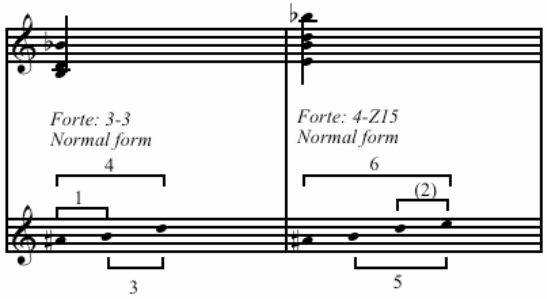
Tetrahedron for orchestra

(2006 / 2007)

Bram Van Camp

HARMONIC STRUCTURE

Basic set



Intervals:
1 / 11
3 / 9
4 / 8

Interval vector
1001100

Extended with one note

Extra intervals:
(2 / 10)
5 / 7
6 / 6

Interval vector
111111

Combinations of the set, resulting into chords with symmetrical interval structures

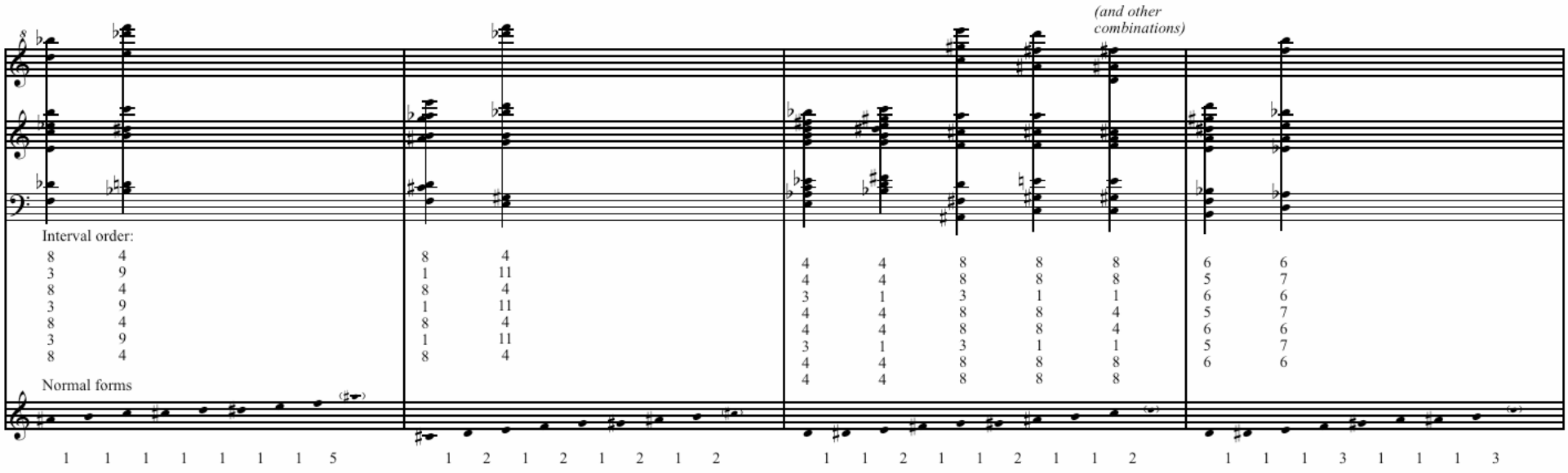
The result is a **'consonant'** sound, thanks to

-the intervallic symmetry (see 'interval order' listed below)

-the wide tessitura

-the use of 'tonal' intervals:
3 / 9 as minor third / major sixth
4 / 8 as major third / minor sixth
5 / 7 as perfect 4th and 5th

but used in an other context: symmetrically constructed thanks to
the 'atonal' interval 1 / 11 (minor 2nd / major 7th)
the 'neutral' interval 6 (triton)



Forte: 8-1

M1

Messiaen mode 2 (octatonic)
M2

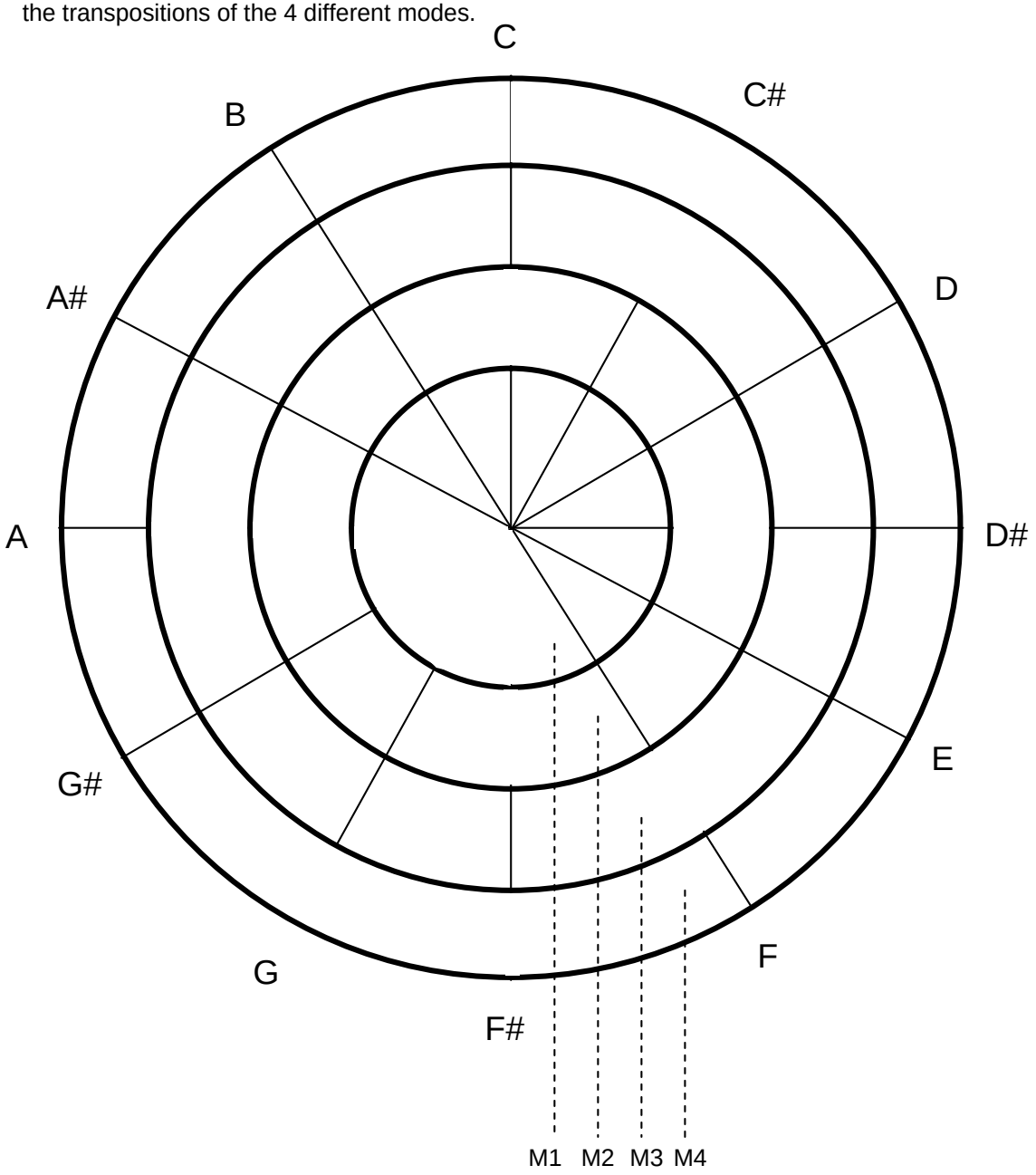
Messiaen mode 3

M3

Messiaen mode 4

M4

Chromatic tone clock with 4 (transpositionally variable) modes.
Each mode (M1, M2, M3, M4) can be rotated. This is essential to find out which common sets (and which transpositions of them) are hold under the transpositions of the 4 different modes.



Transpositions of the modes (M)

M1	12 transpositions
M2	3 transpositions
M3	4 transpositions
M4	6 transpositions

Possible common subsets (M1-M2-M3-M4)

4-12
4-12 I

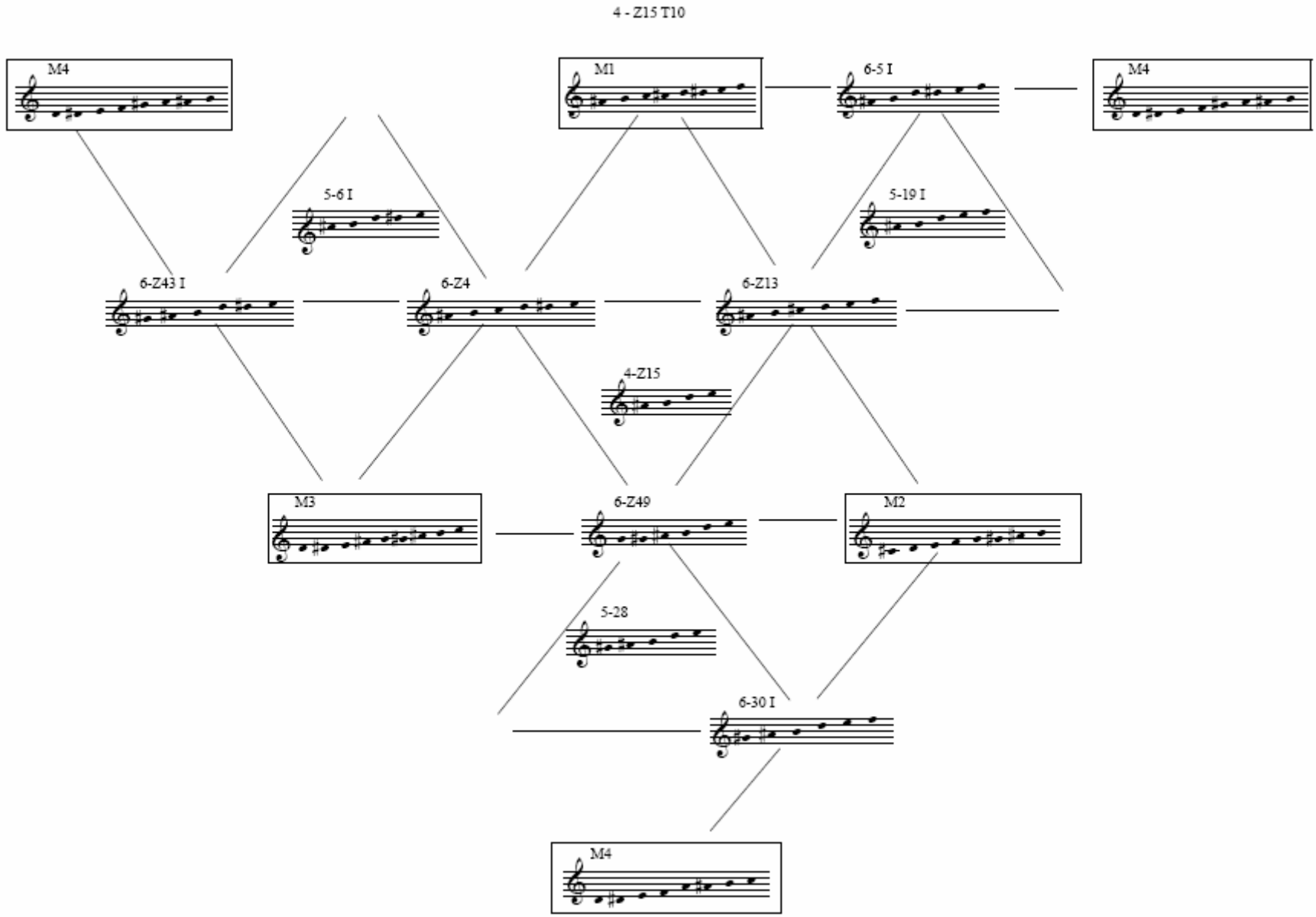
4-18
4-18 I

4-Z15
4-Z15 I

4-Z29
4-Z29 I

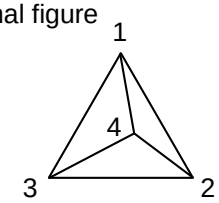
Other common subsets for 4-Z15 as common subset of 4 modes

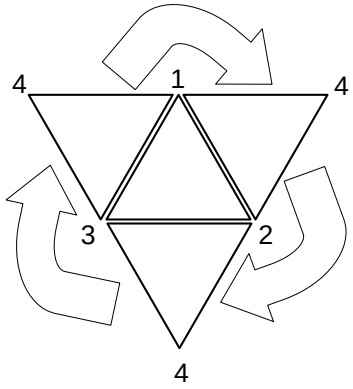
2 modes in common	3 modes in comon
6-Z4 (M1-M3)	5-6 I (M1-M3-M4)
6-5 I (M1-M4)	5-19 I (M1-M2-M4)
6-Z13 (M1-M2)	5-28 (M2-M3-M4)
6-30 I (M2-M4)	4-Z15 (M1-M2-M3)
6-Z43 I (M3-M4)	
6-Z49 (M2-M3)	


4 - Z15 T10
M4
M1
6-5 I
M4
5-6 I
5-19 I
6-Z43 I
6-Z4
6-Z13
4-Z15
M3
6-Z49
M2
5-28
6-30 I
M4

Tetrahedron
is the only geometrical figure that allows
4 points being connected to each other

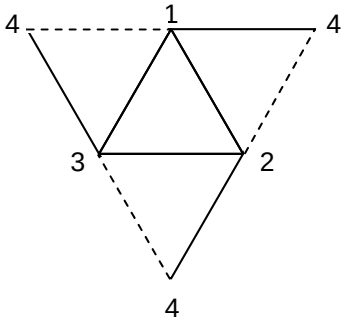
3-dimensional figure



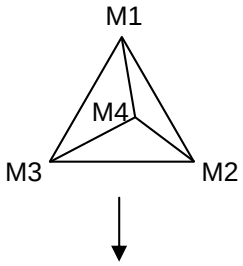


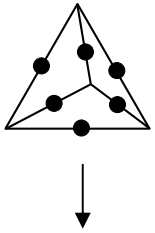
adjacent sides

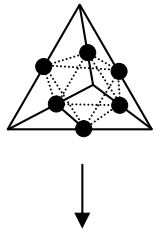
2-dimensional figure (surface plan)



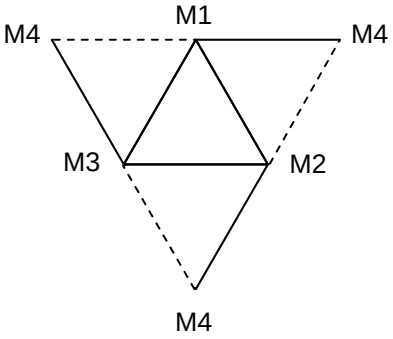
3-dimensional figure

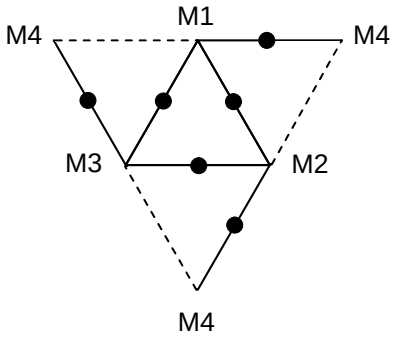


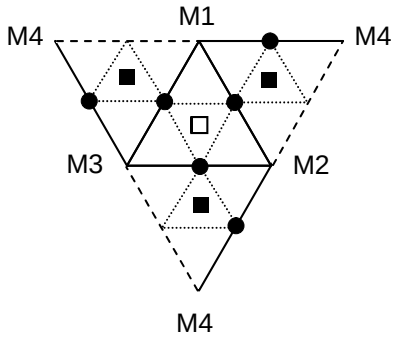




2-dimensional figure (surface plan)







M1 - Forte: 8-1 (8 tones)
M2 - Messiaen mode 2 (8 tones)
M3 - Messiaen mode 3 (9 tones)
M4 - Messiaen mode 4 (8 tones)

● Common subsets of 2 modes
6-Z4 (M1-M3)
6-5 I (M1-M4)
6-Z13 (M1-M2)
6-30 I (M2-M4)
6-Z43 I (M3-M4)
6-Z49 (M2-M3)

■ Common subsets of 3 ●
and common subsets of 3 modes
5-6 I (M1-M3-M4)
5-19 I (M1-M2-M4)
5-28 (M2-M3-M4)

□ Common subset of all ■ and ● and 4 modes
4-Z15 (M1-M2-M3-M4)

The Tetrahedron as a composing system

Thematic development from one small set to larger sets and modes (and vice versa)

Ex. 4-Z15
5-28 + 1 tone
6-Z49 + 1 tone
Mode 2 or 3 + 2 or 3 tone

The added tones can be considered as 'ajouté's', which can be part of 4 different 'families' (4 modes)
All transpositions and inversions of the basic set (4-Z15 and 4-Z15 I) are possible, thanks to all the transpositions of the 4 modes.

Transformations (*modulations*)

1) Common tones or sets between modes - the small harmonic plan

The tetrahedron as a tone center

One tetrahedron can be considered as a **tone centre** with possibilities (thanks to the common tones) for intern modulations.
4-Z15 can be extended to 4 large modes ('worlds' or 'tonalities') with a completely different sound, but always keeping the same 4 tones in common. It is possible to 'modulate' from one mode to an other thanks to common tones (6).
Cfr. A movement of a tonal symphony can have one basic tonality (c minor) but mostly makes modulations to neighbour tonalities (Eb major, g minor, f minor, C major) while you can still speak of a movement with one tonality (c minor).

Layered structure

The composer can combine more modes at the same time, for example a background-mode and a foreground-mode.
If the music consists of more layers, each layer can represent an other mode.
In this situation the common tones can also be used to 'blend' the different layers, as an harmonical 'support point' for the listener.

2) Common modes between other tetrahedra - the big harmonic plan

The total number of tetrahedra with basic set 4-Z15 and 4-Z15 I remains too high to be guided by during the composing process.
So it is better to put several tetrahedra in small groups. These groups can be made by tetrahedra that have the same transposition of 1 mode in common. The groups are connected to each other thanks to their same transposition of one mode.

There are 4 groups of tetrahedra, which represent the 4 movements in the composition.

Mode 1 (T8) 2 tetrahedra
Mode 2 (T2) 8 tetrahedra
Mode 3 (T1) 6 tetrahedra
Mode 4 (T2) 4 tetrahedra

Each movement is formed by the same harmonic structure (several connected tetrahedra) but each movement has a proper mode that stays in the same transposition during that movement. This means that each movement of the piece has its own stable mode, surrounded by other unstable modes in a specific tetrahedral relation.
Cfr. In a tonal symphony each movement can have its own tonality, mostly related to each other by the circle of fifths, which is based on common tones between the neighbour tonalities.

Conclusion: In *Tetrahedron for orchestra* the harmony is based on the same principles as the harmonic plan of a tonal symphony. The difference is the construction of the chords (modes) and the resulting relationships, which result in tonal music into the circle of fifths and here in a tetrahedral structure. The use of common tones as the key to modulation remains the same.