteristics such as:

1. The use of a drone or of a melodic/rhythmic ostinato – (“*reference heterophony*”), a compositional means (partially or totally improvised from a pre-defined pattern) in which the musician uses variations within the formulation of the melodic phrase, of a given scalar element (a polychord) – (“*formular or variational heterophony*”).
2. A narrowing or expanding (variation) of the dimension of interval components within the scalar reference (usually a tetrachord or a pentachord – “*homothetic heterophony*”).
3. A progressive evolution – evolution strata are generally smaller than the smallest structural interval in the chosen scale – in time of the reference tonic (or reference degree) which provokes a corresponding series of transpositions, fluctuations, etc., more or less homothetic (“*tonal [or ‘tonic’] heterophony*”).¹⁷

An example of *tonal [or ‘tonic’] heterophony*, is shown on Figure 7 and Figure 8 for a song in which two Breton singers, Jean-Marie Long and Pierre Fer apply a usual technique

¹⁵ See also the concept of “heterochrony” in [Bouët, 1997], and the subtleties of “ovoid” (and other) rhythms in [During, 1997].

¹⁶ Note that the accompaniment or “*supporting heterophony*” practiced in *maqām* music may use a number of methods with one or more secondary voices supporting the principal melody, by means of lagging in tempo, pitch, in variations (see “secondary characteristics”) or by reference.

¹⁷ This definition is translated and adapted from [Beyhom, 2007a, p. 78], [Beyhom, 2015b, p. 422–423] and [Beyhom, 2015a]. See for example [Ambrasevicius, 2014] for other examples and analyses of particular types of heterophony, and note that some of the aspects of heterophony listed above can be compared to the concept of “Polyphonic stratification” introduced by Ki Mantle Hood (see [Hood, 1993]).

in Breton singing consisting in overlapping verses performed by the first then (overlapping the end of the first verse by the first singer) by the second singer. To increase the tension (this is – traditional – dance singing), each of the singers slightly raises the tonic with each verse (Figure 8). The mastery of these singers is such that the evolution of the tonic can be approximated by a straight line (Figure 7).

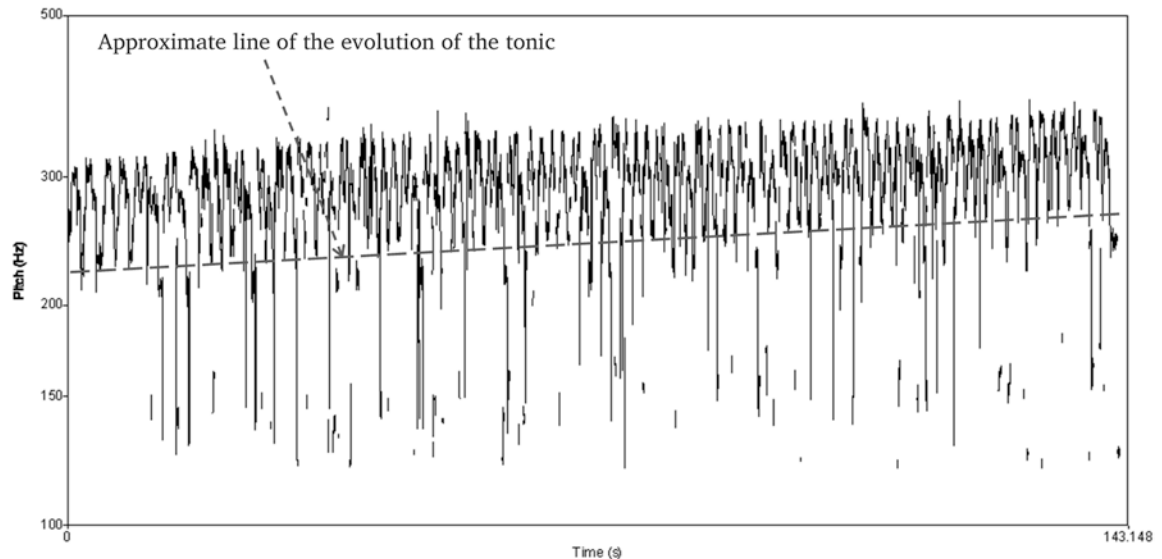


Figure 7: Evolution of the tonic with time in a song with overlapping verses (*kan ha diskan*) by Breton dance-singers Pierre Fer and Jean-Marie Long¹⁸

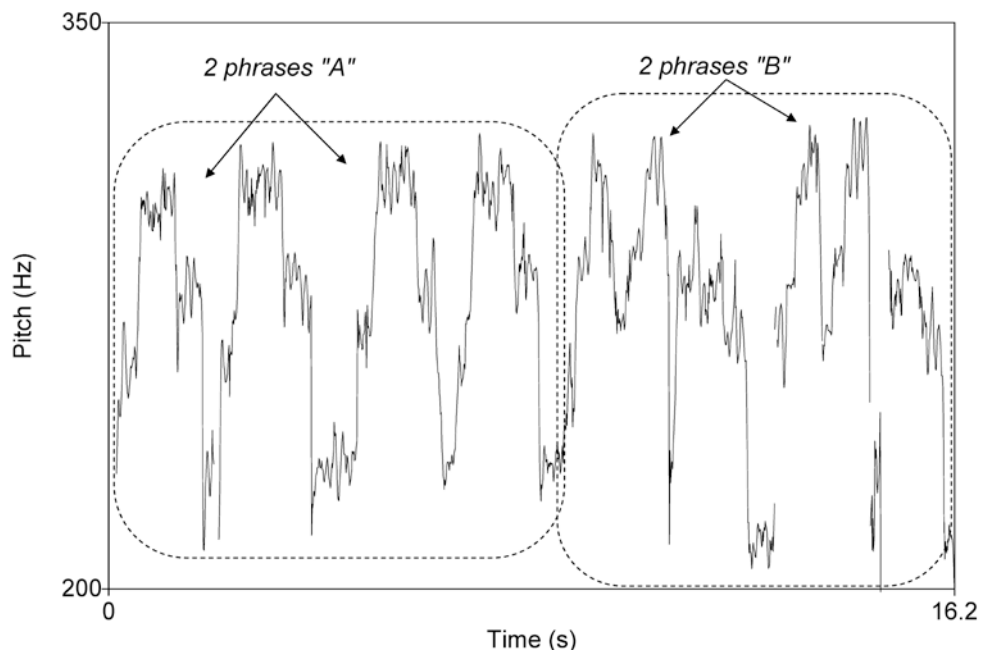


Figure 8: Segmentation of the first verse in a song with overlapping verses (*kan ha diskan*) by Breton dance-singers Pierre Fer and Jean-Marie Long, in two parts with each two identical phrases: the tonic rises at the end of the first part

If we compare the above definition with other definitions of heterophony found in Western literature,¹⁹ the general tendency in the latter is to term heterophony as a particular, lesser type of polyphony, as for example with McComb:

¹⁸ The recording of this song was kindly provided by Breton singer Erik Marchand in August 2006 – first published (audio and graphic analysis) in [Beyhom, 2007b, p. 207]. The tonic rises regularly for about 250 cents in 2:20 minutes.

“Heterophony means that multiple parts use the same melody, but at somewhat different times. In other words, it is like doubling, but not at the same time. **The term heterophony was invented to distinguish many world musical styles from Western polyphony, and so is sometimes considered prejudicial. It does, however, designate a more specific kind of polyphony.** In *heterophony*, generally speaking, any vertical alignment of intervals is coincidental and not important. This is as distinguished from a fugue or other imitative forms, which we might otherwise term heterophonic”²⁰,

or with Bruno Nettl:

“Most polyphonic music employs identical or similar material in each part. The statement applies, of course, to the three most common forms of polyphony: heterophony, parallel intervals, and imitation. **Heterophony**, the use of slightly modified versions of the same melody by two or more performers, **is the simplest** in some ways, because it can come about accidentally, e.g. a solo performer may vary his part slightly while singing essentially unison material with a group. [...] Probably most of the primitive examples of it we have were accidental phenomena. Rhythmic variation is very likely the commonest form. [...] Thus heterophony is not necessarily simple and accidental: it may be elaborate and detailed”²¹,

or with McLeish:

“Heterophony is a style of music which uses no harmony or counterpoint: there is one line of melody only [...]. The key element is that several voices or instruments all perform the line, not in absolute unison, but with all the possibilities of deliberate or chance variation: individual phrasing, spontaneous ornament, independent rhythmic variation. The line is thus subtly blurred and varied even as we hear it [...] Heterophony occurs most frequently in orally-transmitted vocal traditions [...] Heterophony is not so much a technique as an indication of the importance, in many musical cultures, of the expressive and aesthetic quality of each individual part, and of the personal, often improvised contribution to the musical whole as well as to the performance itself”²²,

and lastly:

“*Heterophony* is a term frequently associated with oriental music. The term goes all the way back to Plato’s music theory, where it describes a melody sung by a choir while a soloist embellishes the same melody with – usually improvised – ornaments, grace notes, etc. In symphonic Western music, heterophony (or textures resembling heterophony) generally occurs as a special effect, for instance in the form of several simultaneous versions of the same melody, but it may also function as an extended doubling strategy. In the case of a pioneer like Berlioz, and not least in the music of the 20th century, such creatively motivated and widely different heterophony-like doublings have been of great importance for the development of the orchestra as a medium. Textures of this kind are often motivated by compositional issues rather than matters of orchestration, which is why the expression *heterophony* is used here as a collective term to denote these special types

¹⁹ See footnote no. 12 and the Western definitions of heterophony farther.

²⁰ Todd M. McComb at <http://www.medieval.org/emfaq/misc/homophony.html> – accessed 12/01/2018. Note that bold font, in this and the following quotes, is mine.

²¹ Quoted in [Royer-Artuso, 2012] in *Music in primitive culture*, Cambridge, Harvard University Press p. 80-81.

²² From “MCLEISH, Keith (Ed.), 1993, *Key Ideas in Human Thought*, London, Bloomsbury, p. 344”. This last definition is, to the least, erroneous in many aspects, one of which for heterophony “not being a technique” ... See also [Uscher, 1986], or the interesting progression “monophonic, heterophonic, and, to a certain extent, the polyphonic hymnody” in [Tallmadge, 1975, p. 106], [Mok, 1966, p. 14] opposing “The science of harmony” to “homophonic music” and “heterophonic effects”, the progression “homophony, heterophony, and polyphony” in [Dahlig, 1993], <https://answers.yahoo.com/question/index?qid=20081213211005AA43xen>, accessed 2018/10/04 as with the following <https://www.sweetwater.com/insync/heterophony/> and “**heterophony (Gr., ‘other voice’)**. Vague term, coined by **Plato**, used to describe simultaneous variation of one melody. Also applied to vocal mus. of Near and Far East, when an instr. embellishes the vocal part” at <https://www.encyclopedia.com/arts/dictionaries-thesauruses-pictures-and-press-releases/heterophony>.

of doubling strategies [...]. Judging whether a passage involves partial doubling or leans more towards heterophony is a matter of opinion, of course”²³.

Beyond the aesthetics and the value judgment inferred by such definitions, the definition proposed by the speaker begins with the general (heterophony) before singling out particular techniques such as polyphony, counterpoint and harmony.

The question is: How does it work? To answer this question, I shall explain, through the presentation of three case studies, first how choir heterophony and solo heterophony work, then explain the difference between heterophony and “errors” in performing the music or the chant.

THREE CASE STUDIES IN BYZANTINE CHANT: HETEROPHONIC SCALES, HETEROPHONIC CHANT, STEADY HETEROPHONY VERSUS CHANGE OF TONIC AND SCALE DISRUPTION

First Case Study: Choir singing

The first Case Study in Byzantine Chant concerns itself with Heterophonic Scales by four experienced Byzantine Choir directors (and soloists) in Lebanon. I recorded these cantors from 2010 to 2012 and asked them notably to chant the scales of the 8 canonical modes. I found serious disparities between performances, along with serious discrepancies between praxis and theory.

The question that arose was “How to reconcile between performers, on one side, AND between theory and praxis, especially for choirs, on the other side?”. To answer this question I tried to concentrate on the most “canonical” mode, the First diatonic mode and its scale²⁴. Figure 9 shows this scale in Western notation with Byzantine alteration signs.



Figure 9: Scale(s) of the 1st (“diatonic”) mode in Byzantine chant

In the arithmetic formulation of the 2nd Reform (1881), the scale of the 1st mode, which is equivalent to the scale of *maqām Bayāt* in Arabian music, can be expressed (in equivalent *moria* – or *minutes* – or twelfths of the octave) as “πα ↑ 10 8 12 12 10 8 12, Πα ↓ 12 12 6 12 12 8 10”.²⁵ The key signature in Figure 9 shows that the ascending (and descending) *e* and ascending *b* are lowered by two *minutes* (the equivalent of a sixth of a tempered tone) while the descending *b* is flat.

The first tonogram²⁶ of the performance of this scale – by fr. Makarios Haidamous – is shown on Figure 10.²⁷ We observe, despite the use of a diapason by this cantor, major discrepancies between the ascending and descending scales (apart from the theoretical descending *b^b*), with an augmented ascending octave, an accented attack of the ascending *e*- (*βου*) while the whole ascending scale is shifted upwards beginning with the fourth. With the descending octave stabilized at its theoretical value, the descending fifth and lower

²³ From <http://theidiomaticorchestra.net/partial-doubling-and-heterophony/> accessed 2018.10.04

²⁴ And more precisely on the first two ascending degrees, the $\square\square$ and the $\square\square\square$.

²⁵ Ascending and descending arrows show the direction of the scale-melody.

²⁶ Graphic vertical representation of the pitch versus time.

²⁷ On the figures, a simple color code is used for the delimitation of the vertical space, with red lines for the tonic and the octave (πα and ΠΑ – by convention), a green line for the fourth (here δι) and a blue one for the fifth (here κε).

degrees are raised while the descending tonic returns to the theoretical value. Note that the pitches of the ascending and descending *βου* do not coincide.

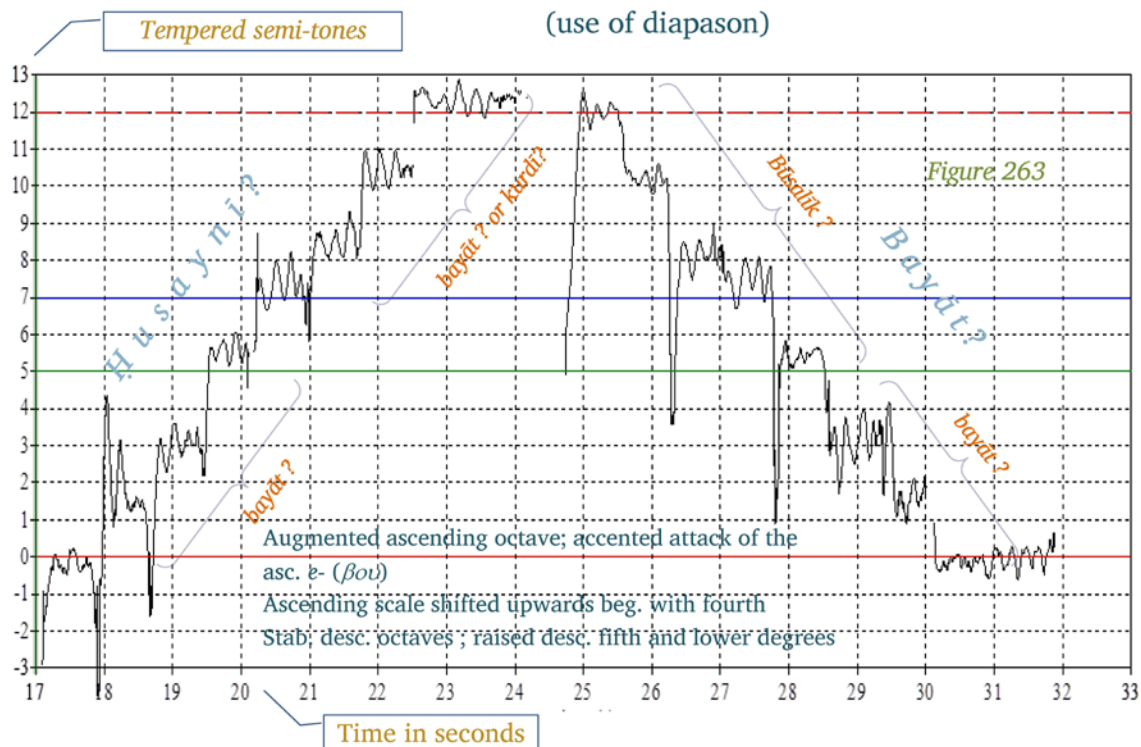


Figure 10: Tonogram of the scale of the 1st mode as performed by fr. Makarios Haidamous (with use of diapason)²⁸

If we compare this performance with the performance of fr. Nicolas Malek – for the same scale – in Figure 11, we observe that, although this cantor uses no diapason (and *ison*), he performs much more stable pitches with just octaves and a regular vibrato. Other particularities for this cantor are the accented attack of the ascending *e-* (*βου*) and generally low (stabilized) *e-* (*βου*) and *b-* (*ζω*) – which corresponds to what local cantors call “the Oriental style”. Both cantors “attack” the descending octave pitch from below, which is equally the case for the two other cantors, Joseph Yazbeck (Figure 12) and a fourth cantor who has chosen to remain anonymous (Figure 13).

In Yazbeck’s case (Figure 12), we observe in the tonogram ample vibratos – albeit somewhat difficult to describe precisely – and expanded octaves with also (as with fr. Haidamous) a shift of the descending pitches beginning, however, with the fifth²⁹. The descending *e-* (*βου*) is undefined in terms of pitch, while the ascending one has an “*∩*” shape which makes it also difficult to determine the exact pitch³⁰. More generally, such a detailed tonogram gives the impression that all pitches are of more or less unstable character with this cantor.³¹

²⁸ A video-equivalent of the Power Point animation shown at the original presentation is proposed in the accompanying DVD-R, and entitled *MH 1st mode*. (Also downloadable at <http://foredofico.org/CERMAA/wp-content/uploads/2018/10/MH-1st-mode.mp4>.)

²⁹ This is the probable reason for the stabilization of the descending tonic.

³⁰ Should it be taken at the top, the middle or the bottom of the graphical representation of the performed degree? There is no simple answer in this particular case.

³¹ This, in fact, is not the case as video-analyses of performances of *Kyrie Ekekraxa* by this cantor – available at <http://foredofico.org/CERMAA/analyses/kyrie-ekekraxa> and at <http://foredofico.org/CERMAA/analyses/byzantine-chant/axion-estin> – show a definite coherency in his chanting style. In other words, the auditory perception of pitch is sometimes not correlated with its measure in acoustical units – or as here with its graphical representation.

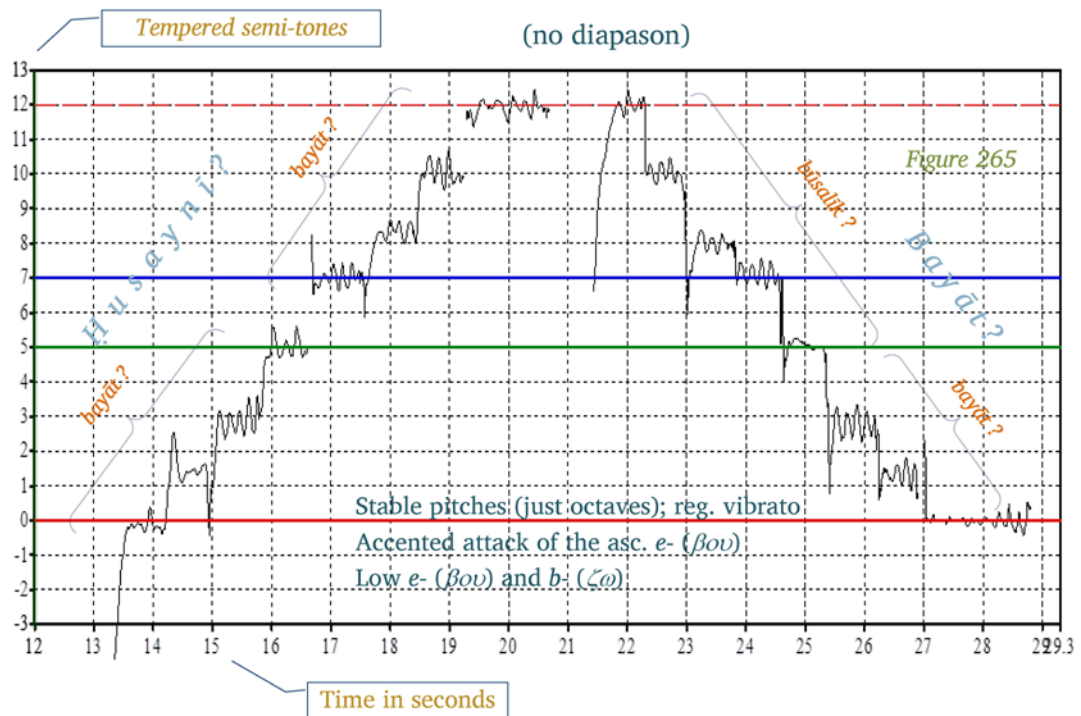


Figure 11: Tonogram of the scale of the 1st mode as performed by fr. Nicolas Malek (no diapason)³²

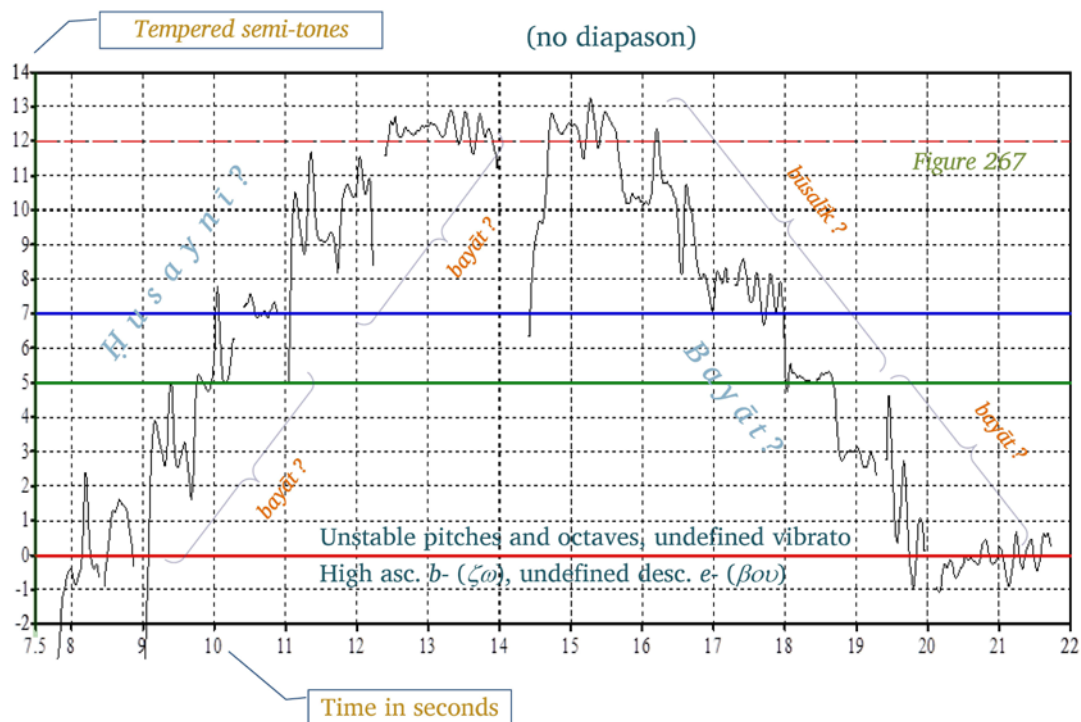


Figure 12: Tonogram of the scale of the 1st mode as performed by Joseph Yazbeck (no diapason)³³

³² A video-equivalent of the Power Point animation shown at the original presentation is proposed in the accompanying DVD-R, and entitled *NM 1st mode*. (Also downloadable at <http://foredofico.org/CERMAA/wp-content/uploads/2018/10/NM-1st-mode.mp4>.)

³³ A video-equivalent of the Power Point animation shown at the original presentation is proposed in the accompanying DVD-R, and entitled *JY 1st mode*. (Also downloadable at <http://foredofico.org/CERMAA/wp-content/uploads/2018/10/JY-1st-mode.mp4>.)

The performance of the Anonymous Cantor (Figure 13) is much more straightforward, with a very regular vibrato and just octaves (slightly raised for the ascending one), high ascending $e-$ ($\beta\omicron\upsilon$) and $b-$ ($\zeta\omega$) and descending $\zeta\omega$, with also a slight descending scale disruption from the $\zeta\omega$ down (the 5 lower degrees are shifted upwards). Note also the slight attack of the ascending $e-$ ($\beta\omicron\upsilon$).

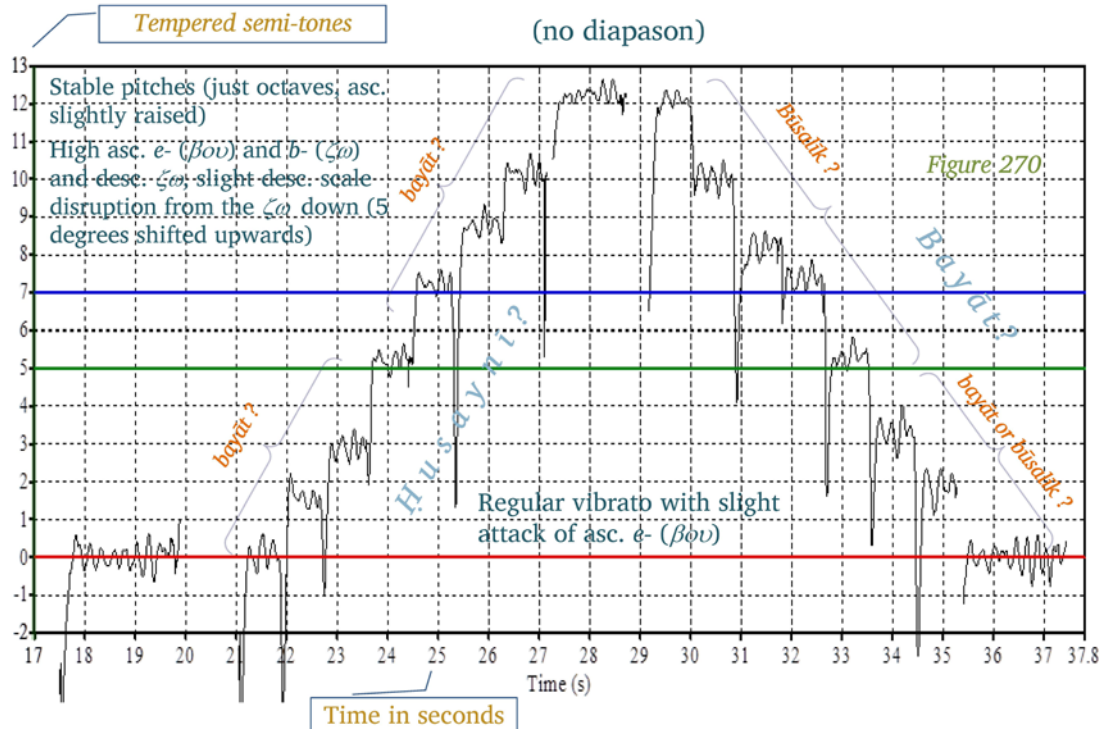


Figure 13: Tonogram of the scale of the 1st mode as performed by an Anonymous Cantor (no diapason)³⁴

The most important aspect of these analyses are, for our study, the differences in the styles and in the details of each note, showing great disparities in the performance of what is supposed to be the most important scale of Byzantine chant, and the most stable one (with notably no alterations). Moreover, each cantor uses a – slightly – different register, with Joseph Yazbeck using a clearly lower one, far from the three others (the greatest difference between the absolute pitches of the initial tonics is nearly two whole tones – See Figure 14).

The differences between the 4 performances are clearly delineated – for the two initial $\pi\alpha\beta\omicron\upsilon$ degrees – in Figure 14, and seem impossible to reconcile. Knowing, however, that these four cantors are also choir directors and that they have successfully – and for decades now for some of them – performed in various concerts and vicinities, there had to be a way to reconcile those performances, which I found by applying the following procedure (Figures 14 and 15):

1. I extracted the first two notes $\pi\alpha$ and $\beta\omicron\upsilon$ from the recording of each cantor
2. I transposed the intervals to the same (approximate) tonic
3. I slightly displaced (adjusted) the pitches to align them (approximately) together and mixed them
4. Finally, I added a reverberating effect simulating a cathedral

³⁴ A video-equivalent of the Power Point animation shown at the original presentation is proposed in the accompanying DVD-R (and downloadable at <http://foredofigo.org/CERMAA/wp-content/uploads/2018/10/CA-1st-mode.mp4>), and entitled *CA 1st mode*.

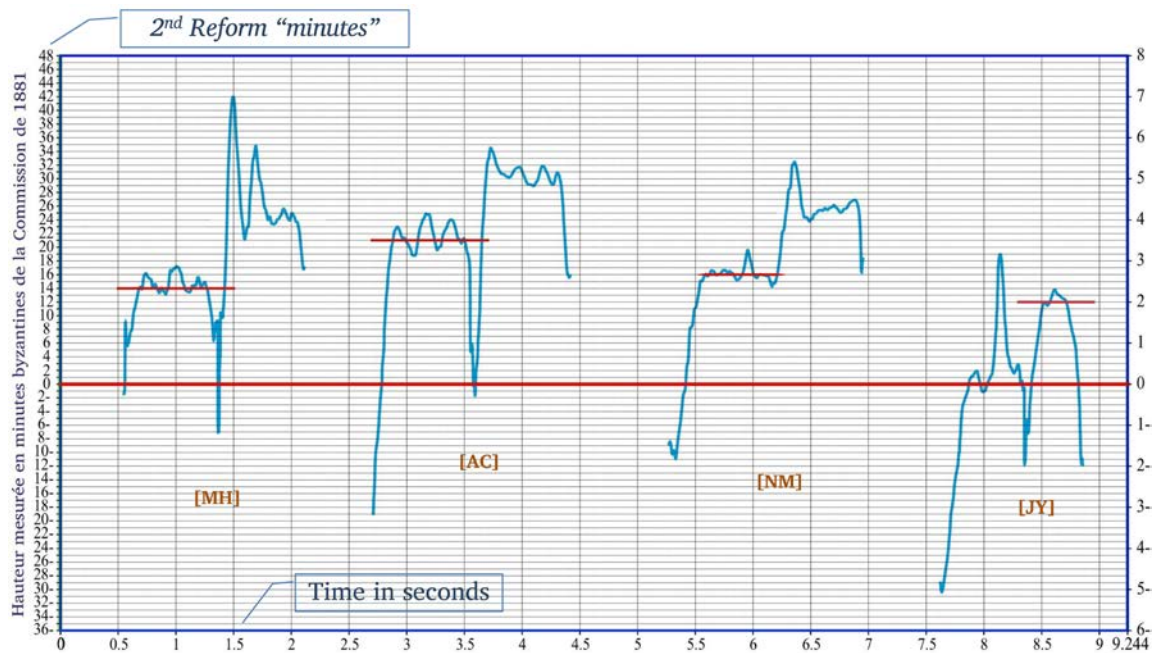


Figure 14: Graphic representation of the first two degrees $\pi\alpha$ and $\beta\upsilon\upsilon$ of the scale of the 1st Byzantine mode as performed (from Left to Right) by fr. Makarios Haidamous [MH], the anonymous cantor [AC], fr. Nicolas Malek [NM] and Joseph Yazbeck [JY]; left vertical axis shows divisions in *moriat* from the 1881 Reform³⁵

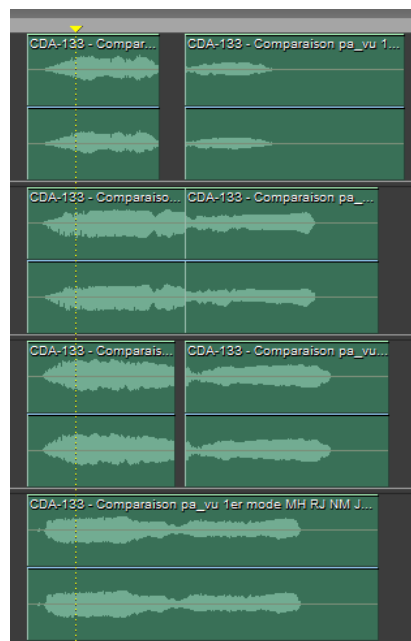


Figure 15: Approximate alignment of the pitches of the four $\pi\alpha$ $\beta\upsilon\upsilon$ pairs³⁶

³⁵ A video-equivalent of the Power Point animation shown at the original presentation is proposed in the accompanying DVD-R (and downloadable at <http://foredofigo.org/CERMAA/wp-content/uploads/2018/10/4-Lebanese-Cantors-PA-VU-1st-Mode.mp4>), and entitled *4 Lebanese Cantors PA VU 1st Mode*. Three successive animations are shown in the video, the normal-tempo animation followed by the half-tempo then the quarter-tempo animations.

³⁶ See the Power Point slide entitled *PAVU* proposing the 4 audio examples in the accompanying DVD-R. (This slide and the following – entitled *Papa* – could not, for technical reasons, be rendered as a video. This slide can be downloaded at <http://foredofigo.org/CERMAA/wp-content/uploads/2018/10/PAVU.ppsx>.)

The result³⁷ was stunning and conformed to usual choir singing documented for years of field work in Byzantine chant choirs. Later on, I decided to apply this procedure to the whole (ascending and descending) scale, with the result shown on Figure 16³⁸.

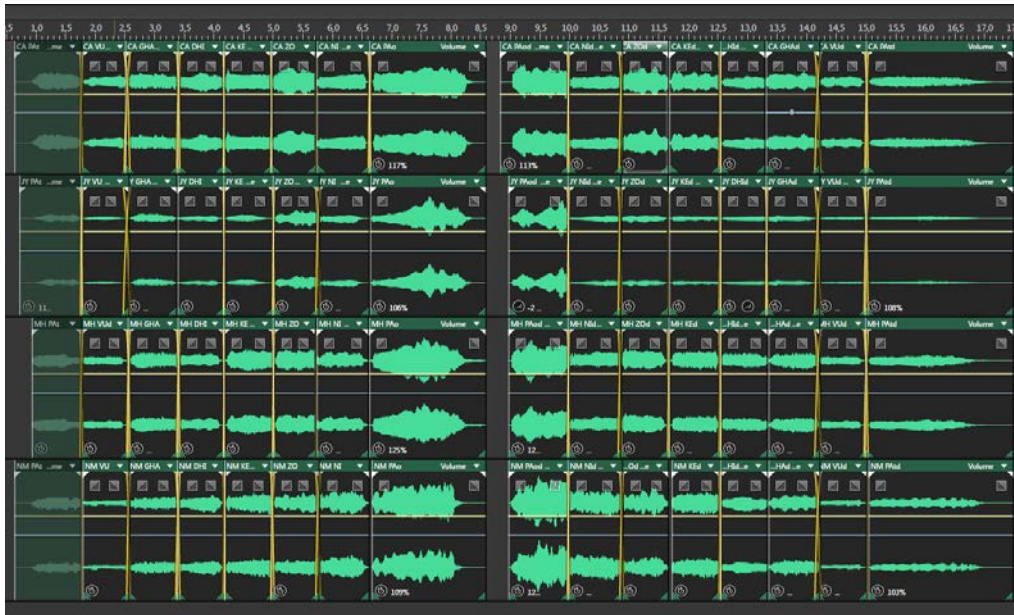


Figure 16: Approximate alignment of all the pitches of the ascending-descending scale of the 1st Byzantine mode as performed by 4 Lebanese cantors³⁹

This definitely explains how choir heterophony works, and why it is so important for Byzantine choir performances. It also explains how pitch perception works in such cases, relegating exact pitch measurements and theories of the scale to the role of modern oddities as will be further shown for solo heterophony with the following analysis – and Case Study – of the incipit of a chant performed by cantor Giorgios Tsetsis.

Second Case Study in Byzantine Chant: Heterophonic Chant by Giorgios Tsetsis

The Second Case Study I propose in this paper is an analysis of the incipit of a chant performed by Giorgios Tsetsis in the 1st mode (new Stichiraric style – Figure 17)⁴⁰.

The tonic of the beautifully performed *apechema* rises (at 8s) for about one half-tone (vertical subdivisions are in half-tones) above the intended – and stabilized – tonic (at 3-6s) with the incipit beginning (at 10 s) with an attack which is a quarter-tone higher than the intended pitch. This can be better observed in Figure 18 (at approx. 10.5s) in which a detailed analysis of the first 5 seconds of the incipit is proposed (namely from 10s to 14.5s). The first note stabilizes at 3 half-tones (10.8s) then the melody goes down 3 quarter-tones (between 10.8 and 11.4s) then further one half-tone, 1 quarter-tone and 1 half-tone (sequence ending at 12s). The attack of the next pitch (12.8s) is at 1 whole-tone then descends one quarter-tone (13.2s) and rises for three-quarter-tones etc.

³⁷ A Power Point slide entitled *PAVU* with 4 audio examples is provided in the accompanying DVD-R. (Also downloadable at <http://foredofigo.org/CERMAA/wp-content/uploads/2018/10/PAVU.ppsx>.)

³⁸ A Power Point slide entitled *PApa* is provided with the audio example in the accompanying DVD-R. (Also downloadable at <http://foredofigo.org/CERMAA/wp-content/uploads/2018/10/PApa.ppsx>.)

³⁹ See previous footnote and the Power Point slide entitled *PApa* proposing the audio example in the accompanying DVD-R.

⁴⁰ This chant is Track 10 from *Σύμμεικτα Εκκλησιαστικής Μουσικής 2: Μεγάλη Τεσσαρακοστή – Κέντρο Ερευνών και Εκδόσεων, Αθήνα 1999*.

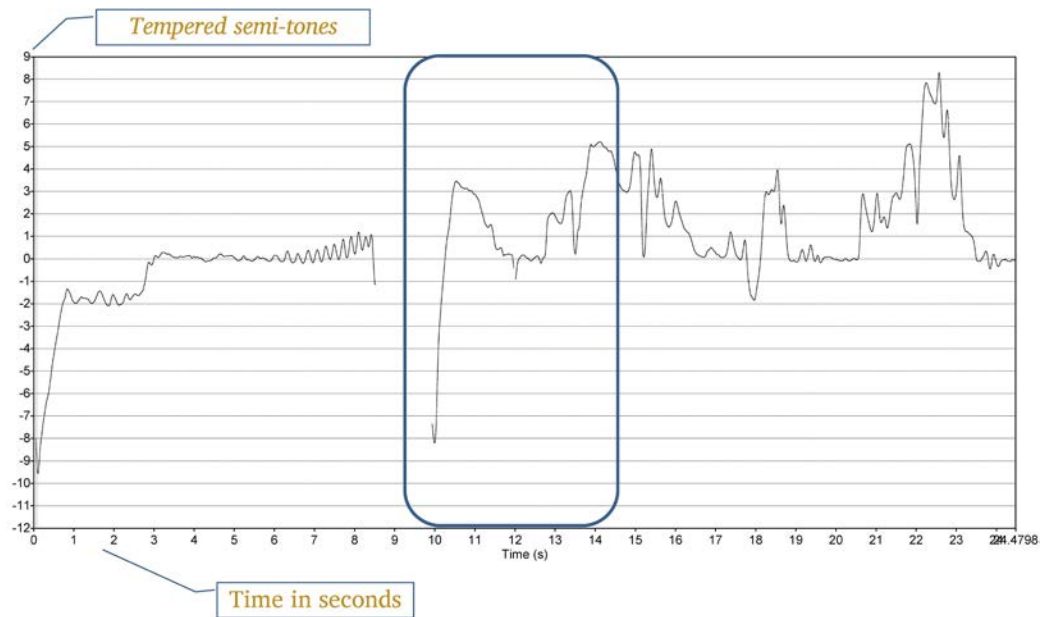


Figure 17: Analysis of the *arechema* (0-9s) and of the Incipit from Track 10 on *Σύμμεικτα Εκκλησιαστικής Μουσικής 2: Μεγάλη Τεσσαρακοστή* (Κέντρο Ερευνών και Εκδόσεων, Αθήνα 1999), performed by Giorgios Tsetsis in the 1st mode (New Stichiraric style)⁴¹



Figure 18: Detailed analysis of the Incipit (10-14.5s) from Track 10 on *Σύμμεικτα Εκκλησιαστικής Μουσικής 2: Μεγάλη Τεσσαρακοστή* (Κέντρο Ερευνών και Εκδόσεων, Αθήνα 1999), performed by Giorgios Tsetsis in the 1st mode (New Stichiraric style)

Three successive analyses are proposed in the accompanying video-equivalent of the Power Point slides shown in Volos, the first in normal tempo being followed by a half-tempo then by an eighth-tempo analysis. With such detailed analyses it is easy to ascertain

⁴¹ The graphic enclosed in the rounded-corners rectangle is analyzed further in details. See the video-equivalent entitled *Chant by Giorgios Tsetsis* proposing three successive analyses in normal, half- and eighth-tempo in the accompanying DVD-R. (Also downloadable at <http://foredofico.org/CERMAA/wp-content/uploads/2018/10/Chant-by-Giorgios-Tsetsis.mp4>.)

that the theoretical values of the pitches and intervals in the 1881 theory are but mere guidelines that this cantor does not follow here with rigor, or that he has perhaps and simply never tried to match in his chanting.

Third Case Study in Byzantine Chant: Steady Heterophonic chant versus unsteady Tonic changes and Scale disruption (or: about the usefulness of the *ison*)

Pitch measurement is best undertaken – notably with Praat – when the recording is well done, with low-level ambient sound and well calibrated dynamics (ideally a studio recording). This is one of the main reasons why I recorded the Lebanese cantors⁴² solo, without the accompaniment of an – mainly electronic these days for recordings – *ison*. The four cantors featured for the First case study performed one additional chant, *Kyrie Ekekraxa* by Petros Byzantios. Somewhat unexpectedly⁴³ these performances were achieved without notable shifts of the tonic. This was however not the case with a fifth cantor – Bachir Osta –⁴⁴ whose performance of *Kyrie Ekekraxa* I later analyzed in full using a video-animation technology for a better understanding of the evolution of the melody.⁴⁵

Kyrie Ekekraxa by Petros Byzantios is composed in the 8th Byzantine Mode (“Diatonic on *Nη*” – equivalent to the Arabian *Rāst*) with a modulation in the 2nd Mode (“Mild Chromatic on *Nη*” – Figure 19). The complete original Byzantine notation is proposed in Figures 39 and 40, with the westernized transcription (with Byzantine alterations) in Figures 41 and 42.⁴⁶

⁴² Except for fr. Makarios who made his recordings in the studio of the convent of Dayr al-Mukhallis in Lebanon.

⁴³ My practice with interval measurements – for nearly two decades now – made me familiar with tonic changes and interval variations in acapella singing. This is why I awaited more variations in the tonic of a chant based on two different scales, and with two modulations – from the eighth to the second, then from the second back to the eighth modes.

⁴⁴ Bachir (al-) Osta was at that time *archon protopsaltēs* of the Holy See of Antioch and Director of the St. Stephen the Melodist Patriarchal School of Byzantine Music, Antelias (Lebanon) – See <http://www.cini.it/en/events/voice-and-sound-of-prayer-3-4>. I could not include the scales he performed in the analyses of my book on Byzantine chant as I could first record him in 2014, whenever the 4 others were recorded in 2011 (the book was published in 2015 which left no room for thorough analyses of the performances of this 5th cantor before the time of publication).

⁴⁵ See the video [Beyhom, 2018b] entitled *Kyrie Ekekraxa (Petros Byzantios) performed (gr) by Bachir Osta* in the accompanying DVD-R, together with the half-tempo version [Beyhom, 2018c] entitled *Kyrie Ekekraxa (Petros Byzantios) performed (gr) by Bachir Osta (ht)*. (These are also – and respectively – accessible at <https://youtu.be/WQVdSqLh1v4> and <https://youtu.be/2QYvuEAOhWE>.) Numerous complete analyses of this chant, in both Greek and Arabic languages, are proposed at <http://foredofico.org/CERMAA/analyses/byzantine-chant/kyrie-ekekraxa> and commented, together with approx. 30 other video-analyses, in [Beyhom, 2018d]. These include the video-analyses of this chant performed by an Anonymous Cantor, one of which (referenced [Beyhom, 2018a] and accessible at <https://youtu.be/ush88CvgQYk> and <https://youtu.be/cVvwFtQE8Dc> – the second of which is also available in the accompanying DVD-R and entitled *CERMAA Video of Kyrie Ekekraxa by Petros Byzantios performed in Greek by an Anonymous Cantor 2011*) was proposed in Volos for the comparison with the performance of Bachir Osta scrutinized farther.

⁴⁶ The two proposed audio versions are comprised in the author’s book on Byzantine chant and referenced: *CDA-008* and *CDB-053* in the accompanying DVD-R.

“Rāst”

Scale of the 8th mode $N\eta$ \uparrow 12 10 8 12 12 10 8 $\nu\eta$ \downarrow 8 10 12 12 8 10 12
as deduced from the theory of the Second Reform

“Mild Chromatic”

Scale of the 2nd mode $N\eta$ \uparrow 8 14 8 12 8 14 8 $\nu\eta$ \downarrow 8 14 8 12 8 14 8
as deduced from the theory of the Second Reform

“Hijāz-Kār” ?

Scale of the 2nd mode $N\eta$ \uparrow 8 16 6 12 8 16 6 $\nu\eta$ \downarrow 6 16 8 12 6 16 8
according to fr. Makarios Haidamous (Lebanon)

Figure 19: Western-Byzantine notations of the scales of the 2nd and 8th modes used in *Kyrie Ekekraxa* by Petros Byzantios, according to the theory of the “Music Committee” of 1881 and to fr. Makarios Haidamous (2nd chromatic mode below)

In the aforementioned book⁴⁷ I concentrated on two extracts (Figures 20 and 22) which⁴⁸ comprise notably a *portamento* (Figures 20 to 22) and a change of mode (Figures 23 to 25).

The comparison between the two performances by the Anonymous Cantor and Bachir Osta shows that while the first performs an ornamented *portamento* with a descending curve (Figure 21, 6-9s)⁴⁹, the style of Osta (Figure 22, 44-45s) is more steady, albeit his changes of tonic are much more frequent and accented. For example, while the Anonymous cantor raises all pitches during the modulation to the 2nd mode (Figure 24, 2-16s) then goes back to the initial tonic (17-32s), the tonic with Osta constantly changes with frequent disruption of the (theoretical) scale (Figures 25 and 26).

These changes were so pregnant at the time the analysis was undertaken that I decided to make a preliminary analysis of the most important pitches of the tonic (Figure 27), then to extract them one by one (Figure 28) and align them for successive audition (Figure 29).

As a result of the changes of the tonic, the vertical position of the scale in the video-analysis changes constantly to adapt to the pitch of the tonic (Figures 30 to 33).⁵⁰

⁴⁷ [Beyhom, 2015b].

⁴⁸ According to Joseph Yazbeck who first proposed this chant for – notably – the particularities in these two extracts.

⁴⁹ The time on the analysis of Anonymous is the time of the extract, while for Osta the time shown below the graph is the global time of the chant.

⁵⁰ These variations of the tonic pitch are evidently best understood from the video-analysis. A Power Point slide is provided in the accompanying DVD-R for Figure 29 with the successive tonics extracted from the chant.

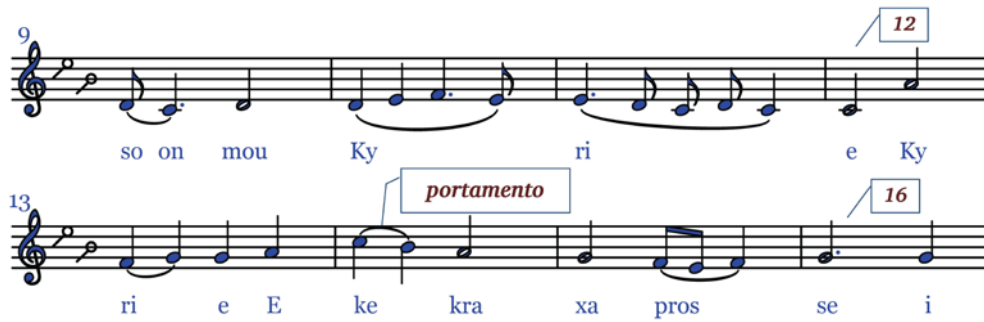


Figure 20: Extract from the western-byzantine score of *Kyrie Ekekraxa* by Petros Byzantios (in Greek) showing analyzed measures 12 to 16

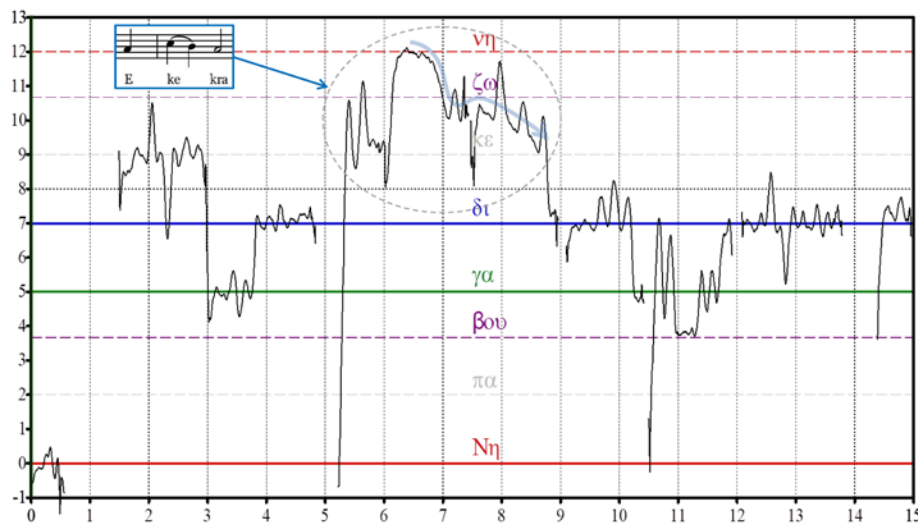


Figure 21: Detailed analysis of *Kyrie Ekekraxa* by Petros Byzantios (in Greek) performed by Anonymous (measures 12 to 16)

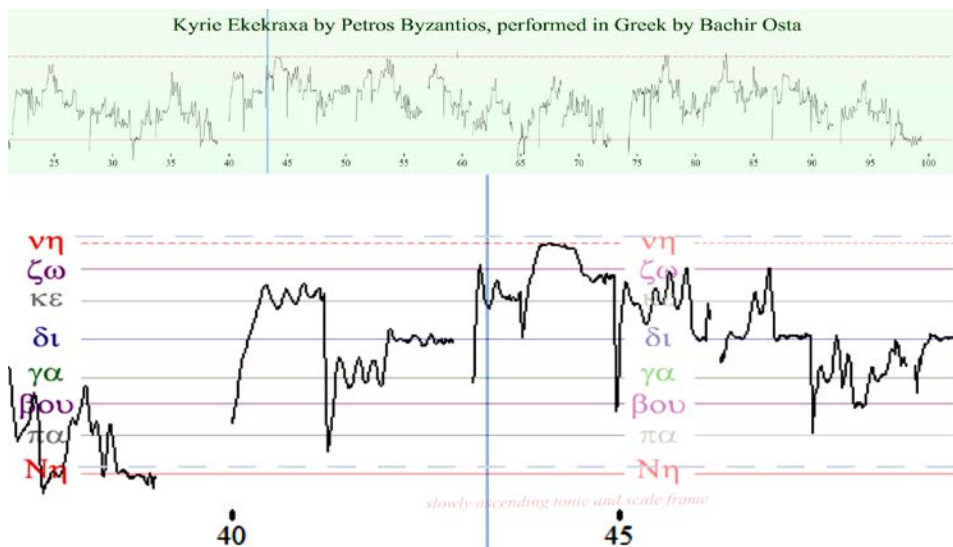


Figure 22: Detail (frame) from the video-analysis of *Kyrie Ekekraxa* by Petros Byzantios (in Greek) performed by Bachir Osta (measures 12 to 16) – the dashed gray horizontal lines show the original positions of the tonic and of its octave

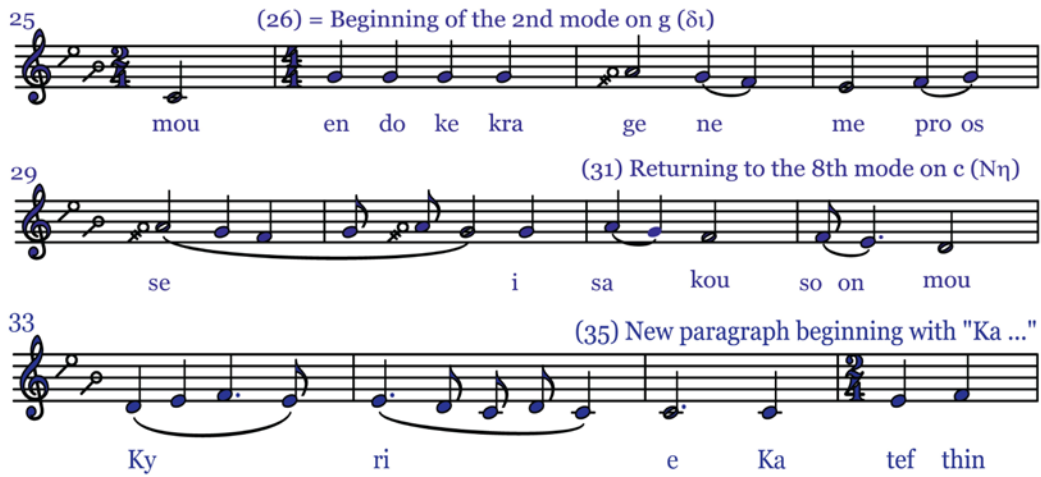


Figure 23: Extract from the western-byzantine score of *Kyrie Ekekraxa* by Petros Byzantios (in Greek) showing analyzed measures 26 to 35

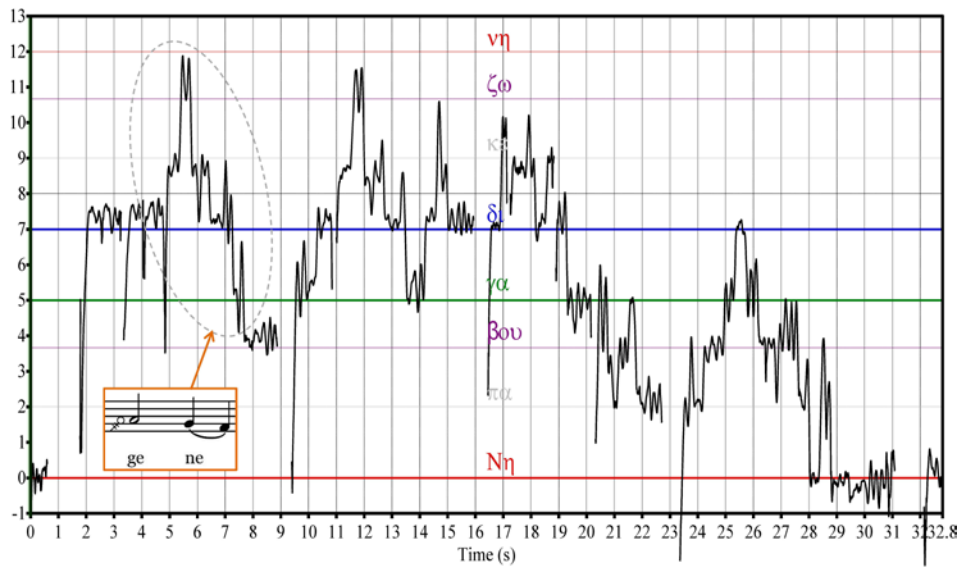


Figure 24: Detailed analysis of *Kyrie Ekekraxa* by Petros Byzantios (in Greek) performed by Anonymous (measures 26 to 35)

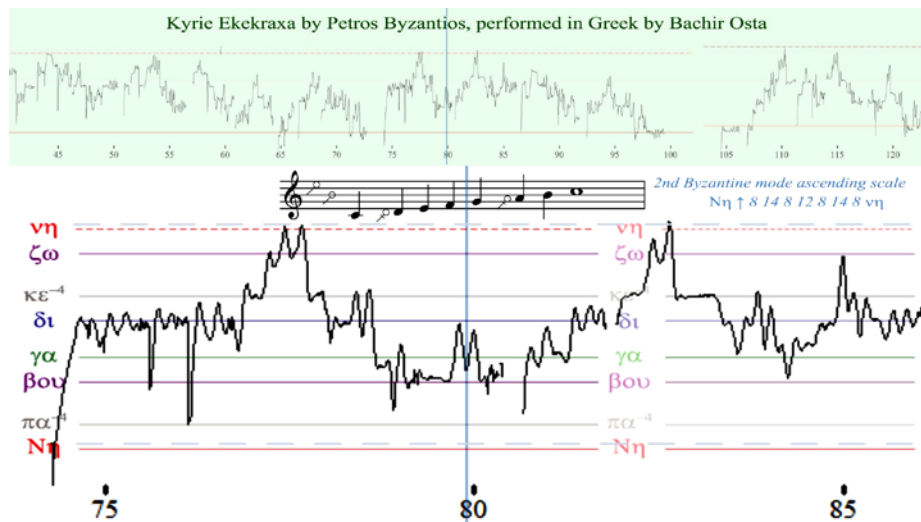


Figure 25: Frame from the video-analysis of *Kyrie Ekekraxa* by Petros Byzantios corresponding to 0-16s in Anonymous (Figure 24)

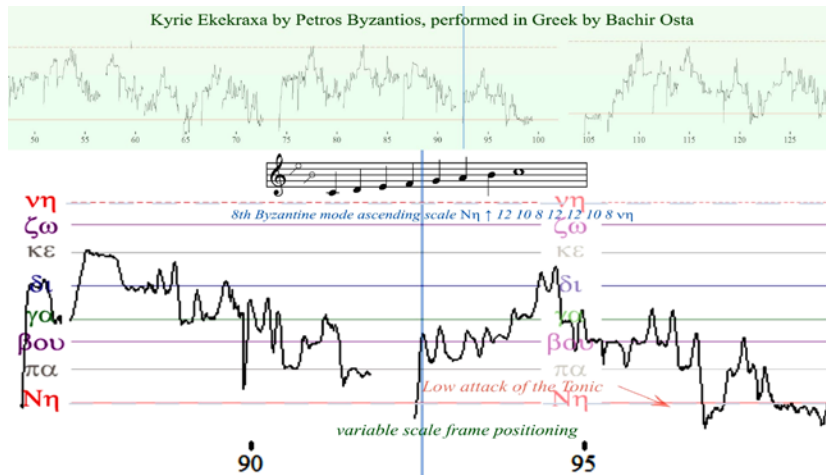


Figure 26: Frame from the video-analysis of *Kyrie Ekekraxa* by Petros Byzantios performed by Bachir Osta corresponding to 17-31s in Anonymous (Figure 24)

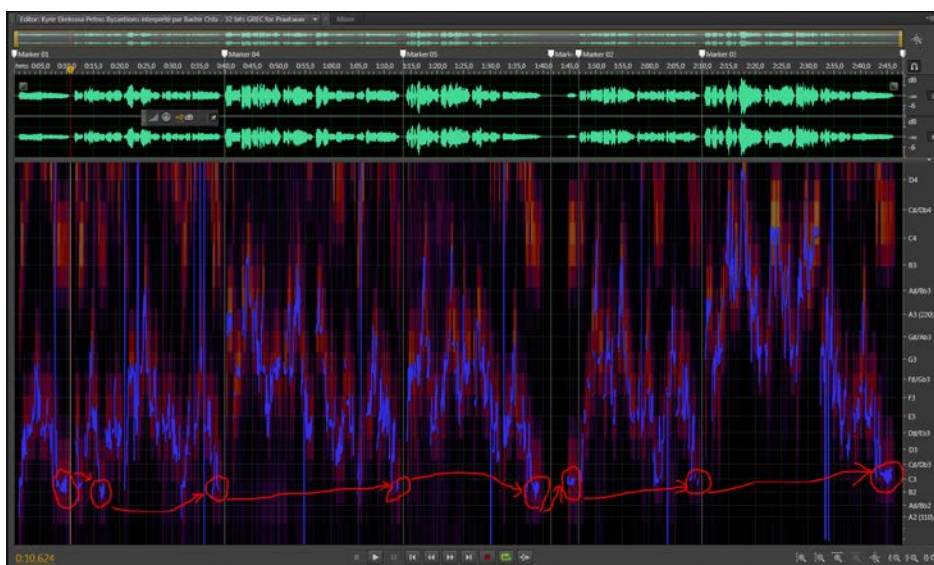


Figure 27: Preliminary analysis of *Kyrie Ekekraxa* by Petros Byzantios performed by Bachir Osta with the approximate directions of the changes in the tonic pitch (circles and arrows) shown in red

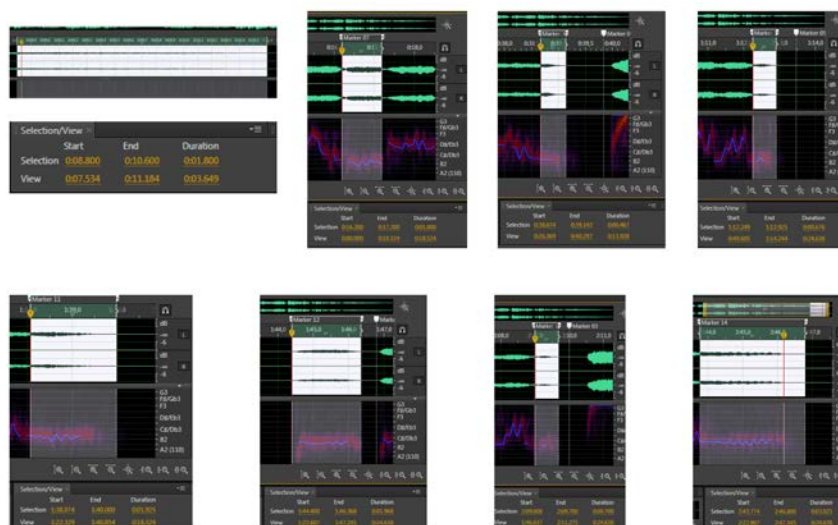


Figure 28: Eight different tonics from *Kyrie Ekekraxa* by Petros Byzantios performed (in Greek) by Bachir Osta, with the highlighted zones showing the extraction bordering times

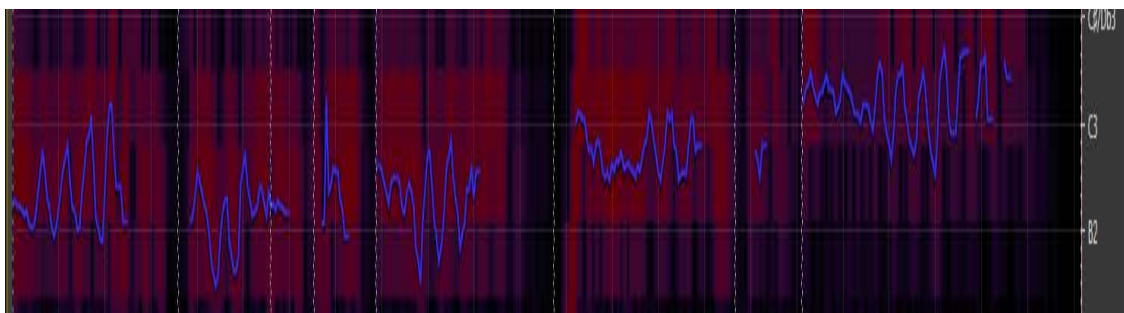


Figure 29: Eight different tonics from *Kyrie Ekekraxa* by Petros Byzantios performed (in Greek) by Bachir Osta assembled one after another for analysis⁵¹

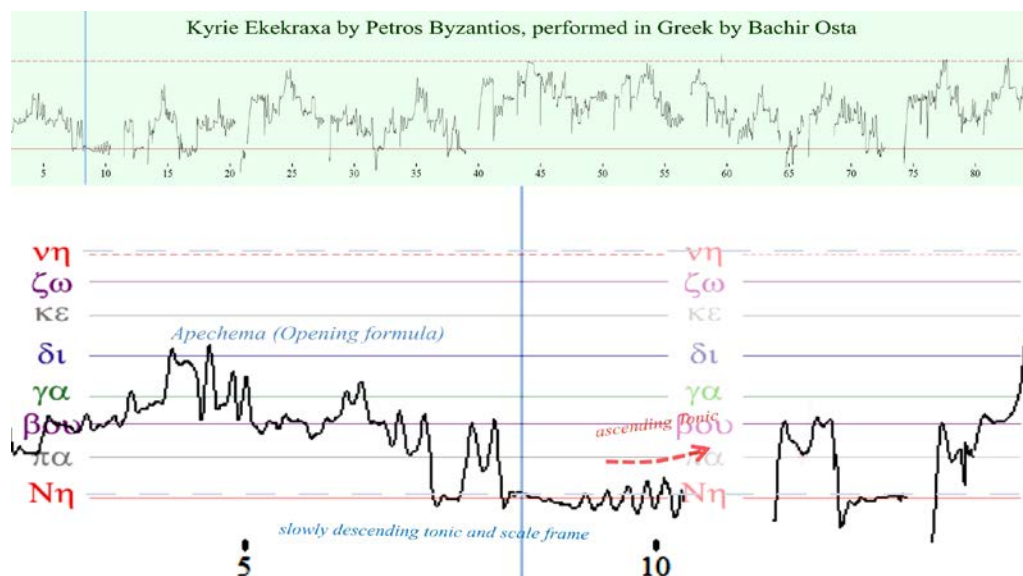


Figure 30: Frame showing the first tonic pitch (of the *apechema*) in the video-analysis of *Kyrie Ekekraxa* by Petros Byzantios performed (in Greek) by Bachir Osta



Figure 31: Frame showing the second tonic pitch in the video-analysis of *Kyrie Ekekraxa* by Petros Byzantios performed (in Greek) by Bachir Osta

⁵¹ These can be heard in the video entitled *Eight different tonics in Kyrie Ekekraxa performed by BO* in the accompanying DVD-R. (Also downloadable at <http://foredofico.org/CERMAA/wp-content/uploads/2018/10/Eight-different-tonics-in-Kyrie-Ekekraxa-performed-by-BO.mp4>.)



Figure 32: Frame showing a leap of the tonic (nearly one half-tone) between two main subdivisions of the song in the video-analysis of *Kyrie Ekekraxa* by Petros Byzantios performed (in Greek) by Bachir Osta

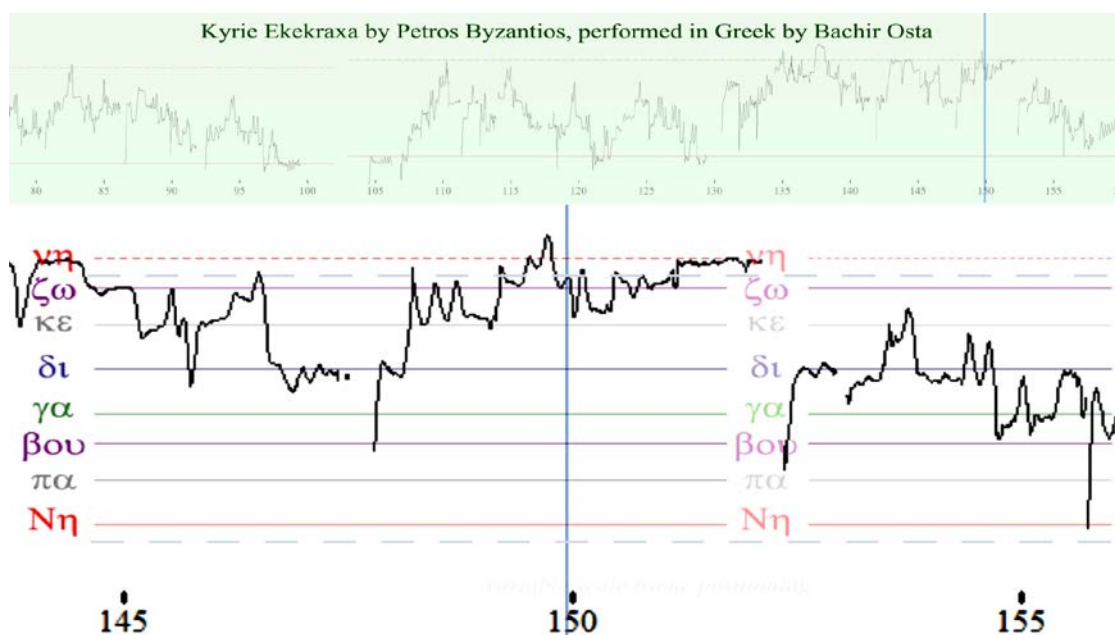


Figure 33: Frame showing an increase of the pitch of the tonic *Νη* (with the original position underlined by the lower horizontal dashed line) towards the end of the song in the video-analysis of *Kyrie Ekekraxa* by Petros Byzantios performed (in Greek) by Bachir Osta

Further analyses of this chant and of one another recorded in Volos and in Lebanon in parallel to the conference⁵² show that these discrepancies between the styles of cantors performing the same song are the rule, and that each performer has a distinctive style, if

⁵² These are 4 further recordings of *Kyrie Ekekraxa* by 4 Greek cantors together with the recording of the chant *Axion Estin* (Anonymous) in the eight Byzantine modes. Further recordings of the latter song were undertaken for comparison with the four Lebanese cantors mentioned in the First Case Study (scales of the 1st Mode). Video-analyses from these recordings are published, as aforementioned, in parallel to [Beyhom, 2018d].

not a distinctive “graphical signature” which is recognizable in the graphic representations.

This reinforces the hypothesis that the notated melody is but a guide, and that each cantor reinterprets it according to his style and to the circumstances in which the performance takes place, which leads us to the preliminary conclusions of this paper.

Answering the initial question: Why do Theory and Practice of Psaltiki NOT coincide?

Theory and practice coincide only very approximately in Byzantine chant, firstly because theory does not define traditional chant praxis – but should simply aim at describing it – and secondly because the phenomenon of heterophony rules the performance. Although discrepancies in pitches and in the tone-colors of the sung notes exist, choir members “adjust” intonations and placement of notes during performances (and rehearsals), producing a dense sound which translates into the plenitude (completeness) of the chant. This phenomenon is amplified by the environment – Church or Cathedral reverberation – which plays a major role in the resulting sound.

While heterophony and polyphony are independent from scales and from the exact measurements of the intervals used, it is necessary to understand that the aesthetics of Byzantine chant are completely different from the – classical – western aesthetics of sound: this applies to Choir music which relies on micro-tonality to create a compact sound which unites the chant of the choir members, and also applies to solo chant – as was underlined for the chant of Giorgios Tsetsis and with the analyzed versions of *Kyrie Ekekraxa*. Additionally, solo and choir chants rely on small variations of pitches – and rhythm⁵³ – which contribute to the aesthetics of the whole performance.

Furthermore, the heterophonic process in Byzantine chant can be understood as a way to promote Unity through varying individual performances. The *ison* helps keeping a steady tonic pitch while the cantor is free to improvise within tradition, and to use slightly different intervals than the theoretical ones, as long as these “modified” intervals are coherent.

What must be mostly remembered is that theory is a guide, and not a binding straightjacket: changing the priorities – imposing theory as the rule for performance – can only lead to the impoverishment of the melodic tradition of Liturgical chant. The moreover when this theory is channeled, with time, into corresponding to the *ditonic* – for two whole tones in the Just fourth – canon imposed by centuries of Western music influence on Byzantine chant as will be shown in the concluding part of this paper.

ABOUT THE 1881 THEORY AND SOME RECENT TRENDS IN BYZANTINE CHANT THEORY⁵⁴

Another question that arises is why the patriarchate of Constantinople enforced a Second – Major – reform of Byzantine chant theory in the 19th century, whenever the First reform – by the so-called “Three Masters” – took place only a few decades before it? And yet, despite the success of the so-called “New Method” borne to the First reform⁵⁵, the

⁵³ Although – for lack of space and time – rhythmic heterophony was not scrutinized in this paper, it is easily observed in the few examples provided by the author.

⁵⁴ This whole section relies on Chapter 4. “Musicological Byzantinism and its consequences” in [Beyhom, 2016] and, as for this whole paper, on [Beyhom, 2015b] in which detailed explanations about the processes of Byzantinism and Re-Byzantinism are provided.

⁵⁵ [Morgan, 1971, p. 91]: “For more than fifty years the musical theories and practices of Chrysanthos remained unchallenged. The changeover to his method of learning Church Music was complete. The obvious simplicity of the new method of musical notation, as opposed to the excessively complex old system, encouraged the success of Chrysanthos’ teachings. However, in 1881 a Patriar-

Ecumenical Patriarchate commissioned the Musical Committee, presided by Archimandrite Germanos Aptonidēs for the reform of Chrysanthine theory.

The “official” reasons for the Second reform are provided in the booklet published in 1888 by the Music Committee, the *Στοιχειώδης διδασκαλία της εκκλησιαστικής μουσικής εκπονηθείσα επί τη βάσει του ψαλτηρίου υπό της μουσική επιτροπής του Οικουμενικού Πατριαρχείου εν έτει 1883*⁵⁶:

- “The Music Committee considered three reasons leading to the undertaken research, **the first being the Historical importance of Liturgical music and the need for its reform.**
- **The second reason was the infiltration of Occidental music in the daily life of the believers, through the musical and theatrical scene, the concerts, the music institutes;** its results were an ever-growing influence of Occidental music which rapidly became overwhelming.
- **The third reason was the incapacity of many cantors to interpret the liturgical chants correctly.**
- **To these three main reasons must be added the attempts of composers of Liturgical chants to associate their own compositions [notably polyphonic and westernized] with Traditional chanting [...]**
- **It is [here ...] reminded that the work of the Three Masters was substantial but did not fill [all] the gaps of Oriental music, in general, and of liturgical music, in particular, because of the lack of technological means, at the time, which would have allowed for scientific measurements of Musical intervals**”.⁵⁷

As for the intervals proposed by Chrysanthos in the First Reform, the Music Committee states that “they were incomplete”, which would have driven him to “divide the scale [the octave] in 68 parts, and to quantify the intervals by following this division”.

The first “reason” cited above is a simple assessment of the importance of Liturgical music; the second reason (Western influence on Byzantine society, notably in Greece – although this is not stated explicitly in the document at this point) was of a more urgent nature⁵⁸ whenever the third reason is a simple repetition of the reasons for the First Reform,⁵⁹ and sounds more, in the light of the success of the New Method highlighted above, as a mere justification⁶⁰ rather than a real reason for (a second) reform.

The only reasons which remained then were the need to counter Occidental influence on Byzantine chant, and to “correct” the Chrysanthine division of the octave and the resulting intervals.

An additional reading of the booklet allows us to list in short the main propositions of the Music Committee of 1881:

1. Chrysanthine intervals must be completed.
2. The theory of the Second Reform is not preconceived.

chal Commission was founded by Patriarch Joakeim III to correct what were simply termed ‘mathematical errors’”.

⁵⁶ The *Elementary teachings of ecclesiastical music elaborated on the basis of the psalter by the musical committee of the Ecumenical Patriarchate in the year 1883* – [Commission musicale de (Musical Committee of) 1881, Aptonidēs, and al., 1888].

⁵⁷ Translated and synthesized by fr. Romanos Joubran from [Commission musicale de (Musical Committee of) 1881, Aptonidēs, and al., 1888] – Bold font is mine.

⁵⁸ Confirmed in the text of the Committee by “the attempts of composers of Liturgical chants to associate their own compositions with Traditional chanting”.

⁵⁹ In the beginning of the 19th century, the continuously growing repertoire of Byzantine chant was becoming more and more difficult to memorize. Thus, cantors had to develop an efficient musical notation much needed for a better teaching of this music, and therefore the First Reform at the beginning of the 19th century.

⁶⁰ This reason – as documented in the aforementioned [Beyhom, 2016] and [Beyhom, 2015b]– justified the introduction of indications about the “attractions” in Byzantine chant theory.

3. This theory results from measurements, on the monochord, of intervals sung by cantors.
4. All cantors perform the intervals alike in the realm of Orthodoxy, Greece included.

As for the first claim, it is untenable and can be explained by a (conscious?) misconception of Chrysanthine theory, notably by confusing it with an equal-temperament division.⁶¹

The last claim – cantors perform alike – is easily dismissed, as is demonstrated in the three case studies examined in this paper *and* because we know that Byzantine chant in Greece underwent deep changes under Othon the First, and that in Athenian churches it was even sung in polyphony.

With regard to the theory of the Second Reform which had been conceived without prejudice (second claim) this is, given the theoretical formulation by the committee (0 34 and accompanying footnote), simply impossible.

There are two main reasons for this impossibility: firstly, because there is no traditional chant⁶² which is “naturally” based on “Pure” (“Harmonic”) intervals, and secondly, because the measuring procedure as described by the Music Committee is inconsistent.

<p style="text-align: center;">Διὰ τεσσάρων</p> $\frac{\Gamma\alpha_1}{\text{Nr}_1} = \frac{4}{3}$ $\frac{\Delta\iota_1}{\text{Π}\alpha_1} = \frac{\Gamma\alpha_1}{\text{Nr}_1}$ $\frac{\text{Κ}\epsilon_1}{\text{Βο}\upsilon_1} = \frac{4}{3} \cdot \frac{(81)^2}{(80)}$ $\frac{\text{Ζ}\omega_1}{\Gamma\alpha_1} = \frac{4}{3} \cdot \frac{25}{24}$ $\frac{\text{Nr}_2}{\text{Π}\alpha_1} = \frac{\Gamma\alpha_1}{\text{Nr}_1}$ $\frac{\Delta\iota_2}{\text{Κ}\epsilon_1} = \frac{\Gamma\alpha_1}{\text{Nr}_1}$ $\frac{\text{Βο}\upsilon_2}{\text{Ζ}\omega_1} = \frac{\Gamma\alpha_1}{\text{Nr}_1}$ <p style="text-align: center;">Διὰ ἑξ</p> $\frac{\text{Κ}\epsilon_1}{\text{Nr}_1} = \frac{5}{3} \cdot \frac{81}{80}$ $\frac{\text{Ζ}\omega_1}{\text{Π}\alpha_1} = \frac{5}{3} \cdot \frac{80}{81}$ $\frac{\text{Nr}_2}{\text{Βο}\upsilon_1} = \frac{5}{3} \cdot \frac{81}{80} \cdot \frac{24}{25}$ $\frac{\text{Π}\alpha_2}{\Gamma\alpha_1} = \frac{\text{Κ}\epsilon_1}{\text{Nr}_1}$ $\frac{\text{Βο}\upsilon_2}{\Delta\iota_1} = \frac{\text{Ζ}\omega_1}{\text{Π}\alpha_1}$ $\frac{\Gamma\alpha_2}{\text{Κ}\epsilon_1} = \frac{5}{3} \cdot \frac{24}{25} \cdot \frac{80}{21}$ $\frac{\Delta\iota_2}{\text{Ζ}\omega_1} = \frac{\text{Nr}_2}{\text{Βο}\upsilon_1}$	<p style="text-align: center;">Διὰ πέντε</p> $\frac{\Delta\iota_1}{\text{Nr}_1} = \frac{3}{2}$ $\frac{\text{Κ}\epsilon_1}{\text{Π}\alpha_1} = \text{''}$ $\frac{\text{Ζ}\omega_1}{\text{Βο}\upsilon_1} = \text{''}$ $\frac{\text{Nr}_2}{\Gamma\alpha_1} = \text{''}$ $\frac{\text{Π}\alpha_2}{\Delta\iota_1} = \text{''}$ $\frac{\text{Βο}\upsilon_2}{\text{Κ}\epsilon_1} = \frac{3}{2} \cdot \frac{(80)^2}{(81)}$ $\frac{\Gamma\alpha_2}{\text{Ζ}\omega_1} = \frac{3}{2} \cdot \frac{24}{25}$ <p style="text-align: center;">Δι' ἑπτὰ</p> $\frac{\text{Ζ}\omega_1}{\text{Nr}_1} = \frac{15}{8} \cdot \frac{80}{81}$ $\frac{\text{Nr}_2}{\text{Π}\alpha_1} = \frac{15}{8} \cdot \frac{80}{81} \cdot \frac{24}{25}$ $\frac{\text{Π}\alpha_2}{\text{Βο}\upsilon_1} = \frac{15}{8} \cdot \frac{81}{80} \cdot \frac{24}{25}$ $\frac{\text{Βο}\upsilon_2}{\Gamma\alpha_1} = \frac{\text{Ζ}\omega_1}{\text{Nr}_1}$ $\frac{\Gamma\alpha_2}{\Delta\iota_1} = \frac{\text{Nr}_2}{\text{Π}\alpha_1}$ $\frac{\Delta\iota_2}{\text{Κ}\epsilon_1} = \frac{\text{Nr}_2}{\text{Π}\alpha_1}$ $\frac{\text{Κ}\epsilon_2}{\text{Ζ}\omega_1} = \frac{\text{Π}\alpha_2}{\text{Βο}\upsilon_1}$
--	---

Figure 34: Part of the theoretical formulation of the *diatonic* intervals in the booklet of the Second Reform⁶³

⁶¹ The investigation of the so-called “shortcomings” in the octave division of Chrysanthos was undertaken in the aforementioned [Beyhom, 2016] and [Beyhom, 2015b].

⁶² Except for overtone singing, which can however inconceivably convey the subtleties of Eastern Byzantine chant.

⁶³ [Commission musicale de (Musical Committee of) 1881, Aphtonidēs, and al., 1888, p. 14, 15]: note an error for the ratio of $\gamma\alpha_2/\text{κε}_1$ (1st column, 2nd line from bottom) given as $5/3 \times 24/25 \times 80/21$, which should be: $\gamma\alpha_2/\text{κε}_1 = (5/3) \times (24/25) \times 80/81 = 128/81$; note also that the elementary inter-

Interval measurement is not an exact science

I have spent considerable time for the last 15 to 20 years measuring intervals⁶⁴ for my research, which taught me to be very cautious about methodology in this matter⁶⁵. The Music Committee gives no clues about the measurement procedure for the intervals in its booklet, neither does it provide details about the cantors⁶⁶ who participated in this process.

A series of questions arises, in this case, with regard to the latter:

- Did the Music Committee gather cantors from all the realm of Orthodoxy, or did it content itself with a few renowned cantors from Constantinople?
- How did the members of the Music Committee agree on the adequacy of the monochord with the note sung by the cantors? Was it by ear, was it by consensus or was it by vote?
- Did the cantors sing only the intervals by holding both notes while the scientific investigators of the committee measured them on the monochord, or did they chant in situation while the latter measured the intervals simultaneously⁶⁷?
- Were the pitches measured at the beginning of the attack of the note⁶⁸, or when the note became stabilized?
- And does the measuring procedure give the same results for various tempos?
- Furthermore: how were the measurement results from different cantors⁶⁹ handled statistically for the determination of the dispersion, the mean value⁷⁰, the standard deviation and the evaluation of errors of measurement?
- Finally, did the committee ask the cantors to avoid fluctuations⁷¹ in their singing, and how were these fluctuations (or their absence) integrated in the final results?

To all these evident⁷² questions⁷³, I could get no answers as the Music Committee did not find it necessary to provide them in written form, which casts serious doubts about the

vals used (in combination – added or subtracted) for the *diatonic* scale by the Music Committee are the disjunctive tone (8/9), the “Major” (or “Harmonic”) third (4/5), the fourth (3/4), the Just fifth (2/3) and the “Major” (or “Harmonic”) sixth (3/5), combined with the 24/25 *diesis* and the 80/81 *comma*, mostly “Harmonic” intervals – see [Beyhom, 2015b, p. 228] for more details.

⁶⁴ And teaching interval measuring.

⁶⁵ See for instance [Beyhom, 2007b ; Miramon-Bonhoure and Beyhom, 2010].

⁶⁶ Notably their identity.

⁶⁷ An almost impossible task in praxis, noticeably for the “attractions” which can be measured only in the course of the (rising or falling) melody.

⁶⁸ In which case, according to my experience, the pitch could be a quarter-tone to one and a half-tone higher. (See the Second Case study with the chanting of Tsetsis and the *βov* performed by [MH] at 1.5 s in Figure 14, as well as the *πα* performed by [JY] at 8.2 s in the same figure.)

⁶⁹ Or even for the same cantor.

⁷⁰ This is the only methodological procedure used by the Music Committee cited by Borrel in his [1950] article; however, the statistical correlation of interval measurements requires time-consuming and complex computational means. I explain, in [Beyhom, 2015b, p. 259–263], a simple procedure for statistical interval measurement verification which, for one single note in a song, requires hours of computation if not using a computer: how much time did the members of the committee spend on the verification of the accuracy of their results for each cantor, for each of the seven notes + octave of each scale, for all the possible combinations of intervals, and for all the attractions?

⁷¹ Which can also be considerable as can be concluded from all the proposed analyses in this paper.

⁷² *i.e.* for which any scholar in the field of musicology should require accurate, precise answers in order to endorse or decline the proposed results.

⁷³ And many others that would arise from the answers to the previous questions; for an example of methodology in Interval measuring, see [Beyhom, 2015b, p. 323–329] (and the following pages for the results and the additional questions which arise when interpreting them).

claimed accuracy – and validity – of this measuring procedure⁷⁴, as well as about the “un-preconceived” scale of the Music Committee.

Did the Second Reform reach its stated objectives?

The main issue which arises, however, and when realizing that the apparent aims of the Second Reform were purely rhetorical with regard to the mere 10 cents difference⁷⁵ in the theoretical configuration between the intervals of the two theories⁷⁶, is the issue of the pertinence of the Second Reform and of the real reasons which underlie it.

The official reasons for the Second Reform, simply stated, were the following:

1. Safeguard the tradition.
2. Counter Western influence on Byzantine chant and society.
3. Help cantors with their apprenticeship of this chant.
4. Correct the “errors” in Chrysanthine theoretical formulation.

While most of the repertoire, as seen above, had already been transcribed in the New Method at the time the Second Reform took place, the first and third reasons stated above are related to one another and could be dealt with through the implementation of the “attraction” in the theory – which was done⁷⁷.

In the light of similarities in interval values between the two theories, however, “correcting” the errors in Chrysanthine theory was a purely theoretical question, mostly limited to the formulation of the scale, which means that replacing the Zalzalian⁷⁸, Chrysanthine theory, with a “Harmonic” theory, which uses the moreover exact semi-tonal intervals in its scale descriptions, cannot constitute a distanciation from Western theories of the scale (and Western music), on the contrary.

Aphthonidēs’ concern, in a letter to Ilias Tantalidēs,⁷⁹ about the influence of “Arabo-Persian” music on Byzantine chant shows that the two contradictory trends at work in Byzantine society in the 19th century, the westernization of Byzantine society and the defense of Byzantine tradition, did not exclude in his mind a detachment from the “more

⁷⁴ Moreover: the Music Committee criticized at some point Chrysanthos because he used a *ṭunbūr* with moveable frets (instead of the monochord which was the proofing instrument of the Music Committee) to ensure that his intervals were accurate: while I do not pretend that Chrysanthine intervals are fully consistent with the praxis of Byzantine chant at that time, it must be noted that using a fretted *ṭunbūr* is probably the best way for such a procedure, because it gives the pitches of *all* the notes in a scale (additional frets can be used when necessary) and allows for small modifications of the positions of the frets in order to verify if they are in tune with the chant or not; the *ṭunbūr* can also be played along with the scale as many times as needed in order to verify the adequacy of the fretting with the scale or the tune. Note also that the *ṭunbūr* is an “oriental” (and mainly Ottoman) instrument, especially for Byzantine cantors in Constantinople, while the monochord, whenever used as a theoretical means for measuring pitches and intervals in Ancient Greece and later in Europe, became at some point a Western music instrument (see for instance [Adkins, 1963 ; 1967] and [Hughes, 1969 ; Meyer, 1997]). See also an example of the theoretical use of the *ṭunbūr* by Chrysanthos in [Chrysanthos (de Madytos), 2010, p. 116].

⁷⁵ See Figure 3.

⁷⁶ Mostly because of the effective use of sixths of the tone as a smaller divider of the octave, *i.e.* an interval the (equal-tempered) value of which is 33,33 cents, which is more than three times the alleged difference.

⁷⁷ With however a side effect which is that this implementation was one-sided and normative, while Byzantine chant tradition is interpretative, leaving the cantor a great deal of flexibility in praxis.

⁷⁸ Ascribed to Manṣūr a-ḍ-Ḍārib Zalzal – or Zulzul? – who was a famous *‘ūd* player in the Golden Age of Arabian civilization and has supposedly introduced the “neutral” intervals in Arabian *maqām* performance.

⁷⁹ See the article [Baud-Bovy, 1982] in which Baud-Bovy explains how Bourgault-Ducoudray became involved in Byzantine chant and later connected with Tantalidēs and Aphthonidēs, and provides various excerpts from their correspondence in the years prior to the Second Reform.

Oriental” Arabian⁸⁰ or Persian (Zalzalian) musics. His approach is however similar to the approach of most “Oriental” – Persian, Arabian and Ottoman – theoreticians of the scale at that time, who still mastered the tradition and cherished it, but wished to adorn it with Western clothes, making it more appealing for both Orientals and Westerners.

While the diatonic scale of the First Reform (Chrysanthos) was close to praxis in its time,⁸¹ and completely *Zalzalian* (“Oriental”), the “errors” in Chrysanthine theory were an excuse for a detachment from this Oriental basis. In fact, the (main) aims of the Second Reform (Germanos Aptonidēs) were the rapprochement of Byzantine theory from Western theories of the scale and the introduction of complementary characteristics of praxis in the teaching of Psaltiki: of these characteristics, only the phenomenon of “attraction” was effectively implemented, but inefficiently and – by all means with regard to the undisclosed measuring methodology – inaccurately.

First Reform			
Interval	Theoretical		Equal-temp.
	ratio	in cents	in cents
12	9 / 8	203,91	211,76
9	12 / 11	150,64	158,82
7	88 / 81	143,50	123,53

Second Reform			
Interval	Theoretical		Equal-temp.
	ratio	in cents	in cents
12	9 / 8	203,91	200,00
10	800 / 729	160,90	166,67
8	27 / 25	133,24	133,33

Figure 35: Table showing the values of the intervals of second composing the *diatonic* scale in the two Byzantine chant reforms of the 19th century⁸²

Beyond the Second Reform: Re-Byzantinism

Byzantinism results from the discourse of European Nations in the 19th and 20th century on Byzantium, and has two main periods, a first period of disparagement (of Byzantium),⁸³ and a second period of integration. The latter period differentiates Byzantinism

⁸⁰ As compared with Ottoman music which had already set its course towards the same goal as Byzantine chant: westernization in the form of Ottoman music and society.

⁸¹ See Chapter I (about Mikhā’īl Mashāqa) in [Beyhom, 2015b].

⁸² Chrysanthine “equal-temperament” values are included here for the sake of comparison, most Occidental theoreticians having contented themselves with such an interpretation, including Borrel [1950, p. 2] – as they were unaware of, or unable or unwilling to acknowledge, types of division other than the equal division of the octave in Chrysanthine theory.

⁸³ For example, this assessment by William Lecky in his *History of European morals*: “Of that Byzantine Empire the universal verdict of history is that it constitutes, without a single exception, the most thoroughly base and despicable form that civilisation has yet assumed. Though very cruel and very sensual, there have been times when cruelty assumed more ruthless, and sensuality more extravagant aspects; but there has been no other enduring civilisation so absolutely destitute of all the forms and elements of greatness, and none to which the epithet mean may be so emphatically applied. The Byzantine Empire was preeminently the age of treachery. Its vices were the vices of

from plain Orientalism, as the sole aim of the Orientalist procedure was to *exclude* Oriental cultures from the evolutionary process, presumably initiated in Ancient Greece and finding its climax in 19th-20th-Centuries Europe, and inspired by the Darwinian and Spencerian theories.⁸⁴ In the case of Byzantium, and due to its presumed connection with Ancient Greece,⁸⁵ it became indispensable to integrate Greece and Byzantium among the European nations to ensure an evolutionary continuity of History (and culture – including music, evidently).

While the Second Reform of Byzantine chant in the 19th century⁸⁶ is a direct result of the Byzantinist discourse and of its effects on the Greek society at that time, it should be here reminded that Mainstream – Western – Byzantine musicology pretended for decades (and still does) that the Byzantine chant “of the Origins” was ditonic (or “Western”, or “tense” diatonic)⁸⁷, with no proofs whatsoever except for one fabrication about the “Byzantine-Church organs” by the quartet (Egon) Wellesz / (Henry Julius Wetenhall) Tillyard / (Amédée) Gastoué / (Mahmoud) Raghīb, and for a incomplete theoretical demonstration by Oliver Strunk which neglected generalized (and Byzantine) diatonism.⁸⁸

The predominance of Western musicology and of its discourse on Byzantine chant initiated local attempts among Byzantine theoreticians for a revisited, western-compatible Byzantine chant theory which continued well after the Second 19th-Century reform – Thus for example the attempts of Simon Karas to force-fit Byzantine chant theory in the mold of Pythagoreanism.⁸⁹

I call this predominant trend in the 20th century *Re-Byzantinism*.⁹⁰ It resulted for Byzantine chant in an evolution of the theory which determined an evolution of practice –

men who had ceased to be brave without learning to be virtuous. Without patriotism, without the fruition or desire of liberty, after the first paroxysms of religious agitation, without genius or intellectual activity; slaves, and willing slaves, in both their actions and their thoughts immersed in sensuality and in the most frivolous pleasures, the people only emerged from their listlessness when some theological subtlety, or some rivalry in the chariot races, stimulated them into frantic riots. They exhibited all the externals of advanced civilisation. They possessed knowledge; they had continually before them the noble literature of ancient Greece, instinct with the loftiest heroism; but that literature, which afterwards did so much to revivify Europe, could fire the degenerate Greeks with no spark or semblance of nobility” – [Lecky, 1869, v. II, p. 13–14].

⁸⁴ The Orientalist and Byzantinist processes, together with the analytical tools put at work to enforce them, are explained in detail in [Beyhom, 2016].

⁸⁵ See [Beyhom, 2016], notably in Chapter IV the section on Romantic Hellenism.

⁸⁶ With a scale which is Western-compatible – at least clearly more than the scale of Chrysanthos – but which still retains some “Oriental” characteristics.

⁸⁷ “Diatonic” includes numerous scale-types, including the Byzantine diatonic system and the zalzalian (Persian and Arabian – then Ottoman) *maqām* system.

⁸⁸ For the refutation of these assertion and demonstration see the aforementioned [Beyhom, 2016] and [Beyhom, 2015b].

⁸⁹ Note that Generalized 20th-Century Re-Byzantinism led Greek (and other) Byzantine scholars to use Western arguments and “musicological science” (mostly Pythagoreanism) with the main – seemingly contradictory – aims to either defend their music or to make it (even) more Western compatible. The contradiction disappears, however, whenever the theorist is convinced by the arguments of Western Byzantinology – or pretends to be so.

⁹⁰ This process is equivalent to the Re-Orientalism process, with specificities including the fact that Byzantinism became eventually an inclusive process, and not an exclusive process as with Orientalism. Music composers and theorists such as Bourgault-Ducoudray threw the line of Western musical science to their Byzantine counterparts (including Aphtonidēs for Bourgault-Ducoudray) who readily used it to try to defend their own music. The (Re-Orientalist) reaction of 19th-Century *maqām* theoreticians such as Rauf Yekta Bey in Turkey, Maḥmūd Aḥmad (al-) Ḥifnī in Egypt and Wadīʿ Ṣabrā in Lebanon, although their music was being excluded from the evolutionary process promoted by the Orientalist vision, was typically the same.

mainly towards a more westernized aesthetics of the sound but also, today when each Byzantine chant apprentice can listen easily to electronic equivalents of the scale of the Music Committee⁹¹, towards a change in the effective intervals used in the chant.⁹²

One example of straightforward Re-Byzantinism

To conclude this paper, I would like to expound here one further attempt at Re-Byzantinism which shows that the tendency towards the westernization of Byzantine chant is still vigorous towards – at least – the end of the 20th century.

One of the first references I looked up for my research on Byzantine chant was the book of Dimitri Giannelos *La musique byzantine*⁹³, the only available (in French⁹⁴) complete description of Byzantine theory from the Second Reform.

At some point the author, while proposing the usual progression of the *diatonic* scale of the Second Reform (the ascending – here on *c* – 12 10 8 12 12 10 8 *minutes* scale) “reminds” us that “all the intervals [of the Byzantine *diatonic* scale used in the 1990s] are natural” and “that this scale corresponds to the Occidental, Natural scale of Zarlino”⁹⁵, with intervallic ratios given as 9/8, 10/9 and 16/15⁹⁶ for the three “tones” of the *diatonic* scale (see first row in 0 36 and further comparisons)⁹⁷.

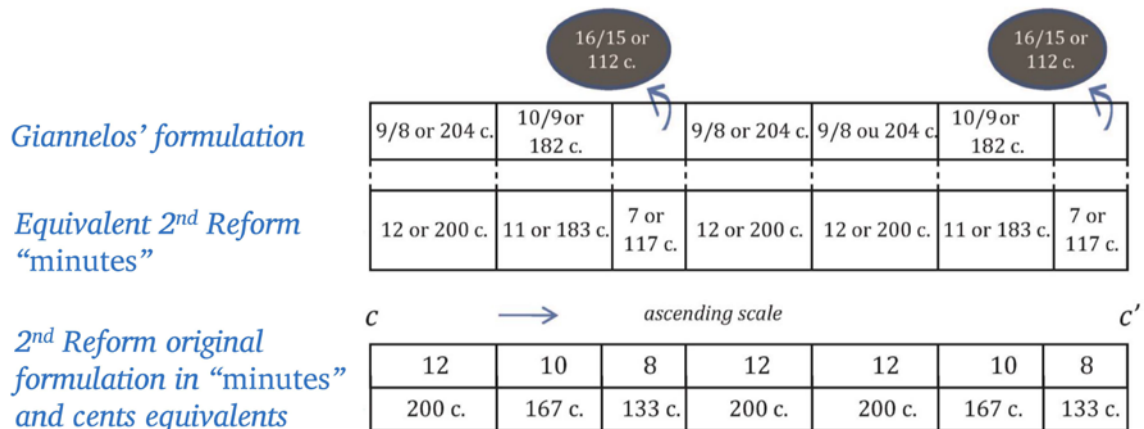


Figure 36: The “Byzantine” *diatonic* scale⁹⁸ according to Giannelos and comparisons⁹⁹

⁹¹ This I have witnessed while doing my field research on Byzantine choirs in Lebanon: while discussing with some apprentice-cantors I realized that they were totally convinced that the intervals in chant praxis corresponded – or should correspond – exactly to the theoretical intervals they were listening to on their smartphones. More advanced students and performers are generally aware, however, of the differences between theoretical and practical intervals.

⁹² Sadly enough, we are born in a time when everything that is written is more important than oral tradition: the younger generations think even more than the preceding ones that theory gives “true” values for the intervals, whenever every theory is arbitrary and but an approximation of the reality – in the same way as (here paraphrasing Alfred Korzybski) the map is not the territory, but merely a sketch of it, and sometimes inaccurate.

⁹³ [Giannelos, 1996], a redrafted version of his Ph.D. thesis [Giannelos, 1988].

⁹⁴ An equivalent in English language would be [Savas, 1965] which however, although seemingly translated from the Greek language (see the title page) is limited in contents and relies heavily on Occidental literature. (See [p. 106-107] in the aforementioned reference.)

⁹⁵ [Giannelos, 1996, p. 61].

⁹⁶ With the corresponding values approx. 204, 182 and 112 cents.

⁹⁷ [Giannelos, 1996, p. 59].

⁹⁸ This scale is called “The diatonic ‘natural’ *gamut*” (given in ratios) in [Castellengo, Liénard, and Bloch, 2015, p. 405].

⁹⁹ The first row shows frequency ratios as given by Giannelos and values of intervals in cents, the second row gives the closest equivalents in numbers of minutes of the scale of the Second Reform,

While this scale is presented as the scale of the Second Reform, it is obviously – and at least theoretically – not so (see Figure 3 – Right – and Figure 40 – Below) although the numbers of minutes composing its intervals are the same as in the latter theory.

A most interesting fact, however, is that Chrysanthos Madytos, the architect of the First Reform, when he explained the *differences* between the Byzantine scale and the Western scale (see Figure 37), presented *the latter* as composed with the same Zarlinian intervals and as having nearly the same structure¹⁰⁰ as the “Byzantine” scale of Giannelos (see the last scale to the right in Figure 38 and compare it with the “Byzantine” scale of Giannelos in Figure 39).

δι : κε	9 : 8	ρε : μι	10 : 9
νη : πα	9 : 8	σολ : λα	10 : 9
γα : δι	9 : 8	ουτ : ρε	9 : 8
πα : ββ	12 : 11	λα : σι	9 : 8
κε : ζω	12 : 11	μι : φα	16 : 15
ββ : γα	88 : 81	σι : ουτ	16 : 15
ζω : νη	88 : 81	φα : σολ	9 : 8
πα : δι	4 : 3	λα : ρε	27 : 20
κε : πα	4 : 3	μι : λα	4 : 3
δι : Δι	1 : $\frac{1}{2}$	ρε : Ρε	1 : $\frac{1}{2}$
πα : Πα	1 : $\frac{1}{2}$	λα : Λα	1 : $\frac{1}{2}$

Figure 37: Frequency ratios of Byzantine chant intervals according to Chrysanthos Madytos (two columns to the left) as compared with “Western” (“Zarlinian”) intervals (two columns to the right)¹⁰¹

If we put together the intervals of the Byzantine diatonic scale following the First and Second Reform and compare them to Giannelos’ and to the Pythagorean scales (Figure 40) we notice that the intervals in Giannelos’ “Zarlinian”¹⁰² scale (3rd row from top) are even closer to the Pythagorean ditonic formulation (or 9/8, 9/8 and 256/243 in the ditonic tetrachord – 4th row below in Figure 40) than those of the Second Reform (2nd row from top in Figure 40). This procedure distorts then the intervals of the scale of the Second 19th-Century reform, (already a distortion of Chrysanthos’ scale) and brings them closer to the Western reference: the ditonic, Pythagorean scale.

and the third row gives the canonical numbers of minutes in the latter scale with the last row showing the equivalents of the latter intervals in cents. Interval equivalents are given in the equal-tempered scale for the Second Reform; these values are close, as shown in Figure 35, to their theoretical values; the logical conclusion is that the scale of Giannelos should be represented with (ascending) 12 11 7 12 12 11 7 minutes (of the Second Reform) intervals.

¹⁰⁰ The two 9/8 and 10/9 tones are inverted when compared with the “Zarlinian” scale of Giannelos.

¹⁰¹ [Chrysanthos (de Madytos) and Rōmanou, 1973, p. 99]: Western intervals are (3^e column from the left), beginning from above, *ré mi sol la ut ré la si mi fa si ut fa sol la ré mi la ré Ré (octave) la La (octave)*.

¹⁰² Which he terms “Byzantine”.

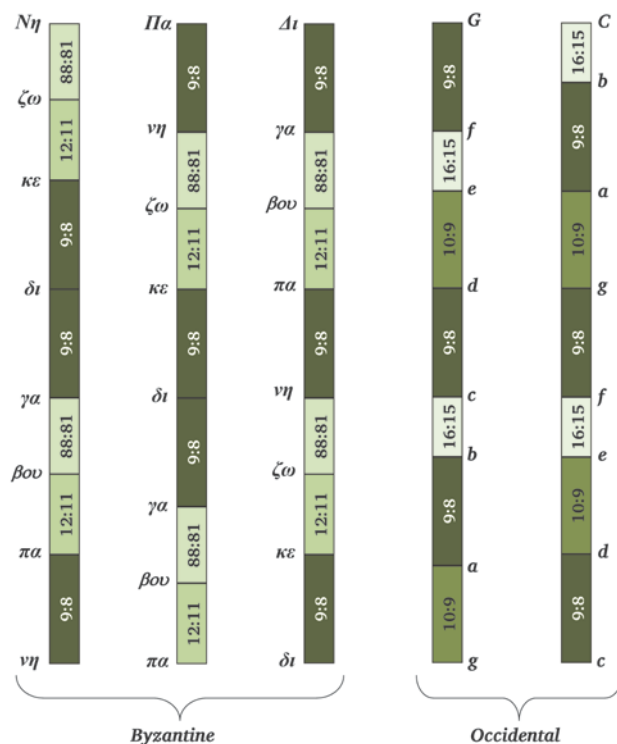


Figure 38: Comparing (a) Byzantine *diatonic* scales (the three on the left) with (b) the Western scales (the two on the right) according to Chrysanthos¹⁰³

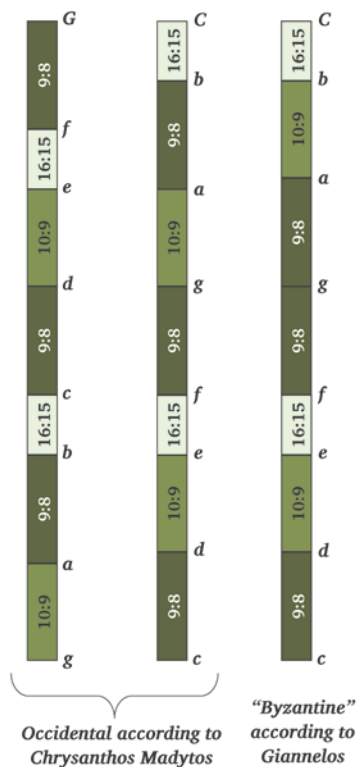


Figure 39: Comparison of the Western scale(s) according to Chrysanthos (left) and the “Byzantine” scale according to Giannelos (right)

¹⁰³ Adapted from [Beyhom, 2015b]: the *diatonic* scales of Chrysanthos are Zalzalian (composed from intervals corresponding to generalized – i.e. not ditonic – diatonism), while the “Occidental” scales use so-called Zarlinian intervals (here based on a superparticular progression) with the smallest interval (ratio 16/15) considered as a “semi-tone”.

Interval	tone		"medium" tone		"small" tone	
	ratio	in cents	ratio	in cents	ratio	in cents
1 st Reform	9 / 8	203,91	12 / 11	150,64	88 / 81	143,50
2 nd Reform	9 / 8	203,91	800 / 729	160,90	27 / 25	133,24
Giannelos	9 / 8	203,91	10 / 9	182,40	16 / 15	111,73
Ditonic	9 / 8	203,91	9 / 8	203,91	256 / 243	90,22

Nη
Πα
Βου
Ε
Γα
c
d
e
f

Figure 40: Evolution of “tones” from Chrysanthos (top) to Giannelos (penultimate row), to be compared with the intervals of the (Pythagorean) ditonic tetrachord (last row); the “*mujannab*” intervals (the “medium” and “small” tones) get closer, with each successive theoretical formulation, to the intervals of Pythagorean ditonism¹⁰⁴

Indeed, the “Byzantine” scale of Giannelos is, as he himself writes, Western and similar in its intervallic contents to the Chrysanthine “Western” scale¹⁰⁵, but completely different from the Chrysanthine estimation of Byzantine intervals, and from his *diatonic* scale. Therefore this scale represents a further “evolution” in the representation of Byzantine chant intervals, and one further (Re-Byzantinist) step towards the complete westernization of this chant¹⁰⁶.

IS THERE AN ALTERNATIVE?

While “more” oriental patriarchates resisted a while longer to Musical westernization (Figure 41), a definite tendency of the last decades in the “Greek” realm was further Re-Byzantinism¹⁰⁷ and, as a collateral result, the rapprochement of Byzantine chant theory with the theory of western music of common practice.

¹⁰⁴ See the video-equivalent of the Power Point slide entitled *In a Straight Line Towards Ditonism* to listen to the successive intervals and to the changes occurring to the degree $\square\square\square$ with the successive reforms. (Also downloadable at <http://foredofico.org/CERMAA/wp-content/uploads/2018/10/In-a-straight-line-towards-ditonism.mp4>.)

¹⁰⁵ *i.e.* what Giannelos terms “Byzantine” was considered by Chrysanthos as “Western”.

¹⁰⁶ And towards the rewriting of both its theory and history.

¹⁰⁷ While the plain defense of Byzantine tradition – such as with Georgios Sthathis’ “An analysis ...” [Sthathis, 1979] – is in my opinion a salutary reaction to Byzantinism, Re-Byzantinism includes attempts at isolating Byzantine chant from any historical interaction with neighboring musics: “This written and artistic musical Greek culture has lasted a millennium (from the tenth to the twenty-first century), and is the art of setting words to music in the Byzantine and post-Byzantine psalmodic style. The Greeks of this millennium, until the middle of the nineteenth century, were not familiar with any other musical culture except for that of Arabic-Persian music. They were able to keep Arabic-Persian music separate as ‘foreign’ or ‘ethnic’ music—as the music of a foreign race with a foreign religion—without letting it influence their own ethnic and religious musical expression” – [Sthathis, 2012]. Byzantine chant – and this is evident from theoretic and melodic analyses – has definitely common features shared by Persian and Arabian *maqām* music: pretending to a “purity” of this chant – and as a possible collateral differentiating sharply the periods before and after the fall of Constantinople for it – is equivalent to reproducing the schemes of Mainstream Byzantinism as applied by Mainstream western Byzantinologists in the 19th-20th centuries.

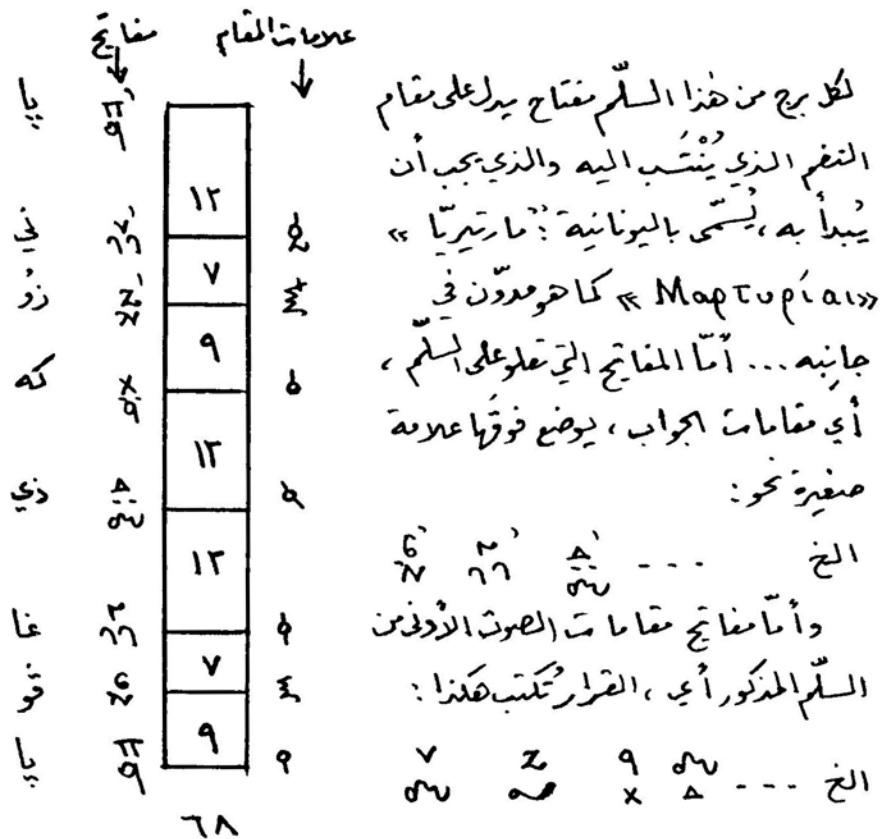


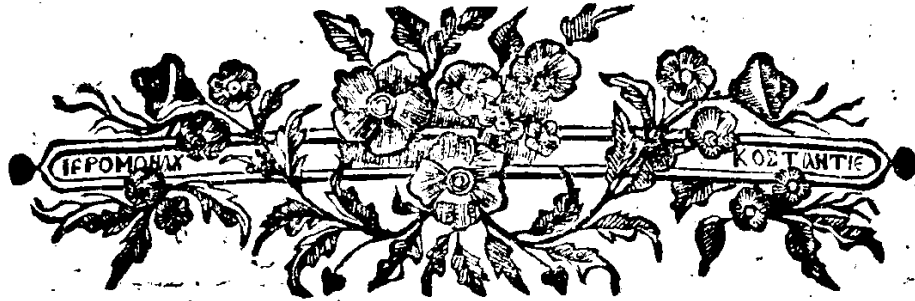
Figure 41: Chrysanthine *diatonic* scale and explanations by Mitri (al-) Murr (Lebanon)¹⁰⁸

Knowing, however, that practice is sometimes sharply differentiated from theory, and acknowledging western influence in the last two centuries – but not necessarily accepting it, the time has perhaps come to undertake more effective steps towards a better understanding of the melodic subtleties of this – living – art.

One of the possible ways of achieving such a goal is suggested in this paper: a thorough and wide research program on the intonations of Byzantine chant can be undertaken per country, per region and per well-known or distinguished performer of the realm of Byzantine liturgy in the aim of establishing a common database for the documented variants and intonations. This would help remind that variations of intonation and heterophony are main constitutive parts of Byzantine chant, and possibly reconcile it with its “Oriental” roots.

Eventually, it is possible to change (back) the theory of Byzantine chant by reverting to the values of Chrysanthos’ scale, although these remain theoretical – while closer to Arabian *maqām* practice. If not, it is always possible to adapt his theory so as to make it acceptable by Modern scholars influenced by centuries of so-called musicological science.

¹⁰⁸ [Murr (al-), 1981, p. 1]: this scale remained the reference for the patriarchate of Antioch for about one century after the Second Reform of the 19th century.



ἀρχὴ τοῦ πλαγίου τετάρτου ἡχοῦ. πέτρου βυζαντίου ἡχος δὲ -υη

Κυ ρι ε ε κε κρα ξα προ ος σε ε(λ)ει σα κου ου ου
 σο ο ου μου ου ει σα ακου σο ου μου κυ υ υ υ ρι ε
 ε ε ε ε(δ) κυ ρι ε ε κε κρα ξα προ ος σε
 ε σα κου σο ο ου μου προσχε ες τη φω νη η η τη ης δε
 η σε ε ε ε ω ω ω ω ως μου(δ) εν τω κε κρα γε
 υει αι με προς σε ε ε ε ε ε ε(δ) ει σα ακου σο ου μου
 κυ υ υ υ ρι ε ε ε ε

Κα τευ θυυ θυη τω η προ σε ε ευ χη η η μου(λ) ω
 θυ μι α α μα α ε υω πι ε ε ε ε ο ο ο ο ου σου

Figure 42: 1st page of Kyrie Ekekraxa by Petros Byzantios, from [Ephesios, 1820, p. 208]

παρσι ες τω ων χειρω ων μου ου θυσει
 α α ε σπε ρει ε κ υη η η φει σα κ οου σου μου
 κυ υ υ υ υ ρι ε ι ε ε

→ (H) ου κυ ρι ε φυ λα κην τω στο μα τι μου και θυ
 γραν περι ο χης περι τα χοι λη μου

Μ η εκ κλει νης την καρ δι αυ μου εις λο γους πο νη ρι
 ας του προ φα σι ζεσθαι προ φα σεις εν α μαρ τι αις

Σ υν αυ θρω ποις ερ γα ζο με ευοιστηνα νο μι ε αυ
 και ου μη συν δυ α σω με τα των εκ λε κτων αυ των

Π αι δευ σει με δι και ος εν ε λε ει και ε λε γξει με
 εε λε ον δε α μαρ τω λου μη λι πα να τω την κε φα λην
 μου

Ο τι ε τι και η προ σευ χη μου εν αις ευ δο κει αις αυ
 των (σ) κα τε πο θη σαν ε χο με να πε τρας οι κρι
 ται αυ των

Figure 43: 2nd page of *Kyrie Ekekraxa* by Petros Byzantios, from [Ephesios, 1820, p. 209]

Kyrie Ekekraxa

from the "Anastasimatarion" by Petros Efesios (1820)

Composed by Petros Byzantios

Transnotated by Joseph Yazbeck and Amine Beyhom

1 $\text{♩} = 80$ 4th mode plagal (8th mode)

Ky ri e E ke kra xa pro os se i

sa kou so on mou i sa kou

so on mou Ky ri e Ky

ri e E ke kra xa pros se i

sa kou so on mou pros khe es ti fo

ni ti is dhe i se o os

(26) = Beginning of the 2nd mode on g (δι)

mou en do ke kra ge ne me pro os

1

Figure 44: 1st page of *Kyrie Ekekraxa* by Petros Byzantios, transnotated by Joseph Yazbeck (Western) and Amine Beyhom (added Byzantine alterations and comments)

29 (31) Returning to the 8th mode on c (Nη)

se i sa kou so on mou

33 (35) New paragraph beginning with "Ka ..."

Ky ri e Ka tef thin

37

thi to i pro se ef khi mou os thi

41

mi a ma e no pi o on

45

sou E pa ar si is to on khi ro on

49

mou thi thi a e spe ri

53

ni i sa kou son mou Ky

57

ri e

Figure 45: 2nd page of *Kyrie Ekekraxa* by Petros Byzantios, transnotated by Joseph Yazbeck (Western) and Amine Beyhom (Byzantine alterations)

CITED REFERENCES

- ADKINS, Cecil : *The theory and practice of the monochord*, State University of Iowa [1963].
- ADKINS, Cecil : "The Technique of the Monochord", *Acta Musicologica* 39 1/2 [1967-1-1] [doi: 10.2307/932465. url: <http://www.jstor.org/stable/932465>] p. 34–43.
- AMBRAZEVICIUS, Rytis : "Performance of musical scale in traditional vocal homophony: Lithuanian examples", *Muzikologija* 17 [2014] [doi: 10.2298/MUZ1417045A. url: <http://www.doiserbia.nb.rs/Article.aspx?ID=1450-98141417045A>] p. 45–68.
- BAUD-BOVY, Samuel : "Bourgault-Ducoudray et la musique grecque ecclésiastique et profane", *Revue de Musicologie* 68 1/2 [1982-1-1] [doi: 10.2307/928286. url: <http://www.jstor.org/stable/928286>] p. 153–163.
- BEYHOM, Amine : "Des Critères d'authenticité dans les musiques métissées et de leur validation : exemple de la musique arabe", *Filigrane. Musique, esthétique, sciences, société* 5 [2007a-6] [url: <http://foredofico.org/CERMAA/wp-content/uploads/2017/11/Beyhom-filigrane-n-5-p.63-91-INTERNET.pdf>] p. 63–91.
- BEYHOM, Amine : "Dossier : Mesures d'intervalles – méthodologie et pratique", *Revue des Traditions Musicales des Mondes Arabe et Méditerranéen* 1 1 [2007b-6] [url: http://foredofico.org/CERMAA/wp-content/uploads/2017/11/Beyhom_2007_Mesures_d_intervalles_RTMMAM_n11.pdf] p. 181–235.
- BEYHOM, Amine : "Paroles (et gestes mélodiques) dans les musiques d'Orient : une mise en perspective", Al-Kalima min al-Ma'nā ilā-l-Maghna [La parole : de la signification au chant du répertoire], ed. Lassaâd Zouari, Ministère de l'éducation supérieure et de la recherche scientifique / L'Institut supérieur de musique de Sfax |Sfax - Tunisie, 2015a-3-30| p. 17–23.
- BEYHOM, Amine : *Théories et pratiques de l'échelle dans le chant byzantin arabe : Une approche comparative et analytique proposant une solution inédite pour le système théorique de Chrysanthos le Madyte*, Par l'auteur |Broummana (Liban), 2015b-9|.
- BEYHOM, Amine : "Dossier: Hellenism as an Analytical tool for Occidentism (in musicology) (V2)", *Near Eastern Musicology Online* 3 5 [2016-11] [url: [http://nemo-online.org/wp-content/uploads/2017/02/\(V2-INTERNET\)%205-04.%20Article%20NEMO%20n%C2%B05%20Amine%20Beyhom%20170219S.pdf](http://nemo-online.org/wp-content/uploads/2017/02/(V2-INTERNET)%205-04.%20Article%20NEMO%20n%C2%B05%20Amine%20Beyhom%20170219S.pdf)] p. 53–275.
- BEYHOM, Amine : *Kyrie Ekekraxa by Petros Byzantios performed by an Anonymous Cantor in Greek*, 1920x1080, *Kyrie Ekekraxa by Petros Byzantios*, CERMAA |Broummana - Lebanon, 2018a-2-19| [url: https://www.youtube.com/edit?o=U&video_id=ush88CvgQYk].
- BEYHOM, Amine : *Kyrie Ekekraxa by Petros Byzantios performed by Bachir Osta in Greek*, 1920x1080, *Kyrie Ekekraxa by Petros Byzantios*, CERMAA |Broummana - Lebanon, 2018b-9-6| [url: <https://youtu.be/WQVdSqLh1v4>].
- BEYHOM, Amine : *Kyrie Ekekraxa by Petros Byzantios performed by Bachir Osta in Greek (Half-Tempo)*, 1920x1080, *Kyrie Ekekraxa by Petros Byzantios*, CERMAA |Broummana - Lebanon, 2018c-9-6| [url: https://youtu.be/Jcg_xSC5NXA].
- BEYHOM, Amine : "MAT for the VIAMAP. Maqām Analysis Tools for the Video-Animated Music Analysis Project", *Near Eastern Musicology Online* 4 7 [2018d-11] [url: <http://nemo-online.org/>] p. 145–258.
- BORREL, Eugène : "Les gammes byzantines et la commission de Constantinople en 1881", *Revue de musicologie* 32 93/94 [1950] p. 1–7.
- BOUËT, Jacques : "Pulsations retrouvées: Les outils de la réalisation rythmique avant l'ère du métro-nome", *Cahiers de musiques traditionnelles* 10 [1997] [doi: 10.2307/40240268. url: http://scd-ezproxy.paris-sorbonne.fr:2058/stable/40240268?seq=1#page_scan_tab_contents] p. 107–125.
- CASTELLENGO, Michèle, Jean-Sylvain LIENARD and Georges BLOCH : *Écoute musicale et acoustique: avec 420 sons et leurs sonagrammes décryptés* [2015].
- CHRYSANTHOS (DE MADYTOS) : *Great theory of music*, translator Kaitē Rōmanou, The Axion Estin Foundation [2010].
- CHRYSANTHOS (DE MADYTOS) and Panagiōtēs G. PELOPIDĒS : *Θεωρητικόν Μέγα της Μουσικής [Theōrētikon mega tēs mousikēs – Great theoretical book of music]*, En Tergeste : ek tes typographias Michael Vais (Michele Weis) |Trieste - Italie, 1832|.
- CHRYSANTHOS (DE MADYTOS) and Kaitē RŌMANOU : *Great theory of music by Chrysanthos of Madytos*, Thesis, Indiana University [1973].
- COMMISSION MUSICALE DE (MUSICAL COMMITTEE OF) 1881, APHTONIDĒS and AL. : *Στοιχειώδης διδασκαλία της εκκλησιαστικής μουσικής εκπονηθείσα επί τη βάσει του ψαλτηρίου υπό της μουσική επιτροπής του Οικουμενικού Πατριαρχείου εν έτει 1883 [Elementary teachings of ecclesiastical music elaborated*

- on the basis of the psalter by the musical committee of the Ecumenical Patriarchate in the year 1883], (Orthodox Patriarchate) Patriarcat de Constantinople [Istanbul, 1888].
- DAHLIG, Ewa : "Monophonie, hétérophonie et Poly(?) Phonie dans le jeu du violon traditionnel en Pologne", *Cahiers de musiques traditionnelles* 6 [1993-1-1] [doi: 10.2307/40240158. url: <http://www.jstor.org/stable/40240158>] p. 45-53.
- DURING, Jean : "Rythmes ovoïdes et quadrature du cycle", *Cahiers d'ethnomusicologie. Anciennement Cahiers de musiques traditionnelles* 10 10 [1997-12-1] [url: <http://ethnomusicologie.revues.org/953>] p. 17-36.
- EPHESIOS, Petros : *Neon Anastasimatarion* [1820].
- GERSON-KIWI, Edith : "The Bourdon of the East. Its Regional and Universal Trends", *Journal of the International Folk Music Council* 16 [1964-1-1] [doi: 10.2307/835072. url: <http://www.jstor.org/stable/835072>] p. 49-50.
- GIANNELOS, Dimitrios : *Musique byzantine : tradition orale et tradition écrite, XVIII^e-XX^e siècles, 3^e cycle Ethnologie*, Paris X [Nanterre, 1988].
- GIANNELOS, Dimitrios : *La musique byzantine : le chant ecclésiastique grec, sa notation et sa pratique actuelle, Collection Musique et musicologie, les Dialogues, ISSN 1272-1972 ; 1996, L'Harmattan* [1996].
- HOOD, Ki Mantle : "Stratification polyphonique dans les musiques d'Asie du Sud-Est", *Cahiers de musiques traditionnelles* 6 [1993-1-1] [doi: 10.2307/40240154. url: <http://www.jstor.org/stable/40240154>] p. 3-10.
- HUGHES, Andrew : "Ugolino: The Monochord and musica ficta", *Musica Disciplina* 23 [1969-1-1] [url: <http://www.jstor.org/stable/20532043>] p. 21-39.
- LECKY, William Edward Hartpole : *History of European morals from Augustus to Charlemagne - Vol. II II/II* (vols.), D. Appleton and company [1869].
- MASSOUDIËH, Mohammad Taghi : "Polyphony in Iranian Music", *Translingual Discourse in Ethnomusicology* 2 0 [2017-8-23] [url: <https://www.tde-journal.org/index.php/tde/article/view/1887>] p. 82-102.
- MEYER, Christian : "La tradition du Micrologus de Guy d'Arezzo. Une contribution à l'histoire de la réception du texte", *Revue de Musicologie* 83 1 [1997-1-1] [doi: 10.2307/947028. url: <http://www.jstor.org/stable/947028>] p. 5-31.
- MIRAMON-BONHOURE, Jeanne and Amine BEYHOM : "Praat : Petit manuel pratique pour débutants – 1^{ère} partie : Analyses de systèmes intervalliques et d'échelles V 1.0.3", Université Paris Sorbonne [2010-9].
- MOK, Robert T. : "Heterophony in Chinese Folk Music", *Journal of the International Folk Music Council* 18 [1966-1-1] [doi: 10.2307/834636. url: <http://www.jstor.org/stable/834636>] p. 14-23.
- MORGAN, Maureen M. : "The 'Three Teachers' and Their Place in the History of Greek Church Music", *Studies in Eastern chant*, ed. Egon Wellesz and Miloš M. Velimirović, Oxford Univ. Press [London & others, 1971] p. 86-99.
- MURR (AL-), Fu'ād (Di-)Mitrī : *Al-Kunūz al-Mūsīqiyya al-Bizāntīyya*, منشورات معهد القديس يوحنا الدمشقي اللاهوتي - جامعة البلمند, Ma'had al-Qiddīs Yūḥanna a-d-Dimashqī [Balamand – Liban, 1981].
- NAPIER, John : "A 'Failed' Unison or Conscious Differentiation: The Notion of 'Heterophony' in North Indian Vocal Performance", *International Review of the Aesthetics and Sociology of Music* 37 1 [2006-6-1] [doi: 10.2307/30032186. url: <http://www.jstor.org/stable/30032186>] p. 85-108.
- ROYER-ARTUSO, Nicolas : "Une approche réaliste du phénomène hétérophonique (Quelque chose dépasse...)", *Revue des Traditions Musicales des Mondes Arabe et Méditerranéen, RTMMAM* 6 [2012] [url: <http://www.academia.edu/download/33686625/heterophonie-1.doc.docx>] p. 113-123.
- SAVAS, Savas I. : *Byzantine music in theory and in practice*, Hercules Press [Boston, 1965].
- SCHAEFFNER, André : *Variations sur la musique*, Fayard [Paris, 1998].
- STATHIS, Gregorios Th. : "An Analysis of the Sticheron [...] by Germanos, Bishop of New Patras [The Old 'Synoptic' and the New 'Analytical' Method of Byzantine Notation]", *Studies in Eastern chant*, ed. Miloš M. Velimirović, Oxford Univ. Press [London & others, 1979] [url: Oxford University Press] p. 177-227.
- STATHIS, Gregorios Th. : "Prologue" [2012-6-3] [url: <http://stanthonysmonastery.org/music/Prologue.htm>].
- TALLMADGE, William H. : "Baptist Monophonic and Heterophonic Hymnody in Southern Appalachia", *Anuario Interamericano de Investigacion Musical* 11 [1975-1-1] [doi: 10.2307/779887. url: <http://www.jstor.org/stable/779887>] p. 106-136.
- USCHER, Nancy : "A 20th-Century Approach to Heterophony: Mark Kopytman's 'Cantus II'", *Tempo, New Series* 156 [1986-3-1] [url: <http://www.jstor.org/stable/945846>] p. 19-22.

Curriculum Vitae: Amine Beyhom is Chief Editor of NEMO-Online (<http://nemo-online.org/>) and director of the CERMAA research center (Centre de Recherche sur les Musiques Arabes et Apparentées) affiliated to the FOREDOFICO foundation in Lebanon (<http://foredofico.org/CERMAA/>); he holds a Ph.D. (2003) in music and musicology as well as an *Habilitation à diriger les recherches* (2010) from the Université Paris-Sorbonne in France. He is the author of two books (2010; 2015 – see also <http://foredofico.org/CERMAA/publications/publications-on-the-site/publications-amine-beyhom>) the first about Arabian theories and music praxis from the 8th to the 13th centuries, and the second on Byzantine chant history, theory and praxis. Amine Beyhom was recently (in October 2017 – see <http://foredofico.org/CERMAA/archives/820>) bestowed the triennial Lois Ibsen Al-Faruqi prize by the Society for Ethnomusicology.