

The Spaced Chromatic Circle Varèse's Open Harmonic System in a Nutshell

by Federica Di Gasbarro

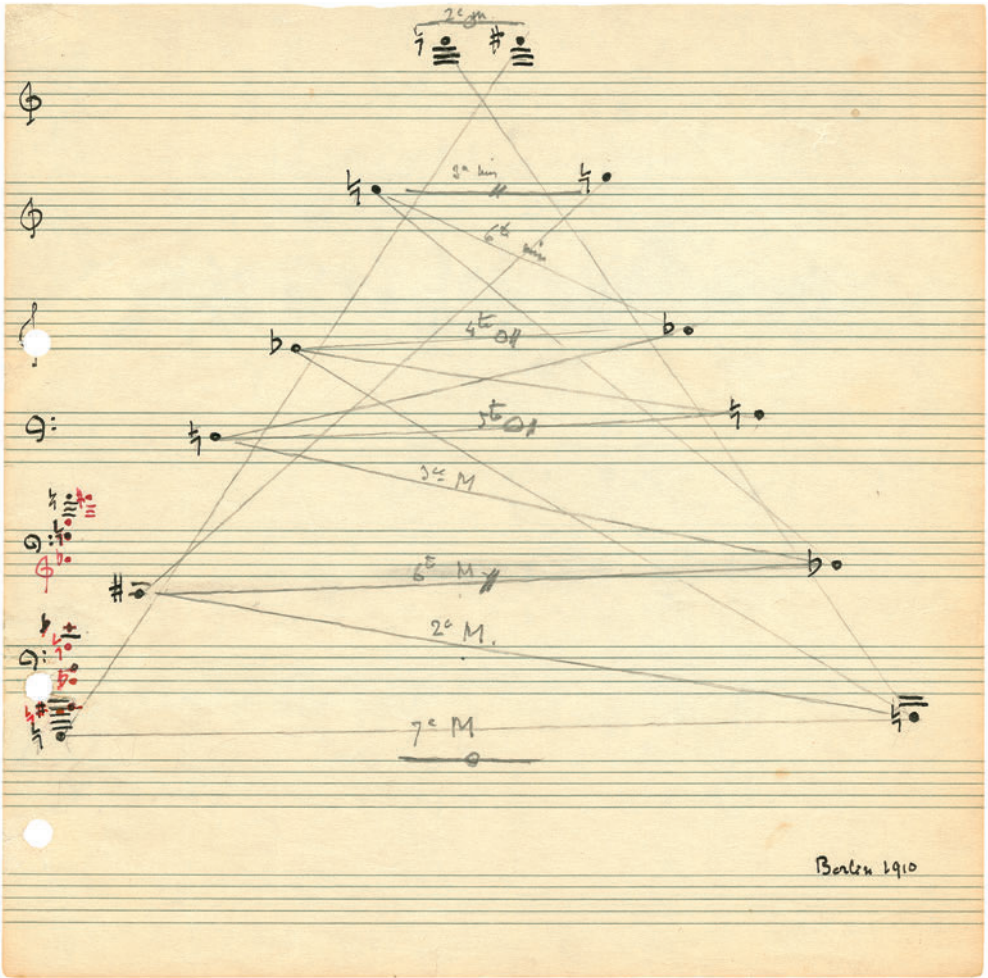
Among the sources in the Edgard Varèse Collection, numerous sketches and drafts attest the composer's preoccupation with a systematic and structural organization of his musical material, especially with regard to interval combinations and to specific pitch distributions within the sound space. Provisionally preserved within dossiers of so-called "unidentified sketches," most of these documents cannot be assigned to any particular piece: their proper value for the understanding of Varèse's music resides precisely in their general nature. Assuming an almost "theoretical" function, they reveal the two fundamental principles of Varèse's "harmonic system": a high chromatic potential, whereby the wide spacing of ic1 rises to a stylistic feature, and a high variability of the harmonic surface through the reintroduction of diatonic relations, now endowing a "coloring" function to the overall "expanded chromaticism."

The main source for the present essay is what the exegetes until now have called the "hexachord diagram," the basic concept of which Varèse backdates with the annotation "Berlin 1910" although both paper and ink reveal that it postdates his move to America in late 1915 (*Example 1*).¹

Far from being an arrangement based on two hexachords, as the diagram might suggest, its deeper sense becomes apparent when read as a continuous chromatic circle (the idea) regularly projected within the sound space (the musical constraint) through the prism of the expanded chromatic intervals [13] and [11] (the stylistic mark) (*Example 2*).

Instead of two dissociated halves, the twelve notes are distributed in a unique circular progression of expanded intervals (minor ninth and major seventh), so that, once they reach the top, ascending [13] flip over into

1 The schema was first reproduced and discussed in Chou Wen-chung, "Converging Lives: Sixteen Years with Varèse," in *Edgard Varèse: Composer, Sound Sculptor, Visionary*, ed. Felix Meyer and Heidy Zimmermann (Woodbridge: Boydell, 2006), pp. 348-60, esp. pp. 356-59; and idem, "The Arcana of Déserts," in *Mitteilungen der Paul Sacher Stiftung*, 20 (2007), pp. 13-18. Chou's interpretation, repeated by later authors, focuses on the division into two complementary hexachords and on the symmetry and interval complementarity around the central tritone.

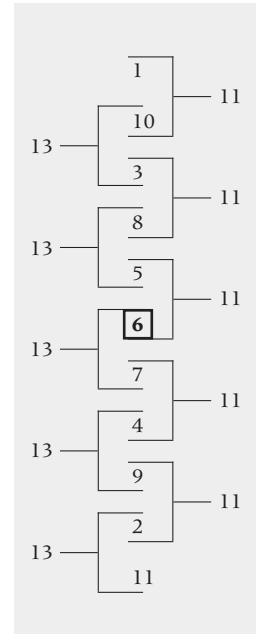
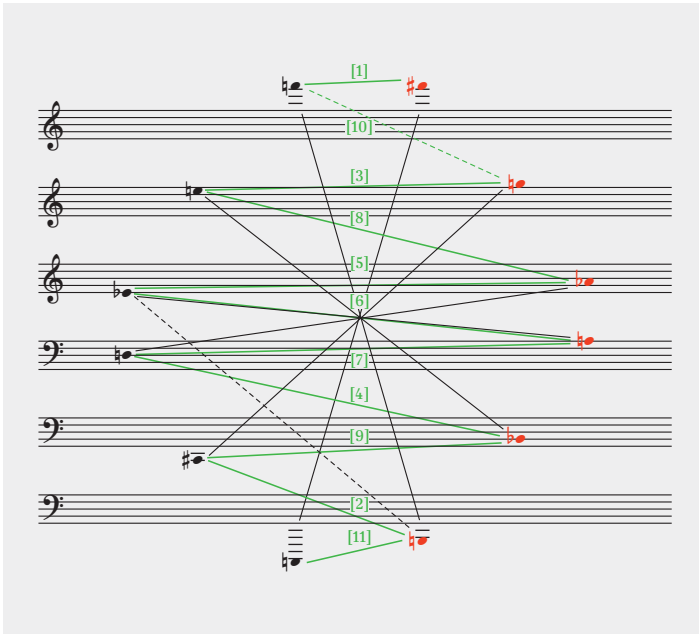


Example 1: Edgard Varèse's Spaced Chromatic Circle (Edgard Varèse Collection, PSS).

descending [11] in order to remain within the available range of six octaves. This interpretation is supported by another diagrammatic representation of this same pitch distribution, where the composer assigns the letters "a" to "l" to the twelve successive pitches (see left part of *Example 6a*).

At the same time, the transverse lines that connect the two sides of his diagram (in *Example 2*, left, marked with green lines, starting from the bottom left C₁, to the top right F #₆) point out the eleven possible intervals the composer explicitly writes on each line.² Not only that, they also trace

2 As already mentioned by Chou, two exceptions occur in the diagram: the line G₅-F₆ is missing while the major third connection B₁-E_{b4} is traced. They are both indicated in the example through dotted lines.



Example 2: Re-arrangement of Varèse's diagram as circle (left) with interval succession and interlocked [13]- and [11]-chains (right).

the subdivision of each frame [13] and [11] into two intervals through the interpolation of the third pitch (on the opposite side of the diagram), producing at least one diatonic relation. The source of variability in Varèse's musical language resides precisely in the multiple interval combinations resulting when the two chains of expanded chromatic intervals are interlocked into a single ensemble. On the other hand, the ten different trichords thus generated represent the real structural units of Varèse's music.³ Such an alternative exploration of the diagram is corroborated by another sketch, in which Varèse numbers the pitches following the zigzag of the diagonals and makes explicit the specific sequence of the eleven intervals (*Example 3*). This peculiar *Allintervallreihe* is furthermore transcribed in the form of a chord at the bottom left of the diagram (in *Example 1*), where black and red inks differentiate the notes that belong to the ascending [13]-chain and to the descending [11]-chain, respectively.

Finally, in the diagram, Varèse connects all the six tritone relations of the chromatic total. While the centrally positioned tritone $A_3-E\flat_4$ func-

3 Jonathan Bernard was the first to stress the structural role of trichords in Varèse's music; see *The Music of Edgard Varèse* (New Haven and London: Yale University Press, 1987), pp. 73-127.



Example 3: Diagram re-drawn on the backside of a brochure for *The New Chorus* (not prior to 1941) with ascending numerated *Allintervallreihe* (Edgard Varèse Collection, PSS).

tions as an inversive axis, the five supplementary lines join the remaining compound tritones (*Example 2*, black lines) and correspond to the ten possible transpositions of the diagram, each tritone acting as an axis for two different transpositions (for instance, A-E \flat for the diagrams on both C and F \sharp). This central role of the tritone leads to another property expressed by the diagram. As shown in *Example 2* (right), the axis [6] generates the two middle trichords [7][6] = [13] and [6][5] = [11], corresponding to the trichords most frequently used by Varèse. Proceeding towards the two extremities ([11][2] and [10][1]) via trichordal interlocking – i.e. via a common interval between two successive trichords – the resulting ascending and descending progressions reflect a proper hierarchy between the different trichords according to their respective position in the diagram, from the center to the periphery.

To fully understand the role of this sketch in Varèse’s composing, one has to assign it a “suggestive” rather than “prescriptive” function. As a representation of his *Urklang*, the diagram does not impose any systematic application but merely synthesizes the combinatorial potential based on the composer’s stylistic principles. A few examples from Varèse’s scores will show that specific adaptations only appear to violate these premises: on the contrary, they locally stress other outcomes produced by the fundamental

I	S	[6]	[6]	[6]	[6]	[6]	[5]	[5]	[7]
II	A	[5]	[7]	[5]	[7]	[5]	[6]	[8]	[4]
	T	[11]	[4*]	[11]	[4*]	[11]	[10]	[3*]	[11]
	B								
	I =	[11]	[13]	[11]	[13]	[11]	[11]	[13]	[11]
	II =	[11]	[11*]	[11]	[11*]	[11]	[10]	[11*]	[11]

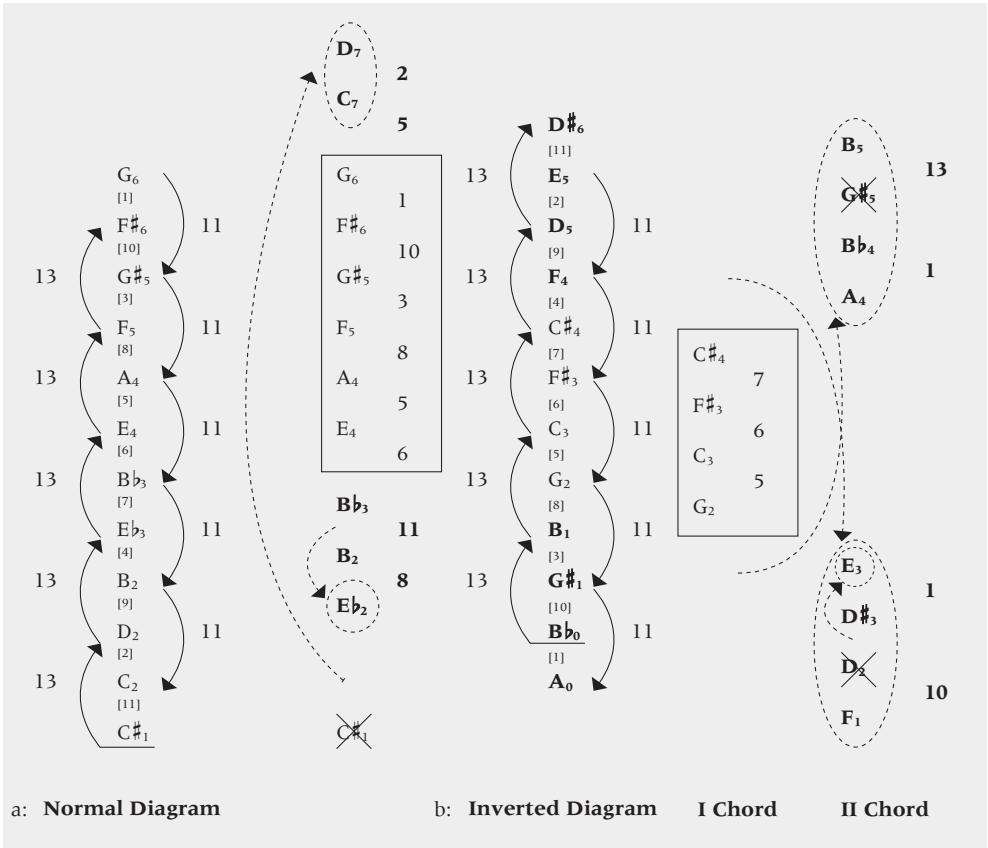
Example 4a: Trichordal succession in *Amériques* (mm. 16-18). Since the bassoon part merely doubles the contrabassoon one octave higher and must thus be considered as an orchestration choice and not as a supplementary voice, it has not been integrated here.

		[11]	
		[8] [3]	
		[8] [5]	[5] [8]
		[13]	[13]
		< -13, +8, +3, -5, +13 >	

Example 4b: Trichords in the melodic figure of *Hyperprism* (mm. 19-21).

regulator, which remains in effect in spite of (or exactly because of) the accumulation of exceptions that appear in the foreground.

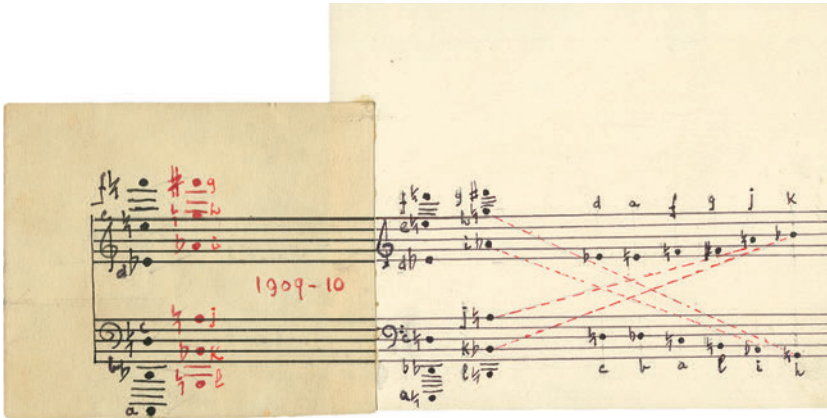
Varèse uses, for example, interval successions that conform to single or combined trichords appearing in the diagram in order to control the harmonic content of vertical and linear entities. In one of the occurrences of the horn chorale in *Amériques* (1918-21, rev. 1927-29, Example 4a), the composer concentrates on the initial oscillation of the central trichords of the diagram [7][6] and [6][5], progressing toward the adjacent trichords in each direction, [5][8] and [7][4], for the cadence. In a melodic figure from *Hyperprism* (1922; Example 4b), he conversely chooses two [13]-trichords [5][8], interlocked through their [11]-complement [8][3].



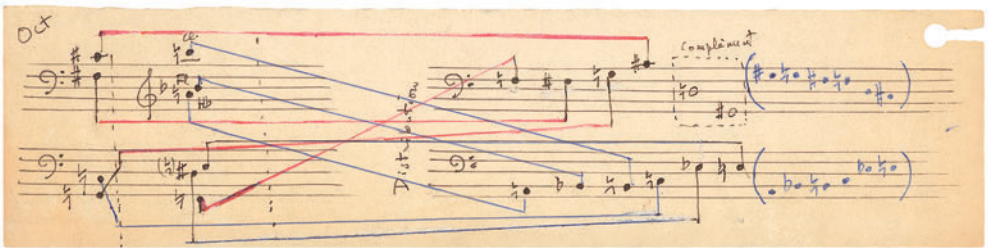
Example 5: a: *Amériques* (1929, mm. 418-44); b: *Octandre* (mm. 19-20).
 The underlined tones C# and Bb identify the origin for the diagrams' circular rotation.

Alternatively, the composer adopts within "tutti-chords" interval successions corresponding to wider segments of the diagram, frequently contextually varied. In the repeated chords preparing the final section of *Amériques* (Example 5a), he works with an alteration of the basic diagram transposed on C# by eliminating one note (C#₁), by transferring another tone into a lower register (Eb₂), and by projecting one segment into a higher register (C₇-D₇). The use of a nearly complete total (eleven notes out of twelve) reveals another main characteristic of Varèse's exploitation of chromaticism.

An example from *Octandre* (1923, Example 5b) shows a similar way of using trichordal structures to create coherence not only within a sound event but also between "juxtaposed masses." The first chord reproduces the hierarchically privileged part of an inverted diagram transposed on Bb,



Example 6a: Diagram projected on two hexachords (Edgard Varèse Collection, PSS).



Example 6b: Analytical sketch for chords in *Octandre*, mm. 19-20 (Edgard Varèse Collection, PSS).

corresponding to the interval succession [5][6][7].⁴ For the second chord, Varèse complementarily uses only upper and lower parts of the diagram; he then eliminates two pitches ($G\#_6$ and D_2), symmetrically placed with respect to the outer pitches F_1 and B_5 , and subsequently re-arranges the remaining six pitches in each of the two segments: the three upper pitches are projected into the lower register $F_1-D\#_3-E_3$ ([10][1]), and the three lower pitches into the upper one $A_4-B\flat_4-B_5$ ([1][13], with the additional transfer of E one octave up). The symmetry and the complementarity within and between the two chords in relation to the diagram recall the “attracting forces” which, according to Varèse, determine the external form of a passage or a composition.⁵

Some drawings attest that Varèse maintained a constant and always renewed interest in the basic idea conveyed by the diagram, even in later

4 Because of the octave-complementarity of all the intervals with respect to the central axis (the tritone), a variant of the diagram that shows a complete interval inversion can be constructed merely by transposing the whole [11]-chain one octave down.

5 Edgard Varèse, “Musical Conceptions” (typescript, 1959, National Library of Canada, Ottawa), in Anne Jostkleigrewe, “The Ear of Imagination”: *Die Ästhetik des Klangs in den Vokalkompositionen von Edgard Varèse* (Saarbrücken: Pfau, 2008), p. 94.

years. A draft written on the back of a concert invitation from November 1959, and pasted with the above-mentioned sketch dated “1909-10,” shows an alternative structuring of the twelve pitches of the diagram into two hexachords with the interval succession [1][1][1][3][1], i.e. a simplified visualization reduced within a close range (*Example 6a*). Derived from a subdivision of all pitches into two halves (from letters “d” to “i,” upper hexachord, and from letters “j” to “c,” lower hexachord), it is then varied through the exchange of two pairs of notes (“j-k” and “h-i,” marked by Varèse with red lines). This not only transfers within each half the main property of the complete diagram – i.e. the presence of all intervals – but also inserts two tritones in each hexachord, an interval not normally contained in chromatic hexachords.⁶

In another schema, also not “functional” to a composition, Varèse correlates these two hexachordal structures with the two above-mentioned chords from *Octandre* (*Example 6b*). He derives the latter from a “Distribution” of the twelve-tone set according to the two hexachords, but varies their arrangement by distributing the two basic collections into two ascending hexachords and removing two pitches from the upper one (marking the missing tritone $G\sharp_2-D_3$ as “Complément”). Using red and blue lines, he links the two altered hexachords with the respective pitches within the two chords in order to highlight the additional exchange between F_3 (red but belonging to the second chord) and C_3 (blue, a member of the first one).

The actual spacing of the relevant chords leads to a further reading. The chord in bar 19 corresponds, as already mentioned, to the center of an inverted diagram characterized by its central tritone relation $C_3-F\sharp_3$ (*Example 7a*, left). For better contrast in bar 20 (*Example 7a*, right), and despite the presence of three tritone relations between the two trichords (F_2-B_5 , $D\sharp_3-A_4$, $E_3-B\flat_4$), the composer hides the axis tritone $A_3-D\sharp_4$ through register transfers. This produces in each register a chromatic segment of three tones, each containing one close and one expanded interval ($A_4-B\flat_4-B_5$ and $F_2-D\sharp_3-E_3$). The register transfer acts as “repulsing forces” to separate two masses delineated by distinct timbre combinations.

Finally, the twelve-tone field at mm. 41-45 of *Déserts* (1950-54; *Example 7b*) demonstrates another exploitation of the harmonic potential of the diagram. This time, the [11]-chain is inverted so as to produce a second ascending [13]-chain a tritone lower. The result is a regular alternation of [6][7] trichords as the main pattern of this harmonic space. The two extreme sounds of the theoretical construct ($F\sharp_7$ and G_1) have been “in-folded” in order to generate a further diatonic subdivision of two intervals [7] into [5]+[2]. To stress the new diatonic color within the otherwise

6 A serial interpretation of this sketch appears in Roger Reynolds, “The Last Word Is: Imagination. A study of the spatial aspects of Varèse’s work,” *Perspectives of New Music*, 51 (2013), no. 1, pp. 196-255, esp. p. 247.

a:

b:

Example 7: a: *Octandre* (mm. 19-20), diagram analysis; b: *Déserts* (mm. 41-45), homogeneous triton diagram. Black notes appear in the music, white notes do not; rhombs indicate pitches with register transfers.

“monochrome” harmonic structure, Varèse begins his field exactly with the simultaneously sounding interval [5] completing it melodically with the two intervals [13] and [8] (mm. 41-42) to produce the trichord [8][5] adjacent to the center [7][6] in the diagram.⁷

In conclusion, the relationship between the diagram as the abstraction of a harmonic system and the concrete applications in Varèse’s scores resonates with his use of the metaphor of crystallization to describe his works. In spite of “the relatively limited variety” of “definite internal structures,” based on the unity of the crystal (“which is the smallest grouping of the atoms that has the order and composition of the substance”), the “external forms of crystals are almost limitless.”⁸ Analogously, the variability of the exterior appearance once a sound event is projected in time is provided by the very nature of this “open harmonic system,” which does not determine its environment but interacts with it in a continuous exchange. Within a stylistic constant, the system modifies its outputs by establishing in each situation a contingent hierarchy between different operating principles. Hence the need to further enlarge the investigation of the consistent development of Varèse’s harmonic strategies throughout his career and their impact on the treatment of other compositional levels, including the overall form.

7 This field has already been analyzed as an imbrication of two 13-chains with register transfers by Pascal Decroupet, “Via Varèse,” in *Edgard Varèse: Die Befreiung des Klangs*, ed. Helga de la Motte-Haber (Hofheim: Wolke, 1992), pp. 28-40.

8 Edgard Varèse, “Autobiographical Remarks, dedicated to the memory of Ferruccio Busoni: From a Talk Given at Princeton, September 4, 1959,” in Christine Flechtner, “Die Schriften von Edgard Varèse (1883-1965)” (licentiate diss., Fribourg University, 1983), pp. 338-47, esp. p. 345.