Musicology Today

Journal of the National University of Music Bucharest

Issue 2 (42) April-June 2020

Title: Contribution to a Future Theory of Supra-Octave Modes. Case Study: Ștefan Niculescu's Late Works

Author: Mihai Măniceanu
E-mail: mihai.maniceanu@gmail.com

Source: Musicology Today: Journal of the National University of Music Bucharest / Volume 11 / Issue 2 (42) / April-June 2020, pp 119-154

Link to this article: musicologytoday.ro/42/MT42studiesManiceanu.pdf

How to cite this article: Mihai Măniceanu, "Contribution to a Future Theory of Supra-Octave Modes. Case Study: Ștefan Niculescu's Late Works", *Musicology Today: Journal of the National University of Music Bucharest*, 11/2 (42) (2020), 119-154.

Published by: Editura Universității Naționale de Muzică București

Musicology Today: Journal of the National University of Music Bucharest is indexed by EBSCO, RILM, ERIH PLUS, and CEEOL

Mihai MĂNICEANU
National University of Music Bucharest

Contribution to a Future Theory of Supra-Octave Modes. Case Study: Ștefan Niculescu's Late Works

Keywords: Romanian contemporary music, theory of modes, musical analysis

The issue of supra-octave modes is of great interest, as topical as it dates far back in time. Supra-octave structures can be found in ancient Indian music or in Byzantine music (Hieromonk Makarios' modes). In European art music, these modal scales will only be used from the 20th century onwards, by Edgar Varèse, Iannis Xenakis, Ștefan Niculescu, Anatol Vieru (Clarinet Concerto), Aurel Stroe (*Arcade*), Wilhelm Georg Berger (see Berger 1979) and others.[1]

Although there is no doubt about the interest in the field, it hasn't yet been looked at in a comprehensive, structured way. I therefore aim to order and systematize it, with no intention of an exhaustive treatment of the subject, as the related combinatorial and expressive possibilities and compositional processes are, in fact, infinite. Any supra-octave mode can in theory be reduced to one octave-repeating, less so those that contain elements belonging to the same classes of pitches, distributed in different octaves, which in such construction would lead to an actual repetition of sounds. They share the same fundamental material but they cannot be reduced and the order of the components cannot be changed because supra-octave modes are defined by the specificity of the geometric profile.

[1] As Romanian composer Nicolae Coman showed me during a seminar, Giuseppe Verdi too intuitively used supra-octave modes in his *Ave Maria*; according to Coman, the Italian composer suggestively called them "stairs to the heavens".

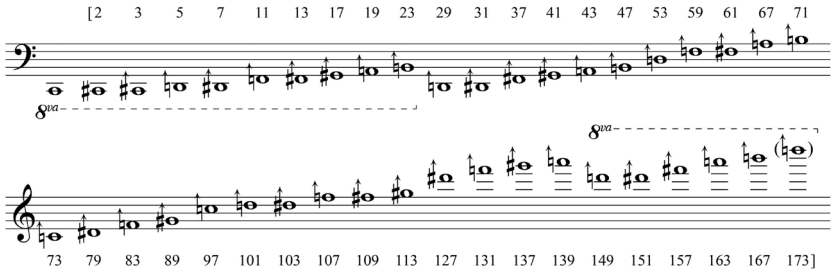
Criteria, categories

1. The habitual register accommodates supra-octave modes on two to seven octaves:
    a. di-octave scales (see Ex. 2)[2];
    b. tri-octave scales (see Ex. 7a);
    c. tetra-octave scales (see Ex. 11);
    d. penta-octave scales (see Ex. 3a);
    e. hexa-octave scales (see Ex. 6);
    f. hepta-octave scales (see Ex. 14).

Some supra-octave modes go beyond the habitual registral disposition:
    g. octa-octave scales;
    h. nona-octave scales;
    i. deca-octave scales;
    j. undeca-octave scales etc.

2. Differentiation by tuning:
    a. tempered (see Ex. 7a);
    b. microtonal (1/4 tone, 1/3 tone etc.) (see Ex. 6).

3. Another category is determined by the *finalis* (part of or outside the *incipit*'s pitch class):
    a. "octave-repeating" supra-octave scales (all examples except Ex. 1);
    b. "non-octave-repeating" supra-octave scales, the result of a construction principle, of a random construction, or of an algorithm whose evolution doesn't generate a multiple of 12, 24 etc., which would mean closing the cycle (the multiple isn't generated across the habitual 7-octave register or isn't generated at all; see Ex. 1).



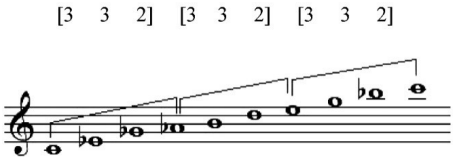
Ex. 1. *"Non-octave-repeating" supra-octave mode based on prime numbers. 1 = one quarter tone (see also point 10c).*

[2] Many categories are characterized by more than one example. For the sake of simplicity, we will generally give one example for each category.

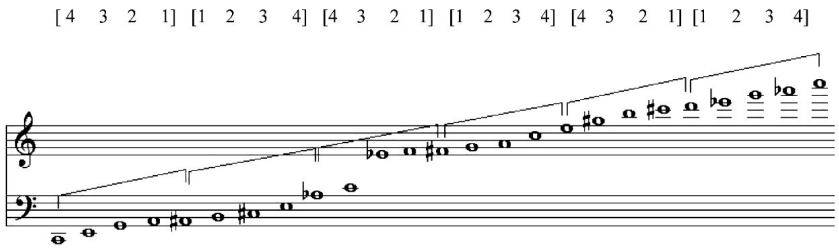
4. There are two ways of measuring the intervals between the various steps:
    a. relating each step to the initial step (see Ex. 6);
    b. relating each step to the previous step (see Ex. 7a).
5. Differentiation depending on the direction of the construction:
    a. ascending (see Ex. 8a);
    b. descending (see Ex. 7a);
    c. convergent (see Ex. 10);
    d. divergent (see Ex. 12);
    e. mixed (see Ex. 13).

In the case of ascending and descending modes – evolutive modes (10c) or resulting from the translation of a model (10a) –, their retrograde version can be considered as another modal structure. Palindromic modes are convergent (10b) and composite modes are divergent (8b).

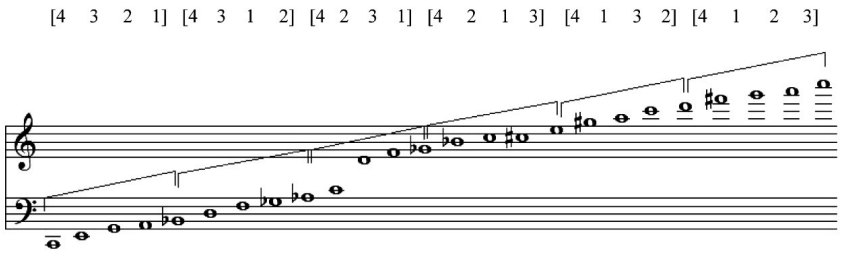
6. Depending on the density of the sound material, there are modes which:
    a. represent a partition of the total chromatic (see Ex. 2);
    b. contain the total chromatic (see Ex. 10).
7. Differentiation depending on the existence or absence of multiplied pitches, outside the pitch class of the *incipit*:
    a. repetitive (see Ex. 5);
    b. non-repetitive (see Ex. 6).
8. Differentiation depending on the presence or absence of notes in the pitch class of the *incipit* (with the exception of the *finalis*) and on the use of a single principle or of several principles of construction:
    a. homogenous (see Ex. 2);
    b. non-homogenous (see Ex. 11, 12).
9. Differentiation by number of elements (specified by the index number). The minimum index number is 2, in the case of a bichordal *incipit-finalis* mode structure. The maximum of 7 octaves is 7 x 12 + 1 in the tempered system and 7 x 24 + 1 in the quarter tones microtonal system.
10. Depending on the nature of the construction principle, there are organized and non-organized/random modes. Organized supra-octave modes can be:
    a. the result of the translation:
        - of an invariable model (see Ex. 2);
        - of a variable model (retrograde intervallic structure, combinatorial technique applied to the intervallic structure elements etc.) (see Ex. 3a, 3b).
    b. symmetrical to the axis (palindrome):
        - single-pitch axis (see Ex. 4);
        - two-pitch axis (see Ex. 5);



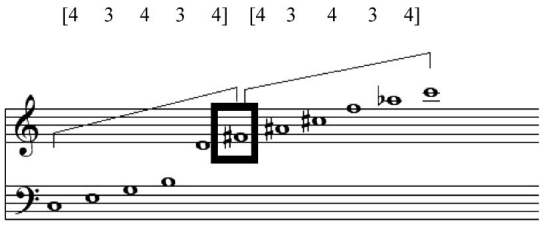
Ex. 2. *Supra-octave mode resulted from the translation of an invariable model. 1 = a semitone.*



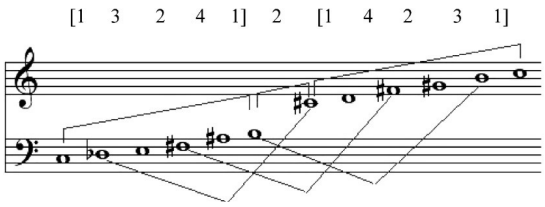
Ex. 3a. *Supra-octave mode resulted from the retrograde interval structure. 1 = one semitone.*



Ex. 3b. *Supra-octave resulted from a combinatorial technique applied to the intervallic structure elements. 1 = one semitone.*



Ex. 4. *Symmetrical supra-octave single-pitch axis mode. 1 = one semitone.*



Ex. 5. *Symmetrical supra-octave two-pitch axis mode. 1 = one semitone.*

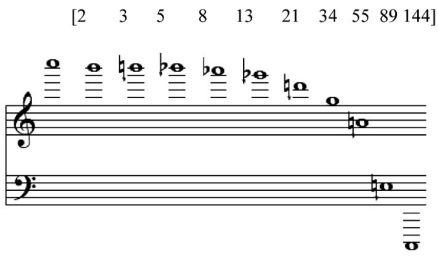
c. evolutive (based on a mathematical algorithm: Fibonacci sequence, prime numbers, arithmetic progression, geometric progression, triangular numbers, pyramidal numbers etc.). A mathematical algorithm generates an infinite sequence, but the habitual register only allows the use of partitions. Generally, the profile of algorithm-generated modes is of the pyramidal type (▲ or ▼) (see Ex. 6 – golden ratio, Ex. 7a – arithmetic progression, Ex. 1 – prime numbers sequence, Ex. 8a – triangular numbers);

d. generated through omission ("riddling") (see Ex. 9, related to Ex. 8a). By extracting the pitches (*incipit* and *finalis* excepted) of a supra-octave mode from its register another mode is obtained, a sort of "negative" of the original.

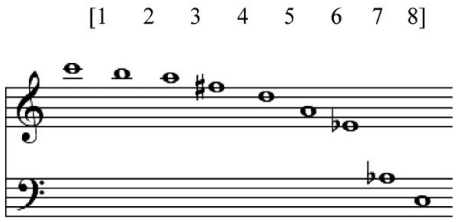
e. generated by mixing ("intertwining") (see Ex. 7b, related to Ex. 7a). By overlapping, say, the scale in the Ex. 7a with a scale resulted from the reversal of its intervallic structure, while positioning it at an ascending semitone and respecting the direction, a mixture is obtained, a different modal construction. Here, the principle generating the arithmetic progression is barely distinguishable, almost unrecognizable.

f. generated by the substitution of element in the intervallic structure with their complements within the *modulo* 12 (see Ex. 8b, related to Ex. 8a). A "negative" of the scale is thus obtained, but different from that presented at 10d, the result of a more subtle strategy, impacting not the level of the sound material as such, but unfolding at the deeper level of intervallic structure.

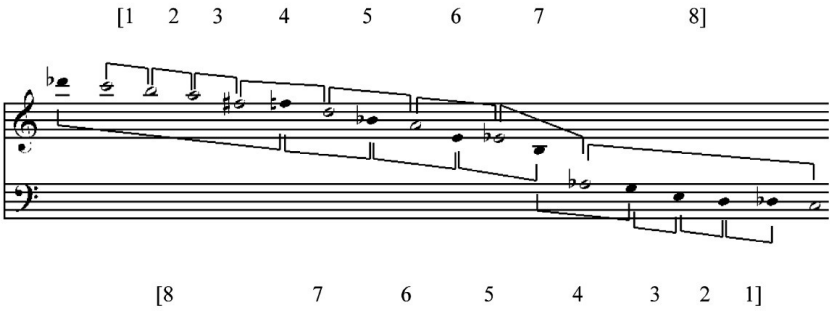
g. generated by combinations of the above (see Ex. 13).



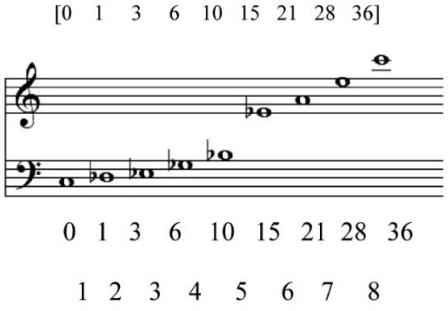
Ex. 6. *Evolutive supra-octave mode based on the golden ratio. 1 = one quarter tone.*



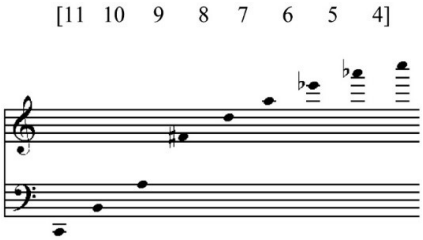
Ex. 7a. *Evolutionary supra-octave mode based on algebraic progression. 1 = one semitone.*



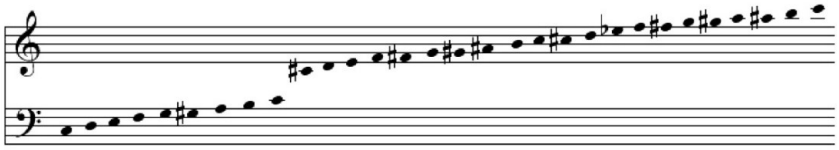
Ex. 7b. *Intertwining of an evolutive supra-octave mode based on arithmetic progression with a mode resulted from the reversal of its intervallic structure. 1 = one semitone.*



Ex. 8a. *Evolutive supra-octave mode based on triangular numbers. 1 = one semitone (the generating modal number sequence algorithm).*

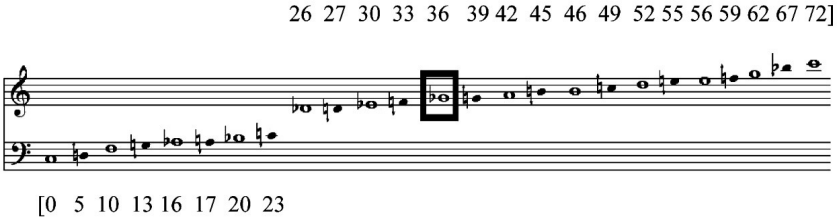


Ex. 8b. *"Negative" of the evolutive supra-octave mode in Ex. 8a, resulted from the substitution of intervallic structure elements with their complements within modulo 12.*



Ex. 9. *"Negative" of the evolutive supra-octave mode in Ex. 8a, generated by "riddling" (see 10d).*

To show the symmetrical profile of the elements of the mode in relation to the single-pitch axis – F♯ (no. 18 on the abscissa), in Ex. 4 (palindrome mode, Fig. 1) supra-octave pitches are placed on the abscissa and the corresponding octave pitches on the ordinate. An efficient way to build non-repetitive palindromic single-pitch axis supra-octave modes is to select from a graph such as that in Fig. 2 a single element from each row and its symmetrical version in the corresponding column (see Ex. 10).



Ex. 10. *Palindromic non-repetitive supra-octave single-pitch axis mode. 1 = one quarter tone.*

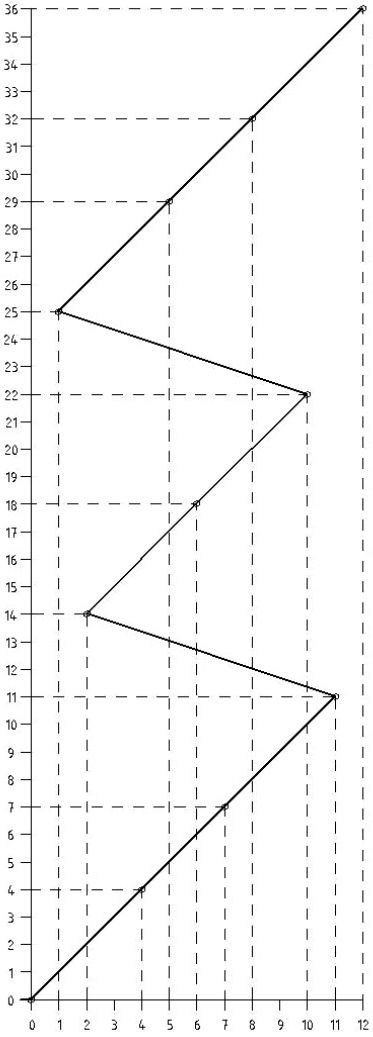


Fig. 1. *Representation of the symmetrical supra-octave single-pitch axis mode in Ex. 4.*
1 = one semitone.

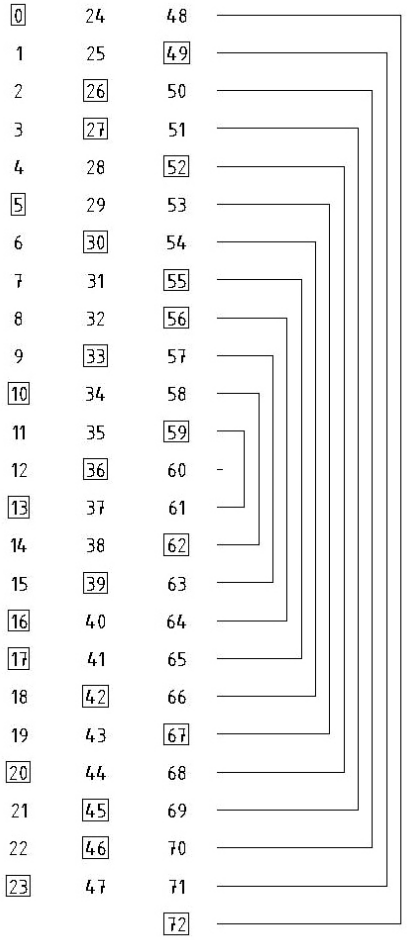


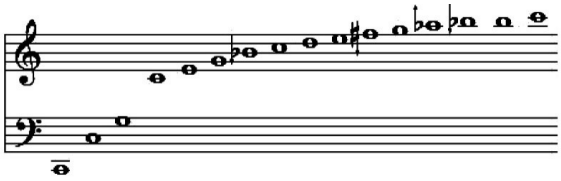
Fig. 2. *Representation of the palindromic non-repetitive supra-octave single-pitch axis mode in Ex. 10.*
1 = one quarter tone.

11. Differentiation based on the modes' genesis and on naturally occurring (golden ratio, natural resonance) or man-made principles:

a. natural aesthetics (see Ex. 6 and Ex. 11);

b. artificial (all examples except Ex. 6 and 11).

If the circle is can suggestively represent the octave cycle, the spiral, often used in the field of supra-octave modes, faithfully expresses the connection of several octave cycles, each time at a different level (see Fig. 3).



Ex. 11. *Supra-octave natural resonance-based mode.*

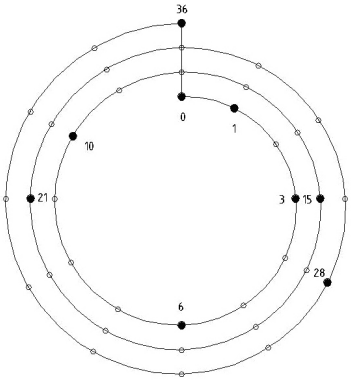
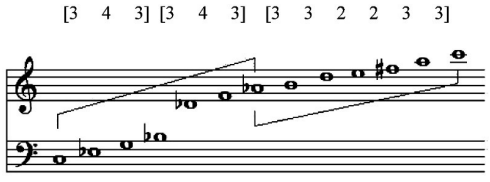
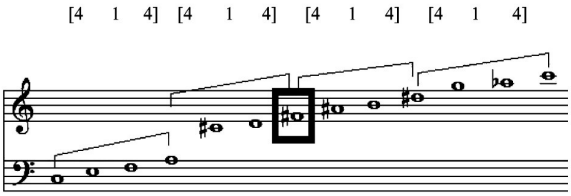


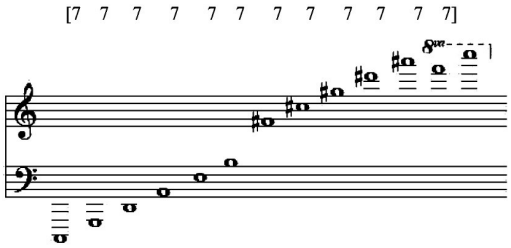
Fig. 3. *Representation of the evolutionary supra-octave mode in Ex. 8a. 1 = one semitone.*



Ex. 12. *Non-homogenous supra-octave mode. 1 = one semitone.*



Ex. 13. *Supra-octave mode generated by the translation of an invariant and symmetrical pattern to the single-pitch axis. 1 = one semitone.*



Ex. 14. *Hepta-octave mode. 1 = one semitone.*

Supra-octave structures in *Psalmus*, *Undecimum*, *Deisis* and *Litanii la plinirea vremii* [Litanies at the Fullness of the Time] by Ștefan Niculescu

Ștefan Niculescu belongs to that generation of composers (next to Myriam Marbe, Tiberiu Olah, Aurel Stroe, or Anatol Vieru) successful in correlating Romanian and West-European contemporary compositional novelties.

With a diploma both in the technical (Polytechnic Institute, 1946-50) and musical field (similar to Romanian-born Iannis Xenakis, who studied architecture and music), he found original musical solutions as radically modern as they were often rooted in mathematics: set theory, linear algebra, analytic geometry etc. Notions from other areas such as philosophy, information theory, symbolic logic or linguistics also influenced Niculescu's compositional ideas.

At the end of the 50s, he adopted integral serialism (championed by Pierre Boulez, Karlheinz Stockhausen etc.), which identified with the spirit of the European avant-garde. He would leave it, though, to go his own way and to gradually find a personal, original language whose trademark is modal-rooted heterophony.

Heterophony had been theorized and employed around the same time by Boulez too, but in a serial context. In contrast, Niculescu looked at het-

erophony in more general terms, defining it as the "alternation between a mono- and a pluri-vocal state, that is, between unison and plurimelody" (Sandu-Dediu 2002: 108). This sinusoidal movement, similar to a primordial acoustic phenomenon (the nod-antinode alternation in a standing wave) first appears in his *Ison I* (1973) as the basis of both sonic construction and formal structure.

Evolving towards an original heterophonic expression, Niculescu is on a constant path to get closer to a profoundly religious content. At the end of the 1980s, he becomes particularly interested in invocation, supplication, looking for new ways of expressing the sacred and his own faith. Another trait specific to his last period, which cannot be omitted, is the use of complex supra-octave modes, which we will next present in detail and identify in some of his late works.

The analysis of the modal aspects of each work will begin by a look at those sections whose modes are octave-repeating-based and those that are not exclusively supra-octave-based.

Psalmus

Psalmus for six male solo voices, of which the altos sing in falsetto in the higher register, was commissioned by the Huddersfield Contemporary Music Festival and is dedicated to Richard Steiniz and to the King's Singers.

The text comes from King David's Psalm 12:

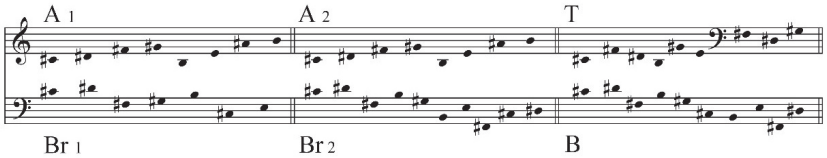
> 1. Usquequo, Domine, oblivisceris me in finem? Usquequo avertis faciem tuam a me?
> 2. Quamdiu ponam consilia in anima mea dolorem in corde meo per diem?
> 3. Usquequo exaltabitur inimicus meus super me?
> 4. Ego aurem in misericordia tua speravi. Respice, et exaudi me, Domine Deus meus.

Says Niculescu:

> These four fragments correspond to the four sections of the work. Heterophony combines with monody and homophony, and non-octave-repeating scales alternate with diatonic and micro-tonal moments. A continuation of my interests as shown in earlier works (*Invocatio* for 12 choral voices and *Axion* [Axion estin] for female choir and saxophone), *Psalmus* is an invocation, a supplication, a prayer in an imaginary ceremony. (Manolache 2002: 167)

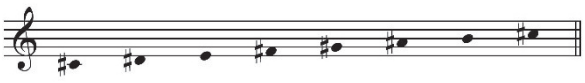
Sections 1, 2 and 4 employ supra-octave modes and section 3, a diatonic octave-repeating mode.

Section C (m. 65-116)
The analysis only takes into account the main notes of the intonationally and rhythmically controlled vibrato. Non-tempered sounds in ornaments are excluded. Pitches are given in the order in which they appear in each voice. Repetitions are excluded (see Ex. 15).



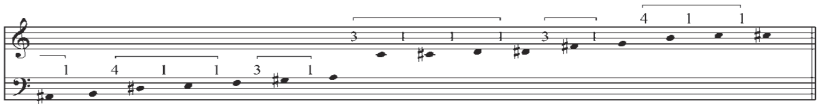
Ex. 15. *Temperate pitches used in section C of* Psalmus.

The section starts with C♯ and the final cadence is on the C♯-G♯ (tonic-dominant) fifth. As such, this is a Dorian mode on C♯ (see Ex. 16).



Ex. 16. *Octave-repeating mode used in section C of* Psalmus.

Section A (m. 1-37)
For the sake of simplicity, accidentals are only given as raising, even if the score employs contextual enharmonic representation (see Ex. 17).



Ex. 17. *Supra-octave mode used in section A of* Psalmus.

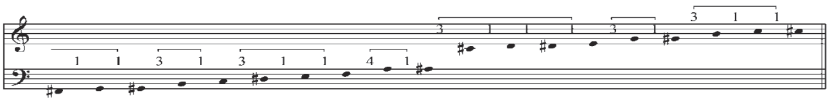
There is a repeatable model consisting of four modules: 411; 31; 3111; 31. We can thus infer that the sound material is part of a supra-octave mode generated by the translation of a model. Given the model's rotational capacity, we will start with the module containing the most elements/semitones (3111; 31; 411; 31) and we will group the modules into two segments (a = 3111; 31

and b = 411; 31). The segments have a minor seventh range and the model has a minor thirteenth range (see Fig. 4).

	a		*b*	
elements	3111	31	411	31
modules	6	4	6	4
segments	10		10	
model	20			

Fig. 4. *Structure of the supra-octave mode used in section A of* Psalmus.

Section B (m. 31-64)



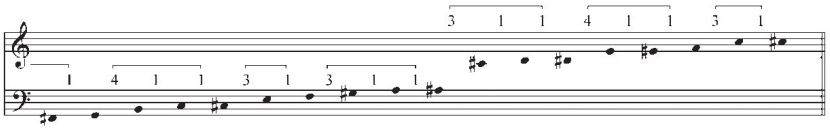
Ex. 18. *Supra-octave mode used in section B of* Psalmus.

Below, the model starts with one of the previous segments (*a* or *b*). The new segment will be identified by another letter (Fig. 5).

	a		*c*	
elements	3111	31	311	41
modules	6	4	5	5
segments	10		10	
model	20			

Fig. 5. *Structure of the supra-octave mode used in section B of* Psalmus.

Section D (m. 117-178)



Ex. 19. *Supra-octave mode used in section D of* Psalmus.

	b		*d*	
elements	411	31	311	311
modules	6	4	5	5
segments	10		10	
model	20			

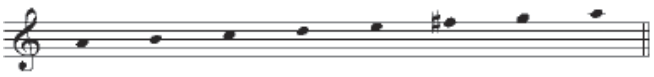
Fig. 6. *Structure of the supra-octave mode used in section D of* Psalmus.

Undecimum

Undecimum for 11 instruments – flute/piccolo, oboe/cor anglais, clarinet, bassoon/contrabassoon, horn, trumpet, trombone, two violins, viola and cello – is dedicated to Peter Oswald and to the Klangforum Wien. It has seven dimensionally variable sections.

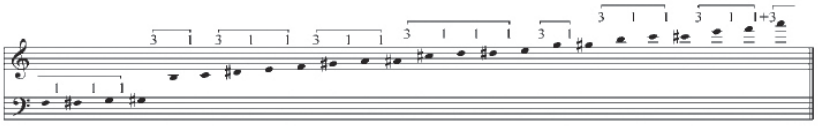
Section F (m. 169-226)

This mode is similar to that in section C (m. 56-85) of *Psalmus*: the initial sound *a*, *a-e* (dominant-tonic) fifth cadence, Dorian mode on *a* (see Ex. 20).



Ex. 20. *Octave-repeating mode used in section F of* Undecimum.

Section A (m. 1-38)

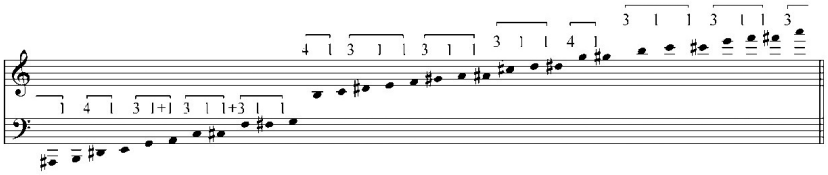


Ex. 21. *Supra-octave mode used in section A of* Undecimum.

	a		*d*	
elements	3111	31	311	311
modules	6	4	5	5
segments	10		10	
model	20			

Fig. 7. *Structure of the supra-octave mode used in section A of* Undecimum.

Section B (m. 39-57)

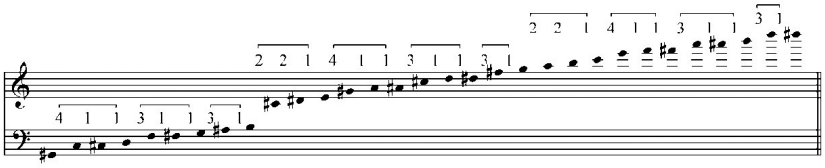


Ex. 22. *Supra-octave mode used in section B of* Undecimum.

	c		*d*	
elements	311	41	311	311
modules	6	4	5	5
segments	10		10	
model	20			

Fig. 8. *Structure of the supra-octave mode used in section B of* Undecimum.

Section C (m. 56-85)



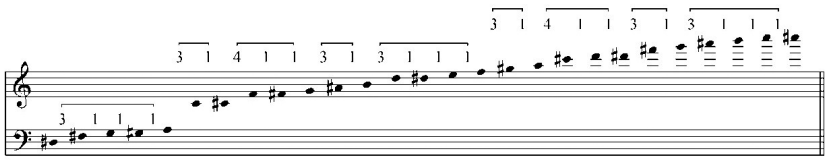
Ex. 23. *Supra-octave mode used in section C of* Undecimum.

	e		*f*	
elements	411	311	31	221
modules	6	5	4	5
segments	11		9	
model	20			

Fig. 9. *Structure of the supra-octave mode used in section C of* Undecimum.

This is the only model that cannot have equal segments in any of the variants generated by the modules' rotation.

Subsection d_1 (m. 85-102)

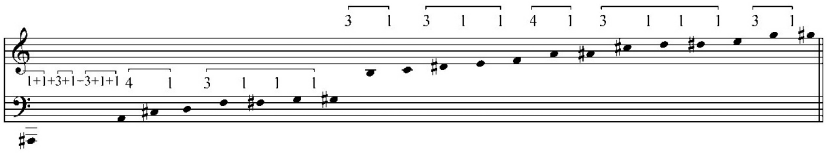


Ex. 24. *Supra-octave mode used in subsection d_1 of* Undecimum.

	a		*b*	
elements	3111	31	411	31
modules	6	4	6	4
segments	10		10	
model	20			

Fig. 10. *Structure of the supra-octave mode used in subsection d_1 of* Undecimum.

Subsection d_2 (m. 102-113)

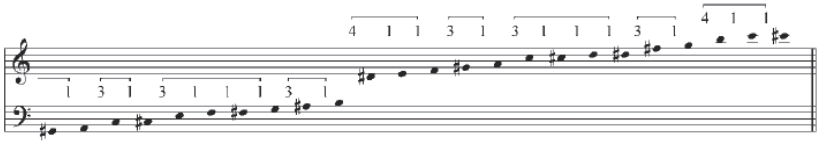


Ex. 25. *Supra-octave mode used in subsection d_2 of* Undecimum.

	a		*c*	
elements	3111	31	311	41
modules	6	4	5	5
segments	10		10	
model	20			

Fig. 11. *Structure of the supra-octave mode used in subsection d_2 of* Undecimum.

Subsection d_3 (m. 113-117)

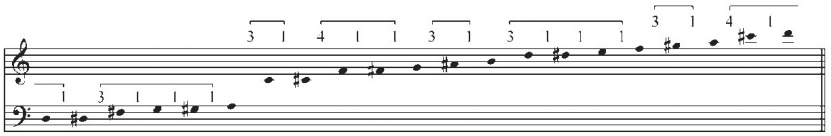


Ex. 26. *Supra-octave mode used in subsection d_3 of* Undecimum.

	a		*b*	
elements	3111	31	411	31
modules	6	4	6	4
segments	10		10	
model	20			

Fig. 12. *Structure of the supra-octave mode used in subsection d_3 of* Undecimum.

Subsection d_3 bis (m. 117-120)

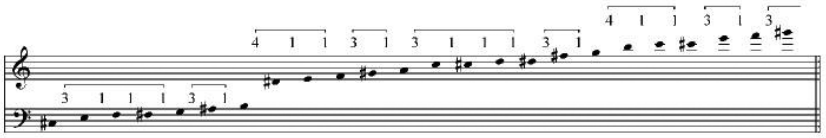


Ex. 27. *Supra-octave mode used in subsection d_3 bis of* Undecimum.

	a		*b*	
elements	3111	31	411	31
modules	6	4	6	4
segments	10		10	
model	20			

Fig. 13. *Structure of the supra-octave mode used in subsection d_3 bis of* Undecimum.

Subsection d_4 (m. 120-134)

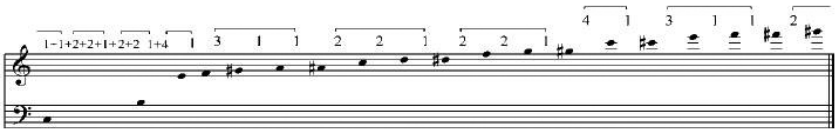


Ex. 28. *Supra-octave mode used in subsection d_4 of* Undecimum.

	a		*b*	
elements	3111	31	411	31
modules	6	4	6	4
segments	10		10	
model	20			

Fig. 14. *Structure of the supra-octave mode used in subsection d_4 of* Undecimum.

Subsection d_5 (m. 135-141)

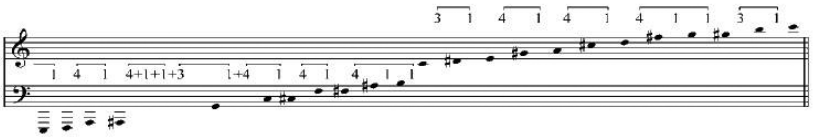


Ex. 29. *Supra-octave mode used in subsection d_5 of* Undecimum.

	g		*h*	
elements	41	311	221	221
modules	5	5	5	5
segments	10		10	
model	20			

Fig. 15. *Structure of the supra-octave mode used in subsection d_5 of* Undecimum.

Subsection e_1 (m. 141-152)

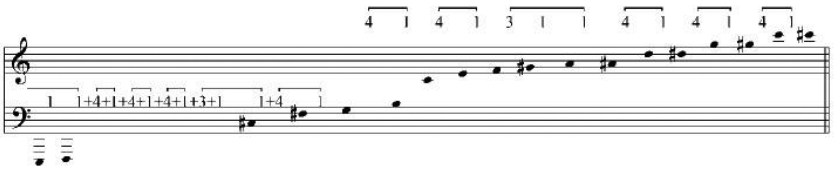


Ex. 30. *Supra-octave mode used in subsection e_1 of* Undecimum.

	b		*i*	
elements	411	31	41	41
modules	6	4	5	5
segments	10		10	
model	20			

Fig. 16. *Structure of the supra-octave mode used in subsection e_1 of* Undecimum.

Subsection e_2 (m. 152-158)

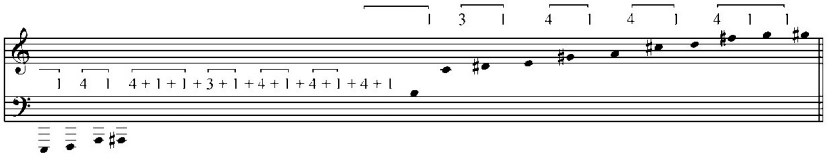


Ex. 31. *Supra-octave mode used in subsection e_2 of* Undecimum.

	g		*i*	
elements	41	311	41	41
modules	5	5	5	5
segments	10		10	
model	20			

Fig. 17. *Structure of the supra-octave mode used in subsection e_2 of* Undecimum.

Subsection e_3 (m. 159-162)

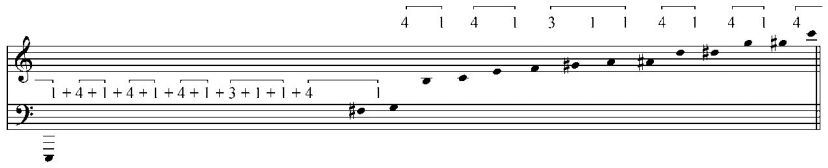


Ex. 32. *Supra-octave mode used in subsection e_3 of* Undecimum.

	b		*i*	
elements	411	31	41	41
modules	6	4	5	5
segments	10		10	
model	20			

Fig. 18. *Structure of the supra-octave mode used in subsection e_3 of* Undecimum.

Subsection e_4 (m. 162-168)



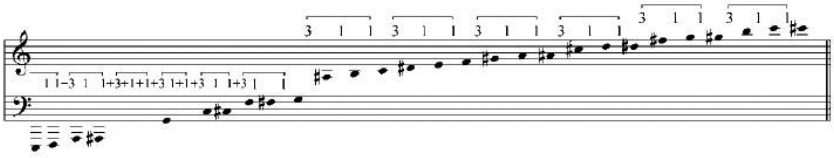
Ex. 33. *Supra-octave mode used in subsection e_4 of* Undecimum.

	g		*i*	
elements	41	311	41	41
modules	5	5	5	5
segments	10		10	
model	20			

Fig. 19. *Structure of the supra-octave mode used in subsection e_4 of* Undecimum.

The conjugation of modes used in subsections e_1, e_2, e_3 and e_4 is another supra-octave mode, again the translation of a model (see the example below for the entire section E).

Section E (m. 141-168)

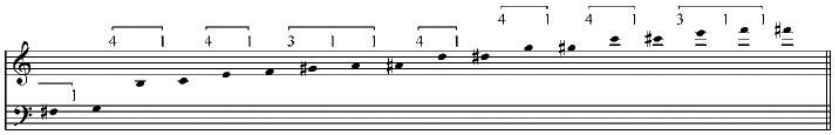


Ex. 34. *Supra-octave mode used in section E of* Undecimum.

	d		*d*	
elements	311	311	311	311
modules	5	5	5	5
segments	10		10	
model	20			

Fig. 20. *Structure of the supra-octave mode used in section E of* Undecimum.

Section G (m. 221-229)



Ex. 35. *Supra-octave mode used in section G of* Undecimum.

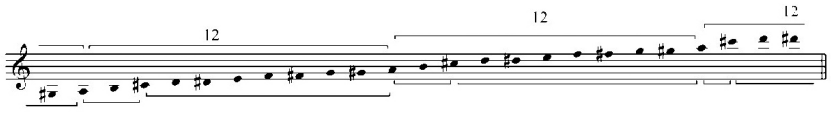
	c		*i*	
elements	311	41	41	41
modules	5	5	5	5
segments	10		10	
model	20			

Fig. 21. *Structure of the supra-octave mode used in section G of* Undecimum.

Deisis

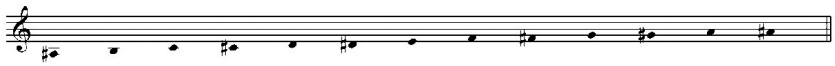
There are two versions of Symphony No. 4, *Deisis* (*Rugăciune* [Prayer]), different only in sonic amplitude, one for 21 soloists and one for orchestra. It has eight sections, of which A, B, C and D are built on a supra-octave scale and E, on two supra-octave scales while F superposes and swaps between several types of scales, G is based on an octave-repeating scale, and H brings back the supra-octave writing.

Section G (m. 208-234) employs an octave-repeating mode composed of a diatonic segment with the range of a major third and a chromatic segment with the range of a minor sixth (see Ex. 36).

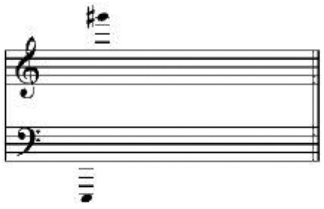


Ex. 36. *Octave mode used in section G of* Deisis.

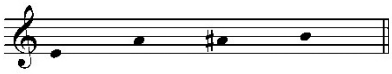
Subsection f_1 (m. 194-201) blends four modes: a total chromatic mode (see Ex. 37a), a bichord structure mode (see Ex. 37b) whose sounds (five octaves and a major third apart) are one in the lower and one extreme high register, a 4-sound infra-octave mode (see Ex. 37c) and another supra-octave, natural resonance-based mode (see Ex. 37d).



Ex. 37a. *Mode comprising the chromatic whole used in subsection f_1 of* Deisis.



Ex. 37b. *2-pitch mode used in subsection f_1 of* Deisis.

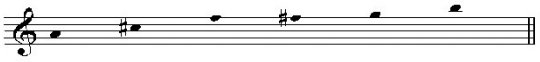


Ex. 37c. *Infra-octave mode used in subsection f_1 of* Deisis.

Ex. 37d. *Supra-octave mode used in subsection f_1 of* Deisis.

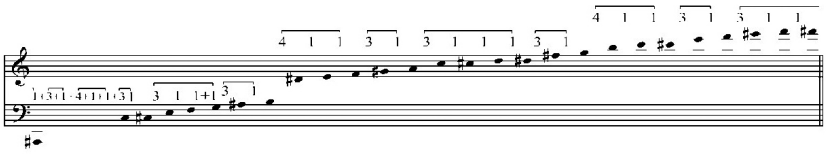
Subsection f_2 (m. 202-207) retains only the low sound of the bichord structure, on which another 4-sound infra-octave mode (see Ex. 38a) and another "natural" mode (see Ex. 38b) are placed. The latter contains an exception, an "error" – a diatonic sound alien to the natural resonance (F♯).[3]

Ex. 38a. *Infra-octave mode used in subsection f_2 of* Deisis.



Ex. 38b. *Supra-octave "natural" mode used in subsection f_2 of* Deisis.

Section A (m. 1-65)



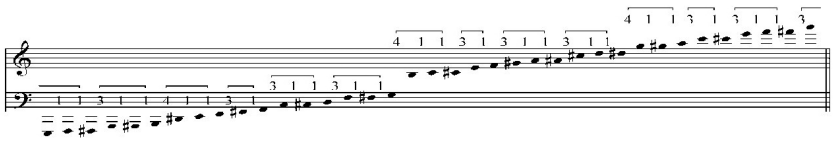
Ex. 39. *Supra-octave mode used in section A of* Deisis.

[3] Actually, both F and F♯ are alien, as the sixth of the natural resonance is neither major, nor minor, but in between.

	a		*b*	
elements	3111	31	411	31
modules	6	4	6	4
segments	10		10	
model	20			

Fig. 22. *Structure of the supra-octave mode used in section A of* Deisis.

Section B (m. 66-100)

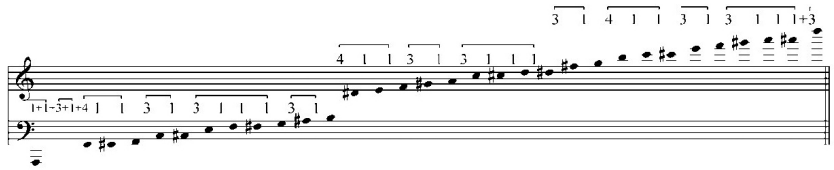


Ex. 40. *Supra-octave mode used in section B of* Deisis.

	b		*d*	
elements	411	31	311	311
modules	6	4	5	5
segments	10		10	
model	20			

Fig. 23. *Structure of the supra-octave mode used in section B of* Deisis.

Section C (m. 101-129)

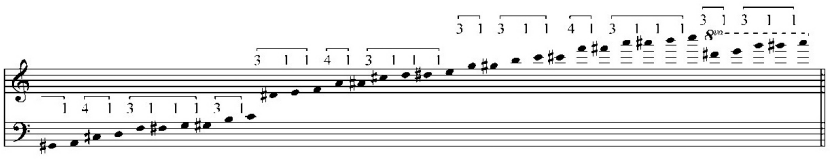


Ex. 41. *Supra-octave mode used in section C of* Deisis.

	a		*b*	
elements	3111	31	411	31
modules	6	4	6	4
segments	10		10	
model	20			

Fig. 24. *Structure of the supra-octave mode used in section C of* Deisis.

Section D (m. 130-167)

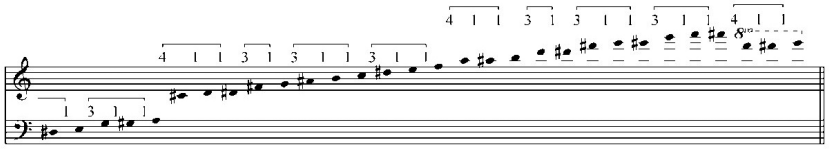


Ex. 42. *Supra-octave mode used in section D of* Deisis.

	a		*c*	
elements	3111	31	311	41
modules	6	4	5	5
segments	10		10	
model	20			

Fig. 25. *Structure of the supra-octave mode used in section D of* Deisis.

Section E (m. 168-193)

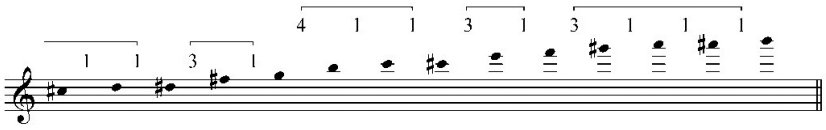


Ex. 43. *Supra-octave mode used in section E of* Deisis.

	b		*d*	
elements	411	31	311	311
modules	6	4	5	5
segments	10		10	
model	20			

Fig. 26. *Structure of the supra-octave mode used in section E of* Deisis.

Subsection e_6 – transition (m. 188-193)

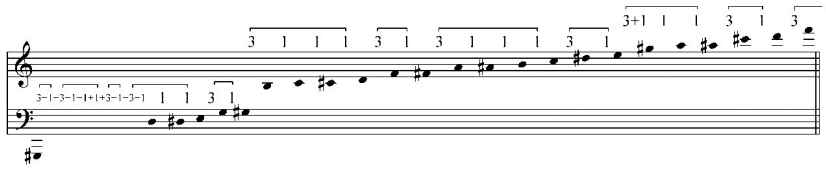


Ex. 44. *Supra-octave mode used in subsection e_6 – transition of* Deisis.

	a		*b*	
elements	3111	31	411	31
modules	6	4	6	4
segments	10		10	
model	20			

Fig. 27. *Structure of the supra-octave mode used in subsection e_6 – transition of* Deisis.

Section H (m. 234-321)



Ex. 45. *Supra-octave mode used in section H of* Deisis.

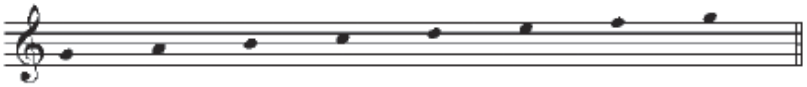
	a		*a*	
elements	3111	31	3111	31
modules	6	4	6	4
segments	10		10	
model	20			

Fig. 28. *Structure of the supra-octave mode used in section H of* Deisis.

***Litanii la plinirea vremii* [Litanies at the Fullness of the Time]**

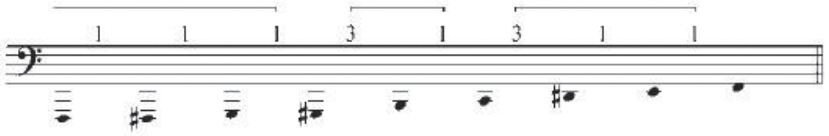
Like its two predecessors, Symphony No. 5 *Litanii la plinirea vremii* is in one movement. The invocations to the powers of heaven (the litanies) are embodied by a massive percussion-less orchestral apparatus, the number of the instruments in each section equal to 4 or a multiple of 4 (tuba excepted): 4 flutes, 4 oboes, 4 clarinets, 4 bassoons, 4 trumpets, 4 horns, 4 trombones, tuba, 15 first violins, 16 second violins, 12 violas, 12 cellos, 8 double-basses. The number 4-based genesis is also noticeable form-wise, as the work is in eight sections, reminiscent of the symbol of the cross. Sections A, B, C, D, F, G are founded on supra-octave modes, E, on an octave-repeating mode, and H is a modal mixture.

Section E (m. 76-128) is the correspondent of sections C in *Psalmus* and F in *Undecimum*. The Dorian mode is replaced by a Mixolydian mode on G (see Ex. 46).

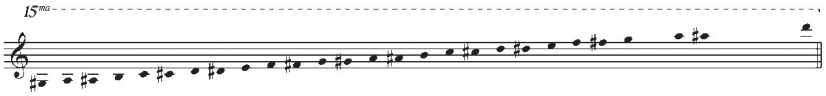


Ex. 46. *Octave mode used in section E of* Litanii la plinirea vremii.

Subsection h_1 (m. 203-215) is the superimposition of two modes: a chromatic octave-repeating mode (a possible segment of a supra-octave mode; see Ex. 47a) and one that comprises the total chromatic (see Ex. 47b).

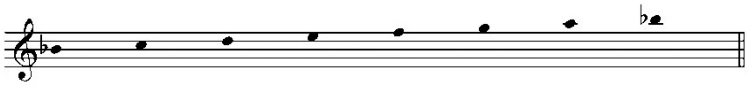


Ex. 47a. *Chromatic octave-repeating mode used in subsection h_1 of* Litanii la plinirea vremii.

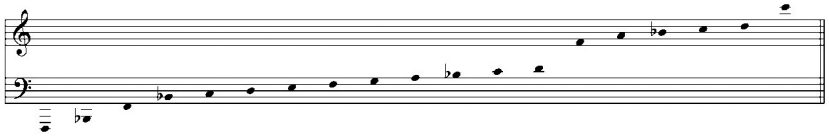


Ex. 47b. *Mode comprising the total chromatic, used in subsection h_1 of* Litanii la plinirea vremii.

The total chromatic mode persists throughout **subsection h_2** (m. 216-224), joined by a diatonic (Lydian) octave-repeating mode on B♭ (see Ex. 48a).



Ex. 48a. *Diatonic octave-repeating mode used in subsection h_2 of* Litanii la plinirea vremii.

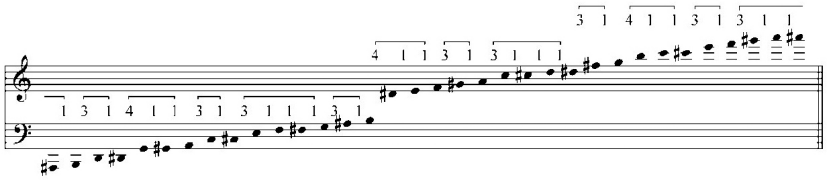


Ex. 48b. *All pitches of the diatonic octave-repeating mode used in subsection h_2 of* Litanii la plinirea vremii.

The example above (see Ex. 48b) presents all pitches used by the diatonic mode. The last orchestral bloc is composed of a chord-mode with the dominant in the bass voice (on the double-basses).

Subsection h_3 (m. 225-233) continues the total chromatic-based discourse adding a prolonged pedal (subsection h_2) on the C in the third octave.

Section A (m. 1-19)

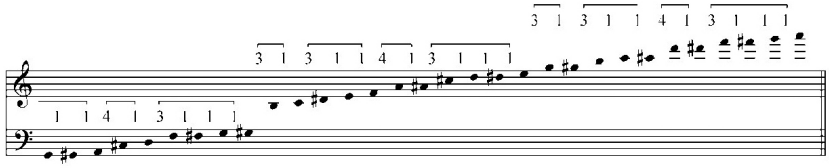


Ex. 49. *Supra-octave mode used in section A of* Litanii la plinirea vremii.

	a		*b*	
elements	3111	31	411	31
modules	6	4	6	4
segments	10		10	
model	20			

Fig. 29. *Structure of the supra-octave mode used in section A of* Litanii la plinirea vremii.

Section B (m. 20-31)

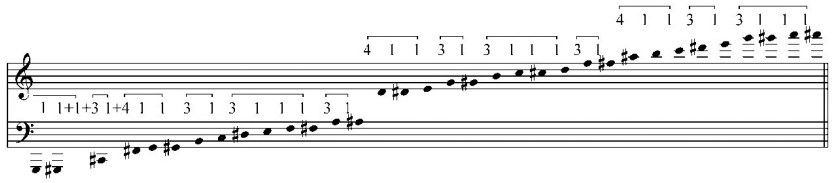


Ex. 50. *Supra-octave mode used in section B of* Litanii la plinirea vremii.

	a		*c*	
elements	3111	31	311	41
modules	6	4	5	5
segments	10		10	
model	20			

Fig. 30. *Structure of the supra-octave mode used in section B of* Litanii la plinirea vremii.

Section C (m. 32-55)

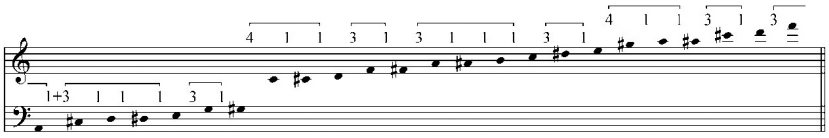


Ex. 51. *Supra-octave mode used in section C of* Litanii la plinirea vremii.

	a		*b*	
elements	3111	31	411	31
modules	6	4	6	4
segments	10		10	
model	20			

Fig. 31. *Structure of the supra-octave mode used in section C of* Litanii la plinirea vremii.

Section D (m. 55-75)

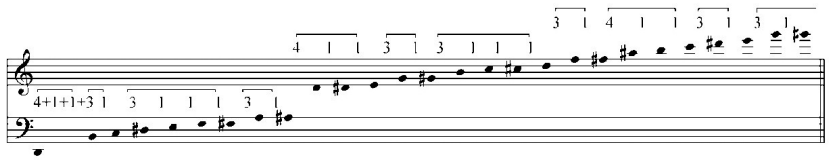


Ex. 52. *Supra-octave mode used in Section D of* Litanii la plinirea vremii.

	a		*b*	
elements	3111	31	411	31
modules	6	4	6	4
segments	10		10	
model	20			

Fig. 32. *Structure of the supra-octave mode used in section D of* Litanii la plinirea vremii.

Subsections f_1 + $f_{2.1}$ (m. 129-142, third beat)

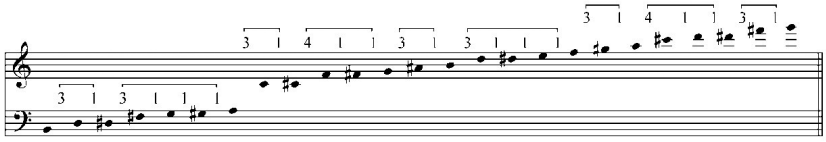


Ex. 53. *Supra-octave mode used in subsections f_1 + $f_{2.1}$ of* Litanii la plinirea vremii.

	a		*b*	
elements	3111	31	411	31
modules	6	4	6	4
segments	10		10	
model	20			

Fig. 33. *Structure of the supra-octave mode used in subsections f_1 + $f_{2.1}$ of* Litanii la plinirea vremii.

Subsection $f_{2.2}$ (m. 142, fourth beat-146)

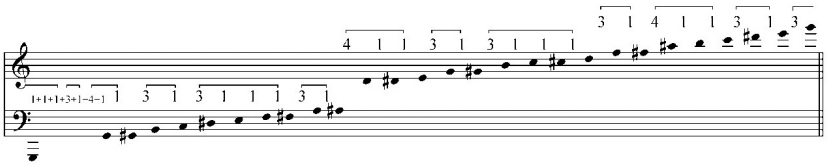


Ex. 54. *Supra-octave mode used in subsection $f_{2.2}$ of* Litanii la plinirea vremii.

	a		*b*	
elements	3111	31	411	31
modules	6	4	6	4
segments	10		10	
model	20			

Fig. 34. *Structure of the supra-octave mode used in subsection $f_{2.2}$ of* Litanii la plinirea vremii.

Subsection $f_{3.1}$ (m. 146-150, second beat)

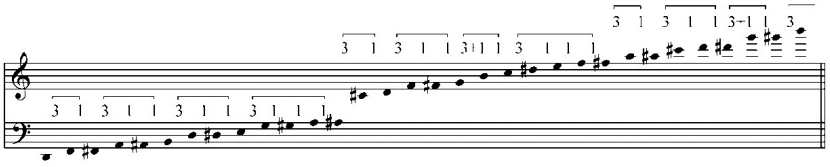


Ex. 55. *Supra-octave mode used in subsection $f_{3.1}$ of* Litanii la plinirea vremii.

	a		*b*	
elements	3111	31	411	31
modules	6	4	6	4
segments	10		10	
model	20			

Fig. 35. *Structure of the supra-octave mode used in subsection $f_{3.1}$ of* Litanii la plinirea vremii.

Subsection $f_{3.2}$ (150, third beat-158)

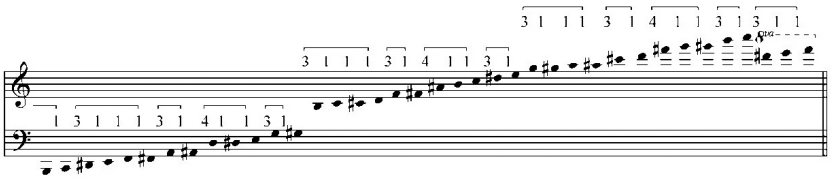


Ex. 56. *Supra-octave mode used in subsection $f_{3.2}$ of* Litanii la plinirea vremii.

	a		*d*	
elements	3111	31	311	311
modules	6	4	5	5
segments	10		10	
model	20			

Fig. 36. *Structure of the supra-octave mode used in subsection $f_{3.2}$ of* Litanii la plinirea vremii.

Section G (m. 158-203)



Ex. 57. *Supra-octave mode used in section G of* Litanii la plinirea vremii.

	a		*b*	
elements	3111	31	411	31
modules	6	4	6	4
segments	10		10	
model	20			

Fig. 37. *Structure of the supra-octave mode used in section G of* Litanii la plinirea vremii.

Conclusions

In the case of supra-octave modes generated by the translation of a model, all models have the same content of semitones – 20. To calculate after how many 12-semitone octaves the modal cycle will close (i.e., after how many translations the *finalis* of a translatable model will belong to the pitch class of the generating model's *incipit*), we will look for the least common multiple of 12 and 20; the result, 60, is the number of semitones equivalent to 5 octaves.

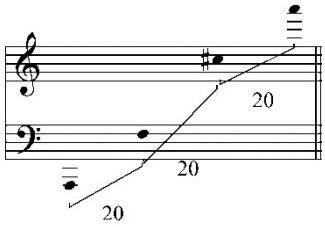


Fig. 38. *Nodal points of the models.*

All modal structures can become a constituent section of four supra-octave modes variants due to the models' rotational capacity. Preferred intervals of intervallic structures are the minor third, the major third and the minor second, the major second being less frequently used.

According to the classification criteria stated in the first chapter, these modes are penta-octave, tempered, "octave" supra-octave, generated by relating each step to the previous step and by the translation of a model, containing the total chromatic, repetitive, homogenous, and artificial.

Here are the models used in the four works in the order of appearance.

Psalmus

A	(*a*, *b*)	3111; 31; 411; 31
B	(*a*, *c*)	3111; 31; 311; 41
D	(*b*, *d*)	411; 31; 311; 311

Undecimum

A	(*a*, *d*)	3111; 31; 311; 311
B	(*c*, *d*)	311; 41; 311; 311
C	(*e*, *f*)	411; 311; 31; 221
d_1	(*a*, *b*)	3111; 31; 411; 31
d_2	(*a*, *c*)	3111; 31; 311; 41
d_3	(*a*, *b*)	3111; 31; 411; 31
d_3 bis	(*a*, *b*)	3111; 31; 411; 31
d_4	(*a*, *b*)	3111; 31; 411; 31
d_5	(*g*, *h*)	41; 311; 221; 221
e_1	(*b*, *i*)	411; 31; 41; 41
e_2	(*g*, *i*)	41; 311; 41; 41
e_3	(*b*, *i*)	411; 31; 41; 41
e_4	(*g*, *i*)	41; 311; 41; 41
E	(*d*, *d*)	311; 311; 311; 311
G	(*c*, *i*)	311; 41; 41; 41

Deisis

A	(*a*, *b*)	3111; 31; 411; 31
B	(*b*, *d*)	411; 31; 311; 311
C	(*a*, *b*)	3111; 31; 411; 31
D	(*a*, *c*)	3111; 31; 311; 41
E	(*b*, *d*)	411; 31; 311; 311
e_6 – trans.	(*a*, *b*)	3111; 31; 411; 31
H	(*a*, *a*)	3111; 31; 3111; 31

Litanii la plinirea vremii

A	(*a*, *b*)	3111; 31; 411; 31
B	(*a*, *c*)	3111; 31; 311; 41
C	(*a*, *b*)	3111; 31; 411; 31
D	(*a*, *b*)	3111; 31; 411; 31
f_1 + $f_{2.1}$ onto bar 142, third beat	(*a*, *b*)	3111; 31; 411; 31
$f_{2.2}$ from bar 142, fourth beat	(*a*, *b*)	3111; 31; 411; 31
$f_{3.1}$ onto bar 150, second beat	(*a*, *b*)	3111; 31; 411; 31
$f_{3.2}$ from bar 150, third beat	(*a*, *d*)	3111; 31; 311; 311
G	(*a*, *b*)	3111; 31; 411; 31

There are rather few segments:

a – 3111; 31
b – 411; 31
c – 311; 41
d – 311; 311
e – 411; 311
f – 31; 221
g – 41; 311
h – 221; 221
i – 41; 41

Modules are even less numerous. With the exception of module 221, all intervallic combinations between the minor second and the minor and major third are exhausted, so that the result is equal to 4, 5 or 6 semitones: 31, 311, 41, 3111, 411.

Many sections use the same modal organization, that is, the same modes in various transpositions:

- *a, b*: section A of *Psalmus*, subsections d_1, d_3, d_3 bis, d_4 of *Undecimum*, sections A and C and transition from subsection e_6 of *Deisis*, sections A, C, D and G and subsections f_1, f_2 and $f_{3.1}$ of *Litanii la plinirea vremii*;

- *a, c*: section B of *Psalmus*, subsection d_2 of *Undecimum*, section D of *Deisis* and section B of *Litanii la plinirea vremii*;

- *a, d*: section A of *Undecimum* and subsection $f_{3.2}$ of *Litanii la plinirea vremii*;

- *b, d*: section D of *Psalmus* and sections B and E of *Deisis*;

- *b, i*: subsections e_1 and e_3 of *Undecimum*;

- *g, i*: subsections e_2 and e_4 of *Undecimum*.

Sections E of *Undecimum* and H of *Deisis* use single-segment models – *d, d* and, respectively, *a, a*. Models *c, d*; *e, f*; *g, h*; *c, i*; *a, a* and *d, d* only occur once.

Psalms and *Litanii la plinirea vremii* show a very economical modal writing, each using only three models: *a, b*; *a, c*; *b, d* and, respectively, *a, b*; *a, c*; *a, d*.

Some treatises, for example Anatol Vieru's *Book of Modes*, consider that 3-, 4- or 5-pitch structures are implicitly restricted within the limits of an octave (see Vieru 1980). For example, C-D♭-E-F♯ (all in the same octave), interval-wise given as 1, 3, 2, would automatically require the addition of the interval necessary for closing the structure within an octave (resulting in C-D♭-E-F♯-C, given as 1, 3, 2, 6). As such, the modal framework can only be divided into two categories: octave-repeating and supra-octave.

In view of the above, I however believe that a structure of this type can exist independently, with context and specificity of the compositional approach decisive. Consequently, I propose another, more nuanced delimitation: infra-octave, octave-repeating, supra-octave.

English version by Marius Sireteanu and Maria Monica Bojin

References

Berger, Wilhelm Georg
1979 *Dimensiuni modale* [Modal Dimensions] (Bucharest: Editura Muzicală).

Sandu-Dediu, Valentina
2002 *Muzica românească între 1944-2000* [Romanian Music between 1944 and 2000] (Bucharest: Editura Muzicală).

Manolache, Laura
2002 *Șase portrete de compozitori români* [Six Portraits of Romanian Composers] (Bucharest: Editura Muzicală).

Vieru, Anatol
1980 *The Book of Modes* (Bucharest: Editura Muzicală).