First generation atonal pitch-class set theorists imported from mathematics, elementary principles of set theory after the Second World War. Essays appearing primarily in American flagship publications from the 1950s through the 1980s developed theoretical and analytical approaches to the "atonal" music written most prominently by the composers of the Second Viennese School between roughly 1905 and 1923.

Beginning in the 1980s and continuing to the present, a second generation of set theorists has been emerging. These theorists take the premises of first generation atonal pitch-class set theory and extend them into theoretical and analytical work including post-Riemannian theory, mathematical (re)modeling of pitch-space, and atonal voice-leading. In general, theoretical and analytic work of this second generation of set theorists has abandoned the subset and the superset in favor of linear connections between and among pitches, pitch classes, and pitch-class sets on different structural levels—analogous to the structural levels that Schenkerian voice-leading has so powerfully elucidated in tonal music.

Time limitations require a theoretical location of this talk in the growing community of scholarship in atonal voice-leading in broad strokes. My work has been informed by second generation atonal pitch-class set theorists publishing work particularly from the 1990s to the present. Joseph N. Straus has proposed four well-known conditions for atonal prolongation. These four conditions are all underwritten by the single assumption that a structure of <u>subordination</u> of musical materials is required for atonal voice-leading.

Straus has also advocated what he dubs "smoothness" in atonal voice-leading—a criterion according to which voices move as little as possible in pitch-class space, not unlike the principles of common-practice part-writing in which SATB voices move as much as necessary (particularly upper voices) but as little as possible.

Theorists such as Straus and David Lewin have taken atonal pitch-class set theory well beyond the one-to-one correspondences that limited first generation theory with its sets, subsets, supersets, and similarity relations. One of Straus' greatest contributions is in the idea of near transposition and near inversion of pitch-class sets. Near transposition and near inversion account for transformations between and among pitch-class sets in which some pitch-classes move a certain distance and others move a <u>different</u> distance under transposition and / or inversion. The distance between these distances (as it were) is measured as offset. Straus' notion of near transposition and near inversion has two major limitations: First how great must the offset between two near transpositions and / or inversions be before the <u>nearness</u> of transposition and / or inversion becomes <u>difference</u> between two pitch-class sets? And, second how do near transposition and / or inversion work when dealing with pitch-class sets of differing cardinality?

Mathematics offers elementary structures of mapping elements of sets of similar and different cardinality. Figure 1 shows these elementary structures. Much of Straus' work relies on showing principles of exact and near transpositions between and among pitch-class sets of the <u>same</u> cardinality; this is work in musical <u>bijection</u>. Much of the work of David Lewin and others relies on showing voice-leading between and among pitch-class

sets of <u>differing</u> cardinality; this is work in musical <u>surjection</u>. There is much to be said concerning the theoretical and aesthetic integrity of such applications, including a musical injection and a musical application of a logically necessary fourth structure— neither "onto" nor "one-to-one" but such considerations must await a different time and place.

I offer a reading of Webern's Opus 6, no. 4 that is surjective. One of the most obvious characteristics of its musical language is a texture that gradually thickens to a highly re-iterative sonority at its conclusion. While Straus' four conditions for prolongation in atonal voice-leading demand <u>subordination</u> of some musical materials to others, I would like to suggest in today's talk that a voice-leading of atonal <u>coordination</u> is possible—a stretching out and projection of a single motivically concise idea through stepwise motion, splitting, and extension along a contiguous series of discrete sonorities.

My analytic notation involves noteheads without stems and noteheads with stems; anyone used to Schenkerian notation will recognize the association between rhythmic duration and structural depth. This notational system is firmly underwritten by regimes of <u>subordination</u>; in all examples used today, you will see noteheads without stems and noteheads with stems. This notation is meant to acknowledge the perhaps irresistible pull of subordination in our perceptual apparatus within the experience of listening to and understanding music whose materials are <u>coordinated</u>. By coordinated, I mean represented as contiguous eventsde along a time line without the logic of serialism.

My examples followed by the lower case a) attempt to reproduce as accurately as possible the content of the Universal Edition of the score; all examples followed by other lower case letters offer analytic reductions showing various aspects of atonal pitch-class set theory and atonal voice-leading.

See Example 1a for the opening of the work that feathers silence to sound in an extended layering of one percussion sonority upon another.

There are two ideas nested within each other as shown in Example 1b. Pitch-class sets II, III, and IV are nested within pitch-class sets I and VI. Pitch-class sets I and VI are both pitch-class sets {256}members of set class (014). Once we have heard the music from mm. 7-12, we hear pitch-class set I having been a point of departure, pitch-class sets II, III, and IV a sonority of otherness, and pitch-class set VI as a point of return. This is a nested structure at the set class level—a foundationally surjective gesture for the piece.

Within this gesture of departure-otherness-return, there is another nested structure at the pitch-class set level. Having heard mm. 7-12, pitch-class set II {0134} member of set class (0134) sounds like a point of departure; pitch-class set III {58T12} member of set class (01469) is a sonority of otherness; and pitch-class set IV {0134} member of set class (0134), a point of return. The departure-return quality of pitch-class sets II and IV suggest a pitch-class set version of the famous technique of Klangfarbenmelodie—the pitches played by the flute in pitch-class set II are the same pitches played by the muted

trumpets in pitch-class set IV. Pitch-class sets II and IV are of course, symmetrical around D-natural—first heard in pitch-class set I with its split third F-natural / F-sharp.

I would like to narrow down and listen more intently within the internal nesting I have just described. I hear the relationship between pitch-class sets II, III, and IV as a neighbor gesture. Not only is there a pitch-class, set-theoretical relationship among these three groups of notes, but on a pitch-class to pitch-class and pitch-to-pitch level, they are neighbor notes, much in same way that in a tonal progression tonic | fully-diminished seventh chord | tonic, the pitches of a fully-diminished seventh chord can be heard as neighbor notes in a simple prolongation of a tonic harmony. I suggest that Webern has composed neighbor <u>gestures</u> from pitch-class sets II, III, and IV, not neighbor <u>notes</u>. While neighbor <u>notes</u> denote melodic motion of consonance-dissonance-consonance, let neighbor <u>gestures</u> denote a stepwise ascending and / or descending departure from and return to a pitch-class or pitch in a contiguous series of coordinated events. I offer Example 1c as a representation of this neighboring gesture.

Example 1c shows that a descending motion of two semitones (and back) marks the motion from E-flat to D-flat and C to B-flat, while an ascending motion of one semitone (and back) marks the motion from C-sharp to D-natural and E-natural to F-natural.

The {256} pitch-class set played by the clarinets in measure 12 leads to pitch-class set VII that serves as a background against which a solo played by the E-flat clarinet sounds. See Example 2a. Example 2b shows pitch-class sets VI and VII. Pitch-class set VI

expands to pitch-class set VII: set class (014) becomes (0145) that contains two interlocking (014) set classes. Instead of writing a neighbor motion back to pitch-class VI or a pitch-class set that belongs to set class (014), Webern sustains pitch-class set VII as shown in Example 2c.

The voice-leading repeats and expands the voice-leading between pitch-class sets II, III, and IV. From pitch-class set VI to VII there are two half-step motions (D-natural to E-flat and F-sharp to G), one whole step motion (F-sharp to E-natural) and a new motion of a minor third (F-natural to A-flat). Example 1c had shown pitches with stems representing points of departure and return; pitches with noteheads only represent the neighbor gesture. Example 2c has both sonorities with stems, since the coordinating relationship between these sonorities is emphasized by the absence of a return to the pitch-class set VI or a pitch-class set that is a member of set class 014.

After four measures of rest from measures 16-19, an alto flute melody enters accompanied by a change of sonority in the trombones and bass tuba. See Example 3a. Example 3b shows the pitch-class set of the trombones and bass tuba. Example 3c shows that a voice-exchange occurs between pitch-class set VI and VII. The voice-exchange creates the paradoxical impression of motion and stasis; it is static since both pitch-class sets contain an E-flat (pitch-class 3) and an E-natural (pitch-class 4). On the other hand there is a total of two half-steps in motion from pitch-class set VI to VII—the E-flat in pitch-class set VI moves to E-natural in pitch-class set VII (represented by the solid line in Example 3c); and the E-natural in pitch-class set VI moves to E-flat in pitch-class set

VII (represented by the solid line in Example 3c). And this is not just a pitch-class, but a pitch-specific voice-leading.

In measure 23, the brass accompaniment figure shifts; see Example 4a for a transcription of the measures from the score and Example 4b for an indication of the pitch-class sets. See Example 4c for an account of a semitonal ascent from pitch-class sets VIII and IX, and 4d for an expansion of the E / F / E neighbor motion from the beginning of the piece.

In measure 32, Webern shifts the texture of the composition. From the opening through measure 31 the piece contains melodic gestures set against accompanying gestures. The melodic gestures of E-flat clarinet from measures 12-15, the alto flute from measures 20-22, the horn from measures 21-24, and the trumpet from measures 24-27 are all melodic components of the chords and voice-leadings among them upon which I am focusing in this presentation. An explication of the relationship between these melodic gestures and the voice-leading implications among the simultaneities that support them must await another time and place. From measure 32 to the end of the piece, these melodic gestures stop.

 Measure 32 contains the first music of this accompaniment-only texture. See Example 5a for a transcription of the score and Example 5b for a reduction with pitch-class sets and the set classes to which they belong. I hear this passage stretching out the initial neighboring idea of the piece as shown in Example 5c.

Measure 33 picks up the sonority of pitch-class set II, splitting the C/E-flat from C-sharp/E. See Example 6a for a transcription, 6b for pitch-class sets, and 6c for an analytic reduction showing the transformations of pitch-class set II into the musical

materials of measure 33. From measures 33 to the downbeat of measure 39, Webern stretches out the C/C-sharp motion inherent in the neighboring motion from pitch-class sets II, III, to IV to a dramatic and climactic rising motion in the bass that you can see in the transcriptions Examples 7 and 8.

Example 9 summarizes the results of my reading: notice the D-natural at the center of symmetrical pitch-class set II (measure 9) and the splitting of the two dyads around D—C-sharp / E and C-natural/E-flat; notice these two dyads moving to the bass in measure 33 leading to a chromatic rising motion in the bass leading to the final, reiterated sonority of pitch-class set of measure 39. The rising bass motion leads to A-natural in the bass of measure 33 with twin leading tones G-sharp and B-flat making the A-natural sound like a kind of dominant. Given the origin of the voice-leading of the piece as D-natural, the music embodies a paradoxical atonal half-cadence—opening with the symmetrical pitch-class set II around D-natural from pitch-class set I and culminating in a symmetrical 10-note set supported by A-natural.

I hope to have shown you today, that Webern's Opus 6 no. 4 embodies pitch-centricity around the initial D-natural of pitch-class set I, that pitch-class set II composes out the negative space around this D-natural with a symmetrical pitch-class set that belongs to set class (0134), that this pitch-class set contains two thirds C/E-flat and C-sharp/E-natural that become split into the twin C/E-flat C-sharp/E-natural thirds at the bottom of the sonorities in measure 33, that these thirds expand into an inexorable ascending motion from measure 33 to 39 culminating in a crushing, reiterated 10-note sonority, and that this 10-note sonority bears a family resemblance to the initial configuration of pitches in the

work (the D-natural with the split F-natural / F-sharp thirds and the symmetrical pitch-class set that composes out the negative space around this D-natural).

Elsewhere I have written about this piece as an embodiment of psychoanalytic trauma, and as such one can easily imagine the reiterated 10-note sonority with which it ends as a frozen, musical gaze.

Further work in atonal pitch-class set theory will be able to ground the remarks I have presented today in a thorough and more systematic surjective voice-leading. And yet there are so many mappings possible between and among pitch-class sets of differing cardinality, a selection process leading to a systematic surjective voice-leading will be challenging indeed. Until that day comes, I thank you for your attention.