

The Development of Serial Technique¹

Luigi Nono

Translated by Jeremiah Goyette

From Schoenberg to today the “serial” concept has developed extensively as each musical element has gradually been taken in consideration and subjected to the “serial” principle. After having been exhausted of its basic thematic-dodecaphonic property, the concept of the “series” has been extended to general compositional structure in its various parameters: register, rhythm, dynamics, timbre, form and, more recently (though still in development) the coordination of the characteristics of each in relation to the functioning of the whole.

From the first stage of serialism to the present there has only been a *historical logical development*, taking place over a period of time just long enough to become conscious of time itself—the history, that is—and for its realization.

The conditions that characterize the initial stage are given precisely in Schoenberg’s writings:

“The method of composing with twelve tones grew out of a necessity [...to formulate] the foundations of a new procedure in musical construction which seemed fitted to replace those structural differentiations provided formerly by tonal harmonies. [...] This method consists primarily of the constant and exclusive use of a set of twelve different tones.”²

¹ Translation of “Lo Sviluppo della Tecnica Seriale,” found in Luigi Nono, *Sritti e Colloqui*. Ed. by Angela Ida De Benedictis and Veniero Rizzardi. Milan: Ricordi, 2001. 19-42.

² Schoenberg, Arnold. “Composition with Twelve Tones,” in *Style and Idea*, New York: Philosophical Library, 1950, pp. 103 and 107 [p. 213 in 1984]. All the citations from Schoenberg, Rufer and Webern are in German in the original typescript version of this essay.

“The first conception of a series always takes place in the form of a thematic character.”³

“It will not often happen that one obtains a perfect series which is fit for use as the immediate conception. A little working-over afterwards is usually necessary. But the character of the piece is already present in the first form of the series.”⁴

The “serial” concept is thus dependent on the successive ordering of the 12 pitches, as a unity of thematic material to be developed. The use of four fundamental forms and their transpositions further expands the thematic property of the series. The structure of the 24 measures of the “Theme” section of the *Variations for Orchestra* op. 31, analysed later, reveals more thoroughly and precisely Schoenberg’s concept of serialism.

In a letter written by Anton Webern on May 3, 1941, in which he illustrates his *Variations* op. 30 to the critic Willi Reich, a formulation of new musical interests appears that characterizes what could be called the second stage in the development of serial technique.

Now everything that occurs in the piece is based on the two ideas given in the first and second bars (double bass and oboe!). But it’s reduced still more, since the second shape (oboe) is itself retrograde; the second two notes are the cancrizan of the first two, but rhythmically augmented. They are followed, on the trombone, by a repetition of the first shape (double-bass), but in diminution! And in cancrizan as to motives and intervals. That’s how my row is constructed—it’s contained in these thrice four notes. But the succession of motives takes part in this cancrizan, though with the use of augmentation and diminution! These two kinds of variation now lead almost exclusively to the various variation ideas; that’s to say motivic variation happens, if at all, only within these limits. [...] And that’s how it goes on

³ Rufer, Josef. *Composition with Twelve Tones*. Trans. by Humphrey Searle. New York: Macmillan Co., 1954. p. 92. [Der erste Einfall einer Reihe erfolgt immer in Form eines thematischen Charakters. (p. 86)]

⁴ Ibid. pp. 94-95. [Es wird nicht oft passieren, daß man als ersten Einfall gleich eine vollkommene und verwendungsfähige Reihe erhält. Ein bißchen Nacharbeiten ist wohl meistens erforderlich. Aber der Charakter des Stückes ist bereits in der ersten Form der Reihe vorhanden. (p. 89)]

throughout the whole piece, whose twelve notes, that's to say the row, contain its entire content in embryo! In miniature!⁵

Serial composition ceases to develop solely in relation to the thematic characteristics of the series. Rather, the rhythmic-melodic-harmonic-timbric structure of the *Variations* begins to strictly follow that of the series of 12 pitches. The four fundamental forms are reduced to two by the property of symmetry and from the characteristic ambivalences in Webern's series (later the analysis will be given of the new structural function of the series, based on op. 30).

The third stage is in full development: the serial principle involves each parameter of the music in such a way that the interchange between them is rigorous. The 12 tones of the chromatic scale become organized in permutational series, or in an interchange among permutations and in a fixed ordering with other elements.

The tone becomes analysed (studied for the first time in its original spectrum) as to be directly incorporated into composition (electronic music). This new phase of study, which follows logically, seeks to determine a new musical concept of creation and realization that will be our future.

⁵ Webern, Anton. *The Path to the New Music*. Ed. by Willi Reich. Bryn Mawr: Theodore Presser Co., 1963. [Alles nun, was in dem Stück vorkommt, beruht auf den beiden Gedanken, die mit dem ersten und zweiten Takt gegeben sind (Kontrabaß und Oboe)! Aber es reduziert sich noch mehr, denn die zweite Gestalt (Oboe) ist schon in sich rückläufig: die zweiten zwei Töne sind der Krebs der ersten zwei, rhythmisch aber in Augmentation. Ihr folgt, in der Posaune, schon wieder die erste Gestalt (Kontrabaß), aber in Diminution! Und im Krebs der Motive und Intervalle. So nämlich ist meine Reihe gebaut, die mit diesen dreimal vier Tönen gegeben ist. Aber der motivische Ablauf diesen Krebsgang mit, jedoch unter Benützung von Augmentation und Diminution! Diese beide Arten von Veränderung führen nun fast ausschließlich zu den jeweiligen Variationsideen, das heißt: eine motivische Veränderung geht, wenn überhaupt, nur in diesem Rahmen vor sich. [...] Und so geht's durch das ganze Stück, für das mit den ersten zwölf Tönen, also mit der Reihe, alles an Inhalt im Keim schon da ist! Vorgebildet ist! (p. 68)]

Later, the characteristics of this third stage will be localized and analysed through compositions of Berio⁶, Boulez, Maderna, Nono and Stockhausen.

The ‘Serial’ Concept of A. Schoenberg in the “Theme” of the *Variations for Orchestra* op. 31

The original series is given below, from mm. 34-38 in the celli.⁷



B \flat - E - F \sharp - E \flat - F - A - D - C \sharp - G - G \sharp - B - C⁸

The fourth, A-D (or its complement, the fifth) divides the series into two six-note segments. The first segment is built on the following intervals:

tritone - major second - minor third - major second - major third

The second segment is built on the following intervals:

minor second - tritone - minor second - minor third - minor second

The tritone and the minor third are in common between the two segments.

These two intervals and the one that subdivides the series into two segments (the fourth) carry particular significance in that they share in common the characteristic of determining the degrees of transposition of the series and the relationship between two (or four) series when the series are superimposed.

⁶ None of the versions of this text discuss works by Berio. [AB and VR]

⁷ All music incipits set in staff notation have been added by the translator and do not appear in the Italian version. In some of the following incipits some analysis has been added to help clarify Nono's discussion by identifying series forms, though the added analysis does not necessarily reflect Nono's perspective or analytical methods as his method for identifying series forms is markedly different from modern conventions.

⁸ From this example and from others that follow, it is clear that Nono takes liberties with pitch spelling, often substituting enharmonic equivalents.

Examples:

a) In the first variation, the two parts in counterpoint with the “Theme”—the true *cantus firmus* (mm. 58-69: first part in the woodwinds plus violins I and II, the second part in the brass plus violas and celli)—are each formed by two superimposed series in parallel, separated by the interval of the minor third (as well as the compound minor third and major sixth). The degree of transposition of these series (always in respect to the four fundamental series [see below]) is thus determined by the tritone and the minor third.

The image shows a musical score excerpt for five instruments: Oboe 1,2; Horn 1,2 and Harp; Violin I,II; Viola; and Violoncello. The music is in 3/4 time and starts at measure 58. The woodwind and string parts are shown with complex rhythmic patterns and accidentals. Arrows point from the woodwind part to the string part, indicating relationships between the two.

The four series, which constitute the two parts in counterpoint, are related to each other (initial pitch of the series) by unison, minor third, tritone and fourth.

Measure 64: the first part (woodwinds plus violins I and II) involves two retrograded series in parallel, separated by a major sixth.⁹ The first is transposed at

⁹ In the original Italian, Nono indicates the forms of the series using the German terminology: Krebs (retrograde), Umkehrung (inversion), Krebs-Umkehrung (retrograde inversion), as well as Spiegel (mirror inversion). In *Scritti e Colloqui* they were left untranslated, conforming to Nono’s request (cf. letter from Nono to Berio from October 11, 1958, microfilm 170.1 PSS). [AB and VR]

the tritone (F-sharp in respect to C) [R(P₄)], and the second by the minor third (A in respect to C) [R(P₇)].

The second part (brass plus violas and celli) is built exclusively on parallel superposition, by major sixth and minor third, the two series being retrograde-inversions transposed by tritone (B in respect to F) [R(I₁)], the second transposed by minor third (D in respect to F) [R(I₄)].

63

E♭ Cl, Eng Hr,
Cl 1,2

Vln I, II

Hr

Vla, Vlc

R(P₄)
R(P₇)

R(I₁₀)
R(I₁)

R(I₁)
R(I₄)

The relationship between the series transposed by the same degree in the two parts is the fourth [F[♯]-B and A-D].

b) In Variation II: the two parts in counterpoint, in an almost-mirror canon that strictly imitates the theme—the true *cantus firmus* (violin–oboe)—are each built on series that are a minor third and a tritone apart. The transposition of the series [from the original] is by minor third and by tritone.

Variation II

82

Measure 87: the first part (cello and bass clarinet) is built on the retrograde transposed by minor third (E_b in respect to C) $[R(P_1)]$; the second part (bassoon and flute) is built on the retrograde inversion transposed by a minor third (A_b in respect to F) $[R(I_{10})]$. The two series are a fourth apart ($E_b - A_b$).

87

Measure 98: the first part (cello and bassoon I) is built on the inversion transposed by tritone ($C\sharp$ in respect to G) $[I_1]$; the second part (clarinet I and English horn) is built on the original series transposed by tritone (E in respect to B_b) $[P_4]$. The two series are a minor third apart ($C\sharp - E$).

The image shows a musical score for measures 98-100. It consists of four staves: Eng Hr (English Horn), Clar (Clarinet), Bsn 1 (Bassoon 1), and Vlc (Violoncello). The time signature is 9/8. The key signature has one sharp (F#). The score shows a sequence of notes in each staff, with some notes beamed together. The Eng Hr staff has a label 'R(P₄)' below it. The Vlc staff has a label 'I₁' above it.

The four series that are each built by two parts in strict canon with the theme are related to each other by minor thirds:

measure 83: initial notes of the two inverted series: E-C#

measure 88: initial notes of the two retrograded series: A-C

measure 94: initial notes of the two retrograde-inverted series: D-B

measure 100: initial notes of the two original series: G-B \flat

The transpositions [of the series] are all by minor third and by tritone.

c) In Variation III the series that follow each other are related by tritone (except mm. 113-114 where the relation is by major third) when the transpositions [in respect to the original] are by minor third and by tritone.

The function of these intervals (minor third, fourth and tritone) in determining the transpositions (or superpositions) of the series first becomes evident in the organization of the “Theme” section (mm. 34-57), by which the four fundamental forms of the series (plus the repetition of the original transposed, in mm. 52-57) follow one another in melodic projection:

m. 39: the retrograde-inversion $[R(I_7)]$ is related by fourth to both the initial pitch of the original (F in respect to B_b) and to the final pitch of the original (F in respect to C).



m. 46: the retrograde $[R(P_{10})]$ is not transposed in respect to the original, but in relation (by fourth) to both the initial and final pitches of the preceding retrograde-inversion (C in respect to F, and C in respect to G—the fifth being the complement of the fourth).



m. 51: the inversion $[I_7]$ is related by minor third to the original (G in respect to B_b), by fourth to the initial pitch of the preceding retrograde (G in respect to C) and by minor third to its final pitch (G in respect to B_b).



The tritone determines the relationship between the inversion (G in m. 51) and the repetition of the original ($C\sharp$ in m. 52)—the latter being a transposition by minor third of the original ($C\sharp$ in respect to B_b):

Original (mm. 34-38)	B \flat	E	F \sharp	E \flat	F	A	D	C \sharp	G	G \sharp	B	C
Retrograde-inversion (mm. 39-45)	F	F \sharp	A	B \flat	E	E \flat	A \flat	C	D	B	C \sharp	G
Retrograde (mm. 46-50)	C	B	G \sharp	G	C \sharp	D	A	F	E \flat	F \sharp	E	B \flat
Inversion (mm. 51-57)	G	C \sharp	B	D	C	A \flat	E \flat	E	B \flat	A	F \sharp	F
Original (transposed by minor third) (mm. 52-57)	C \sharp	G	A	F \sharp	A \flat	C	F	E	B \flat	B	D	E \flat

The tritone places the transposition of the B-A-C-H [B \flat -A-C-B] of the original series into a new arrangement:

Original series: B \flat E F \sharp E \flat F A D etc.

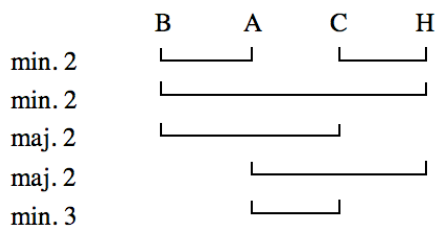
—tritone—

B C A H

[B \flat C A B]

Variation II is based on this transposed and rearranged B-A-C-H figure.

Variation V is based on the various constituent intervals in B-A-C-H: the minor second, the major second, and the minor third.



The “Theme” section, mm. 34-57, is formally divided into A and B sections, each 12 measures long: A) 34-45, B) 46-57.

These sections are in turn divided:

	$\overbrace{\hspace{10em}}^{12}$		
A	$\overbrace{\hspace{5em}}^{5 \text{ measures}}$ 34-38	+ +	$\overbrace{\hspace{5em}}^{7 \text{ measures}}$ 39-45
B	5 measures 46-50	+ +	7 measures 51-57

They are exactly symmetrical.

This formal scheme is based on the serial construction, through melodic and harmonic projection.

A	Melodic Projection	Original (mm. 34-38)	+	Retrograde-Inversion (mm. 39-45)
	Harmonic Projection	Inversion (mm. 34-38)	+	Retrograde (mm. 39-45)
B	Melodic Projection	Retrograde (mm. 46-50)	+	Inversion (mm. 51-57) (at the minor third)
	Harmonic Projection	Retrograde-Inversion (mm. 46-50)	+	Original (mm. 51-57)

In this way both A and B are built on the four fundamental forms of the series.

In A and B each subdivision of five and seven measures is built in a parallel fashion on the form of the series and its inversion [Spiegel]: the scheme of adjoining in parallel

Original	and	Retrograde-Inversion
Inversion	and	Retrograde

remains constant throughout all of the variations.

Having each built on a fundamental form remains unchanged in every variation.

All of the forms of the series in A that are melodically projected have a corresponding harmonic projection in B, as all of the forms of the series in A that have harmonic

projection have a corresponding melodic projection in B. Appropriately, B is the retrograde-inversion of A.

This structure of the “Theme” is fundamental for the whole of the composition. The scheme of 24 measures, divided 12+12 and further subdivided 5+7, stays fixed for each variation, except:

variation IV has the same scheme doubled, that is 10+14;

variation VI has 36 measures, divided 18+18; here, both in A and B, the base scheme—determined by the four fundamental forms of the series—undergoes an alteration by way of a new compositional technique that develops along with the development of the idea of the variation.

In melodic projection, the “Theme” is based on motives, each with a well-determined number of pitches.

A Original (mm. 34-38)

$$\frac{B, E F\# E, F}{5} \quad \frac{A D C\# G}{4} \quad \frac{G\# B D}{3}$$

Retrograde-Inversion (mm. 39-45)

$$\frac{F F\# A}{3} \quad \frac{B, E + E, A, B}{\begin{array}{c} 2 \quad 2 \\ 4 \end{array}} \quad \frac{C D B C\# G}{5}$$

B Retrograde (mm. 46-50)

$$\frac{C B G\# G C\# D}{6} \quad \frac{A F E, F\# E B,}{6}$$

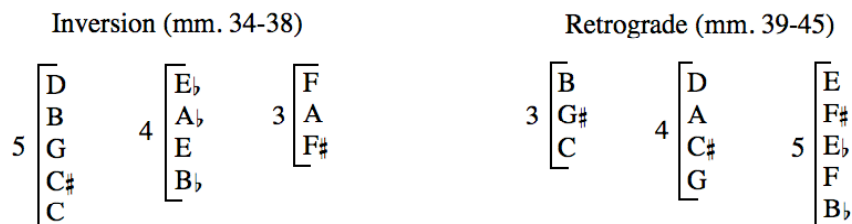
Inversion (mm. 51-57)

$$\frac{G C\# B D C}{5} \quad \frac{A, E, + E B,}{\begin{array}{c} 2 \quad 2 \\ 4 \end{array}} \quad \frac{A F\# F}{3}$$

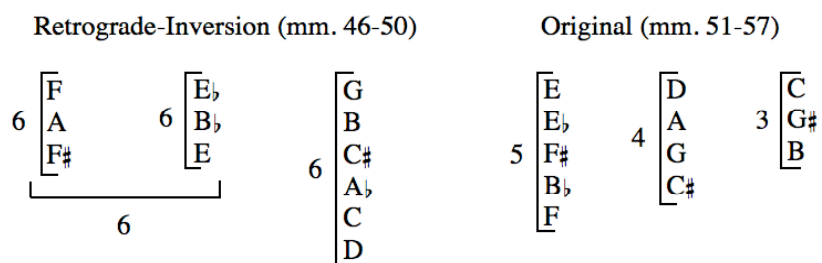
The series are consistently segmented into motivic groups of five, four (subdivided 2+2) or three notes in the original, the retrograde-inversion and the retrograde, while the inversion is motivically segmented into two groups of six pitches.

The same scheme remains unvaried even in the harmonic projection of the “Theme”:

A



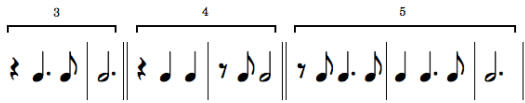
B



Unity, which is characteristic of the series, between melodic and harmonic projections is here for the large part confirmed: the same scheme works under both projections.

In relation to the scheme of the subdivision of tones by melodic motives, the given rhythmic scheme follows:

A (mm. 34-38) 

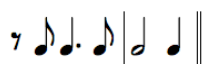
(mm. 39-45) 

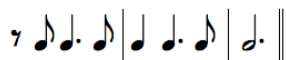
B (mm. 46-50) 

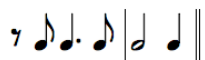
(mm. 51-57) 

Each group of five/four/three pitches maintains the same rhythm, with slight modifications:

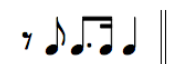
the five-note motive has successively:

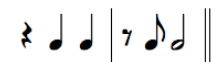
mm. 34-35 

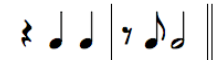
mm. 43-45 

mm. 51-52 

the four-note motive has successively:

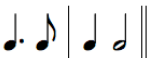
m. 36 

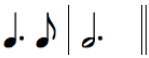
mm. 41-42 

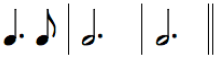
mm. 53-54 

The rhythmic values of the first motive (m. 36) are doubled exactly in the successive iterations, though with an insertion of an eighth-note rest (negative value) that replaces the corresponding eighth-note (positive value) of the dotted quarter.

The three-note motive has successively:

mm. 37-38 

mm. 39-40 

mm. 55-57 

In this way the subdivision scheme by melodic motive is matched by a corresponding rhythmic scheme.

The Structure of the Series of Webern's *Variations op. 30* and its Properties

In the first four measures the original series is stated, subdivided into three motives:



- | | | | | | | | |
|-------------|---|-----------|-----------|------------|----------|----------|----------|
| a) basses | A | B \flat | D \flat | C | min. 2nd | min. 3rd | min. 2nd |
| b) oboe | B | D | E \flat | F \sharp | min. 3rd | min. 2nd | min. 3rd |
| c) trombone | F | E | G | A \flat | min. 2nd | min. 3rd | min. 2nd |

Only two intervals are used: the minor second and the minor third; the minor second is also the subdividing interval between the three groups. In this series one is able to see a typical characteristic of Webern's series, ambivalence: in the relationship of successive

intervals, the retrograde-inversion is equivalent to the original, as is the retrograde to the inversion. If one considers the series as being two motives, each of six pitches, it becomes evident that motive II is the retrograde-inversion of motive I.

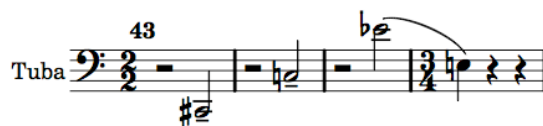
The subdivision into three motives and the ambivalence of the series is here determined by the applied compositional technique.

Throughout the entirety of the composition the subdivision into three motives remains clear, each of the four pitches being both in melodic and harmonic projection.

a) In the melodic projection the four-note motive is varied by the introduction of a rest, based on the combinations of possible summations of 1 1 1 1 (=4), that is 1 1 2 / 1 3 / 3 1 / 2 2 / 1 2 1.

Examples:

mm. 43-46: motive c) is subdivided in the tuba as 1 1 2



mm. 74-75: motive a) is subdivided in the flute as 1 2 1



mm. 32-34: motive b) is subdivided in the trumpet as 1 3



mm. 38-39: motive a) is subdivided in the celli as 3 1



mm. 45-47: motive a) is subdivided in the tuba and trombone as 2 2

mm. 144-145: motive c) is subdivided in violin I as 1 1 1 1

New six-note motives also result, subdivided as 5 1 / 1 1 4. These are built on two motives, each of four notes—generally c) and a)—in which, by the principle of ambivalence, the two final pitches of the preceding motive are also the first two pitches of the following; that is, the two central pitches of the six-note motive are ambivalent.

Examples:

mm. 27-31: the clarinet has a six-note motive, subdivided as 1 1 4, built like so:

$$\begin{array}{c} \text{c)} \\ \overbrace{\text{F E G A}_\flat \text{ B B}_\flat} \\ \underbrace{\hspace{10em}} \\ \text{a)} \end{array}$$

The central pitches G and A \flat are ambivalent within the two motives.

mm. 35-38: the Violin I have a six-note motive, subdivided as 5 1:

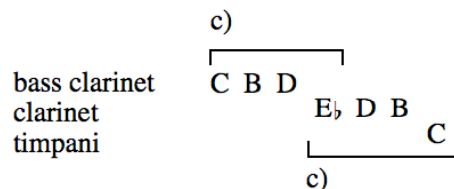
$$\begin{array}{c} \text{c)} \\ \overbrace{\text{E}_\flat \text{ D F F}_\sharp \text{ A G}_\sharp} \\ \underbrace{\hspace{10em}} \\ \text{a)} \end{array}$$

The central pitches F and F \sharp are ambivalent.

In Variation III also the timbric subdivision (between several instruments) of two four-note motives is based on the ambivalence of a single note: the last of the preceding is also the first of the following, thus resulting in melodic groups of seven notes.

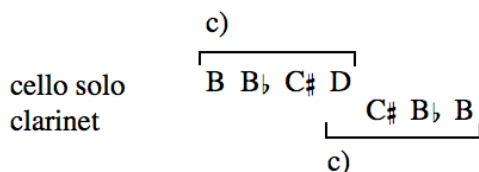
Example:

m. 95:



(using the original and retrograde forms)

mm. 100-103:



(using the original and retrograde forms)

For the most part the unity of the motive, in its subdivisions, is maintained timbrally, thus deriving a unitary function of timbre (cited examples).

The various subdivisions of the motive regulate and distinguish the melodic process throughout the six variations.

The ambivalence of two pitches is regular in variations I, IV and VI. The ambivalence of one pitch is regular in variation III.

b) A parallel procedure in the application of ambivalence of pitches occurs in harmonic projection: always based on four-note motives and four-note harmonic groups (except in mm. 158, 160, 161, 168, 170 and 171, where the groups are three-note groups).

That is, a four-note motive in harmonic projection is at the same time related to two others if the structural properties of the series are applied as follows:

mm. 21-30 (Var. I): the melodic projection of the original series and the harmonic projection of the retrograde are superimposed in parallel:

The image shows a musical score for measures 21-30 of a piece. The score is divided into two systems. The first system includes woodwind instruments: Flute (Fl), Oboe (Ob), Clarinet (Cl), Bass Clarinet (Bass Cl), Horn (Hr), Trumpet (Trp), Trombone (Trb), and Tuba. The second system includes string instruments: Violin I (Vln I), Violin II (Vln II), Viola (Vla), and Violoncello (Vlc). The score is in 3/4 time and features a complex rhythmic pattern with many rests. A 'Solo' marking is present above the Violin I staff, and 'pizz' (pizzicato) markings are present above the Viola and Violoncello staves. The woodwinds play a melodic line, while the strings provide a harmonic accompaniment.

melodic projection, motive:

a) A - B \flat - D \flat - C // b) B - D - E \flat - F \sharp // c) F - E - G - A \flat

harmonic projection, motive:

c) A \flat - G - E - F // b) F \sharp - E \flat - D - B // a) C - D \flat - B \flat - A

The motive b) is here in harmonic projection.¹⁰

¹⁰ This phrase clarifies a particular point of incongruence. Nono is assuming a vertical aggregate (in the woodwinds) as a central motive 'b' of the 'melodic projection' to demonstrate the symmetrical superposition of the two series, omitting the melodic

Note the timbric subdivisions:

melodic projection, motive:

a) strings (violin solo) // b) winds (woodwinds) // c) winds (woodwinds)

harmonic projection, motive:

c) winds (brass) // b) winds (woodwinds) // a) strings (violas and celli)

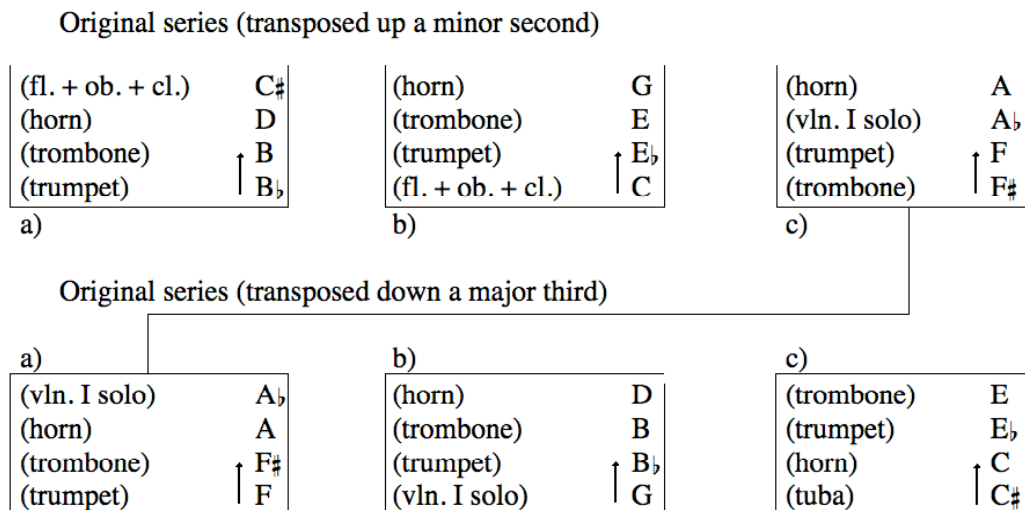
This procedure is systematic in variation I, always in relation to motive b).

In variation II there is a further development in the procedure, in relation to motives c)

and a). Motive c), the end of the original, is also at the same time motive a), the

beginning of the following transposed original.

mm. 56-63:



Motive c) and the following a) are simultaneous.¹¹

motive (B \flat , B, D, C \sharp , motive 'a' transposed a semitone) which appears in the violin in mm. 24-26. [AB and VR]

¹¹ This statement is absent in the first edition. [AB and VR]

Musical score for measures 56-63, featuring woodwinds, brass, strings, and harp. The score includes parts for Flute, Oboe, Clarinet, Bass Clarinet, Horn, Trumpet, Trombone, Tuba, Cello, Harp, Violin I, Violin II, Viola, and Violoncello. Performance markings include *m. Dpf.*, *Solo*, and *Alle pizz*.

The same happens with the retrograde in mm. 56-63:

Retrograde series (transposed down a minor second)

(viola)	A _b	(cello)	F _#	(harp)	C
(viola)	G	(viola)	E _b	(harp)	C _#
(violin II)	E	(viola)	D	(harp)	B _b
(cello)	F	(violin II)	B	(harp)	A
c)		b)		a)	

Retrograde series (transposed up a major third)

(harp)	C _#	(cello)	B	(oboe)	F
(harp)	C	(viola)	A _b	(clarinet)	F _#
(harp)	A	(viola)	G	(bass clarinet)	E _b
(harp)	B _b	(violin II)	E	(flute)	D
c)		b)		a)	

Motive a) and the following c) are simultaneous.¹²

Note the precise correspondence between the intervals of transposition of the series.

The principle of simultaneous ambivalence is a fundamental requirement for the Webernian concept, and his application of it in composition is rigorously logical.

Now one can ascertain more clearly the structural function of the spacing of the three motives in the series. Superimposing them clearly demonstrates the rigorous ambivalence between the melodic and harmonic schemes:

motive a)	┌	minor 2nd	minor 3rd	minor 2nd
motive b)		minor 3rd	minor 2nd	minor 3rd
motive c)		minor 2nd	minor 3rd	minor 2nd

The rhythmic structure follows that of the series: three rhythmic motives for the three motives in which the series is subdivided.



As in the series, considering the series as two six-note motives where motive II is the retrograde-inversion of motive I, in the rhythmic series, considering it as two motives each with six note values, motive II is the retrograde-inversion of motive I.

The rhythmic retrograde-inversion is an augmentation (double) of the smaller values of the original, and a diminution (half) of the larger values.

¹² This statement is absent in the first edition. [AB and VR]

D)	min. 2	min. 3	min. 2	min. 2	min. 3
A	B _b	C _#	C	B	D
II)	min. 3	min. 2	min. 2	min. 3	min. 2
E _b	F _#	F	E	G	A _b

The three rhythmic motives form the material for the whole of the composition, remaining perfectly distinct in their variants by augmentation/diminution and by the insertion of rest in a manner that corresponds to the three motives in which the series is subdivided.

Some of the present procedures of serial composition can be deduced from analyses of recent compositions. They are the result of a historical evolution of music, conditioned by the human and musical necessities of our time. Furthermore, they are also conditioned from recent research and are above all the manifestations of the more extensive possibilities of using single musical elements in conformity with their particular nature. All of this has contributed to a broadening of the scope of music, seen that there are people who are capable of realizing these possible extensions.

Each person takes part of this development according to his own nature and culture and on the basis of his own personal experience. Consequently, a diversity of well-distinguished musical expressions leads to communal compositional principles. To be sure, the nature and culture of the individual do not dissolve at all in the evolution; rather they contribute greatly to giving it its characteristics.

Now let's take in consideration the musical production (particularly that of most recent times) of those composers that one could perhaps call the 'Darmstadt School'—a production that one could equate, in the field of figurative art, to that which has been realized by the Bauhaus in Weimar and Dessau.

From the moment that the thematic function ceased to be developed, instead only continuing to develop the 'serial' function of the dodecaphonic series, the use of four fundamental forms and their transpositions—so important to the thematic concept—is no longer a necessity. The use of two series [forms] is sufficient (typical of Webern), and in the end only one series [form] is needed for deducing the order of the intervals and ultimately the entire compositional structure: the original series either remains unchanged or becomes permuted. The entire composition is thus based on one series [form].

Permutations are performed either internally from the series (in this case each note, depending on the nature of the series, appears only once),¹³ or the pitches are permuted within a larger context, generated by a multiplication of the series (by twelve or a multiple of twelve). ($12 \times 12 = 144$). Naturally in this case each note of the base series appears at least twelve times, though not necessarily every time, depending on the original scheme of the series. In the first case the original series is conserved; in the second it has become projected in a more extensive scope.¹⁴

¹³ Here Nono describes a permutation based on the rearrangement of ordinal positions.

¹⁴ This second method is described more fully in Jeannie Guerrero, "Serial Intervention in Nono's *Il Canto Sospeso*." *Music Theory Online* 12/1, 2006.

The result of the permutation produces the *sonic material*; and thanks to this and to other musical elements (each preformed in its own way, more or less depending on the laws of serialism) the composer ‘creates’ the music proper.¹⁵

The use of successive permutations of the twelve pitches from the series is above all characteristic of the compositional technique of Bruno Maderna, utilized for the first time in 1950 in the *Due Studi per il ‘Processo’ di Kafka*.

The organization of musical elements on the basis of the serial principle becomes determined little by little, in complete freedom, from the creative idea, both in relationship to individual elements and from the point of view of their reciprocal relationship.

In the first of the *Structures pour deux pianos à quatre mains* by Pierre Boulez,¹⁶ the 48 twelve-tone series (the four fundamental forms and their transpositions) correspond to the 48 durational series (the durations form an arithmetic series from 1 to 12, in which the first is a 32nd-note and the last a dotted quarter-note). The two series (I = original, II = inversion) are superimposed in the two pianos, exactly as are the two series of durations.

¹⁵ As one can clearly deduce from a letter from Luciano Berio—not dated, by probably written between March 25 and 31, 1957—Nono had requested some information before his lecture. Berio responded, “I think you should talk about the ‘latest developments of serial music.’ You should secure the fact that the series is dead and buried: it is used only to prepare the material from which the music is *invented*.” [AB and VR]

¹⁶ Composed in 1951.

Mm. 1-64:

In Piano I the 12 series (original and transpositions) are used, of which the first six are:

E \flat	D	A	A \flat	G	F \sharp	E	C \sharp	C	B \flat	F	B
E	E \flat	B \flat	A	G \sharp	G	F	D	C \sharp	B	F \sharp	C
A	A \flat	E \flat	D	C \sharp	C	B \flat	G	F \sharp	E	B	F
B \flat	A	E	E \flat	D	C \sharp	B	A \flat	G	F	C	F \sharp
B	B \flat	F	E	E \flat	D	C	A	A \flat	F \sharp	C \sharp	G
C	B	F \sharp	F	E	E \flat	C \sharp	B \flat	A	G	D	G \sharp

The corresponding rhythmic series;

12	11	9	10	3	6	7	1	2	8	4	5
11	12	6	7	1	9	10	3	4	5	2	8
9	6	8	12	10	5	11	7	1	2	3	4
10	7	12	3	4	11	1	2	8	9	5	6
3	1	10	4	5	7	2	8	9	12	6	11
6	9	5	11	7	8	12	10	3	4	1	2

In Piano II the 12 series (inversion and transpositions) are used, of which the first six are:

E \flat	E	A	B \flat	B	C	D	F	F \sharp	A \flat	C \sharp	G
D	E \flat	A \flat	A	B \flat	B	C \sharp	E	F	G	C	F \sharp
A	B \flat	E \flat	E	F	F \sharp	G \sharp	B	C	D	G	C \sharp
A \flat	A	D	E \flat	E	F	G	B \flat	B	C \sharp	F \sharp	C
G	G \sharp	C \sharp	D	E \flat	E	F \sharp	A	B \flat	C	F	B
F \sharp	G	C	C \sharp	D	E \flat	F	A \flat	A	B	E	B \flat

The corresponding rhythmic series;

5	8	6	4	3	9	2	1	7	11	10	12
8	5	9	2	1	6	4	3	10	12	7	11
6	9	11	5	4	12	8	2	1	7	3	10
4	2	5	3	10	8	1	7	11	6	12	9
3	1	4	10	12	2	7	11	6	5	9	8
9	6	12	8	2	11	5	4	3	10	1	7

The succession of transpositions of the original is regulated by the succession of notes of the inversion. The succession of the transpositions of the inversion likewise follows the succession of notes of the original. In their superposition two notes remain constant:

E \flat	D	A	A \flat	G	F \sharp	E	C \sharp	C	B \flat	F	B
E \flat	E	A	B \flat	B	C	D	F	F \sharp	A \flat	C \sharp	G

A similar thing happens with the superimposition of the two series of durations:

12	11	9	10	3	6	7	1	2	8	4	5
5	8	6	4	3	9	2	1	7	11	10	12

In the two movement Quartet of Bruno Maderna from 1955 the relationships between the different pitch registers, dynamics and attacks are determined by a precise process: all of the material originates from successive permutations of the fundamental series and is

determined by the pitch [altezza] and duration.¹⁷ Pitch registers and dynamics, though, are determined each time by the attacks (pizzicato, al ponte, con l'arco, col legno, battuto).

This composition has the character of having a second movement that is a variation of the retrograde of the first, with varied durations, registers and dynamics. The durations are varied by the insertion of rests between notes and by the rhythmic subdivisions of the longer durational values. These two procedures (the insertion of rests and rhythmic subdivision) in this work represent a new compositional element.

In *Komposition Nr. 2 per Sinustöne*¹⁸ by Karlheinz Stockhausen from 1953, the duration of a note is in inverse relation to its pitch height: the relations 12/5, 4/5, 8/5, 5/12 and 5/4 (harmonic intervals: descending minor tenth, ascending major third, descending minor sixth, ascending minor tenth, descending major third) also determine the degree of transposition of each structure (the structures are vertical or horizontal groupings with one to six sequences; sequence = horizontal pitch groups, formed by mixed tones [*Tongemische*]; mixed tones = vertical groups of notes). The transpositions are based on the following series: 12/5 4/5 8/5 5/12 5/4 5/8 (plus another five permutations of this series).

In my *Incontri* for 24 instruments from 1955, the only fundamental series used remains unvaried throughout, while the series of durations and of dynamics are subjected to

¹⁷ For more on Maderna's serial organization see Christoph Neidhöfer, "Bruno Maderna's Serial Arrays." *Music Theory Online* 13/1, 2007.

¹⁸ Also known as *Studie I* (not *Studie II*, as indicated in *LN-Stenzl* and *LN-Feneyrou*). The title cited by Nono is that by which the piece was referred during the time of its composition. Nono drew on the information relative to Stockhausen's composition, in "Komposition 1953 n. 2, Studie I," *Analyse*, in "Technische Hausmitteilungen des Nordwestdeutschen Rundfunk," 6/1-2, Hamburg 1954 (text also published in *Texte zu eigenen Werken, zur Kunst Anderer, Aktuelles*, V. 2, Köln: DuMont Schauberg, 1964, pp. 23-36). [AB and VR]

permutation in such a way that each note of the series has a different duration and dynamic marking each time it occurs. The order of the durational series also determines the divisions by measure, and thus the sonic density.

In *Zeitmaße* by Karlheinz Stockhausen (1956) serial organization is applied to the pluridimensional essence of the tempo. The composition is determined by combinations of five different types of temporal measurements: 1) tempi metronomically calculated as 12 degrees between a simple tempo and a double tempo, spanning a temporal ‘octave’, so to speak; 2) the tempo indication *so schnell wie möglich* (as fast as possible) can produce different effects depending on the groups of notes that are to be performed as fast as possible and by the instruments that have to play them. There are, in fact, note groups that a player executes with extreme velocity but which seem very slow, in that there are more longer notes in the group than shorter notes. 3) The tempo indication *so langsam wie möglich* (as slow as possible) applies to note groups that the woodwinds must perform within a single breath. Depending on the duration and the pitch of the notes, the breath can be sustained only for so long, and thus it will determine the velocity of the note group. The shorter the duration of breath, the faster the group will be performed, and *viceversa*. Once a player decides on a tempo, the other players will have to conform to that tempo. There is the case where a player who is attempting to play as slow as possible will actually have to perform the written notes as fast as possible. 4) The tempo indication *schnell-verlangsamten* (*veloce-rallentare*) means that note groups are to start *velocissimo* and then are to progressively slow down to a quarter of the speed. 5) The tempo indication *langsam-beschleunigen* (*lento-accelerando*) indicates the opposite. There are multiple combinations of this indication, used in succession and simultaneously

(cf. the indication given by the composer in the program of the third ‘*Musik und Zeit*’ concert of the *Westdeutsche Rundfunk* of Cologne, January 1957).¹⁹

We have knowingly limited the discussion to aspects of compositional technique, passing over the aesthetic aspects. This boundary has been evident, and even necessary in order to better understand some of the lineages in the development of the contemporary serial method. However, it is also clear that the musical and human consequences that result from every technical method should also be taken into consideration.

But as necessary as it was to demonstrate the problems of compositional technique that have arisen in our times, so it is also necessary—in order to avoid academic discussion based on preconceived opinions—to study individual compositions separately, in that they signify, each in its own way, our musical reality, however diverse they may be in relation to their own nature and to their artistic results.

(1957)

[The entirety of the last two sections of the text are here reproduced from ‘Some of the present procedures of serial composition’ (see above) as it appears in a manuscript draft that follows the beginning of the typescript. Despite its provisional state, it is the only source as of yet noted of this portion of text in Italian, and for this reason it is considered particularly important for understanding Nono’s terminology. In it there is a different

¹⁹ Republished with some modifications in K. Stockhausen, *Texte zu eigenen Werke, zur Kunst Anderer, Aktuelles*, V. 2, Köln: DuMont Schauberg, 1964, p. 47. [AB and VR]

ordering of musical examples, as well as a substitution in the final version of *Modes de valeurs et d'intensité* of Messiaen with the *Premier livre* from Boulez's *Structures*. The placement of the *Zeitmaße* example at the end, which is absent in the manuscript, is seen in an outline found in one of the preliminary pages of the present draft.] [AB and VR]

Some of the present principles of serial composition can already be found in recent compositions. They are the consequences and historical development of what has happened in the music already defined through history; they are determined by the musical-human factors of today.

Musical-human because the study, and the major consequences of the use, of each musical element according to its nature, as is particularly possible today, broadens and innovates musical capacity and reality only if there is a *human* to realize it.

Each participates in this development with his own nature and culture based on his own history: to the community of compositional principles that one remembers corresponds a variety of distinct musical expressions. In the development, the proper natural and cultural origins are always present, but not necessarily the precise characteristics. Take in consideration musical production, especially that of more recent times, of those who today can be reasonably considered the Darmstadt school, in as much as there is the connection determined by musical interests and problems that are communal and new, renovating themselves like that which already happened, for example, through the plastic arts in Dessau and Weimar with the Bauhaus.

Development of the serial function (already no longer purely a thematic function) by way of the use of 4 fundamental forms and their transpositions (means more based on a thematic conception) becomes undermined: consequently one arrives at the use of 2 forms or of a single base form, based on the relationship between the serial function of the intervallic order and the consequent compositional technique; that is, if the initial serial ordering of intervals remains fixed or becomes permuted, a single base series is sufficient to specify and to prepare the material, on which then the music becomes composed.

If the series is dependent on permutations, it happens in different ways: being contained each time within the limits of 12 pitches—that is, each time an order of permutations for each serial ordering of 12 pitches (in this case each pitch results only once in the ordering, depending on the properties of the series)—or permuting each pitch based on an order of successive permutations that broadens the series by multiples of 12 (for example, $12 \times 12 = 144$; in this case each pitch of the base series will naturally appear 12 times, but not necessarily each time within the serial scheme of 12 pitches). While in the first way the conceptual serial scheme remains, in the second there is a successive serial projection of 12 pitches of the initial base series.

The resulting permutations are simply *sonic material*, with which the musician participates [*interviene*] in the arrangement [*composizione*] of all of the musical elements.

The use of successive serial projections with permutations of 12 pitches is particularly typical of Bruno Maderna's compositional technique. There one finds its first applications (two *Studi su Kafka* for soprano, recitator and orchestra, 1950).

Different possible degrees of parallelisms of reciprocity and symmetry, and their opposites, are woven into the basic musical elements according to the serial principle. In 1949-50 Messiaen wrote *Modes de valeurs et d'intensité*, where pitches (here organized in modes!) are composed with 12 different durational values, dynamics and rhythmic cells.

In *Komposition 1953 n.2 per Sinustöne* by Karlheinz Stockhausen, the relationship between Zeittdauer der Töne [duration] and the respective Tonhöhe [pitch] is inversely proportional.

1920 Hz (Tonhöhe)	192 cm (Zeitdauer: 76.2 cm/s) ²⁰
800	80
1000	100, etc.

The proportion of frequency, which determines all of the material of frequencies within the gamut $12/5$ $4/5$ $8/5$ $5/12$ $5/4$ (intervals of harmonically superior sounds: fallende kleine Dezime - steigende grosse Terz - fallende kleine Sexte - steigende kleine Dezime - fallende grosse Terz) also determine the degrees of transposition of every structure (Strukturen sind vertikale (simultane) oder horizontale Gruppierungen (sukzessive) von 1 bis 6 Sequenzen. Sequenzen (Klang-Gruppen - horizontale) sind kontrapuntische gebildet - Tongemische (Tongruppen - vertikale) sind von Töne gebildet).²¹

²⁰ The duration is expressed as the length of the magnetic ribbon in centimeters in relation to the velocity in which the ribbon passes. [AB and VR]

²¹ "Structures are vertical groups (simultaneous) or horizontal (successive) from one to six sequences. Sequences (sonic groups - horizontal) are built contrapuntally. Mixtures (groups of sounds - vertical) are formed from single sounds."

12/5 4/5 8/5 5/12 5/4 5/8 (+5 Permutationen, dieser Reihe über ihre eigenen Proportionswerten).²²

1 2 3 5 8 13

1 2 4 8 16

In my *Incontri* for 24 instruments: the single series remains the same while the dynamic and rhythmic series are permuted, so that each pitch of the series has different dynamics and rhythmic values each time. The serial ordering of the durations determines also the division into measures and the density [la dichte] within the measures.

In Bruno Maderna's two movement quartet the use of the registers, dynamics and attacks are wholly dependent: all of the material is derived from successive serial projections of permutations—that is, pitches and durations are fixed—but the registers and the dynamics are chosen depending on the diversity of the attacks (pizzicato, al tallone, col legno, con l'arco, alla punta, etc.).

Characteristic in this composition: the II tempo is a varied mirror inversion of the I tempo, varied in dynamics, registers and durations. The variations of the durations happen through substitutions of rests for sounds and by rhythmic subdivisions of the larger value durations.

²² “5 permutations of this series over their own proportional values.”

Intentionally, the discussion has been limited to compositional technique, and does not investigate compositional aesthetics.

This limitation is clear, even in this case of documenting the serial method through some communal principles and modern developments, in the sense that there is a clear necessity of its integration with the consideration of musical-human results now possible and now achieved.

But as it is necessary to individualize in concrete form today's compositional problems, even if just to put an end to useless aprioristic literary discussions, it is also necessary to consider and place in direct consciousness each of the works that today document in various ways our musical reality, since each of us is different depending on our own personal nature and culture.