Theory of Music – Jonathan Dimond
12-Tone Composition and the
Second Viennese School
(version August 2010)

Introduction

Composers are sometimes grouped together in order to appreciate their combined achievements in shaping the development of Western music over time. Whether they actually considered themselves to be part of a united effort or "school" at the time is debatable, though sometimes it is the case (as with the French "Les Six"). However, music historians have come up with schools such as "The Mighty Handful" (including the Russians Balakirev, Borodin, Cui, Mussorgsky, and Rimsky-Korsakov), and "The First Viennese School "(including the late 18th century composers in Vienna - Mozart, Haydn, Beethoven and Schubert).

The Second Viennese School was headed by Arnold Schoenberg (1874-1951), and was joined by his principal students Alban Berg (1885-1935) and Anton Webern (1883-1945).

As mentioned in the Schoenberg unit, Schoenberg's "classic" 12-tone serial period spanned 16 years (1923-1938) - after quite a long hiatus from serious composition (the years 1915-1922). Perhaps it was during this time that the "method" was gestating...

As a natural extension from free atonality and expressionism, these composers and many followers around them embraced 12 tone serialism as a new way to organize music. They saw themselves not as revolutionists, but rather as evolutionists. So, what is 12 tone serialism?

12 tone serial music differs from free Atonal music in that it seeks to use the chromatic spectrum in such an ordered way as to limit tonal implications and pitch hierarchy. 12 tone serial music uses a *series* as the basis for pitch structure, which use all pitch classes in a particular order. Variation and development occurs through various processes – such as inversion, retrograde and transposition - which effect the order of the notes in the series (rather than the total content as such). When performing or analyzing such variations of a Principal/Original series, look for patterns and changes in the order of the pitch classes and intervals.

A simile for *series* is a 12 tone *row*. (Do not confuse this with a *set* of unordered pitch class.) A 12 tone row is an ordered collection of pitch classes.

The 12 tone matrix

Like our Basic Operations performed on ordered pitch intervals to create variants in the prior unit of this course, we use the same Basic Operations to create variations to 12 tone rows.

O = Original row (also called P for Prime or Principal)
I = Inversion of the Original row
R = Retrograde of the Original row
RI = Retrograde of the Inverted row

Given that there are 12 transpositions of all of these forms, there are 48 series forms in total. A "12 by 12 matrix" displays all these 48 forms at once.

	I_2	I_1	I_9	I_{10}	I_5	I_3	I_4	I_0	I_8	I_7	I_6	I_{11}	
P_2	2	1	9	10	5	3	4	0	8	7	6	11	R_2
P_3	3	2	10	11	6	4	5	1	9	8	7	0	R_3
P_7	7	6	2	3	10	8	9	5	1	0	11	4	R_7
P_6	6	5	1	2	9	7	8	4	0	11	10	3	R_6
P_{11}	11	10	6	7	2	0	1	9	5	4	3	8	R_{11}
P_1	1	0	8	9	4	2	3	11	7	6	5	10	R_1
P_0	0	11	7	8	3	1	2	10	6	5	4	9	R_0
P_4	4	3	11	0	7	5	6	2	10	9	8	1	R_4
P_8	8	7	3	4	11	9	10	6	2	1	0	5	R_8
P_9	9	8	4	5	0	10	11	7	3	2	1	6	R_9
P_{10}	10	9	5	6	1	11	0	8	4	3	2	7	R_{10}
P_5	5	4	0	1	8	6	7	3	11	10	9	2	R_5
	RI_2	RI_1	RI_9	RI_{10}	RI_5	RI_3	RI_4	RI_0	RI_8	RI_7	RI_6	RI_{11}	

Note that the subscript number indicates the pitch class that the Original (Prime) or Inverted form start on, but the Retrograde and Retrograde Inversion forms end on.

The easiest way to build such a matrix is to start with the Original row and write in left-to-right in the top row. It doesn't matter if it starts on 0, but you can transpose it if you prefer. Then write the I row starting on the same pitch class. This is done by starting on the same pitch class from the top left corner and inverting all the intervals as you write down the left most column. (Remember, inversion means opposite polarity of interval). Now you have the starting pitch, reading left to right, for the remaining 11 forms of the Original row. Just transpose the Original row to each of these starting pitches.

To test your working, use the online matrix calculator linked from my web site!

Discovering the Prime Form series in a composition is an important analysis task, and can often be achieved by looking at the initial themes of the piece or movement. Converting this into the 12 tone matrix often assists further analysis because it gives the variants to such a theme that are contained in the music.

Arnold Schoenberg
String Quartet No.4, Opus 37 (1936)

This string quartet was commissioned by the wealthy American patron Mrs Elizabeth Sprague Coolidge, and was premiered by the Kolisch Quartet. It was composed during Schoenberg's relocation from the east coast of the USA to Los Angeles. It has four movements.

The first three bars of the opening movement reveals Schoenberg's strong sense of melody, which is not bound by the rules which he famously put in place (in terms of not repeating notes from the 12-tone row in order to avoid placing extra importance on any one note). The violin plays the following theme.

Task: Identify the Principal Row (O2) and Invert it from G (I7).
Listen: Arditti string quartet recording, CD 2 track 5 (first movement).

The basic row is presented in the first five bars; starting in bar six it is contrasted with a lyrical secondary theme. Over the course of the movement, lyrical episodes develop from this theme, which is repeatedly contrasted with the striking main theme. In addition to the basic row, which is notable for its tone repetition, thirds and sixths are heard not only as horizontal intervals but also as chordal elements of the accompaniment.
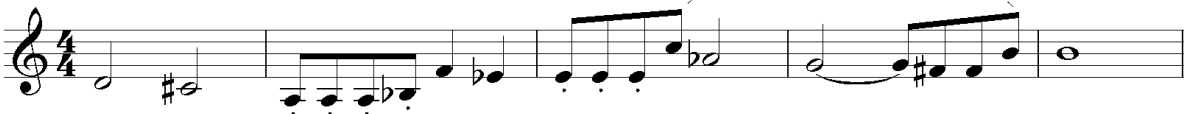
http://www.schoenberg.at/6_archiv/music/works/op/compositions_op37_notes_e.htm

The secondary theme based upon I7 is therefore inversionally-related to the opening theme.

Task: Determine the value of n for the secondary theme when T_nI is applied to O2.
Read Straus, p.40-41.

Violin 1 opening theme

Principal Row - O2

Principal Row Inverted - I7

The dotted slur in the theme indicates the prominent role that half-steps play in the ear's quest for resolution. We tend to hear such relationships retrospectively, as the high C "hangs" in our ear and short-term memory until the B "resolves" it by step.

With 12-tone serial music it is useful to break up the music into meaningful and digestible chunks. Being divisible by 3, 4, and 6, it is common to find meaningful patterns within segments of these sizes within the 12 tone row. This is a process called *segmentation*.

The horizontal square braces indicate the role hexachords (6-note partitions of the 12 tone row) have in creating structural unity and harmonic relationships in the music. Here we have the same set of six notes appearing in the 2nd hexachord on the principal and 1st hexachord of the Inverted rows. This is an example of "hexachordal combinatoriality". Basically speaking, *combinatoriality* is a special likeness that segments of different forms of a row possess, which is used by composers to unify linear and vertical (chordal and melodic) material.

Read Straus, p.145-149 & 51-52.

Composers don't just create a 12-tone row and let it and its variants run their course. Rather, the nature of the aforementioned *segments* are organized as important musical motives themselves. In fact, composers construct 12-tone rows with careful consideration of the intervallic structure of their 3-, 4- and/or 6-note partitions in accordance with their musical ideas.

Every bar in this piece contains the total chromatic. The first bar plus eighth-note of the violin theme sounds three notes (D, C#, A) and is accompanied by notes 4-6, 7-9, then 10-12 from the Principal Row (O2) in the other strings. So it can be seen that Schoenberg has considered the *subset structure* of his original 12-tone row in terms of its four *discrete trichords* at the start of this piece.

Let's define the two ways you could look for the *subset structure* of a 12-tone row:

1.   Discrete subsets (trichords, tetrachords, hexachords)
These are non-overlapping segments of a series. E.g. the discrete trichords for the Principal Row above (O2) are:
[2,1,9] [10,5,3] [4,0,8] [7,6,11]

2.   Consecutive subsets.
These are overlapping (contiguous) segments of a series. E.g. the consecutive trichords for the Principal Row above (O2):
[2,1,9] [1,9,10] [9,10,5] etc

Read Straus, p.154-156.

Task: Find within the Principal Row (O2) played by violin 1 the three occurrences of the set [0,1,4,8]. (Hint: this tetrachord appears as a consecutive – not discreet – collection.)

(Answer: It is played as the 2nd-5th notes; 6th-9th notes; and 7th-10th notes in O2.)

As Straus points out (p.156), Schoenberg chooses to relate his vertical and linear material through careful intersection of the accompanying trichords with the Violin 1 melody line, by intersecting three vertical occurrences of the [0,1,4,8] set during the course of the Principal Row (O2) – itself containing three occurrences of the same set.

Anton Webern
String Quartet Opus 28 (1938)

Doomed to total failure in a deaf world of ignorance and indifference, he inexorably kept on cutting out his diamonds, his dazzling diamonds, of whose mines he had a perfect knowledge. (Igor Stravinsky)
http://en.wikipedia.org/wiki/Anton_Webern

This three-movement string quartet was also commissioned by Mrs Coolidge. It is famous for its featuring of the B-A-C-H motif (Bb-A-C-B) within its 12-tone serial language. Like so many works of Webern, it is extremely refined and contains symmetry and classical forms such as canon and fugue.

<mark>Tasks:</mark>

LISTEN to Julliard string quartet recording, CD 3 track 5 (first movement).
READ score.
WRITE OUT the Principal Row (O7) and analyze the intervals. Express them as ip <x,y>, i<a,b> and i(a,b).
WRITE OUT the next row and analyze it.
Analyze the BACH motif and express it in Prime Form.
Segment these two rows into three tetrachords, and four trichords. Express them in Prime Form.
Analyze the three tetrachords forming the 12-tone row as it is presented in the subject in the A Tempo section at bar 66-70 (p.6 of the score). These tetrachords are shared by the violin 1 and cello.
Notice the BACH motif contained therein?
These second two tetrachords perform the basic operation of R and transposition on the first tetrachord. Furthermore, as hexachords they also display likeness - the second hexachord is an RI of the first:
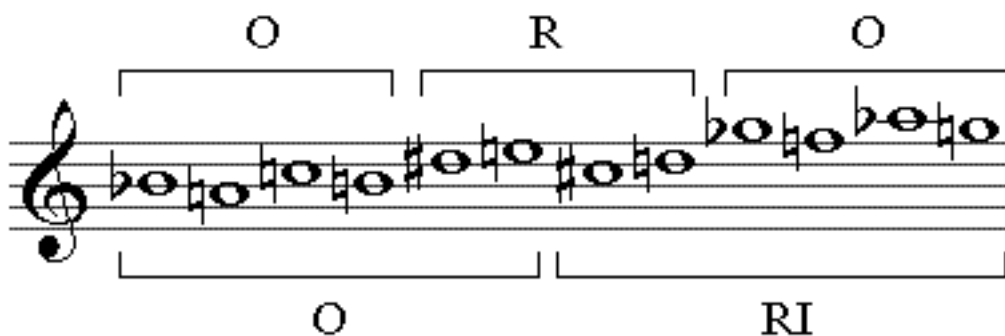
Bibliography/Discography

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