## COMPOSITIONAL USES OF THE ROW

There are a number of ways in which rows are actually used in compositions. Generally, a twelve-tone work consists of the presentation of various row forms at a number of transpositions, the forms being used sometimes in succession and sometimes simultaneously. The notes may appear in any octave, and the order of the notes of each row form is usually preserved, but there are exceptions, Notes can be sounded simultaneously, as in a chord, and there is no "rule" as to how the notes in this case must be arranged. Repeated notes are not considered to alter the order of the row, and neither are tremolo figures-using two of the notes repeatedly in alternation. You may also occasionally encounter overlapped segments of a row (as in Example 10-4) and arbitrary reordering of the row for compositional purposes.

Because most music involves more than a single line, the composer must either present two or more row forms simultaneously or distribute a single row form among the various voices. Both of these approaches are widely used, which complicates the task of determining the original row at the beginning of an analysis. Turn back to Example I0-4 for a minute, and imagine that you had no prior knowledge of the row. You might notice that the melody in the right hand comes to a stop after eight notes (on the D) and that the left hand in the same passage contains four notes, making twelve in all, so you would check out the possibility that the row has been distributed between the two lines. This could have been done in various ways, such as:

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

The first of these diagrams is the more commonly used method of distributing a row, but we could not rule out the second possibility. Even if we want to go ahead on the assumption that the first diagram is basically correct, we still would not be sure of the entire order, because some of the notes are played simultaneously (3-4 and 7-8), and notes in a simultaneity do not have to be arranged in any particular vertical order with respect to the row. In any case, we would have to analyze more of the piece to find out the answers to these questions.

As it turns out, we can see that Schoenberg has not distributed the row between the two hands, because the eight notes in the treble and the four in the bass include only ten of the pitch classes: C and A are missing, and Db and G occur twice. Instead, $\mathrm{P}-4$ continues through the $\mathrm{B} b$ in m .3 , while $\mathrm{P}-10$ is used in the bottom staff. In mm. 3-6 Schoenberg uses the other basic approach, which is to distribute a single row form among the voices. In this and in some of his other works. Schoenberg breaks his row into three tetrachords, which he then uses somewhat independently. That is, he might begin with the third tetrachord in some voice and introduce the first and second tetrachords later. Sometimes the order of pitches within each tetrachord is maintained, and at other times it is not. A more frequently used method is the one shown in the first diagram above, where the notes of the row are presented in order.

Turn back to Example 4-7 (p. 82) for an especially interesting example of row technique. (Remember that in this example the horn is written at concert pitch.) The excerpt, from Schoenberg's Wind Quintet, Op. 26, consists of three statements of P-3 (plus a final Eb) of the following row:

| Eb | G | A | B | $\mathrm{D} b$ | C | Bb | D | E | F | G | F |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

Schoenberg distributes the notes so that the horn melody (the $\mathrm{H}^{-}$symbol designates the primary line) uses each member of the row only once (disregarding immediate repetitions):


The resulting succession of twelve pitch classes in the horn forms a new twelve-tone row, drawn from but distinct from the original row.

Ernst Křenek demonstrates another approach in Example 10-6. The row upon which this work is based is:

$$
\begin{array}{cccccccccccc}
\mathrm{C} & \mathrm{~Eb} & \mathrm{Db} & \mathrm{~Gb} & \mathrm{D} & \mathrm{Bb} & \mathrm{~A} & \mathrm{Ab} & \mathrm{~B} & \mathrm{G} & \mathrm{~F} & \mathrm{E} \\
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12
\end{array}
$$

Here Křenek keeps the initial pitch of P-0 as a pedal point, doubled at the octave, while the other instruments unfold the remainder of the row in a harmonic progression until the cadence on F . The next two measures (not shown) are similar, ending with a strong $\mathrm{B} b-\mathrm{F}$ cadence. Although this is a serial work, it is clear that the C's here are acting as a dominant of the F , and both pitch classes are prominent at the end of the opera as well.

EXAMPLE 10-6 Křenek: Korl V (1933), I, mm. I-4 © 1933 Universal Edition. All rights reserved. Used by permission of European American Music Distributors Corporation, sole U.S. and Conadian ogent for Universal Edition.)


## SET SUCCESSION

Although a composer has forty-eight row forms available, few twelve-tone compositions make use of all of them-in fact, some works use only the prime form and at a single transposition. One of these is another of Schoenberg's early serial works, the fourth movement from his Serenade, Op. 24 (1923), for voice and seven instruments. The text features eleven-syllable lines, which Schoenberg sets to permutations of his row:

Line 1: notes $|-1|$
Line 2: notes 12-10
Line 3: notes 11-9
etc.
Not many twelve-tone works are so restricted, however. Most employ all four basic forms and several transpositions. One of the more difficult tasks of the analyst is attempting to determine why a particular row form and transposition have been chosen. It is not enough to put the label "R-3" on the score without considering why a retrograde form was chosen and why R-3 instead of some other transposition, even though we may not be able to find an explanation in every case.

Invariance is frequently a factor in the choice of transpositions. In the Schoenberg excerpt, Example $10-4, \mathrm{~B} b$ is the invariant pitch class in m .3 between P-4, where it is the last note, and I-10, where it is the first. It is not uncommon for one or more pitch classes to serve as common tones between two row forms in this manner. Schoenberg's reasons for choosing P-10 as the first row in the left hand are not hard to guess. Presumably he chose imitation at the tritone as an effect analogous to the imitation at the dominant so much a part of Baroque style, and it offered the advantage of keeping intact the pitch classes that form the two tritones in the top voice:
$\mathrm{G} / \mathrm{D} b$ answered by $\mathrm{D} / \mathrm{G}$
$\mathrm{Ab} / \mathrm{D}$ answered by D/G $\#$
Also, Schoenberg's choice of T-10 and P-10 conforms to his overall plan for the work, which is to use only P-4, P-10, I-4, I-10, and their retrogrades. Each of these row forms begins on E and ends on Bb (or the reverse), and each contains the tritone $\mathrm{G} / \mathrm{Db}$ (or $\mathrm{D} b / \mathrm{G}$ ).

Luigi Dallapiccola's overall plan for "Fregi," the sixth movement of his Musical Notebook for Annalibera (Quademo Musicale di Annalibera) (1952), goes as follows:

1. Compose a melody for mm . 1-6 to be played by the right hand.
2. In $\mathrm{mm} .7-12$, invert that melody and give it to the left hand.
3. In order to carry the idea of inversion a step further, accompany mm. 1-6 with an I form, and mm. 7-12 with a P form.

The prime form of the row is:

| A\# | B | D | $\mathrm{F} \ddagger$ | $\mathrm{G} \#$ | D | $\mathrm{D} b$ | F | G | C | A | E |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

Notice that this row has tonal implications (for example, the triads on B and A) that we might expect Dallapiccola to make use of. The melody in mm . 1-6 actually consists of two row forms, P-10 (mm. 1-4) and R-5 (mm. 4-7). Here the link between the rows is the E, which is the second note of R-5:

| B | (E) | G | D | C | $\mathrm{G} \#$ | A | E | D | B, | Gb | F |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

This allows a diatonic "progression" from the A minor triad at the end of P-10 to the E minor triad at the beginning of $\mathrm{R}-5$. It also allows for a quintal chord $(\mathrm{A}-\mathrm{E}-\mathrm{B})$ that is beautiful in context. All of this happens in the fourth measure of Example 10-7. The accompaniment in $\mathrm{mm} .3-6$ is provided by I-8:

$$
\begin{array}{cccccccccccc}
\text { Ab } & \text { G } & \mathrm{Eb} & \mathrm{C} & \mathrm{Bb} & \text { (E) } & \mathrm{F} & \mathrm{Db} & \mathrm{~B} & \mathrm{FH} & \mathrm{~A} & \mathrm{D} \\
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12
\end{array}
$$

EXAMPLE 10-7 Dallapiccola: Musical Notebook for Annalibera (1952)."Fregi," mm. I-8


Just as P-10 is ending and R-5 is beginning in m. 4, I-8 in the accompaniment needs an E, the shared pitch class between P-10 and R-5. Dallapiccola puts the E for I-8 in the top staff,
stem up, and all three rows come together at this point. The use of I-8 also allows the first half of the piece to end in m .6 on an inversionally symmetrical sonority, A-D-Gb-F, or [0347], which means that when the first half of the piece is inverted to form the second half, the final sonority will be a (transposed) duplication of this one,

The only remaining row choice to be discussed is the transposition level for the inversion of the melody, which begins with the Cb in the bottom staff at the end of m .6 . The obvious answer is that I-11 is the only inversion that keeps the opening two dyads invariant:

| $\mathrm{P}-10$ | $(\mathrm{~A} \# \mathrm{~B})$ | $(\mathrm{D} \# \mathrm{~F})$ |
| :--- | :--- | :--- |
| $1-11$ | $(\mathrm{BA} \#)$ | $(\mathrm{F} \# \mathrm{D})$ |

Another consideration might have been the nice Gb major-7th sonority in m .7 formed by the end of R-5 and the beginning of I-11.

## COMBINATORIALITY $\bar{\square}$

Sometimes the choice of row forms or transpositions is governed by a desire to form aggregates (without duplication of pitch class) between portions of row forms. For example, in the following diagram, the row that Schoenberg used for his Piano Piece, Op. 33a (1929), is followed by its RI- 3 form. Notice that when the second hexachord of P-10 is combined with the first hexachord of RI-3, they form an aggregate. In effect, we have created a new row, called a secondary set, by combining two hexachords from two different row forms.


This combining of row forms to form aggregates is called combinatoriality, and it is an important aspect of some serial compositions. Most often, however, the combining is done vertically:


This diagram is seen in notation in Example 10-8. The first aggregate occupies m. 14 through the first two notes of m .16 , and the second aggregate occupies the rest of the excerpt. Notice that Schoenberg freely retrogrades or repeats row segments, as in $\mathrm{C}-\mathrm{B}-\mathrm{A}-\mathrm{B}-\mathrm{C}$ in mm. 14-15.

EXAMPLE 10-8 Schoenberg: Piano Piece, Op. 33a (1929), mm. 14-18 (Used by permission of Belmont Music Publishers.)


Schoenberg's row is so constructed that any pair of row forms that can be combined hexachordally to form twelve-tone aggregates can also be combined tetrachordally to form three sets of eight pitch classes each:

| RI-3: | A | B | F | F\# | A\# | C | G | E | D | C\# | G\# | D\# |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| R-10: | E | D | Ab | G | D $\ddagger$ | C ${ }_{7}$ | F\# | A | B | C | F | Bb |
|  |  | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

Though this does not produce twelve-tone aggregates in the way that the combined hexachords do, the technique is similar. In Example 10-9 each pair of tetrachords occupies approximately one measure.

## EXAMPLE 10-9 Schoenberg: Piano Piece, Op. 33a (1929), mm. 3-5 (Used by permission of Belmont Music Publishers.)



Other rows are constructed to produce tetrachord aggregates by combining three rows vertically, or trichord aggregates by combining four rows vertically; however. hexachordal combinatoriality is the approach most commonly used.

Combinatoriality guarantees a more controlled recycling of the twelve pitch classes. and to some it seems a necessary extension of the twelve-tone aesthetic. Schoenberg invented this technique, although he obviously was not using it in his Suite (see the juxtaposed $\mathrm{G} / \mathrm{D}$ b and $\mathrm{D} b / \mathrm{G}$ in Example 10-4). Nor was Dallapiccola interested in combinatoriality in his Notebook (notice the duplicated G's in m. 3 of Example 10-7). In fact, most rows cannot by their nature be used combinatorially (except with their retrogrades) and must instead be specially constructed for that use. But combinatoriality has been of considerable interest to some composers, and a large number of pieces are combinatorial throughout.

## THE ANALYSIS OF SERIAL MUSIC

In analyzing the use of rows in a serial piece, it is often enough to label the row forms (P-0, etc.) without writing the order numbers on the music. If the texture is complex or if some unusual row techmique is being employed, it may be necessary to write the order numbers near the noteheads and even to join them with lines. Always work from a matrix. If you get lost, try to find several notes that you suspect occur in the same order in some row form, and scan the matrix for those notes, remembering to read it in all four directions.

It is important to understand that the labeling of row forms and the consideration of the details of their use is only a part of the analysis of a serial composition, somewhat analogous to identifying the various tonalities of a tonal work. Questions regarding form, thematic relationships, texture, rhythm, and other matters are just as relevant here as in the analysis of more traditional music. The music of classical serialism is not especially "mathematical," and it is not composed mechanically and without regard to the resulting sound or the effect on the listener. Probably the best way to appreciate the processes and choices involved in serial composition is to try to compose a good serial piece. The exercises at the end of this chapter will provide some practice at attempting this.


The pitch materials of a serial work are derived from the twelve-note row, so an analysis should begin with the row itself. Two special types of row are derived sets and all-interval sets. A composition may make use of the prime row, its retrograde, its inversion, and its retrograde inversion, each of which can appear at any of twelve transpositions. This pitch material may be conveniently displayed in the form of a matrix.

Row forms may be used compositionally in a number of ways. For example, a single row form may be distributed among the voices, or more than one row form may be used at the same time. The choice of row forms is often related to invariance or combinatoriality, among other reasons.

Analysis of serial music includes identification of the row forms and consideration of the reasons for choosing a particular row form and transposition, but a thorough analysis cannot be confined only to serial matters.

## NOTES

1. Jan Maegaard, "A Study in the Chronology of Op. 23-26 by Arnold Schoenberg." See the chart on p. 108.
2. Another approach (and one that was used in previous editions of this book) labels the first appearance of the row as P-0, no matter what pitch class it begins with, and numbers the transpositions chromatically from that pitch class. Also, some authors have employed the letters S or O instead of P for the prime form of the row.
3. Another type of all-interval row contains all of the intervals only if some of them are ascending and others are descending. The Dallapiccola row discussed in this chapter is one example.
4. The so-called "hexachord theorem." See John Rahn, Basic Atonal Theory, p. 105.


## Part A: Fundamentals

1. Suppose $\mathrm{P}-7$ begins on G and ends on $\mathrm{B} b$ :

Form Begins on Ends on
(a) P-6
(e) I-1
(b) P-11 $\qquad$ (f) I-9
(g) RI-2
(h) RI-7
2. Analyze the row from Dallapiccola's Musical Notebook for Annalibera (p. 209).
3. Analyze the row from Schoenberg's Wind Quintet, Op. 26 (p. 208), and construct a matrix.
4. The following set is P-0 from the first of Milton Babbitt's Three Compositions for Piano (1947), Analyze it and construct a matrix.
Bb Eb F D C Db G B B F \# A G E
5. Do the same for the following set, from Webern's Symphony, Op. 21.

A F\# G G! E F $\quad \mathrm{B} \quad \mathrm{Bb} \quad \mathrm{D} \quad \mathrm{D}$ b $\mathrm{C} \quad \mathrm{Eb}$
6. The following row consists of two [014589] hexachords (also referred to in Chapter 2 as the "hexatonic" or "augmented" scale). This row can be used combinatorially with three traspositions each of the P, I, R, and RI forms of the row. Find the three transpositions of the P form and the three transpositions of the I form that will work combinatorially with P-3. You may find it helpful to construct a matrix before beginning.

Eb Ab G B C E Bb A C\# F\# F

## Part B:Analysis

1. Turn back to Example 6-3 (p. 119). Note that each accidental effects only the note it procedes.
(a) Analyze the row forms used in the excerpt using the matrix you constructed for Exercise A. 4.
(b) Is the row usage in m. 10 combinatorial? How about m. 11 ? Explain both of your answers.
(c) Is there a secondary set formed by the last hexachord of $m .9$ and the first hexachord in the left hand in m .10 ? If so, write out the secondary set. Does something similar happen the right hand from the end of $m .11$ through the beginning of m. 12? Explain.
2. Turn back to Example 2-B-3 (p. 40).
(a) Analyze the row forms using the matrix you constructed for Exercise A.5. (Hint: Four row forms are used simultaneously.)
(b) Is this excerpt combinatorial? How can you tell?
(c) Is the excerpt canonic? Explain.
3. Schoenberg: Wind Quintet, Op. 26 (1924), III, mm. 8-15. This excerpt is a continuation of Example 4-7 (p.82). We discussed the use of the row in Example 4-7 in the section titled "Compositional Uses of the Row", and you constructed a matrix for this row in Exercise A.3. This excerpt features a duet between the clarinet and horn, with a secondary duet in the flute and oboe.
(a) Analyze the row forms in the clarinet and horn. The Eb in the bassoon is part of the first row, but the Fs in the horn is not and may be ignored.
