VOICE-LEADING PARSIMONY IN THE MUSIC OF ALEXANDER SCRIABIN

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Discussions of pitch structure in Scriabin's later oeuvre typically take as their point of departure a description of the mystic chord, a member of set class 6-34. Dahlhaus (1987) describes this chord as a dominant ninth with a flat fifth and an added sixth, whereas others, including Leonid Sabaneyeff (Taruskin 1997, 342), have considered the chord to be generated by the harmonic series, specifically the seventh through thirteenth partials omitting the twelfth. However, since the former supposes a *tonal* context and the latter ignores context altogether, neither of these descriptions accounts for how this chord is employed in a non-tonal language. A second limitation is that the mystic chord is not the only sonority encountered in Scriabin's music. Instead, there are numerous collections, each of which is closely related to the others by slight alterations of set content. In order to understand the close relation of these collections and their usefulness for Scriabin, it is necessary to determine the properties which bind these collections together, rather than to simply provide an aural description of each collection taken in isolation.

The most prominent pitch-class collections in Scriabin's later works are shown in Figure 1. Figure 1b reproduces the mystic chord in scalar form. Figures 1a and 1c share a similar relation to Figure 1b. Lowering the A of Figure 1b by a half-step to A♭ while holding the remaining five

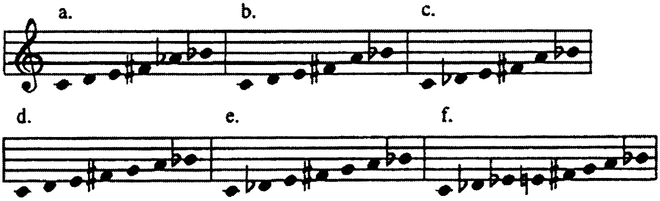

Figure 1. Primary pc-collections:
a) 6-35 (whole-tone); b) 6-34 (mystic); c) 6-Z49;
d) 7-34 (acoustic); e) 7-31; and f) 8-28 (octatonic)

pitch-classes constant yields the collection at Figure 1a, a whole-tone collection (set class 6-35). Alternatively, if the D in Figure 1b is lowered one half-step to D♭ while the remaining pitch classes are held in common, the resulting collection is Figure 1c, a six-note subset of the octatonic collection (set class 6-Z49). The collections at Figures 1d and 1e are related to Figures 1b and 1c, respectively, by a different type of minimal alteration. In this case, every pitch class of the six-note collections is held constant and a single pitch class is added, yielding the seven-note collection at Figure 1d, the acoustic collection (set class 7-34), and Figure 1e, the sole seven-note subset of the octatonic collection (set class 7-31). The final collection, the octatonic (set class 8-28), is similarly related to the collection at Figure 1e by the addition of a single pitch class.

Each collection in Figure 1 can be changed into one or more other collections by introducing a single alteration. This alteration may take the form of "raising" or "lowering," so to speak, an existing pitch class by a "half-step" (that is, $\pm 1 \bmod 12$) or of adding or subtracting a single pitch class. Figure 2 shows an incomplete relational network for these collections, including the members of the network and the relations between them.[1] Horizontal connections between set classes, which are labeled P^1-relations, correspond to altering a single pitch class by a half-step "up" or "down." (P^1-relations will be discussed in greater detail shortly.) Vertical connections between elements correspond to the addition or subtraction of a single pitch class, labeled as an inclusion-relation.[2]

Motion from the upper left-hand to the lower right-hand corners reveals a progression from whole-tone sonority, to whole-tone influenced sonority, to sonorities of increasing octatonic influence, and, finally, to the octatonic collection. The visual layout of the structure places the acoustic collection in a central position within the motion from whole-tone to octatonic sonorities. The function of the acoustic collection as a nexus between the two characteristic collections will be considered later. In this paper, I will be focusing primarily on the mystic chord and acoustic collection, and their respective relations to the whole-tone and octatonic collections.

Set class 6-34, along with set class 3-11 (consonant triads) and set class 4-27 (dominant and half-diminished seventh chords), possesses the important property of being a minimal perturbation of an equal division of the octave, in this case the whole-tone collection. Thus, the mystic chord shares with set classes 3-11 and 4-27 possibilities for parsimonious voice-leading that preserves set-class identity as considered in Cohn 1996, Childs 1998, and Douthett and Steinbach 1998. While the general notion of smooth, or conjunct, voice leading is very intuitive, there are subtle distinctions in the formalization of parsimony. Some definitions—for instance Douthett's P_n (unpublished) and Douthett and Steinbach's $P_{m,n}$ (1998)—require common tones between chords to remain fixed, so that, for example, between {023} and {034} two pitch classes remain fixed, while another moves by whole-step. However, without this constraint one can imagine a single pitch class remaining fixed and two pitch classes moving by half-step. While this distinction is not relevant in investigations of relations between members of set classes 3-11 or 4-27 (since these sets lack interval class 1), it is important when considering relations between mystic chords.

Another consideration in the formalization of parsimonious voice-leading is the intervallic limitation of moving voices. Cohn limits motion of voices to no more than a whole-step, Childs to a half-step, and Douthett and Steinbach keep track of half- and whole-steps separately. Since the interval vector for set class 6-34 contains a high proportion of whole-steps, I shall limit conjunct voice leading to the half-step. Taking these two considerations into account, the formalization in this paper begins by

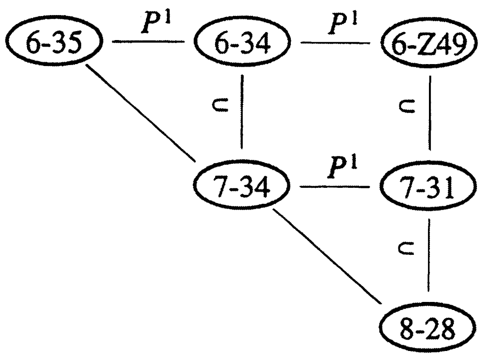

Figure 2. Incomplete relational network of Scriabin's preferred pitch collections

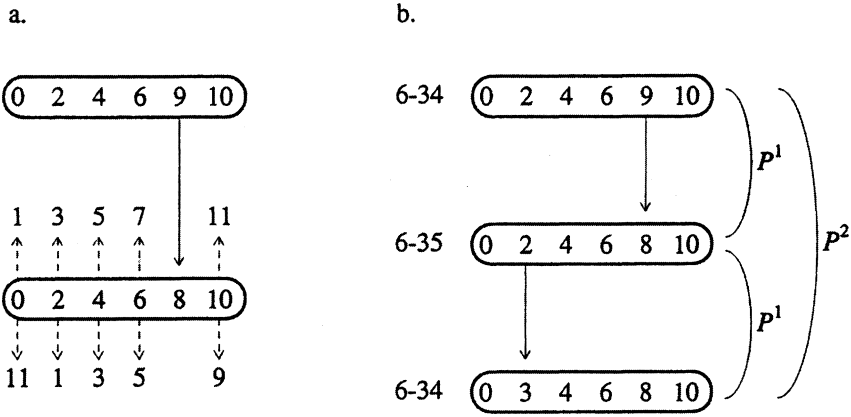

Figure 3. P^2-relations between mystic chords

defining a relation between chords in which only a single voice moves by half-step:

Definition 1: Let X and Y be pcsets such that $|X\backslash Y| = |Y\backslash X| = 1$. Then X and Y are P-related (written $X\ P\ Y$) if for $x \in X\backslash Y$ and $y \in Y\backslash X$, $x - y \equiv \pm 1 (\mathrm{mod}\ 12)$.[3]

Motion between chords in which more than one voice moves by half-step will be modeled as a sequence of P-related chords. For instance, the above motion from {023} to {034} can be bridged by the sequence {023} P {024} P {034}. Further, we will prefer the *shortest* possible sequence between the given chords. We also require that each voice move no more than once within the sequence, so as not to allow sequences such as {023} P {024} P {025} P {026}, which violate the half-step condition. Thus, the total number of moving voices is equivalent to one less than the number of sets in the sequence. This is accomplished by making sure that the destination of each voice does not become the origination of any successive voice. Noting that for any two successive pitch-class sets in the sequence, X_i and X_{i+1}, a single voice moves *from* $X_i\backslash X_{i+1}$ *to* $X_{i+1}\backslash X_i$, we have:

Definition 2: Let X and Y be pcsets, and suppose $(X_k)_{k=0}^{n}$ a shortest sequence of pcsets with the property $X = X_0\ P\ X_1\ P\ X_2\ P \dots P\ X_n = Y$ (i.e., if $(Y_k)_{k=0}^{m}$ is another sequence with the above property, then $m \geq n$). Then X and Y are P^n-related (written $X\ P^n\ Y$) if $X_{i+1}\backslash X_i \cap X_j\backslash X_{j+1} = \varnothing$, for all $j > i$.[4]

The superscript is used in order to distinguish this relation from P_n or $P_{m,n}$ and to reflect the influence of iteration. Additionally, as P is equivalent to P^1, the latter designation will be used exclusively for the remainder of this paper in order to minimize confusion with the neo-Riemannian Parallel operation on consonant triads.

Figure 3a demonstrates the manner in which members of set class 6-34 engage in P^2 relations. The circled pitch-class collection at the top, {0,2,4,6,9,10}, is a member of set class 6-34 where the lone deviation from the whole-tone collection listed on the bottom, {0,2,4,6,8,10}, is pitch class 9. The solid arrow leading from the upper to lower collections signifies that pitch class 9 must descend by a half-step to pitch class 8, in a sense returning to the whole-tone fold. Once the original displaced voice has moved into the whole-tone collection, any of the other five voices may be displaced up or down by half-step, yielding a total of ten P^2 relations. One realization of this P^2 potential is given in Figure 3b where the motion is broken into its P^1 components.

The specific motion between T_6-related mystic chords shown in Figure 3b is one of the most common sequences in Scriabin's non-tonal music. Typically, the four sustained pitch classes, which yield set class 4-25 (a French augmented-sixth chord), arise from the combination of T_6-related [026] sets, each articulated by left-hand arpeggios. The third of the Three Etudes, op. 65, offers a clear example. As Figure 4 shows, the voice leading between pitch-class collections from the first and second half of the opening bars consists of common tones yielding set class 4-25, the pitch classes contained within the four rectangles {C♯, G, F, B}, articulated in the left hand with the two remaining voices, E to E♭ and A to B♭, moving by half-step in contrary motion in the right hand. A similar motion is found at mm. 17–18; here the two voices move by similar motion yielding inversionally-related members of set class 6-34.

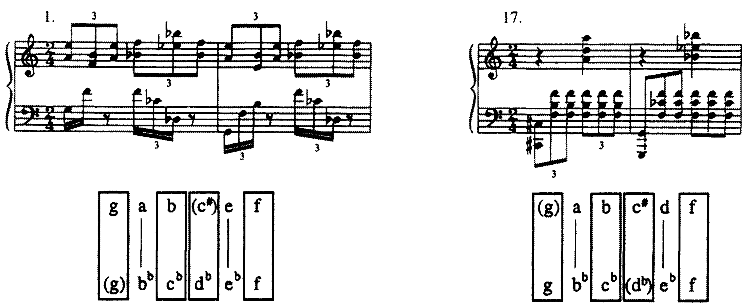

Figure 4. Scriabin, op. 65, no. 3

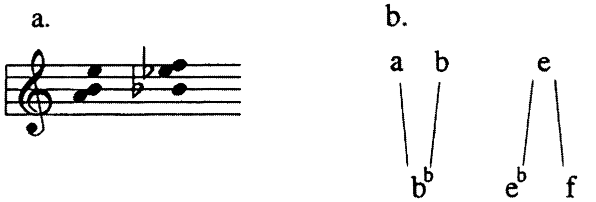

Figure 5

P^n relations, along with many models of voice leading, rely on the existence of a one-to-one mapping between chords in which voices are paired according to registral order position (Roeder 1994). However, mappings may instead be derived from registral proximity, as suggested by Albert Bregman's work on auditory stream segregation (Bregman 1990). Scriabin's Etude provides an example. The first bar is reduced to its essential pitch components in Figure 5a. Figure 5b shows A, B♭, and B in the lower voice and E♭, E, and F in the upper voice. In the upper voice, we can imagine that E *splits* into E♭ and F, while in the lower voice A and B *fuse* into B♭. Additionally, each voice may be considered as existing in one of two states: a fused position in which a single pitch class is sounding, and a split position in which the upper and lower neighbors of a fused pitch class are sounding simultaneously. Each voice may be said to be split-related about the pitch class, x, sounding in fused position, denoted $S_{(x)}$. Formally:

Definition 3: Let X and Y be pcsets such that $|X \backslash Y| = 1$ and $|Y \backslash X| = 2$. X and Y are $S_{(x)}$-related (written $X\ S_{(x)}\ Y$ or $Y\ S_{(x)}\ X$) if for $x \in X \backslash Y$ and every $y \in Y \backslash X$, $x - y \equiv \pm 1 \pmod{12}$.

(If x is not specified, then we write $X\ S\ Y$ or $Y\ S\ X$.)

Figure 6 shows the four possible combinations of voices and positions: one in which both voices are fused, another in which both are split, and two cases in which one of the voices is fused while the other is split. The top of the network, {10,4}, corresponds to the situation in which both voices are fused. Splitting the lower voice into A and B produces the opening right-hand sonority of the étude, {9,11,4}. Splitting the upper voice of this chord yields {9,11,3,5}, which is a member of [0,2,6,8]—the exclusive sonority of the lower stratum for the entire opening section. Beginning again at the top of the structure and proceeding along its right arc amounts to alternating the order in which voices are split. If the upper voice is split first, the resulting set is {10,3,5}, the second chord of the étude and a tritone transposition of the first. Splitting the lower voice yields the same {9,11,3,5} sonority as before. Neighboring elements in this structure are S-related about a single voice, while elements which lie opposite one another are S-related about both voices. The relationship between opposing elements, in which two separate *S* relations occur simultaneously, is similar to P^2 relations between members of set class 6-34, which may be decomposed into two P^1 relations. Motion between {9,11,4} and {10,3,5} must "pass through" either {10,4} or {9,11,3,5}, and vice versa.

Figure 7 shows an elaboration of the above network through the addition of a set of stationary pitch classes drawn from [0,2,6,8]. Beginning with the whole-tone collection shown at the upper left, splitting B♭ yields an acoustic collection, and subsequent splitting of E yields an octatonic collection. Proceeding through the staves on the right of Figure 7, splitting E in the whole-tone collection results in another acoustic collection, which is the tritone transposition of the previous 7-34 set, and subsequent splitting of B♭ results in the same octatonic collection as before. Figure 8 casts this elaboration of the original network in terms of set classes of the constituent sets. Any whole-tone collection stands in an *S* relation to two T_6-related acoustic collections, each of which is *S*-related with the same octatonic collection.

There are two inferences to be drawn from the structures in Figures 6 and 8. First, the potential for parsimonious voice-leading via *S* relations between T_6-related members of set class 7-34 is present at the onset of the étude. The upper stratum emphasizes T_6-related [0,2,7] sonorities, two of the core elements of the structure, connected by split voice-leading. The lower stratum emphasizes [0,2,6,8] sonorities, which correspond to the added pitch classes of the elaborated structure. All that is needed for this potential to be fully realized is the right relation between the strata such that their respective three- and four-note collections are mutually exclusive subsets of the acoustic collection. At the opening, split voice-leading is present but there is an overlap between the upper and lower

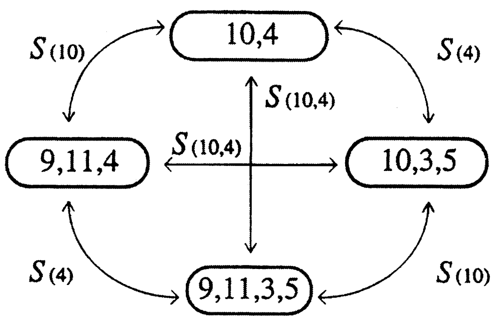

Figure 6

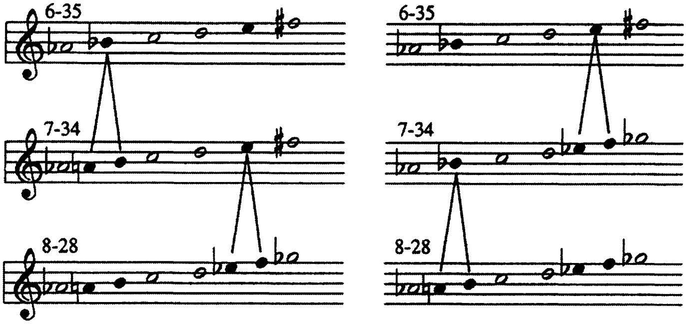

Figure 7. Voice leading between sets resulting from the addition of {8,0,2,6} to the relational network of Figure 6

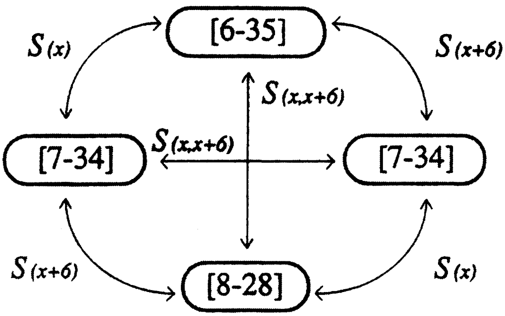

Figure 8. Network of split relations between set classes 6-35, 7-34, and 8-28

strata. In mm. 33–34, shown in Figure 9, the strata are in the proper relation such that the union of the respective subsets does form the acoustic collection, but split voice-leading is not present. A few bars later, however, in m. 37, this potential is fully realized as Figure 10 demonstrates. In the lower stratum, E, A♭, B♭, and D are held as common tones throughout the bar, while in the upper stratum F and G fuse into G♭, and C splits into C♭ and D♭. Scriabin confirms an awareness of the potential for smooth voice-leading between acoustic collections through a progressive realization of the necessary conditions.

A second inference to be drawn from the structures in Figures 6 and 8 is that the relational network of Scriabin's preferred pitch collections, left incomplete earlier, may now be completed. Figure 11 reproduces the earlier relational network from Figure 2 with one notable addition: the diagonal connections between whole-tone, acoustic, and octatonic collections, as well as between the mystic chord and set class 7-31. These are precisely the S-relations we have been considering. The completed network structure explicitly shows the acoustic collection as an important mediating sonority between whole-tone and octatonic sonorities. This mediating potential of the acoustic collection echoes an interesting prop-

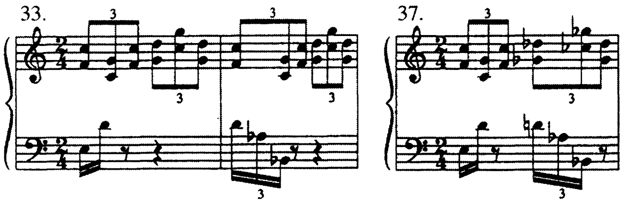

Figure 9. Scriabin, op. 65, no. 3

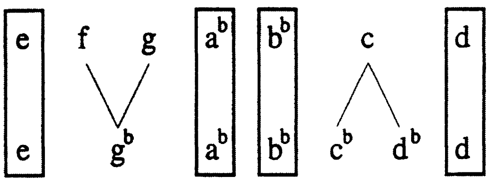

Figure 10. Split-voice leading between T_6-related acoustic collections in m. 37

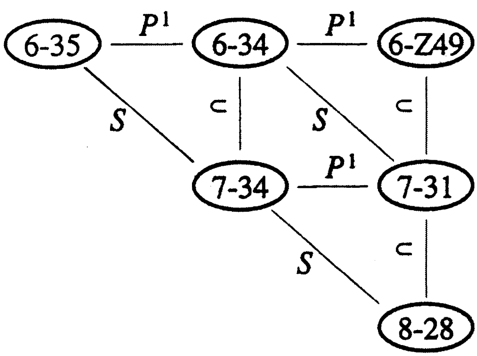

Figure 11. Relational network of Scriabin's preferred pitch collections

erty of its step-interval content, demonstrated in Figure 12: a five-note segment of the collection is a subset of the whole-tone collection, while a six-note segment is a subset of the octatonic collection (Perle 1984).[5] The S relation transforms the whole-tone portion of the collection into the octatonic segment and vice versa.

The relations between whole-tone, acoustic, and octatonic collections are even more pervasive than Figure 11 reveals. Figure 13 shows a relational network which incorporates all of the unique forms of each collection. Collections are designated by transpositions of the prime form, e.g., w.t. 1 = $T_1(\{02468t\})$, ac. 6 = $T_6(\{013468t\})$, and so forth. A whole-tone collection is S-related to six acoustic collections, each related to the others through transposition by an even number of half-steps. The six acoustic collections related to one whole-tone collection are distinct from those related to the other whole-tone collection yielding all twelve unique forms of the set class. Each T_6-related pair of acoustic collections that is S-related to a single whole-tone collection is in turn S-related to a unique octatonic collection. Thus, either whole-tone collection is related

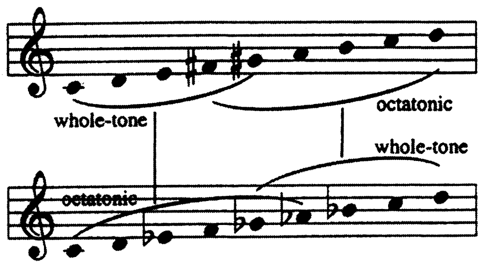

Figure 12. Exchange of whole-tone and octatonic subsets in split voice leading between T_6-related acoustic collections

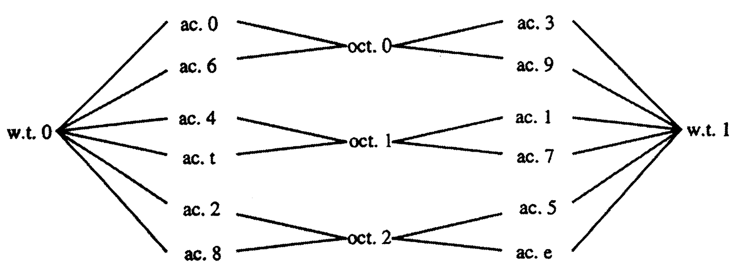

Figure 13. Relational network of split-relations between whole-tone, acoustic, and octatonic collections

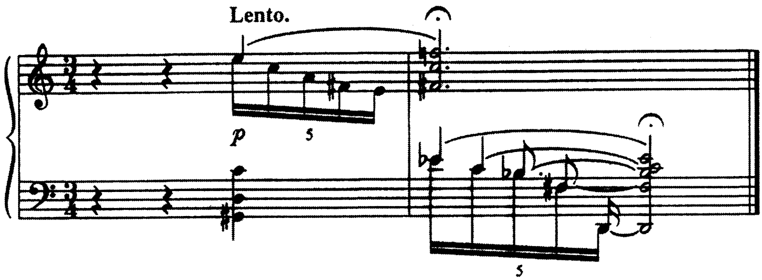

Figure 14. Scriabin, op. 71, no. 2, concluding measures

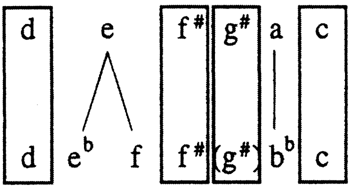

Figure 15. Combination of P^1- and $S_{(e)}$-relations

by smooth voice-leading through a pair of S-relations to any of the three octatonic collections and vice versa. Additionally, any two acoustic collections which are related through transposition by either an even number of half-steps or a multiple of three half-steps are related by a pair of S-relations. If the index of transposition is a multiple of two, this occurs as a combination of S-relations with the whole-tone collection, and as a combination of S-relations with the octatonic collection if the index is a multiple of three. Acoustic collections related by tritone may interact with either whole-tone or octatonic collections since the index, six, is a multiple of both two and three.

Many other prominent pitch-class sets are related through split voice-leading. An example is the relation of consonant triads to dominant and half-diminished seventh chords. Splitting the root of a major triad yields a half-diminished seventh, while splitting the fifth of a minor triad yields a dominant seventh. In both cases, motion from triad to seventh chord is achieved by splitting the Riemannian root. Motion in the reverse direction, from seventh chord to triad, is achieved by fusing the root and seventh of the chord to the corresponding Riemannian root. Dominant sevenths with augmented fifths are also S-related to consonant triads. By connecting triads and seventh chords, S-relations can complement neo-

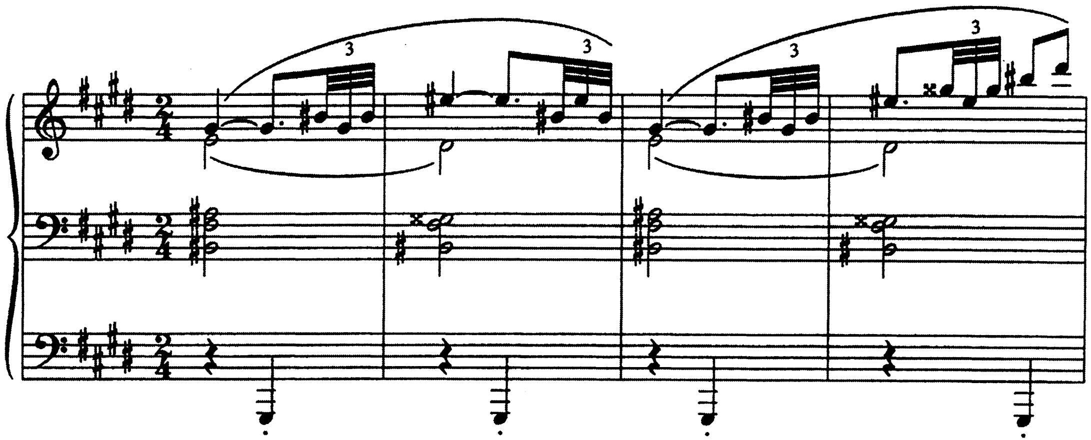

Figure 16. Debussy, “Feuilles mortes,” mm. 37–40

Riemannian operations on triads—Leittonweschel, Parallel, and Relative—and provide a link to recent work developing neo-Riemannian operations on seventh chords. For example, Mozart's Piano Concerto, K. 453, movement 2, mm. 86–90, contains a transition from C♯ minor to the return of the opening theme in C major via the following progression, which begins and ends with the respective dominants of each key:

$$G\sharp \xleftrightarrow{P} g\sharp \xleftrightarrow{S_{(D\sharp)}} E7 \longleftrightarrow G7.$$ [6]

As suggested in Figure 11, P^n and S relations may be combined to relate any collections which are not directly connected in the network. Thus, any mystic chord is P^1S-related to six acoustic collections, either whole-tone collection is SP^1-related to twelve members of set class 7-31, and so forth. One example from Scriabin will serve to illustrate this principle. Figure 14 reproduces the concluding two bars of Scriabin's *Poème*, op. 71, no. 2. The voice leading between pc-collections in the final two bars, given in Figure 15, shows the manner in which parsimonious voice leading between the two collections decomposes into a P^1 and a $S_{(e)}$ relation. In this example, the split relation involves motion from an octave to a major ninth, rather than a unison to a major second. The octave from E5 to E4 is emphasized through the right-hand arpeggiation in the penultimate bar, and the motion into the major ninth from F5 to E♭4 is likewise emphasized as the boundary pitches on the downbeat of the final bar. Here the grouping of voices does not result from *registral* proximity, but *pitch-class* proximity emphasized by context. Similarly, the motion from A4 to B♭3 is heightened, despite octave displacement, through corresponding serial order positions within their respective quintuplet arpeggiations.

Figure 16 provides a similar example involving motion between whole-tone and octatonic, rather than acoustic collections, in Debussy's *Feuilles mortes*. The four-bar phrase alternates between a five-note subset of the whole-tone collection and a six-note subset of the octatonic. Figure 17 shows both the general smooth voice-leading template between the referential whole-tone and octatonic collections and the specific motion involving their respective subsets, using parentheses for ele-

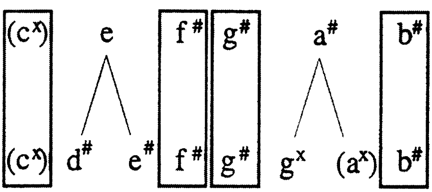

Figure 17. Voice leading between whole-tone and octatonic subsets

ments of the referential collections which are not present in the example. Each bar is related to its neighbors by a $S_{(e)}$ and a P^1 relation involving A♯ and G𝄪. However, the P^1 relation between A♯ and G𝄪 may be understood as an incomplete split relation. Thus, not only are the sonorities used in each bar subsets of the larger referential collections, but the voice leading which connects them smoothly is a subset of the more general voice-leading template between whole-tone and octatonic collections.

Although the collections in Figure 1 first appeared in Scriabin's music as extended dominants, they have interesting properties which may be exploited outside of a tonal context. The voice-leading relations stemming from these properties provide a partial account of the interaction between various collections and the logic behind Scriabin's non-tonal progressions. These relations are not only relevant for Scriabin, but for other turn-of-the-century and more recent composers[7] who make use of these referential collections. The relations among whole-tone, acoustic, and octatonic collections, as well as their respective subsets, in Scriabin's music demonstrate the potential insights to be gained through analytical approaches informed by relations of voice-leading parsimony.[8]

NOTES

1. Scriabin's use of three of these collections in quick succession, 7-34 $\rightarrow$ 6-34 $\rightarrow$ 6-Z49, accompanied by salient realizations of the connections between them, may be observed in the opening two bars of Op. 74, No. 5. See Perle 1984.
2. The inclusion relation between sets in this relational network may be strengthened by considering only those pc-sets which Zimmerman (forthcoming) refers to as "collections without clusters (CWC)." CWC are pitch-class sets which do not contain [012] as a subset. Limiting the repertoire of pitch-class sets to CWC, 7-34 is the only 7-note superset of 6-34, and, likewise, 8-28 is the only 8-note superset of 7-31, which in turn is the only 7-note superset of 6-Z49.
3. P is equivalent to Douthett and Steinbach's $P_{1,0}$ (1998) or DOUTH1 (Lewin 1996). Note that neither P nor $P_{1,0}$ require the related pitch-class sets to be members of the same set class.
4. Jack Douthett suggested several useful modifications to my original definitions, which are incorporated in Definitions 1 and 2.
5. Taruskin 1997 makes a similar point with respect to the mystic chord, noting that two different five-note subsets are subsets of the whole-tone and octatonic collections, respectively. He describes the mystic chord, sister sonority to the acoustic collection, as being "on the cusp between two nonfunctional pitch collections" (344).
6. For transformations addressing the motion from E^7 to G^7, see Childs 1998, Douthett and Steinbach 1998, and Gollin 1998.
7. For example, see Steve Reich's *The Desert Music*, which makes extensive use of the acoustic collection.
8. I would like to thank David Clampitt, Richard Cohn, and Jack Douthett for their helpful comments on earlier drafts of this paper.