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No Simple Pieces - Curricular Coherence, Row Combination, Classroom Vocalization, and the Trio from Schoenberg's Suite for Piano, Op. 25

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No Simple Pieces: Curricular Coherence, Classroom Vocalization, Row Combination, and the "Trio" from Schoenberg's *Suite for Piano*, Opus 25

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During his essay "Composition with Twelve Tones" (1941), Schoenberg points to the compositional skill required to manage the relationship between the Trio's canonic voices:

> "The Trio of this Menuet is a canon in which the difference between the long and short notes helps to avoid octaves. The possibility of such canons and imitations, and even fugues and fugatos, has been overestimated by analysts of this style. Of course, for a beginner it might be as difficult to avoid octave doubling here as it is difficult for poor composers to avoid parallel octaves in the 'tonal' style. But while a tonal composer still has to lead his parts into consonances or catalogued dissonances, a composer with twelve independent tones apparently possesses the kind of freedom which many would characterize by saying 'everything is allowed.' 'Everything' has always been allowed to two kinds of artists: to masters on the one hand, and to ignoramuses on the other."[1]

There is more disdain than detail in Schoenberg's commentary; about compositional practice, he writes only of "avoiding octaves." As shown later in this paper and as one might suspect from a composer of Schoenberg 's experience and ability, other more sophisticated methods of contrapuntal organization saturate the "Trio." Although undergraduate theory curricula often leave only a short time for twelve-tone study, it is imperative that we teach students to appreciate such row combination relationships. For if students learn noth-

[1]Arnold Schoenberg, "Composition with Twelve Tones," *Style and Idea*, ed. Leonard Stein, trans. Leo Black (London: Faber and Faber, 1975): 235.

ing of Schoenberg's "mastery" from our teaching, they are unlikely to respect the twelve-tone repertoire. After all, *anyone* could write a canon if the harmony didn't matter! With the pedagogical goal of equipping undergraduate students to uncover or at least understand and appreciate such relations, the paper presents an analytic framework with accompanying vignettes, analyzes the "Trio," and offers musically convincing ways to present these analytic findings in a classroom setting.

Curricular Coherence

In his book *Teaching Approaches in Music Theory*, Michael Rogers underlines the importance of curricular continuity in the pedagogy of twentieth-century music:

> "The main point is that some approach be chosen—that a rationale exists—so that a course does not ramble from topic to topic and issue to issue but is bound together by a predetermined view or governing philosophy that provides some bearings—and that students perceive what that philosophy is."[2]

The following set of issues organizes the analysis of twelve-tone serial compositions and sets the stage for a coherent pedagogical approach to that repertoire. Pitch-class (pc) relationships within such works can be divided into three categories. *Intra-row relations* feature two or more subsets of a single row form, and they permeate an entire piece because they exist within *each* row form. *Inter-row relations* compare one row form with another. The most common type is pitch-class *invariance*, in which a subset of one row form appears untransposed in another. Finally, in *row combination*, a subset may draw pcs from two or more row forms. Example 1 provides sample situations from each of these three categories. Examples 1(a) and (b) depict intra- and inter-row relations, respectively. Example 1(c) depicts two row combination situations. The first relates two subsets, *each* involving pcs from both row forms, and the second relates a bi-row subset to a subset of row P.

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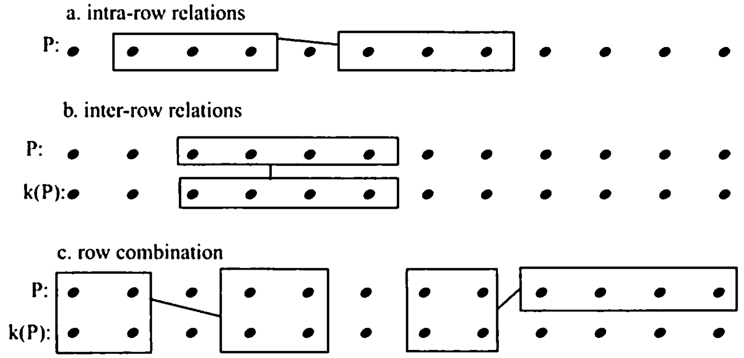
[2]Michael Rogers, *Teaching Approaches in Music Theory: An Overview of Pedagogical Philosophies* (Carbondale and Edwardsville: Southern Illinois University Press, 1984): 73.

Example 1: Categories of relationships in twelve-tone works.



Within these broad categories tremendous variety is possible. The subsets involved in these relations may be composed of temporally-adjacent pcs, as in Example 1's situations, or non-adjacent pcs. Subsets may be of any size and number, and may overlap with one another or be disjoint. Analyses of pc structure typically relate subsets via operations such as transposition-by-n (T_n), inversion (I), and occasionally the cycle-of-fifths transformation. While *set-type* relationships do not preserve pc ordering, *segment-type* relations do and therefore may also invoke retrograde (R) and/or rotation-by-n (r_n). Although temporal ordering is the cornerstone of analytic technique, we may also consider *pitch-space ordering*, the ordering of pcs from low to high. Further, all of these types of relations operate on various *levels*, governing both small and large-scale structure. Moreover, we can study how other dimensions of the *musical realization*—dynamic, duration, contour, meter, articulation, texture, etc.—

help to clarify or conceal various pc relationships.[3] Finally, while analyses usually focus on relationships within a given movement, they may also address relationships with other movements, pieces, and repertoires. Because of the numerous possible combinations of all of the above, relationships are various shades and combinations of simple/complex, sparse/comprehensive, and clear/subtle.

Example 2 relates these many analytic possibilities to the undergraduate curriculum.[4] "Guidelines for Twelve-Tone Analysis" helps students to organize each twelve-tone analysis into three principal categories (intra-row, inter-row, and row combination relations), and encourages them to draw on many facets of their musical expertise. "Analytic Resources" gives a sense of the breadth of knowledge and skill that students may invoke when they have already studied tonal, extended tonal, and atonal music. Though not all-inclusive, this framework fits my current teaching situation (eight classroom hours devoted to the study of twelve-tone music), in which students find a summary that fits on the front and back of a single sheet of paper to be quite helpful. Much of this framework is standard and/or self-explanatory but it is worthwhile to highlight five issues. First, the analytic resources that students first learned while studying tonal

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[3]For treatments of the role of segmentation in analysis see James Tenney and Larry Polansky, "Temporal Gestalt Perception in Music: A Metric Space Model," *Journal of Music Theory* 24 (1980):205-41; Christopher Hasty, "Segmentation and Process in Post-Tonal Music," *Music Theory Spectrum* 3 (1981):54-73; and Dora Hanninen, "A Theory of Segmental Association with Analytic Applications to Four Array-Based Compositions," Ph.D. dissertation, University of Rochester, 1996.

[4]The available textbooks address twelve-tone theory in varying degrees of depth. For texts that focus primarily on atonal music consult Joel Lester, *Analytic Approaches to Twentieth-Century Music* (New York: Norton, 1989) and Joseph N. Straus, *Introduction to Post-Tonal Music* (Englewood Cliffs: Prentice Hall, 1990). For texts that treat a broader range of twentieth-century musical topics and which therefore have briefer twelve-tone sections, see Stefan Kostka, *Materials and Techniques of Twentieth-Century Music* (Englewood Cliffs: Prentice-Hall, 1990) and J. Kent Williams, *Theories and Analyses of Twentieth-Century Music* (New York: Harcourt Brace College Publishers, 1997). For advanced pedagogical situations consider the comprehensive exposition offered by Robert Morris, *Class Notes for Atonal Music Theory* (Hanover, N.H.: Frog Peak Music, 1991) and *Class Notes for Advanced Atonal Music Theory* (Lebanon, N.H.: Frog Peak Music, 2001).

Example 2: Analytic framework.

GUIDELINES FOR TWELVE-TONE ANALYSIS:

A. PRELIMINARIES. (1) Find a row, construct a matrix, and label all row forms. Remember that each row may be found in a single voice, instrument, or register, or may be a collaborative effort involving multiple voices, instruments, or registers. Remember that rows may be re-ordered and several rows may unfold simultaneously. (2) Study the circumstances surrounding the composition of the work (place in *oeuvre*, biographical facts, composer's comments about the piece). Address these issues in your paper *only* if they relate directly to your thesis.

B. INTRA-ROW RELATIONS. (1) Study set-/segment-type repetition and musical realization in the first (linear) row statement. Prepare a musical example that identifies this repetition and write accompanying prose that addresses the relationship between pc structure and musical realization. (2) Each linear row statement will generate the same set-/segment-types—so don't re-calculate them all. But if a row realization radically re-orders the row's pcs you will need to do more calculation and searching to determine what set-types organize the passage and if these are the same or different as those that organize linear row statements.

C. INTER-ROW RELATIONS. (1) Search for pc invariance (T_0 relations) involving ordered or unordered sets of temporally-adjacent pcs, and ordered sets of non-adjacent pcs. Compare each row form used in the piece to each other one. Consider if/how aspects of the musical realization make the invariance easier to hear. Draw some conclusions, construct musical examples, and write accompanying prose. (2) Compare and contrast row realizations. What are the implications for the form of the piece? Summarize your findings in an example with accompanying prose. (3) If the entire row articulates RI or R-invariant pc-interval series, discuss the implications for the number of distinct row forms.

D. ROW COMBINATION. (1) Where rows are superimposed check for combinatoriality. Whether or not there is combinatoriality, search for set-/segment-type repetition and consider how aspects of the musical realization clarify/conceal these. This is a lot of work. (2) Construct a form diagram that identifies the row forms and their relationships. Study transpositional relations. Do these global relations replicate local ones?

E. ANALYTIC RESOURCES. Use all of the analytic techniques, intuition, and musicality developed during your study of tonal, extended tonal, and atonal music.

ANALYTIC RESOURCES:

A. GENERAL. Sing, play, and listen to get you started thinking about the music.

(continued...)

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Example 2: (continued...)

<u>TONAL MUSIC</u>

B. HARMONY AND VOICE-LEADING. Intervals, key, scale-degree, triads/seventh chords, passing/neighbor, non-chord tones, modulation, harmonic rhythm, tonal closure, levels, parallel/contrary/similar motion, conjunct/disjunct motion, etc.

C. MOTIVIC TRANSFORMATION. Real/tonal transposition/inversion, intervallic contraction/expansion, octave transfer, retrograde, other order changes, interpolation, ornamentation, exact/inexact rhythmic augmentation/diminution, changes in dynamic/articulation, metric displacement, sequence, fragmentation, canon, stretto, large-scale replication, etc.

D. FORM. Phrase, period, binary, ternary, rondo, sonata, invention, fugue, passacaglia, theme and variations, elision, (re-)transition, episode, etc.

E. TEXT-MUSIC RELATIONS. Repeated words, phrases, vowel/consonant sounds, rhyme/metrical schemes, parallel sentence structure, analogy, etc.

<u>EXTENDED TONAL MUSIC</u>

F. EXTENDED TONAL TECHNIQUES. Diatonic/altered ninths, elevenths, and thirteenths, modes, diatonic, octatonic, whole-tone, pentatonic, symmetry, golden mean, etc.

<u>ATONAL MUSIC</u>

G. SET-TYPE ANALYSIS. (1) <u>Labels</u>: Plot the pcset on the pitch-class clock. Find a starting pc and direction that yields one of the set types (prime forms) on Forte's list. The label provides the set type, the direction (↑ for clockwise, ↓ for counterclockwise), and the starting pc. For example, the label for {B♭BD} is $[014]_{\uparrow B\flat}$ because counting clockwise from B♭ yields prime form [014]—that is, <u>B♭</u>-<u>B</u>-C-D♭-<u>D</u> yields zero-one-(two-three)-four. (2) <u>Process</u>: Calculate the set-type for each "vertical slice" of the musical texture and for the union of adjacent vertical slices (tri-, tetra-, penta-, hexa-chords). In monophonic situations these are called the imbricated sets. This method may generate a large number of set-types but do not be alarmed. Include only a few of these—often the ones that appear multiple times—in your final interpretation. Aspects of the musical realization may also suggest that you consider set-types involving pcs that are not temporally adjacent. (3) <u>Relating sets</u>: Set-type identity, subset/superset relations, z-relation, similarity, circle-of-fifths, etc..

H. SEGMENT-TYPE ANALYSIS. (1) <u>Labels</u>: A capital letter enclosed in parentheses denotes a set of $R/T_n/I$-related segments (a segment-class) and P, I, RP, or RI specifies the orientation (prime, inversion, retrograde-prime, retrograde-inversion). For P and I forms the subscript indicates the initial pc and for RP and RI forms the final one. For example, $P(X)_D$ = <u>D</u>-C♯-A and $RI(X)_G$ = C-A♭-<u>G</u> are related by RT_9I. When the segment-class is the set of $R/T_n/I$-related twelve-tone rows for a given piece, the capital letter enclosed in parentheses is customarily omitted (RI_B, $P_{B\flat}$, etc.) If segments are related by R/T_n (and not I), P and I indications are likewise unnecessary

(continued...)

Example 2: (continued...)

($X_{E\flat}$, X_G, RX_E, etc.). (2) Process: Calculate the pc intervals between adjacent pcs. Search for patterns. Add together adjacent pc intervals to find patterns involving non-adjacent pcs. In polyphonic situations search for segment-type repetition both within and between voices. (3) Cycles: A series of pc intervals with a repeating pattern such as < 949494> or <5555>.

I. PITCH-SPACE ORDERING. Study pcs ordered in pitch space (from low to high) in the same ways we study pcs ordered in time (from early to late).

J. LEVELS. Take your analysis to a higher level by studying the subscripts of the labels of $(R)T_n$-related sets and segments in the ways we study individual pcs.

K. MUSICAL REALIZATION. Overall, what musical factors can help us to hear various pc relations? (1) Do pattern repetitions in other dimensions correspond with pc relations? Check for repeated series of pitch intervals, durations, dynamics, articulations, textures, and/or timbres. Sometimes patterns are repeated precisely and sometimes they recur transformed. Some transformations are precise (pitch transformations R, T_n, I; exact rhythmic augmentation/diminution; etc.) but others are imprecise and so involve omission, addition, re-ordering, and/or the *ad hoc* expansion or contraction of pitch intervals, durations, dynamic ranges, etc. (2) Does adjacency support the pc relations? It is straightforward to hear connections between temporally-adjacent pcs, but other dimensions also suggest grouping. For example, pitches are easy to connect if they are in the same register (registral adjacency), played by the same instrument (timbral adjacency), etc.. (3) Do salient musical features clarify pc relations? Examples of salient events: first/last, highest/lowest, loudest, longest, one *staccato* in the midst of *legato* phrasing, trumpet notes in a sea of percussion, etc.. (4) Do subset boundaries suggested by large intervals/changes in various dimensions correspond with those suggested by pc relations? The following suggest subset boundaries: a duration longer than the preceding and following durations, a pitch interval larger than the preceding and following pitch intervals, a sudden dynamic change, a change in instrument, a change from *marcato* to *dolce*, etc..

L. TWO-STEP SEARCH PROCESS. Step 1: Lengthen the pattern. Step 2: Search for copies of the pattern. Repeat these steps until the copy no longer copies the pattern. Bracket these sets. Repeat the process until the passage is completed. Use the process to search for pc identity (pc invariance in twelve-tone contexts), set-/segment-type repetition, and patterns in other dimensions (rhythm, articulation, etc.). (The paper steps through the process three times: Example 3(c) and footnotes 12 and 14.)

and extended tonal music (Analytic Resources A-F on Example 2) help to identify relationships within a given twelve-tone work, and to illuminate connections to earlier pieces and repertoires. Moreover, by comparing and contrasting set- and segment-type analysis with their tonal counterparts (the scanning of melodies and entire musical textures for harmonic/motivic patterns) we learn more about both sets of analytic skills. Second, atonal labels such as $[014]_{\uparrow B\flat}$ and $[014]_{\uparrow C}$, which identify {B♭BD} and {CD♭E} respectively, facilitate the study of T_n relations. In this example ↑B♭-↑C suggests T_2. Such analysis imitates tonal situations where root motion is easily inferred from chordal roots, as in the descending-fifths progression of minor-seventh chords Cm^7-Fm^7-$B\flat m^7$-$E\flat m^7$. (Consult Analytic Resources G1 and J.) Third, I introduce students to ordered sets and their labeling at the beginning of the study of atonal music (Analytic Resource H); this enriches our study of the atonal repertoire, lessens the strain on the introduction to twelve-tone analysis, and creates continuity between the atonal and twelve-tone repertoires. Further, when students are coached to address musical realization (Analytic Resource K), they have a more balanced analytic experience, a mixture of pc calculation and other types of musical insights. As a result, students relate analysis to listening and improve their analytic prose—fewer recitations of pc statistics and empty surface descriptions, instead, the beginnings of sophisticated interpretations. Finally, the framework provides a search process—essentially organized trial and error— that helps some students to uncover repeated patterns that others hear/find instinctively (Analytic Resource L). Overall, the framework provides context, possibly even reducing the need for hints and leading questions throughout the course to help students deal with specific cases. This equips students to confront with confidence unfamiliar situations even after the course is over. With such a framework to guide them, students are more likely to emerge with a deeper and clearer understanding, not only of associations within and between twelve-tone pieces, but also of the repertoire's relationship to its historical precedents. As a result, twelve-tone study becomes part of a unified undergraduate theory curriculum.

We now witness the framework in action, first in a series of analytic vignettes appropriate for an introduction to twelve-tone analysis, and then in an analysis of a complete movement, Schoenberg's

"Trio." This pedagogical strategy aspires to the curricular consistency that all of us find routine in tonal contexts, where students examine repertoire excerpts and instructor-made examples as they learn a set of analytic tools (harmonic, motivic, rhythmic, formal) with which they can approach any (complete) tonal piece.

Analytic Vignettes

The following discussion treats ordered and unordered pc relations within each of the guidelines' primary categories (intra-row, inter-row, and row combination relations), addressing various other analytic resources on an *ad hoc* basis. At times, the narrative makes explicit the connection between vignette and framework, while at other times the connection is implicit and therefore must be inferred by the reader. Likewise, there are occasional suggestions for classroom vocalization activities, which can be extended and adapted to suit other vignettes and a variety of pedagogical situations.

Example 3 points out three *intra-row relations*. Example 3(a) depicts row saturation with set-type [015].[5] Registral adjacency highlights the four discrete subsets: the lowest three pcs in the passage constitute $[015]_{\downarrow B}$, the next three lowest pcs $[015]_{\uparrow C}$, etc.. These four subsets articulate a large scale T_2 relationship. Since $[015]_{\uparrow E}$ and $[015]_{\downarrow A\flat}$ share the same attack-point rhythm, metric placement, and melodic and dynamic contour it is easy to hear the latter in terms of the former—specifically, $[015]_{\downarrow A\flat}$ is a registrally-expanded, louder version of $[015]_{\uparrow E}$.[6] Long durations also support the segmentation, separating $[015]_{\uparrow E}$ and $[015]_{\downarrow A\flat}$ from one another and $[015]_{\downarrow A\flat}$ from the final *staccato* material. Example 3(b) points out an RI-invariant pc-interval series, which is highlighted by palindromic features of the

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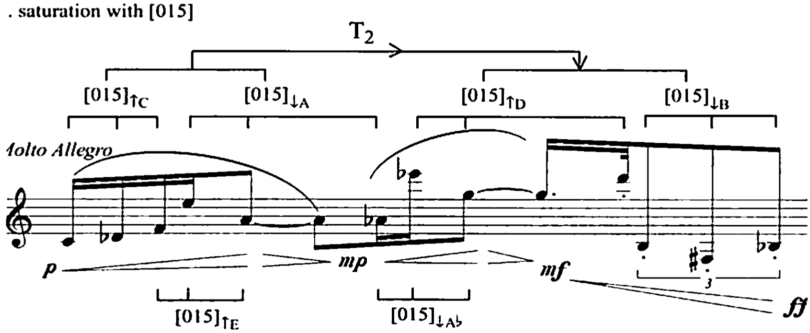
[5]For a detailed discussion of the topic see Robert D. Morris, "Set-Type Saturation Among Twelve-Tone Rows," *Perspectives of New Music* 22/1-2 (1983-84):187-217.

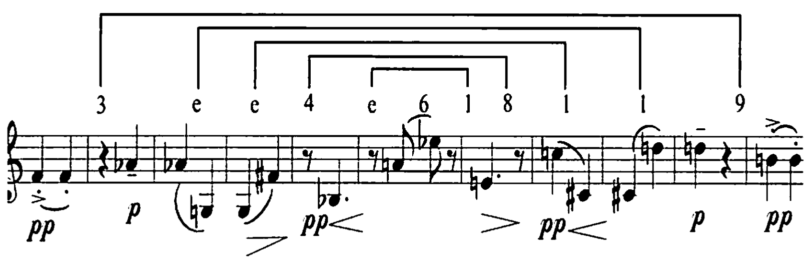
[6]An *attack-point rhythm* is an ordered series of durations measured from the attack of one note to the attack of the next. In this case $[015]_{\uparrow E}$ and $[015]_{\downarrow A\flat}$ each articulate sixteenth attack-point rhythms. Registral (a.k.a. intervallic) expansion/contraction is treated in William Christ et al, *Involvement with Music* (New York: Harper's College Press, 1975): 52-53; and in Williams, *Theories and Analyses*: 152.

Ξxample 3. Intra-row relations.

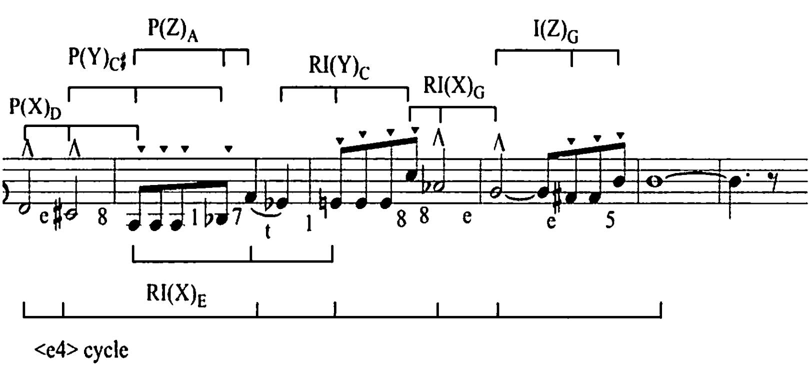
. saturation with [015]



Anton Webern, *Symphonie*, Op. 21, II, Theme, mm. 1-11, clarinet. Webern, *Symphonie*, Op. 21, 1929 Universal Edition. Copyright renewed. All Rights Reserved. Used by permission of ıropean American Music Distributors LLC, sole US and Canadian agent for Universal Edition.



ȷchoenberg, *String Quartet No. 4*, Op. 37, vln. I, mm. 1-6. *String Quartet No. 4*, Op. 37, by ıold Schoenberg. Copyright © 1939 (Renewed) by G. Schirmer, Inc. (ASCAP). International pyright Secured. All Rights Reserved. Reprinted by permission.



musical realization (durations, dynamics, pitch intervals). Example 3(c) depicts row saturation involving three three-pc segment-types (X, Y and Z); that is, $P(X)_D$ - $P(Y)_{C\#}$ - $P(Z)_A$ at the beginning of the row and $RI(Y)_C$ - $RI(X)_G$ - $I(Z)_G$ at the end. The grouping of these six segments into two trios is suggested, not only by the appearance of X, Y, and Z in each, but also by subset overlap. Adjacent subsets overlap by two pcs within the first trio, by one pc within the second trio, and by *zero* pcs between trios. Overall, this creates a tidy though asymmetrical division of the row into five- and seven-pc units. The setting of $P(X)_D$ and $RI(X)_G$ with R-related series of durations, articulations, and pitch intervals strongly supports their pc relationship, but the realizations of the Y and Z subsets do not correspond to the same degree. The example also points out $RI(X)_E$ and an <e4> cycle that embeds five more Y subsets ($RP(Y)_F$ = D-C#-F, $I(Y)_{C\#}$ = C#-F-E, etc.). Although non-adjacent pcs are involved, the relationships are reasonably easy to follow because of their consistent and salient metric placement—all pcs are articulated "on" the half-note beat. Moreover, the <e4> cycle makes steady use of pitch intervals –1 and +4.[7]

Even in these few interpretations we have already invoked many of the framework's atonal analytic resources. Students can come to these and other such interpretations by studying the sets and pc intervals involving adjacent pcs (Analytic Resources G2 and H2), perhaps with the help of the two-step search process (Analytic Resource L).[8] In searching the pc intervals in Example 3(c) for instance, start with the first interval, e (Step 1), and search for copies, that is

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[7]For texts that also address Webern's *Symphony*, Op. 21, see John Rahn, *Basic Atonal Theory* (New York: Schirmer, 1980): 4-18; and Lester, *Analytic Approaches*: 80. For Schoenberg's *String Quartet No. 4*, see Lester, *Analytic Approaches*: 37-39, 68, 79, 176, 192-3, 209-14; Straus, *Introduction*: 30, 35, 119-23, 127-130, 148-150, 156-160; and Williams, *Theories and Analyses*: 276-280, 292.

[8]The ordered set of pc intervals formed by adjacent pcs in the row is called INT_1 in Robert Morris, *Composition with Pitch-Classes: A Theory of Compositional Design* (New Haven: Yale University Press, 1987): 40. The list of a row's imbricated n-sized set-types is defined as BIP_n in Morris, *Notes*: 112. BIP_n generalizes BIP, a tally of interval classes formed by adjacent pcs in a row, set forth by Allen Forte, "The Basic Interval Patterns," *Journal of Music Theory* 17/2 (1973): 234-272. The study of a row's imbricated set-types is also recommended in Kostka, *Materials*: 212-215.

e's or 1's (Step 2). Having found 1 and e later in the row, extend the pattern to <e8> (Step 1), and search for <e8>, <8e>, <14>, or <41> (Step 2). Having found <8e>, extend the pattern to <e81> (Step 1) and search for <18e> (Step 2). Since it is not present, bracket and label the segments that articulate <e8> and <8e> and restart the process, beginning this time with the second pc interval of the row.[9] Continue in like fashion until the entire row has been studied.

I also encourage students to sum adjacent pc intervals (mod 12), looking especially for replications of surface patterns, so that they uncover "hidden" references such as $RI(X)_E$ and the <e4> cycle (Analytic Resource H3). For example, within pc-interval series <e817t1>, 1+7 = 8 and t+1 = e, the resulting <8e> reverses the initial <e8> pointing to the relation between $P(X)_D$ and $RI(X)_E$. With the ability to consider non-adjacent pcs a routine part of row analysis, more students may notice—*without prompting*—relationships such as the embedded <5> and <7> cycles in the row of Berg's "Schliesse mir die Augen Beide." Overall, with such analytic skills students can understand and explain the types of rows usually included in twelve-tone surveys (set-type saturated, derived, all-interval, RT_6-, and RT_nI-invariant rows), as well as others with less obvious and celebrated patterns.

These interpretations have also addressed musical realization as outlined in Analytic Resource K. *Repeated patterns* in various dimensions help to clarify pc relations (rhythm and contour in Example 3(a); rhythm, pitch intervals, and articulation in 3(b); and rhythm and articulation in 3(c)). Registral *adjacency* and *large temporal intervals* (durations) support segmentations in 3(a), and metric *salience* helps us to follow the cycle in 3(c).

Students sing to provide aural reinforcement of theoretical relationships throughout their study of tonal music and should continue to do so throughout the post-tonal curriculum. Example 4 scripts a

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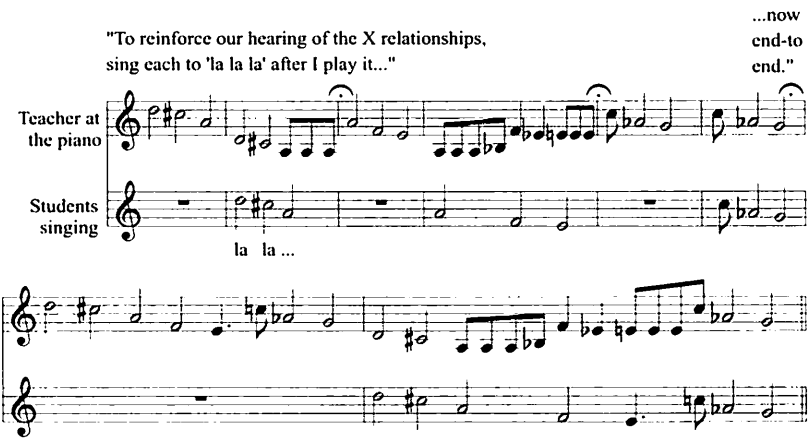
[9]Students readily comprehend that identical pc-interval successions characterize T_n-related pc segments and that I-related interval successions identify T_nI-related pc segments; but they are often initially confused to hear that RI- and R-related interval successions signal *RT_n*- and *RT_nI*-related segments, respectively. For example, R-related interval successions <e8> and <8e> signal RT_nI-related segments $P(X)_D$ and $RI(X)_G$. Such confusion must be completely eliminated before a student can succeed.

Example 4. Classroom activity based on part of Example 3(c).



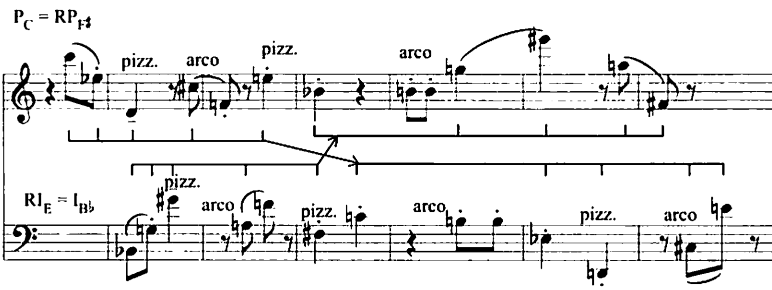
brief classroom activity that reinforces the X relationships of Example 3(c). The activity might go on to treat the Y, Z, and cyclic relationships in like fashion and then culminate with students singing the entire melody, at first in *unison* with the piano, then *a cappella*, and finally accompanied by the violin II, viola, and cello parts played by the instructor at the piano. The simplicity of such activities makes them useful with students of any skill level, provides welcome comfort for students who fear twelve-tone music/theory, and allows students to focus on the analytic points being reinforced rather than on vocal agility or sight-singing. Such musical involvement also encourages students to respect and enjoy the twelve-tone repertoire. Moreover, the vocal repetition inculcates the sound of the atonal language, a necessary first step to sight-singing atonal music. We should not be surprised that students need such practice since they have usually sung many tonal melodies before learning to *sight*-sing them. On the whole these activities provide great benefit and require very little class time.

So far, rows have been presented in straightforward linear fashion. As Guideline A suggests, this will not always be the case. The study of a wider variety of realizations of a single row can prepare

Example 5. Realizations of C-E-C♯-F♯-D-G♯-G-B-B♭-F-E♭-A.

for situations that arise later in the twelve-tone curriculum during the study of complete pieces. In Example 5, parts (a) and (b) are linear presentations with contrasting registral, rhythmic, and dynamic layouts. Parts (c) – (e) mimic the partial orderings of three undergraduate-curriculum favorites by Schoenberg. In (c), the row's three discrete tetrachords are given a chordal presentation akin to the opening of the *Piano Piece,* op. 33a. Part (d) places these tetrachords—one in retrograde—in registral layers as in the *Suite for Piano,* op. 25. In (e) the initial hexachord unfolds in the upper voice with an order reversal, and the final hexachord in the lower voice's dyads, followed by a re-ordering of the dyads—a somewhat irreverent allusion to the outset of *String Quartet No. 4*, op. 37. Part (f) alternates linear and chordal presentation of the row's discrete trichords, and (g) presents three rhythmically independent voices. The example also points out how non-linear row statements can emphasize various intra-row relations (Guideline B2). Contour and texture in (f) highlight set-type relations involving row-adjacent pcs. The layering and re-ordering in (d) and (e) render simultaneous or adjacent pcs that are *not* adjacent in linear row presentations, therefore providing new possibilities for set-type repetition such as that shown on the example. As suggested by Analytic Resource G2, students can discover such relationships by studying each "vertical slice" of the musical texture and the union of adjacent ones, and then scanning for repetition. Such situations are even easier and quicker to study than linear row statements because fewer sets are involved. For instance, if we study tri-, tetra-, penta-, and hexachords, a linear row statement provides thirty-four sets but Example 5(d) provides only twelve. In part (g), registral layout and the three-voice texture highlight $R/T_n/I$-related segments $P(X)_E$ = E-G#-D#, $I(X)_{F\#}$ = F#-D-G, and

Example 6. Ordered invariance involving non-adjacent pcs.



$RI(X)_A$ = B♭-F-A. Rhythm also supports the pc relationships. $I(X)_{F\sharp}$'s durational series is 1-4-2, measured in sixteenth-note units. $P(X)_E$ *quadruples* these durations and $RI(X)_A$ *doubles* them and retrogrades their ordering, so that the durational ratio 1:4:2 inhabits not only each X subset, but the trio of X subsets as a whole. (The passage's grace notes do not participate in these pc/duration relationships.)

We now turn to *inter-row relations*, addressing only the most common type, *pc invariance* (Guideline C1). One type of invariance involves pcsets whose pcs are adjacent in two or more R/T_n/I-related rows. In the second of Dallapiccola's *Goethe-Lieder*, $P_{G\sharp}$ and I_A set four vocal phrases, six pcs to a phrase. Invariant dyads mark phrase beginnings, and invariant tetrachords phrase endings ($P_{G\sharp}$ = G♯A GFBE / DE♭ B♭D♭CF♯ and I_A = AG♯ B♭CF♯D♭ / E♭D GEFB).[10] Sometimes invariant row fragments retain their ordering, as in the following examples based on Dallapiccola's row. $P_{G\sharp}$ = G♯ AGF BEDE♭B♭D♭CF♯ and $RI_{F\sharp}$ = G♯DD♭EBCB♭E♭ AGF F♯ share only one ordered trichord, but $P_{G\sharp}$ = G♯AG FB EDE♭ B♭D♭ CF♯ and $RI_{E\flat}$ = FB B♭D♭ G♯AG CF♯ EDE♭share *five* ordered fragments. Invariance can also involve ordered sets with non-adjacent pcs, such as C-E♭-D-C♯-E and B♭-G-G♯-A-F♯ in Example 6. Pitch layout partially supports the invariance: pitch-interval series –9 –13 +11 sets each C-E♭-D-C♯ and +9 +13 –11 each B♭-G-G♯-A.[11] At times invariance involves a single pc, although this is usually only significant if emphasized by the musical realization or if the pc remains at a salient order position, such as the beginning or end of a row. Conversely, invariance may involve complete rows, as in Webern's *Symphonie* where each row is identical to the retrograde of its tritone transposition (RT_6–invariance). In such cases each row has two labels, such as P_C/$RP_{F\sharp}$ and RI_E/$I_{B\flat}$ in Example 6, and the

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[10]For the score and a series of leading questions see Mary Wennerstrom, *Anthology of Twentieth-Century Music* (Englewood Cliffs: Prentice-Hall, 1988): 93. $P_{G\sharp}$ and I_A set the lines of text that address the sun and crescent moon respectively. As Wennerstrom's questions suggest, invariance provides a musical answer to the poem's question about the relationship between the sun and crescent moon: "[How] could such a pair unite?"

[11]These examples/categories correspond to pc association types 2, 1, and 4, respectively, as discussed in Morris, *Advanced Notes*: 158-160.

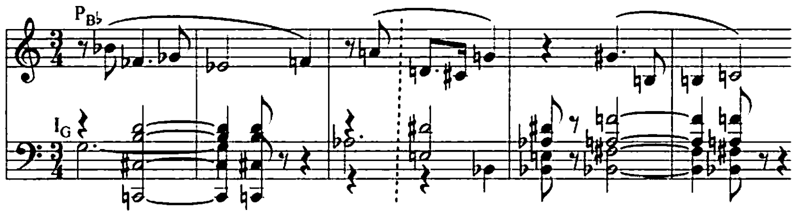
number of distinct row forms is twenty-four, half of the usual forty-eight (Guideline C3).[12]

The study of *row combination* starts with classical combinatoriality, in which pcsets from different row forms combine to articulate pc aggregates. Aggregates arise through the combination of hexachords from T_nI-related rows in Example 7(a), and in other pieces through the combination of tetrachords, trichords, dyads, or sets of varying sizes. But row combination need not involve aggregate completion. In Example 7(b) two rows in tandem invoke harmonic resources familiar to students of tonal and extended tonal music—diatonic and whole-tone collections whose registral layouts suggest tritone-related pairs of fifth-related dominant-seventh chords, E^7-A^7 and $B\flat^7$-$E\flat^7$. E^7-A^7 features the "whole tone" chordal extensions (9, ♯11, and ♭13), $B\flat^7$ is missing two chordal members, and $E\flat^7$ is enriched by a chordal ninth. Moreover, these collections/chords articulate precise and imprecise inversional symmetry. Each whole-tone collection articulates the series of pitch intervals 10-6-10-6-10, the second being a precise pitch-space transposition (by –7) of the first. The spacings of the diatonic collections are nearly symmetric (11-7-3-7-10 and 7-7-2-6-7). As suggested by Analytic Resource I, students can discover such identical spacings, inversional symmetry, and other pitch-space relations if they consider pc ordering from low to high, studying the intervals between pitch-adjacent pcs in the same way that they explore temporally-adjacent pcs in a linear row presentation. This strategy also helps to explain the pitch layout of the initial measure of Example 7(c). $X_G{}^3 = G^3$-C^4-$E\flat^4$-$G\flat^4$-D^5 is pitch-space transposed by +2 into the immediately following $X_A{}^3 = A^3$-(D^4)-F^4-$G\sharp^4$-E^5. The inexact nature of the match is a result of the twelve-tone context; since pc D appears in $X_G{}^3$ it does not also appear in $X_A{}^3$. The subset/superset

[12]The two-step searching process can be used to identify various types of invariance. In searching $P_{G\sharp}$ and I_A for instance, take the first pc in $P_{G\sharp}$, (Step 1) and search for it in I_A, (Step 2). Extend the pattern to G♯-A (Step 1). Search I_A for copies of G♯-A that maintain adjacency, ordering, or both (Step 2). Having found A-G♯ re-ordered but adjacent in I_A, extend the pattern to G♯-A-G (Step 1) and search I_A for G adjacent to G♯-A. It does not occur so bracket the G♯-A and A-G♯ and restart the process with the next pc, G. Repeat until the row is complete.

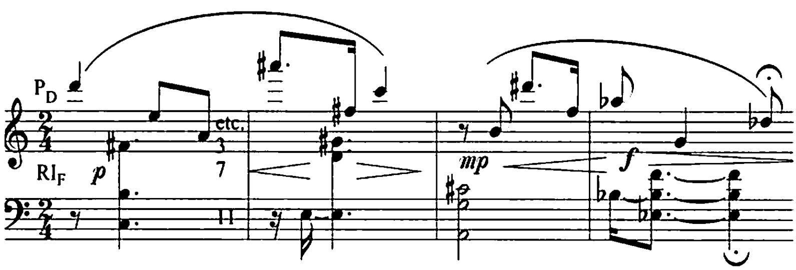
:xample 7. Row combination.

. Schoenberg, *Variations for Orchestra*, "Theme," mm. 1-5. Used by permission of Belmont Music Publishers, Pacific Palisades, CA 90272.



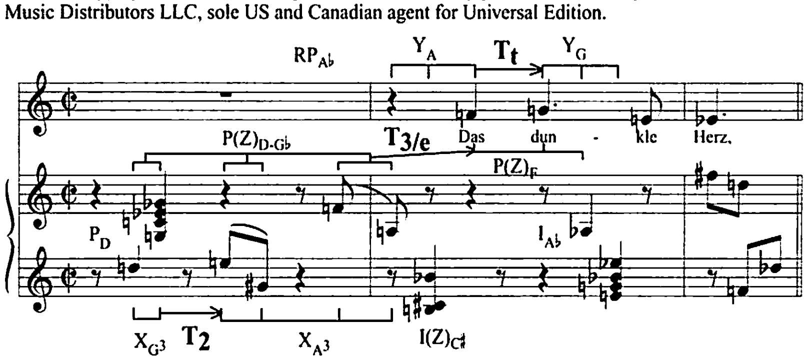
P$_{B♭}$:	B♭F♭G♭E♭FA	DC♯GG♯BC
I$_G$:	GC♯BDCA♭	D♯EB♭AF♯F

›. Extended tonal references; symmetric and quasi-symmetric spacing.



:ollections:	G diatonic (omit G)	whole tone	whole tone	A♭ diatonic (omit C)
:hords:		E7 (♯11-9-♭13)	A7 (9-♯11-♭13)	B♭7? E♭7 (9)
pacing:	11-7-3-7-10	10-6-10-6-10	10-6-10-6-10	7-7-2-6-7

c. Anton Webern, *Three Songs*, "Das dunkle Herz," mm. 1-3. *Drei Gesange.* © 1936 Universal Edition. Copyright Renewed. All Rights Reserved. Used by permission of European American Music Distributors LLC, sole US and Canadian agent for Universal Edition.



Spacing: 5-3-3-8 8-3-8

relationship between X_G^3 and X_A^3 is easily deduced by the addition of adjacent intervals 5 and 3 in X_G^3's 5-3-3-8 to yield X_A^3's 8-3-8.

Example 7(c) also identifies two segment-type pairs that interpret pcs from three row forms ($RP_{A\flat}$, P_D, and $I_{A\flat}$). First, Y_A = A-B♭-F and Y_G = G-A♭-E♭ are T_t-related three-pc segments. Despite their contrasting pitch-space layouts and a shift from piano to voice and back, the Y relationship is very easy to follow. The subsets are adjacent, the recurring eighth-eighth attack-point rhythm and consist metric setting supports the pc correspondence, the lengthier attack-point quarter duration between the subsets supports the segmentation, and when notes are struck simultaneously the interpretation considers the top note of the chord. Overall, the X and Y interpretations are related because they articulate complementary transpositions, T_2 and T_t, respectively. The other interpretation encompasses both measures 1 and 2. $P(Z)_{D\text{-}G\flat}$, the series of descending minor sixths (D^5-$G\flat^4$, E^5-$G\sharp^4$, F^4-A^3), articulates T_{+2} T_{-11}, as does $P(Z)_F$ shortly thereafter. The connection is relatively easy to follow, not only because of the consistent pitch layout and the linking pitch F^4, but also because of the rhythm, which strictly alternates attack-point eighths and quarters from the beginning of $P(Z)_{D\text{-}G\flat}$ to the beginning of $P(Z)_F$. An attack-point eighth sets each minor sixth, supporting the pitch correspondence, and a (longer) attack-point quarter separates each minor sixth from the next, supporting the segmentation. Further, the change in timbre (piano/voice) corresponds precisely with the division between $P(Z)_{D\text{-}G\flat}$ and $P(Z)_F$. The chord that is skipped over in this scheme can be viewed as a verticalization of $I(Z)_{C\sharp}$ = $C\sharp^4$-B^3-$B\flat^4$, which articulates the inverse transformations, T_{-2} T_{+11}.[13]

Ideally students will learn to find such relations independently—and they may do this more easily than we might think—but in preparation for this ultimate goal the instructor may provide more context-specific instructions or simply present such relations to the class.[14] In any case, the order-preserving nature of the relationships

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[13]For an analysis of the entire song, see Brian Alegant, "A Model for the Pitch Structure of Webern's Op. 23, No. 1, 'Das dunkle Herz,'" *Music Theory Spectrum* 13/2 (1991): 127-146.

[14]For instance, Example 7(c)'s Y and Z interpretations may be prompted with the following: "For measures 1 and 2 calculate the pc intervals between

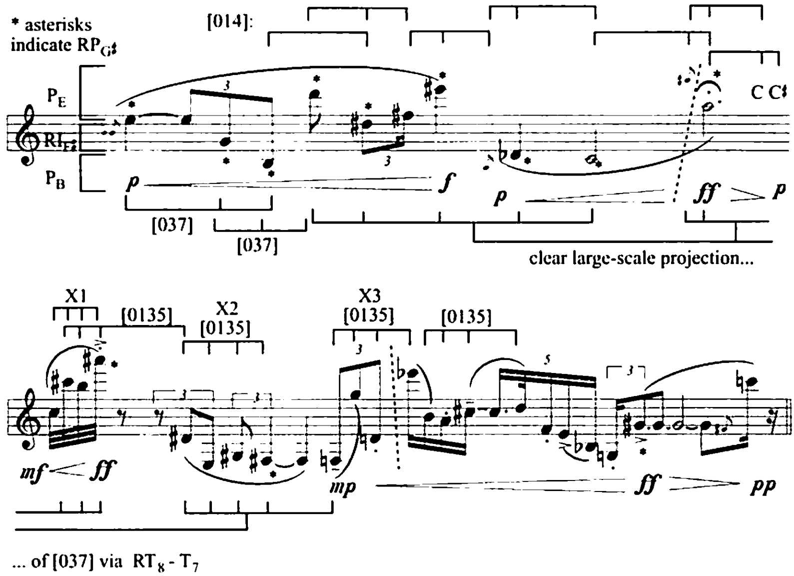
Example 8: Sample classroom vocalizations based on Example 7(c).

in Example 7(c) makes them ideal candidates for classroom vocalization activities such those in Example 8. When simultaneously-stated row forms are notated on different staves as they are in Example 7(c), row combination subsets involve multiple staves and may even skip from staff to staff several times. Such segmentations may arouse skepticism, but as the foregoing descriptions and vocalization activities demonstrate, such relations are relatively easy to hear and sing—perhaps easier than they are to "see" on the score—and it is the hearing and singing that matters.

Example 9(a) summarizes and extends the foregoing row combination examples by incorporating many strategies into a solo clarinet passage. Registral partitioning reveals $R/T_n/I$-related rows P_E, $RI_{F\#}$,

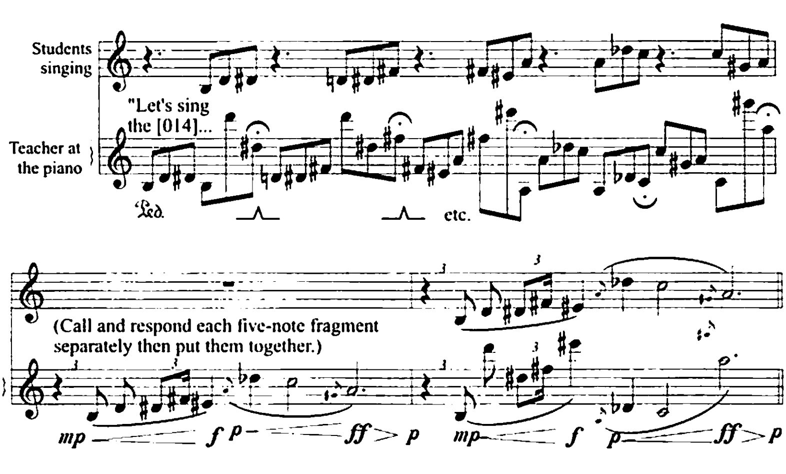
Example 9: Row combination.

a. Clarinet passage and the array on which it is based.



P$_E$:	EDF♯E♯G♯	AC♯BA♯G	E♭C
RI$_{F\sharp}$:	B♭GD♯	C	BAC♯DFEGG♯F♯
P$_B$:	BAD♭C	D♯EG♯F♯FD	B♭G

b. Classroom activity that emphasizes the [014] saturation.



and P_B. These rows are divided into subsets of various sizes to form vertical aggregates (combinatoriality) as demonstrated by the array at the bottom of Example 9(a).[15] The partial orderings defined by this array structure are realized so as to maximize first [014], then [0135], and to articulate an additional row form ($RP_{G\sharp}$ marked by asterisks). At first $RP_{G\sharp}$'s pcs are temporally-adjacent (or nearly so), but later in the passage they are not and so long durations and/or accents emphasize them. A recurring articulation pattern (two notes slurred followed by one *staccato*) and a written-out *accelerando* organize the passage between $RP_{G\sharp}$'s final two pitches ($F\sharp^3$-$G\sharp^4$). Grace-note tritones mark the beginning and end of the passage. X1-X2-X3 articulates a recurring motive of a different sort. X1 and X3 are linked by pitch contour, dynamic contour (*crescendo*), and even-duration attack-point rhythms (thirty-second notes in X1 and triplet eighths in X3). X2 features the triplet eighths of X3, metrically shifted to begin "off" rather than "on" the beat, and an inversion of X1 and X3's

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adjacent pcs, considering only the top notes of piano chords (D^5-$G\flat^4$-E^5-...). What patterns arise? What other dimensions support these pc patterns?" With experience students may independently be able to cope with the polyphonic texture using the two-step search process as follows. Because of the four-note chord following the initial D^5, there are four two-note patterns with which we could begin: D-G♭, D-E♭, D-C, D-G (Step 1). D-G♭ is the most logical choice because $G\flat^4$ is at the top of the chord and registrally closest to D^5. Starting with other pcs would waste a bit of time but would not be fatal to the analysis because those searches would dead-end and they would eventually try D-G♭. Search for R/T_n/I-related copies of D-G♭ (Step 2). Having found E♭-G, E-G♯, and F-A, extend the pattern to D-G♭-E♭ (Step 1) and search for copies (Step 2). D-G♭-E♭ and its copies E♭-G-E and E-G♯-F overlap to create D-G♭-E♭-G-E-G♯-F-A, which alternates pc-intervals 4 and 9—a <49> interval cycle. This is a nice interpretation in its own right, but paying attention to pitch-layout leads to the X interpretation. Pitch layout *and* attack-point rhythm suggest relating D-G♭, E-G♯, and F-A—but we need to take the search process to a new level to achieve the Z interpretation. Studying the intervals of transposition between these minor sixths yields <21> (Step 1). The search for segments that articulate <21>, <12>, <te>, or <et> leads to $P(Z)_F$ and $I(Z)_{C\sharp}$ (Step 2), and the study of pitch-space realization to <+2 –11> and <–2 +11>.

[15]Combinatoriality involving subsets of unequal size is discussed in Daniel Starr and Robert Morris, "A General Theory of Combinatoriality and the Aggregate," *Perspectives of New Music* 16/1 (1977-8):3-25; 2:50-84.

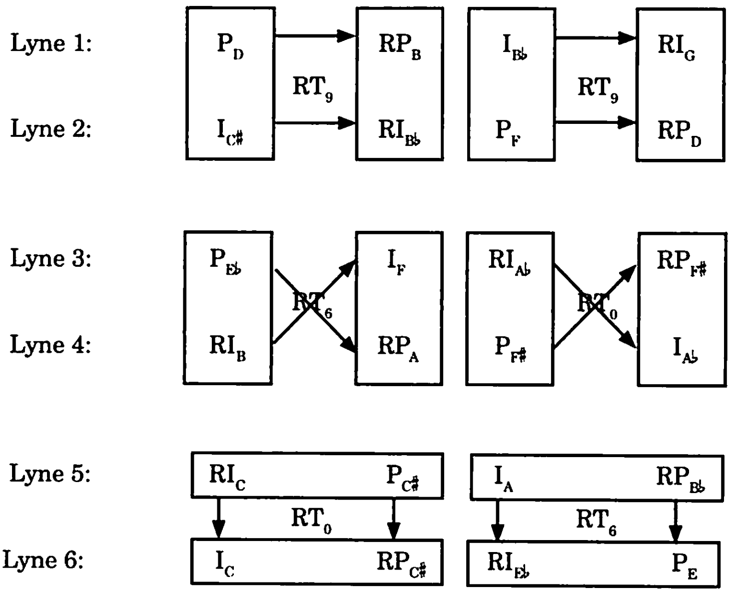
contour-interval series (↓-↑-↓ instead of ↑-↓-↑). These relationships are particularly easy to hear, not only because X1-3 are adjacent and non-overlapping, but also because of the rests and long duration that separate them from one another, and the setting of both X2 and X3 with [0135]. Example 9(b) suggests an activity that reinforces the [014] saturation. Such activities can help students to feel some connection to a passage whose frequent and large registral shifts and multi-level pc relations may initially seem daunting.

Each of the preceding row-combination relations involves at least one subset that includes *portions* of two or more row forms. In the following associations at least one subset contains two or more *complete* row forms (Guideline D2). As with other primary categories of relationships, these may be systematic or *ad hoc*, ordered or unordered, etc.. Example 10(a) lists the row labels for the first four blocks of the six-lyne array that forms the basis for Babbitt's *The Joy of More Sextets*, and points out RT_n-related pairs of row pairs. These row-pair pairs group into pairs on yet another level because of the repetitions of RT_0, RT_6, and RT_9. At the top of the array the RT_n-relations involve adjacent columns and the same lyne, at the bottom adjacent lynes and the same column, and in the middle adjacent lynes and adjacent columns.[16] Not all works employ such systematic strategies. Example 10(b) provides a row-form diagram and identifies an RT_8 relation between two of the four row pairs in "Quartina" from Dallapiccola's *Quaderno Musicale di Annalibera*. Such associations are easy for students to find because they can apply the principles used to study individual pcs to complete row forms (Analytic Resource J). For example, the bottom of the example places $(R)T_n$-related rows beside one another, lists the transformations between adjacent ones,

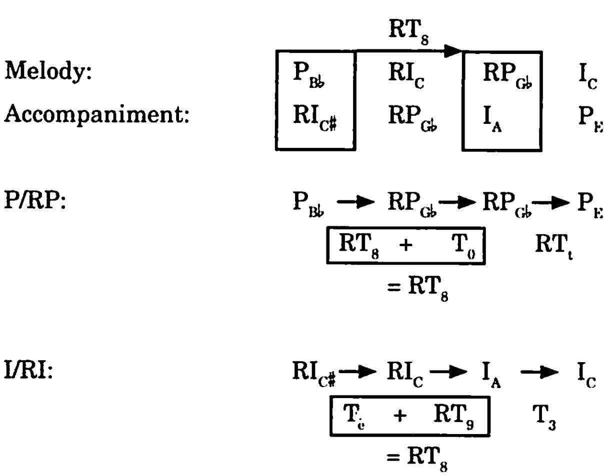
[16]We could just as easily identify RT_nI-related row-pair pairs by switching the orientation of the boxes. At the top of the array, row-pair pairs articulate RT_0I, in the middle RT_2I, and at the bottom RT_1I. A more complex and elegant interpretation is also available. The top lyne-pair articulates P_D-RP_B -P_F-RP_D and $I_{C\sharp}$-$RI_{B\flat}$-$I_{B\flat}$-RI_G, which are related by RT_0I and rotation by twenty-four positions (two complete rows). The other lyne pairs also state various transformed versions of these four-row sets. Such relations are mere child's play compared to the kinds of profound observations offered by Andrew Mead, *Introduction to the Music of Milton Babbitt*. (Princeton: Princeton University Press, 1994).

Example 10: Relations between multiple complete row forms.

a. Milton Babbitt, *The Joy of More Sextets*. Array blocks I-IV.



b. Luigi Dallapiccola, *Quaderno Musicale di Annalibera*, "Quartina."



and boxes the pairs of transformations that add to RT_8 (RT_8+T_0 and T_e+RT_9). We can relate large- and small-scale structures by comparing the transformations between row forms with the intervals between pcs. For example, the P/RP row forms articulate RT_8 - T_0 - RT_t, a large-scale replica of <80t>, stated by a fragment of the first melodic row statement of the movement (G-D♯-D♯-C♯ not shown.)

We can also check for large-scale *unordered* relations by treating the subscripts of (R)T_n-related rows as unordered sets. Taking a recent excerpt, {P_E $RP_{G\sharp}$ P_B} in Example 9(a) projects [037], creating a reference to the overlapping [037]s within each row form. Although the simultaneous unfolding of multiple row forms often obscures each row's overlapping [037]s, and the mixture of P and RP forms tends to conceal the large-scale [037], consequences of the relation rise to the fore in a clear and convincing way. For instance, $RP_{G\sharp}$'s overlapping [037]s begin the passage (E-G-B-D), followed immediately by three five-note row fragments that articulate RT_8-T_7 and therefore a large-scale projection of [037]. The relationship between small- and large-scale manifestations of [037] is so compelling because it starts at the beginning of the passage and unfolds continuously, with very little interruption from extra pcs.

Overall, if students are to benefit from this introduction to twelve-tone analysis, they must clearly understand the vignettes and their relationship to the framework, and must have some personal connection to the music. To this end, I recommend that the foregoing be translated into a pair of homework assignments that includes singing, playing, analysis, vignette comparison, and questions about the framework and its relationship to various vignettes. Provide directions as specific or general as your pedagogical situation dictates. Follow these assignments up in the usual manner, with copious classroom discussion, singing, and listening. With the analytic foundation firmly in place, students are equipped to study complete movements, where their appreciation of the repertoire deepens because they can study the *interaction* of these many and various interpretation types.

Schoenberg, "Trio" from the *Suite*, Op. 25.

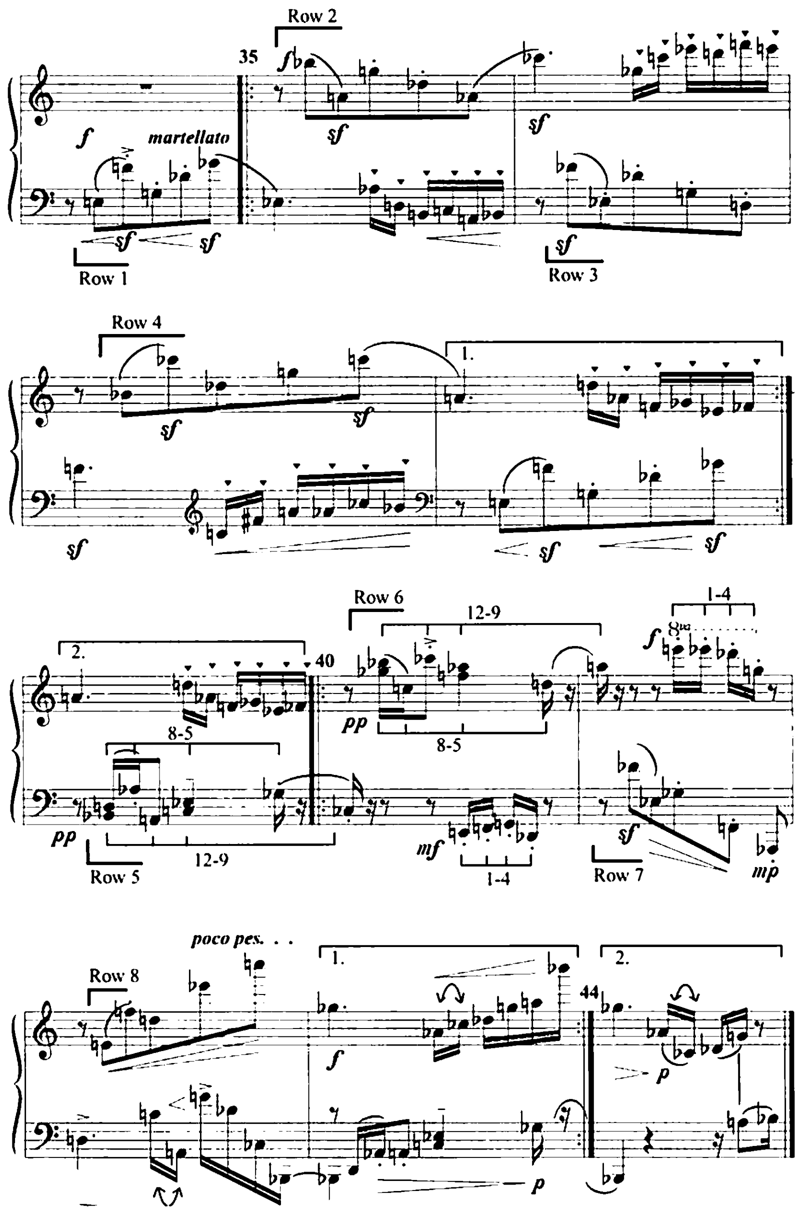
From an historical perspective, it is attractive to begin the study of complete twelve-tone pieces with a work composed by the first master of serial technique. It is no trouble at all to find in Schoenberg's *oeuvre* pieces with compelling relationships of all the types mentioned above, but complete movements, or even parts of movements, that are short enough and straightforward enough for this pedagogical role are rare. The "Trio" from the *Suite for Piano*, seems well suited because it is brief, and because of the straightforward and consistent setting of six of its eight row forms.[17] As seen in Example 11, Rows 1-4, 7, and 8 are each presented linearly with the same characteristic rhythm. Moreover, this movement and the *Suite* as a whole draw on surface features from earlier style periods, providing points of familiarity for students entering strange and threatening territory. Most obviously, a *Suite* of binary dance pieces, each of which begins with a particular member of a twelve-tone row class, recalls the Baroque practice involving thematically-related movements in the same key.[18]

The steady streams of eighths and sixteenths in the Trio's characteristic rhythm and the canonic relationship of right and left hands create a texture that suggests the High Baroque. The recapitulation of the opening rhythm after the contrasting presentations of Rows 5 and 6 suggests classical Rounded Binary form. The subdivision of Rows 5 and 6 into tetrachords—indicated on the example by order positions 12-9, 8-5, and 1-4—parallels the usual practice of thematic fragmentation at this point in the binary form. Students can easily understand the less-than-straightforward realizations of Rows 5-6 (and the order reversals of A/C and A♭/C♭ in Rows 7 and 8 respectively) if they have been prepared during an introduction such as the one associated with Example 5 above.

[17]Wennerstrom, *Anthology*: 174-6 provides the score for the "Menuett and Trio" and a series of helpful questions that could lead to many of the insights mentioned in this paragraph.

[18]See for example Froberger's *Suite No. 26 in B Minor* and Bach's *French Suite in D minor,* cited in Robert Gauldin, *A Practical Approach to Eighteenth-Century Counterpoint* (Englewood Cliffs: Prentice-Hall, 1988): 170-73.

Example 11: Schoenberg, *Suite for Piano*, "Trio." Used by permission of Belmont Music Publishers, Pacific Palisades, CA 90272.



As both Kostka and Straus suggest, several clear and compelling *intra-row* relationships arise from a straightforward study of the pc intervals and set-types involving adjacent pcs.[19] Example 12 shows RI-related segments $P(X)_G$ and $RI(X)_D$ near the row's middle, a <91> cycle near its end that includes a retrograde of B-A-C-H—yet another Baroque reference—and a pair of [0236] that helps to integrate the first two pcs of the row, which are uninvolved in these other relationships.[20] The rhythm makes the [0236] subsets easy to find; one begins the stream of eighth notes and the other the stream of sixteenths. Since all-interval set-types [0146] and [0137] are typically highlighted during the study of pre-serial atonal music, the appearance of [0146] here provides an added measure of familiarity for students.

The musical realization of Row 1 articulates two types of symmetry within the first six notes of the composition. First, the palindromic nesting of low, high, and mid-range pitches, and of slur, *sforzando*, and *staccato* articulations creates *temporal* symmetry (Example 12(b)). We can also hear approximate *pitch-space* symmetry by dividing the same hexachord into two registral strata as shown in Example 12(c). This symmetry is so nearly exact that changing only one of the middle notes—either G^3 to $A\flat^3$ or $D\flat^4$ to D^4—would render the symmetry precise.

Symmetry also organizes the large-scale structure of the binary form. The first half's row forms (P_E, $I_{B\flat}$, I_E, and $P_{B\flat}$) appear in retrograde in the second half (RP_E, RI_E, $RP_{B\flat}$, and $RI_{B\flat}$). The change in canonic pairings, $P_E/I_{B\flat}$ and $I_E/P_{B\flat}$ in the first half and RP_E/RI_E and $RP_{B\flat}/RI_{B\flat}$ in the second, calls to mind a similar procedure in the first four phrases of Milton Babbitt's "Play on Notes."[21] The E/B♭ row

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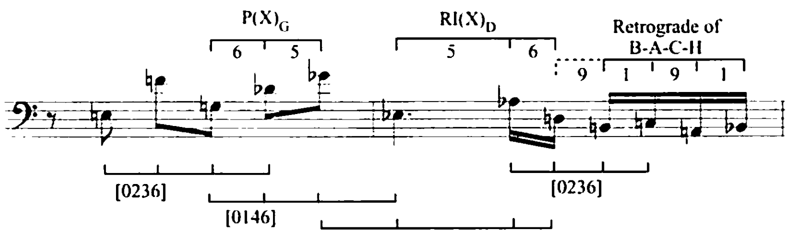
[19]See Kostka, *Materials*: 212-15 and Straus, *Introduction*: 136-38.

[20]The impressive history of B-A-C-H (= B♭-A-C-B) includes several other twentieth-century works: Schoenberg's *Piano Piece* Op. 23, No. 1, presented in Robert Morris, "Modes of Coherence and Continuity in Schoenberg's *Piano Piece* Op. 23, No. 1," *Theory and Practice* 17 (1992): 5-34; the "Simbolo" from Luigi Dallapiccola's *Quaderno Musicale di Annalibera* in David Lewin, *Musical Form and Transformation* (New Haven: Yale University Press, 1993): 1-15; and Anton Webern's *String Quartet*, Op. 28 in Robert Morgan, *Anthology of Twentieth-Century Music* (New York: Norton, 1992): 184-86.

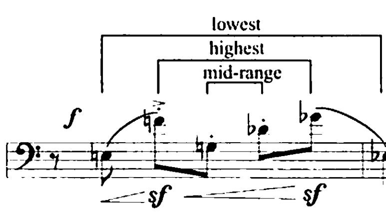
[21]"Play on Notes" is based on P_C = C-E-F-D-G-A and several of its transformations. For example, phrase 1 states P_C in one voice against $RP_{F\sharp}$ in the other and phrase 2 features I_A against $RI_{E\flat}$. Phrases 3 and 4 present

Example 12: Intra- and inter-row relations in the "Trio."

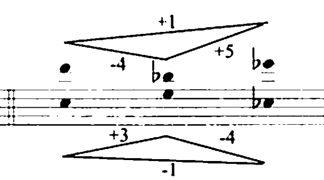
a. Intra-row relations, measures 34-35.



b. Temporal symmetry in Row 1.



c. Approximate pitch-space symmetry.



d. Pc invariance.

Order positions:	1	2	3-4	5-11	12	
Row 1: P_F →	E	F	**GD♭**	G♭F♭A♭DBCA	**B♭**	← Row 5: RP_F
Row 2: $I_{B♭}$ →	**B♭**	A	**GD♭**	A♭C♭G♭CE♭DF	E	← Row 7: $RI_{B♭}$
Row 3: I_E →	E	E♭	**D♭G**	DFCG♭AA♭C♭	**B♭**	← Row 6: RI_E
Row 4: $P_{B♭}$ →	**B♭**	C♭	**D♭G**	CADA♭FG♭E♭	E	← Row 8: $RP_{B♭}$

relationships, the appearance of these pcs at row begin- *and* end-points, and the dyad {GD♭}—held invariant as the third and fourth pcs of P_E, $I_{B♭}$, I_E, and $P_{B♭}$—all reinforce the special role of the tritone throughout the extended tonal and atonal repertoires.[22] These pc invariances are straightforward to hear in the first half of the Trio because the consistent rhythmic presentation places E/B♭ on the second eighth-note pulse of each measure, and {GD♭} on the fourth and fifth eighth-note pulses of each measure.

The analysis so far provides a useful introduction to many of the issues involved in the analysis of twelve-tone serial compositions, but there is more to this piece. For example, B-A-C-H references permeate the entire row, not just the last few notes. First, measure 34's offbeats articulate an incomplete transposition of B-A-C-H, E-G-G♭. (See Example 13(a).) Further, E-F-G♭-E♭ is a rotated transposition of H-C-A-B. This interpretation is particularly attractive because it allows each discrete hexachord of the row to be described in terms of a B-A-C-H reference and a tritone: E-F-(G-D♭)-G♭-E♭ and (A♭-D)-B-C-A-B♭.[23] Example 13(b) scripts an activity that reinforces this connection.

At mid-row, D♭-G♭-E♭-A♭ is a circle-of-fifths transformation of B-A-C-H, moving around the circle of fifths in the same way that B-A-C-H moves around the circle of half steps. As shown at the bottom of Example 13(a), D♭-G♭-E♭-A♭ moves down one fifth, then up three fifths, and then down one fifth; B-A-C-H moves down one half step, then up three half steps, then down one half step. This circle-of-fifths analysis is significant, not only because it deepens our understanding of B-A-C-H within this piece, but also because it sets the stage for

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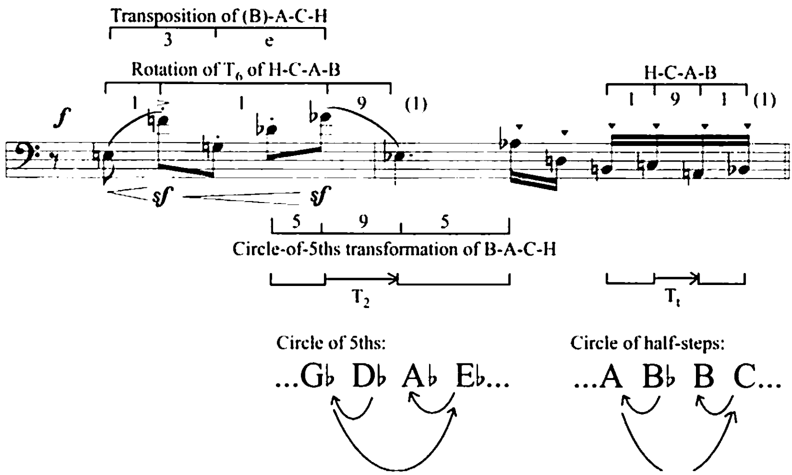
these rows in retrograde with the pairings switched $RI_A/P_{F\sharp}$ and RP_C/I_E. Amazingly enough, this scheme creates a series of interval-class 3 between the voices in phrases 1 and 2 and of interval-class 4 in phrases 3 and 4.

[22]The E/B♭ and G/D♭ relations are pointed out in Andrew Mead, "Some Implications of the Pitch-Class/Order-Number Isomorphism Inherent in the Twelve-Tone System," *Perspectives of New Music* 26/2 (1988): 109.

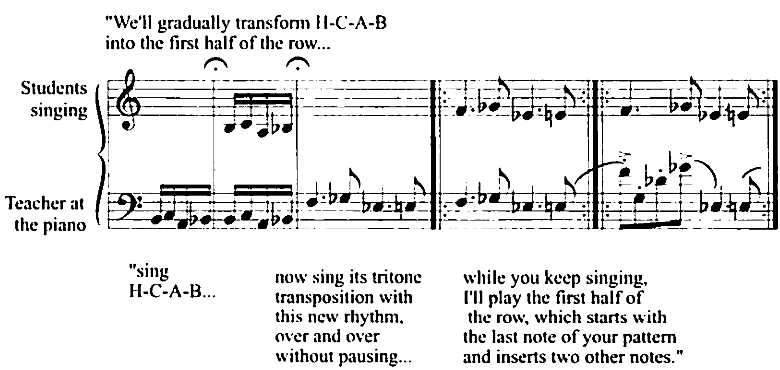
[23]Thank you to Renee McCachren for pointing this out. Overall, the B-A-C-H saturation calls to mind the maximal saturation of ordered collections in Mead, "Some Implications": 140-144. Mead saturates a twelve-tone row with ordered sets related to one another by transposition, rotation, and/or retrograde, and whose pcs are not necessarily adjacent.

Example 13: More intra-row relations.

a. B-A-C-H saturation in Row 1.



b. Singing the transformation of H-C-A-B by T_6 and rotation.



the study of more complex works, especially array-based compositions of Milton Babbitt, which use the transformation in larger-scale contexts.[24] Some of the benefit of this relationship can be enjoyed even in pedagogical situations that do not address the circle-of-fifths transformation *per se*. That is, we can hear the complementary relation between T_2 (D♭-G♭ / E♭-A♭) and T_t (B-C / A-B♭). On the whole the additional B-A-C-H references are a remarkably high analytic payoff given that they can be discovered through the relatively simple task of adding together adjacent pc intervals.[25]

Earlier we noted the contrast between the fragmented realizations of Rows 5 and 6 and the linear presentation of the other six rows. But why are Rows 5 and 6 realized precisely as they are? On one level the division of the row into tetrachords simply parallels similar treatment in other movements of the *Suite*, but what about the specific rhythms, pitch-space layout, and interactions of the tetrachordal layers? Consider the striking set-type relations in Example 14(a). Each row features set-type [0126] followed immediately by [0147]. Pitch-space layout, temporal ordering, and pitch invariance make the connections more vivid. Example 14(b) verticalizes the [0126]s and identifies their inversionally-related spacings, 6-4-1 and 1-4-6, 14(c) points out inversionally-related fragments F^4-G^3-$G\flat^4$ and $B\flat^2$-$A\flat^3$-A^2, and 14(d) illustrates that each [0147] begins with $E\flat^3$ and ends with $B^2 = C\flat^3$.[26] Moreover, pitch-contour repetition highlights the

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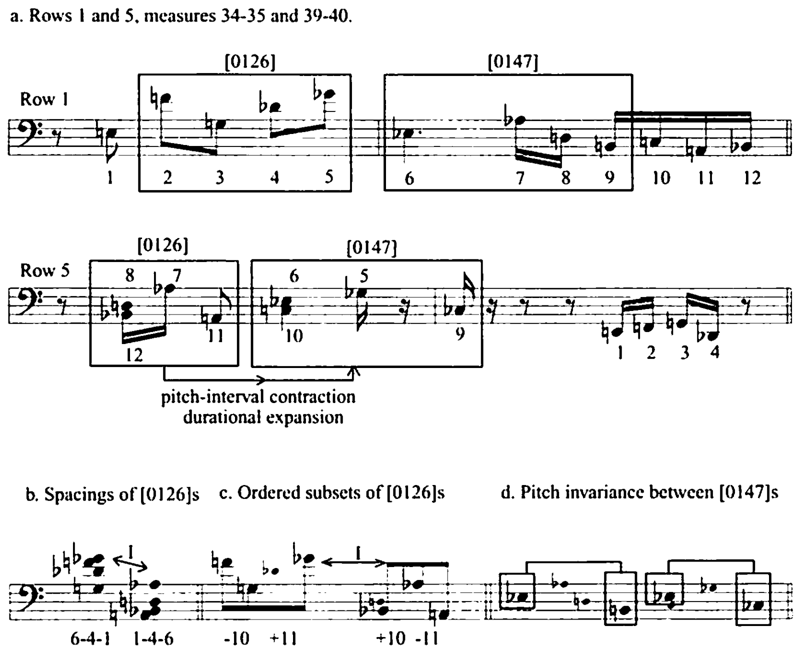
[24]As Morris points out in *Notes*, the circle-of-fifths transformation is precisely the standard jazz practice of tritone substitution, which most typically transforms a descending fifths root progression into a descending chromatic one. Properties and uses of the circle-of-fifths transformation are discussed in Hubert S. Howe, "Some Combinatorial Properties of Pitch Structures," *Perspectives of New Music* 4/1 (1965): 45-61; Daniel V. Starr, "Sets, Invariance, and Partitions," *Journal of Music Theory* 22 (1978): 136-83; Robert Morris, *Notes*: 121, and *Composition*: 65-66, 148-49; and Andrew Mead, *Introduction*: 36, 37, 111, 234-6, 255-63, 264, 271.

[25]For example, we can identify the T_2/T_t relationship involving D♭-G♭/E♭-A♭ and B-C/A-B♭ by hearing that 5 + 9 and 9 + 5 each add to 2 (mod 12) within <595>, and that 1+9 and 9+1 each add to 2's complement, t, within <191>.

[26][0147] and [0126] also arise due to tetrachordal layering in the "Intermezzo" and "Praeludium," as discussed in Martha Hyde, "The Telltale Sketches: Harmonic Structure in Schoenberg's Twelve-Tone Music," *Musical Quarterly* 66 (1980): 568. Elsewhere Hyde points out that side-by-side

Example 14: More intra-row relations: comparing rows 1 and 5.



[0126] and [0147] subsets in Row 5; in terms of motivic transformation (Analytic Resource C), we can turn the former into the latter by reducing pitch-interval size (major third to minor third, diminished octave to perfect fifth, etc.) and lengthening attack-point durations (sixteenth- sixteenth to quarter-eighth).

[012346] arise from tetrachordal layering at the beginning of the "Menuett" and in linear row presentations at order positions 1-6 and 7-12; see Martha Hyde, "A Theory of Twelve-Tone Meter," *Music Theory Spectrum* 6 (1984): 15.

Row Combination

These additional insights deepen our understanding of the movement and create more links to other repertoires and analytic techniques, but—other than noting the tritone relationships created by the family of row forms—we still have yet to address row combination. It is tempting not to bother because so many musical details seem explained by the relations cited above. Further, the idea of linear presentations of twelve-tone "rows"—much less their canonic combination—emerged relatively late in the *Suite*'s compositional process, only *after* the composition of several movements based on the layering of the three tetrachords that would eventually compose "the row."[27] Therefore, how many intriguing row-combination relationships could Schoenberg possibly work into a strict inversion canon, apparently without the luxury of planning them out from the beginning of the compositional process?

But failing to consider one of the principal twelve-tone categories renders our understanding of the work, in the most basic sense, incomplete. We must also remember the excerpt from "Composition with Twelve Tones" cited at the outset of this paper—what makes Schoenberg a "master" of row combination rather than an "ignoramus?" Predictably, the answer is intriguing and complex. There is not one overarching, systematically-applied compositional plan, but rather a string of several types of *ad hoc* relations—at various times supported by and conflicting with surface features of the canon. At times the analysis is hard work, but it does arise from the general analytic procedures outlined in the first part of this article. The remainder of the paper points out five row-combination situations, suggests ways to include such insights in pedagogical presentations, and lists more advantages of doing so.

First, as shown on Example 15, Rows 1 and 2 in combination create two trichordal set-type pairs. The correspondence of set-type boundaries with metric divisions parallels a segmentation strategy common in the harmonic analysis of tonal music. Such simplicity

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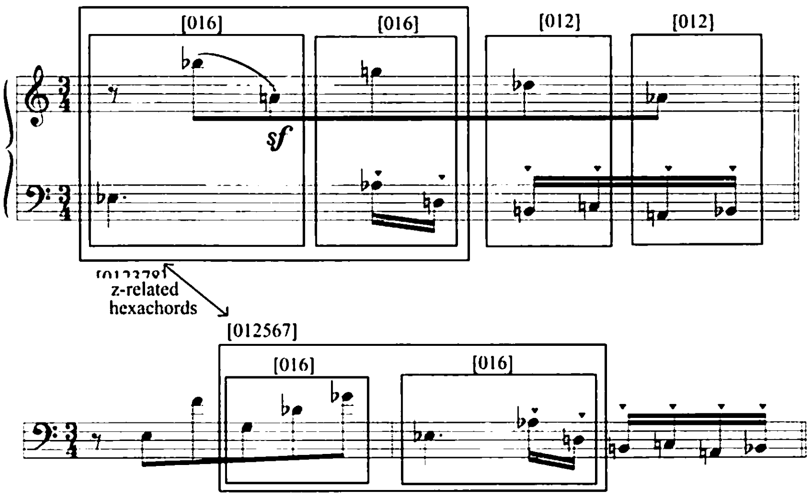
[27]For an enlightening account of the *Suite*'s sketches and chronology of composition see Ethan Haimo, *Schoenberg's Serial Odyssey: The Evolution of His Twelve-Tone Method, 1914-1928* (Oxford: Oxford University Press, 1993): 84-103.

Example 15: Rows 1 and 2 in combination, measures 34-35.



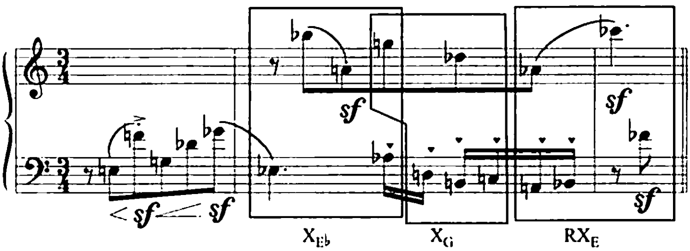
does not continue for the remainder of the piece; similar segmentation of later measures yields an ever-increasing variety of set-types. The pair of [016] also recalls the side-by-side [016] in the row. These [016] pairs articulate z-related (and circle-of-fifths-related) hexachordal set-types [012567] and [012378]. All of these relationships follow from a straightforward study of set-types formed by adjacent "vertical slices" of the texture as suggested in Analytic Resource G2.[28]

Further investigation of this measure reveals that Rows 1 and 2 in combination also assert a series of (R)T_n-related fragments, $X_{E\flat}$–X_G–RX_E. Parts (b)–(e) of the example provide a series of steps to practice hearing the relationships. Example 16(b) presents the pcs

[28]Hyde, "Sketches" shows that [0236], also in the row, arises from row combination in the "Praeludium," m. 1.

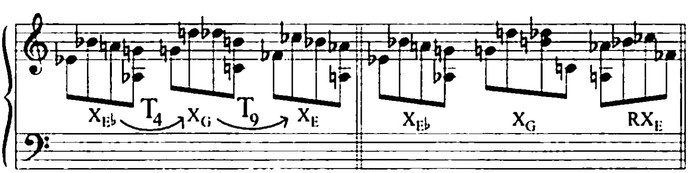
Example 16: Row combination: $X_{E\flat}$-X_G-RX_E.

a. Measures 34-36.



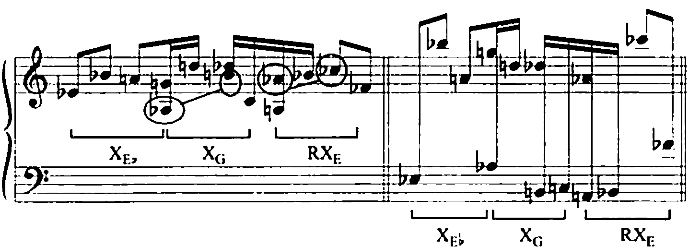
b. consistent pitch layout and rhythm

c. ordering changes



d. rhythmic changes

e. registral changes



Example 17: Classroom activity based on Example 16.

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of the X subsets with temporal orderings and attack-point rhythms that correspond precisely to that of $X_{E\flat}$ in the score. The consistent pitch-space layout is somewhat faithful to the score because A♭ is below G in $X_{E\flat}$ and A is below A♭ in (R)X_E. Example 16(c) transforms X_E into RX_E and makes one small ordering adjustment to X_G, moving B one position earlier to coincide with D♭ rather than C. Example 16(d) introduces Schoenberg's rhythms and elides $X_{E\flat}$ and X_G. These changes create added stability due to the repetition of A♭-B(=C♭) in X_G and RX_E in an eighth-note attack-point rhythm. Example 16(e) adjusts the registral placement of some pitches to correspond with the score. Part (e) may be transformed into the actual score simply by sustaining some notes through the onset of others to create the two contrapuntal lines. Example 17 scripts a one-minute activity that enables the entire class to enjoy these analytic results.

Where pedagogical context allows, we can help students to learn to find—and not merely enjoy—such partially-ordered relations by gradually unveiling them as we step through the framework's two-step process. The search for row combination relationships begins at the first juxtaposition of pcs from different row forms, therefore the initial pattern is measure 35's E♭-B♭, which articulates pc-interval 7 (Step 1). A search for copies (Step 2) in the next few beats of the composition uncovers four dyads, listed in column 1 of Example 18. G-D and D♭-A♭ each articulate pc-interval 7, and so each is related to the pattern by T_n and RT_nI. E♭-A♭ and C♭-F♭ each articulate pc-interval 5, and so each is related to the pattern by RT_n and T_nI. After extending the pattern to E♭-B♭-A (Step 1), the search for copies involves checking the continuation of the copies of E♭-B♭ (Step 2). For example, since G-D = T_4(E♭-B♭) = RT_5I(E♭-B♭), we search for T_4(E♭-B♭-A) = G-D-D♭ and RT_5I(E♭-B♭-A) = A♭-G-D. Column 2 lists the copies being sought followed by a question mark and one of three responses: YES indicating its presence in the music, NO its absence, or a (partially) ordered set indicating a re-ordered version. Column 3 shows the results of extending the pattern to E♭-B♭-A-{A♭G} (Step 1) and searching for copies (Step 2). A fourth pass through the process identifies no new correspondences, but this is certainly not troubling because $X_{E\flat}$–X_G–RX_E accounts for *each* pc in the excerpt under study! Although it may be impractical to step through the process in a brief undergraduate survey, such complex examples are indispensable in

Example 18: $X_{E\flat}$-X_G-RX_E and the Two-Step Search Process.

Pass:	1	2	3
Step 1:	<E♭B♭>	<E♭B♭A>	<E♭B♭A{GA♭}> = $X_{E\flat}$
Step 2.	<GD>	<GDD♭>? YES	<GDD♭{BC}>? <GD{BD♭}C> = X_G
		<A♭GD>? <{GA♭}D>	<{AB♭}{GA♭}D>? NO
	<D♭A♭>	<D♭A♭G>? <GD♭A♭>	<GD♭A♭{FG♭}>? NO
		<DD♭A♭>?YES	<{EE♭}DD♭A♭>? NO
	<E♭A♭>	<E♭A♭A>? NO	
		<DE♭A♭>? <E♭A♭D>	<{CD♭}E♭A♭D>? NO
	<C♭F♭>	<C♭F♭F>? NO	
		<B♭C♭F♭>? YES	<{A♭A}B♭C♭F♭> YES = RX_E

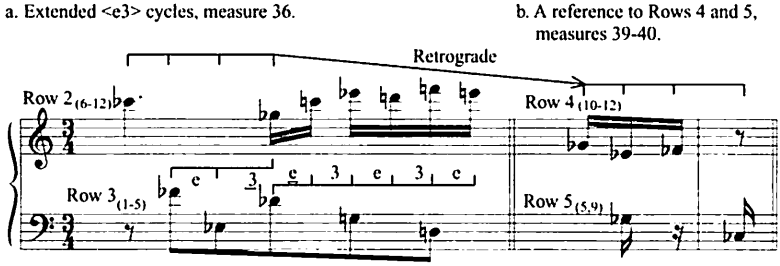
a graduate theory curriculum where students need to learn how to generate original analytic findings independently.

As is evident from the subscripts, $X_{E\flat}$–X_G–RX_E refers to E-G-E♭, the lower melodic strand of the first half of Row 1. E-G-E♭ articulates T_3-T_8 and $X_{E\flat}$–X_G–RX_E the complementary transpositions in the reverse order T_4-(R)T_9. Since E-G-E♭ and $X_{E\flat}$–X_G–RX_E overlap at the downbeat of measure 35, they are easy to hear in sequence, and this interpretation provides an elegant way to hear from E at the beginning of Row 1 to E at the beginning of Row 3.[29]

Rows 2 and 3 in combination create new instances of pc-intervals 3 and e—underlined on Example 19(a)—which further saturate the polyphony with B-A-C-H. $F\flat^4$-$E\flat^3$-$G\flat^5$ articulates attack-point eighths

[29]Since Rows 3 and 4 are a precise T_8I transformation of Rows 1 and 2, the relationship just discussed recurs transformed by T_8I, extending from $F\flat^4$ at the beginning of Row 3 to the first ending's E^3, the beginning of the repetition of Row 1. Overall E-G-E♭/X1-3 and its T_8I copy provide an intensely unified way to hear the entire first half of the composition anchored around pitch-class E.

Example 19: Rows 2 and 3 in combination.



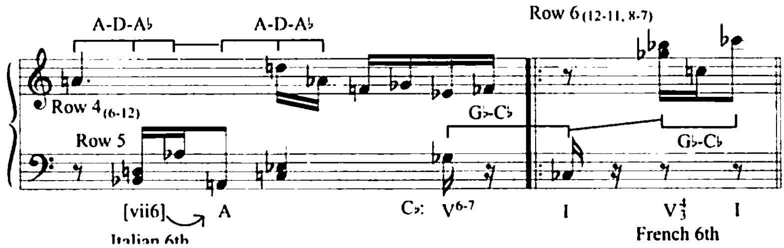
and the extension of Row 2's <e3> cycle C^6-E♭^{6}-D^6-F^6-E^6 back to include D♭^{4}, sixteenths. Like E-G-E♭/$X_{E\flat}$–X_G–RX_E, this pair of fragments begins and ends with pitch-class E. Rows 2 and 3 in combination also set up a long-range connection to the passage where Rows 4 and 5 interact. Example 19(b) points out the correspondence between C♭-F♭-E♭-G♭ and its retrograde; the former unfolds in attack-point eighths and the latter precisely twice as fast.

Row combination strategies also enrich our experience of the second half of the composition. First, Example 20(a) addresses the combination of Rows 4, 5, and 6. Side-by-side statements of A-D-A♭, each unfolding with the same attack-point rhythm, provide local continuity at the entrance of Row 5, further rationalizing both the superposition of Row 5's 12-9 and 8-5 tetrachords and their rhythmic setting. Similarly, a pair of G♭-C♭ that articulates attack-point eighths creates stability at the entrance of Row 6. Further, A-D-A-D, which is embedded within the pair of A-D-A♭, maps onto G♭-C♭-G♭-C♭ under T_9. The relationship is especially clear because each segment unfolds in an eighth-note attack-point rhythm. Since one eighth-note pulse intervenes between A-D-A-D and G♭-C♭-G♭-C♭, their metric orientations contrast—the former begins *on* the quarter-note beat, the latter *off*.

This passage also articulates fleeting tonal progressions. First, an Italian augmented sixth chord, B♭-D-G♯ (spelled as A♭) tonicizes A,

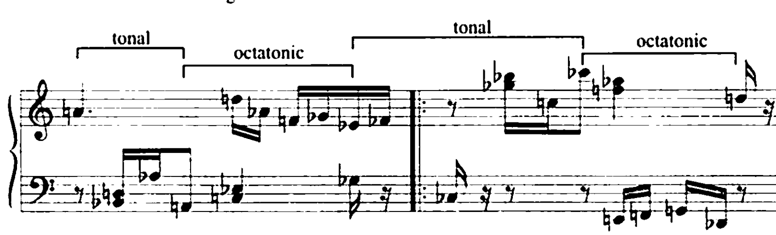
Example 20: Rows 4, 5, and 6 in combination.

a. Segment repetition and tonal allusion, measures 39-40.



b. Reinforcing the tonal interpretations

c. Tonal/octatonic dovetailing



d. Reinforcing the octatonic interpretation

"As you know, an octatonic collection may be thought of as two diminished seventh chords. To confirm the octatonic hearing, I'll play the pitches of each passage organized into two diminished seventh chords, followed by the passage..."

an interpretation strengthened by the octave (!) on beat two.[30] Later, dominant-tonic progressions articulate C♭ major. The first case makes use of an implied 5-6 technique, in which the sixth (E♭) replaces the fifth (D♭) above the dominant bass note (G♭). In the second case G♭-B♭-D𝄫 (spelled C), a dominant triad with a lowered chordal fifth (or an incomplete "French" 4/3 chord), resolves to the tonic note C♭.[31] Due to the passage's brevity, non-tonal surroundings, incomplete chords, and variable texture and register, these interpretations may not be obvious at first. To confirm the tonal hearings, isolate the fragments and juxtapose them with conventional realizations of the progressions as suggested in Example 20(b), or sing with solfége syllables the C♭-major reference as a class (so-mi-fa-do-ti-ra-do).[32]

Hearing the passage in terms of these ephemeral tonal allusions lends support to Joseph Straus's assertion, made during his analysis of the "Gavotte" from the *Suite*: "[Schoenberg] creates beautiful new works that subtly, and ironically, imitate old ones."[33]

As shown in Example 20(c), the tonal fragments alternate and dovetail with octatonic ones. These octatonic passages create local continuity because there are two of them, but they also augment curricular continuity, both by referencing ubiquitous octatonicism in the extended tonal repertoire and by forging links to other of Schoenberg's works.[34] Example 20(d) shows one possible way to

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[30]Using jazz terminology, the incomplete B♭^{7} chord B♭-D-A♭ may be interpreted as a tritone substitute for E^7, the dominant of A.

[31]As Daniel Harrison points out in "Supplement to the Theory of Augmented-Sixth Chords," *Music Theory Spectrum* 17/2 (1995):170-195, a major *triad* with lowered fifth is not mentioned in most recent undergraduate theory texts. In this context it may be characterized as "a defective Italian or incomplete French sixth." (182) The article shows that the chord *is* one of the augmented-sixth chord types presented in Louis and Thuille's *Harmonielehre* (1907).

[32]To test the tonal interpretation and have a little fun, play the C♭-major fragment for students (and perhaps good-natured colleagues) who have not studied or performed the piece, asking them to hazard a guess as to composer and approximate date of composition! (Do this outside the context of twelve-tone pedagogy to produce unbiased results.)

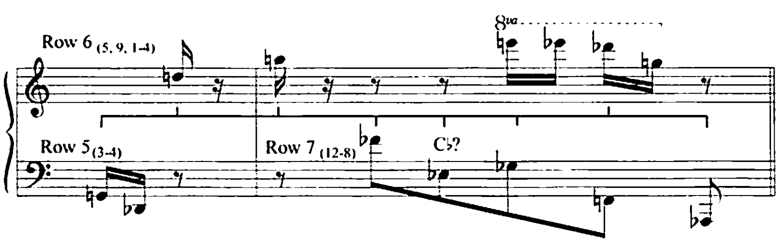
[33]Straus, *Introduction*: 136.

[34]See for example the *Piano Piece*, Op. 33a, in which tetrachordal division and consistent row pairing creates three octachords, one of them "the" octatonic collection.

highlight the octatonic hearings in a classroom situation. With the tonal and octatonic interpretations in place separately, it is relatively straightforward to assemble them into a coherent whole because the overlap is salient and predictably placed. The first overlap occurs on beat two of measure 39 at the articulation of A^2, the lowest note of the measure and the tonic of the preceding tonal reference. The last overlap is precisely one measure later (the corresponding place in the inversion canon) at the articulation of $C\flat^6$, the highest note of the measure and the tonic of the other tonal reference. The middle overlap point is precisely halfway between the others. Overall, this dovetailing tonal/octatonic scheme organizes two full measures into a single continuous interpretation.

During the ends of Rows 5 and 6 and the beginning of Row 7, a <7> cycle provides local coherence. (Consult Example 21.) The cycle extends from G to A♭, skipping only C♭ along the way. The consistent eighth-note attack-point rhythm—which even saves a place for the missing C♭—makes it easier to follow the series, which is somewhat concealed by the large and inconsistent pitch intervals, as well as by the presence of additional notes. This sequence can be thought of as two interlocking T_2 cycles, G-A-(C♭)-Db and D-F♭-G♭-A♭. Oddly enough, each T_2 cycle articulates a straight contour, G^2-A^5-$D\flat^7$ upwards, and D^5-$F\flat^4$-$G\flat^3$-$A\flat^1$ downwards. Grouping the cycles into a series of T_2-related [05]s reveals a clear relationship to the middle of the row; compare {DG}-{F♭A}-{G♭(C♭)}-{A♭D♭} with Row 1's {D♭G♭}-{E♭A♭}.

Example 21: A <7> cycle in Rows 5, 6, and 7; measures 40-41.

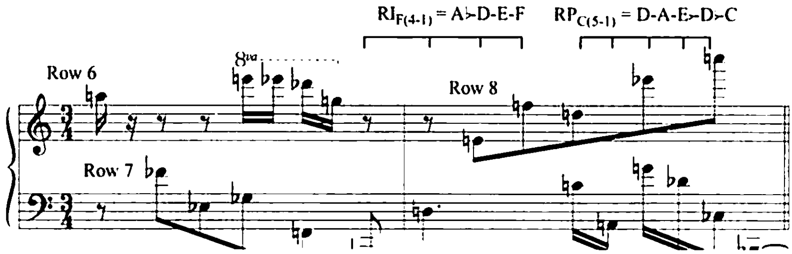


Example 22: T_2 cycle of [016] in Rows 5, 6, and 7.

The other notes in the passage, D♭-E♭-F-G, *also* articulate a T_2 cycle. By combining all three cycles we uncover a series of T_2-related [016]s, labeled Y1-Y4 on Example 22(a). Y1 and Y4 each articulate pc intervals <61> in a sixteenth-note attack-point rhythm. This clear correspondence marks the beginning and endpoints of the cycle. The relationship of Y2 and Y3 is nearly as close. Y2 articulates <7e> in an eighth-note attack-point rhythm, and Y3 would also, were it not for the missing C♭. The only other complicating factor here is E-E♭ during Y3, a repetition of the last two pcs of Y2. As with $X_{E\flat}$–X_G–RX_E above, we provide a series of steps to rehearse the hearing of Y1-4. Example 22(b) presents Y1-Y4 as a series of parallel, close-position chords, part (c) incorporates the Trio's temporal ordering and rhythms, (d) adds elisions, (e) omits C♭, and (f) adjusts the registral layout to correspond to the piece. Example 22(f) can be transformed into the actual score by adding the extra E-E♭ and sustaining some notes through the onset of others to create contrapuntal lines. Example 22 may be transformed into a classroom activity in the manner of Examples 16/17.

Finally, Rows 7 and 8 combine to articulate fragments of other row forms, bracketed on Example 23. The left hand's A♭^{1}-D^3 combines with the right hand's E^4-F^5 to state order positions 4-1 of RI_F. This fragment is straightforward to hear for a number of reasons. First, the right-hand part is silent during the left hand's A♭^{1}-D^3, and the left-hand part is stationary during the right hand's E^4-F^5, so no other notes interrupt or camouflage it. Second, its beginning is easy to find because A♭^{1}, the lowest note of the movement, concludes the relationships shown in Examples 21 and 22. It is curious that this A♭^{1} is not beamed to the preceding eighth notes as in all other such situations in the piece; perhaps a subtle indication that this A♭^{1} is a beginning. Third, the fragment has consistent rhythmic and pitch-space layouts, that is, an eighth-note attack-point rhythm and ascending intervals of between one and two octaves each. Finally, the RT_1 relationship with the immediately preceding E^7-E♭^{7}-D♭^{7}-G^6, order positions 1-4 of Row 6, makes blatantly obvious its row derivation. One unfolds in sixteenths and the other in eighths. One articulates descending intervals of less than an octave, <–1 –2 –6>, the other ascending intervals exactly one octave larger, <+18 +14 +13>.

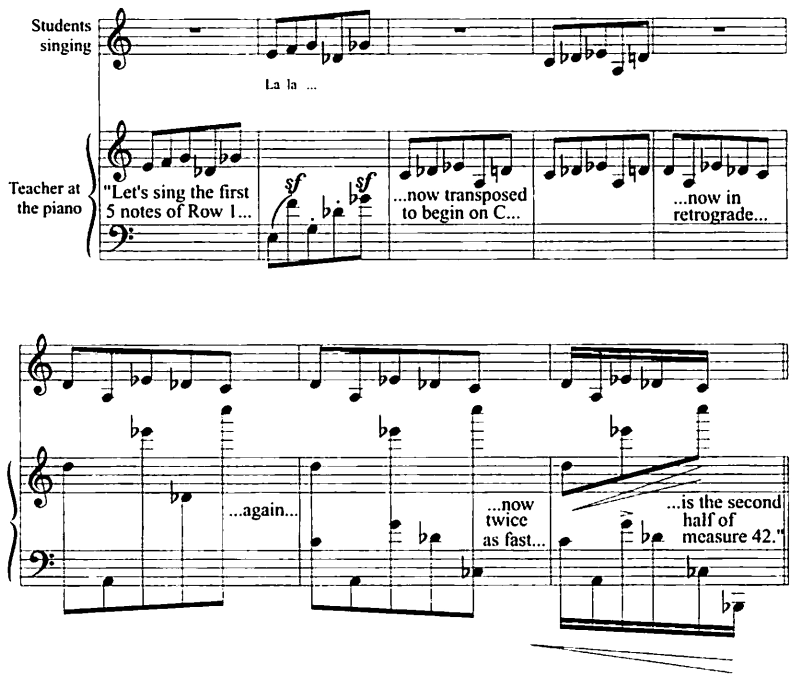
Example 23: Rows 7 and 8 in combination: fragments of RI_F and RP_C; measures 41-42.



Immediately following, Rows 7 and 8 co-operate to state order positions 5-1 of RP_C, D^5-A^2-$E\flat^6$-$D\flat^4$-C^7. Unlike the previous row fragment this one must be pulled from the texture because it unfolds along with some extra notes (C^4, G^4, and $C\flat^3$). Nonetheless, the fragment is straightforward to follow because these omitted notes are the lower notes of simultaneously struck dyads. The result is a strict alternation between right- and left-hand parts in a consistent sixteenth-note attack-point rhythm. This straightforward aural strategy is made possible by the order inversion of C and A within Row 8, which places A on a metrically weak sixteenth so it is struck *alone*, after D and before E♭. Without the order change, the fragment would be much more difficult to follow. Venturing for a brief moment onto the precarious limb of compositional intent, the presence of the RP_C fragment is a *reason* for the order inversion of A and C. Example 24 scripts a one-minute classroom activity that gradually transforms the movement's opening into the RP_C fragment identified. Instructors can easily construct a similar exercise to dramatize the relationship between the RI_F fragment and E^7-$E\flat^7$-$D\flat^7$-G^6 that immediately precedes it.

The presence of these row fragments provides completion to the piece in at least two ways. First, despite the varied and seemingly *ad hoc* nature of the row combination strategies, they are systematic

Example 24: Classroom activity based on Example 23.



in that they refer to each part of the row: <19>/<e3> cycles at order positions 8-12 (Example 19), T_2-related [05]s at order positions 4-7 (Example 21), and RI_F and RP_C fragments articulating order positions 4-1 and 5-1 respectively (Example 23). Second, we noted earlier that RP and RI row forms in the second half of the piece answer the first half's P and I forms, but that Rows 5 and 6 state order positions 1-4, not 4-1 as R and RI forms normally would. The RI_F and RP_C fragments can be viewed as compensating for this anomaly.[35]

[35]The combination of two row forms to articulate fragments of other row forms engages Daniel Starr's "Derivation and Polyphony," *Perspectives of New Music* 23/1 (1984):180-257. The article deals with *complete* row forms as in the following example: in the pc string A38741B25096, 30947A85216B, the underlined pcs articulate row P, the non-underlined pcs $RT_9I(P)$, the first twelve pcs $T_7(P)$ and the last twelve $RT_2I(P)$.

Conclusion

Making students aware of at least some of these row combination strategies will help to give a sense of Schoenberg's compositional genius. If our study of the movement does *not* address row combination, then we run the risk—however unintentionally—of suggesting that twelve-tone composition requires little skill. After all, canonic works—twelve-tone, Baroque, or otherwise—are masterpieces *not merely* because they superimpose contrapuntal voices related to one another by transposition or inversion, but because they do so within some strict harmonic framework. Since twelve-tone students have usually spent two years studying harmony and voice-leading in tonal music, they are prepared for, even expecting, an approach that addresses both vertical and horizontal relationships. Furthermore, Schoenberg's comments about the Trio quoted at the outset of the paper and in the following excerpt leave little question about the significance he placed on row combination. In *Linear Counterpoint: Linear Polyphony* (1931), a strongly worded condemnation of the theories of Ernst Kurth and his followers, Schoenberg writes:

> "But has it occurred to Mr. Kurth and his followers that there must be some bond of cohesion between a number of parts intended to be heard simultaneously and meaningfully, and that this bond can cohere only in some other direction than the linear? ... *Only the relationship of several rows one to another, the vertical aspect of the line gives them their significance!*"[36] (emphasis added)

Even so, with space in the twelve-tone curriculum at a premium, one might argue that it is more important to study standard methods such as hexachordal combinatoriality. Perhaps, but students can get a sense of the *evolution* of Schoenberg's compositional approach by studying the "Trio," a movement from Schoenberg's *first* completely twelve-tone serial work, followed by other works that feature classical combinatoriality. Characterizing Schoenberg's twelve-tone *oeuvre* as the result of a developing historical process rather than as

[36]Arnold Schoenberg, "Linear Counterpoint, Linear Polyphony," *Style and Idea:* 231.

a *fait accompli* encourages students to empathize with Schoenberg. Further, the 'messy' and varied nature of the Trio's row combination strategies provides a marked contrast to more systematic combinatorial methods. Such analytic variety also reflects the diversity within each undergraduate class. Since some students will be more attracted to the elegance of combinatorial designs and others to the wild and various strategies of the Trio, the presentation of both types of relationships should enrich both groups of students. Finally, the irregularity of the Trio's row combination strategies may help some students to understand that, in the words of Stefan Kostka, "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.[37] It is regrettable if even one student does not sense this intuitively, but it is true that some occasionally lose sight of the musicality of the twelve-tone approach amidst the numerical representations and symmetrical structures of pitch-class theory. Besides, as we have shown these row combination strategies provide wonderful opportunities for classroom activities that also aim to alleviate student skepticism.

Clearly there is a lot more to the Trio than its straightforward surface might suggest, an intense melange of various intra-row relations, realization and row combination strategies, and connections to other pieces and repertoires. It is not a simple piece and our pedagogical presentations must not pretend that it is. But this does not mean that we need to bewilder our students. The analytic framework and the resulting organized approach provide guidance. Teachers can also contribute leading questions as dictated by student skill level, time in the curriculum, and other factors, and can reinforce the relationships through classroom vocalization. Since the Trio works on so many levels, and since even its more complicated relationships are amenable to engaging and musical classroom activities, it can be the basis for a profoundly enriching experience for students of various skill levels.

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[37]See Kostka, *Materials*: 222.