Fuzzy Voice Leading and Similarity Relations

Lewin, Morris, and Straus approach the thorny issue of generalized voice leading in different, but related ways. Morris, for example, is most interested in the compositional options made possible by a thorough investigation of various Tonnetze and Tonnetz-like spaces that conform to standard $T_n/I$ functions.¹ One interesting departure is Morris’s willingness to deal with (Perle) spaces that include inversionally-related axes in addition to the standard transposition relationships of a neo-Riemannian Tonnetz (see his Example 10b, p. 192) When mapping triangles and their functions on this type of space, set classes are not always preserved. Instead, cyclic relationships arise, which Morris points out in Perle’s compositional and theoretical work. I found this particular example quite fascinating because transformations between adjacent or close triangles become a rather complicated thing to generalize, despite the consistency of the Klumpenhouwer networks that generate the set classes. Morris points to some work by Lewin and Lansky with which I will be sure to familiarize myself.

Lewin and Straus aim at analytical and theoretical targets instead of compositional ones. Both are interested in modifying existing paradigms of set class theory analysis to explore relationships between set classes from a transformational view. Instead of merely tracing specific set classes through a piece, Lewin and Straus concern their analyses with voice leading work and effort as related to $T_n/I$ functions. Indeed, Straus is most interested in slight perturbations away from standard transpositions and inversions. Instead of merely asking, “what set class is obtained

¹ In addition to these spaces, Morris engages with generalities involving motion (parallel, similar, contrary, etc.) and contrapuntal conditions (voice crossings, inversions, etc.) He also takes time to treat pitches rather than pitch classes in his initial exposition. It is clear that Morris, while seeking a way to accurately and generally describe motion and techniques in any type of (a)tonality, is most concerned with the compositional applications of his research.
by these notes?” or “are these two sets related by inversion or transposition?” Straus asks, “how do I get from this group of notes to this group in a voice leading context?” Both he and Lewin adopt a transformational attitude (though Lewin’s is often more GIS in nature), and both question the practicality of the “crisp” transformational functions that make up traditional set class analyses.

They suggest “fuzzy” transpositions and inversions as a better way to describe voice leading motion between adjacent pc sets.² Take Lewin’s Example 10 (pg. 61), given below.³ Each harmony is of the same cardinality, and all parts move in similar motion (S⁻ or S⁺ for Morris). Upon further inspection, most of the progression can be described as parallel. A literal, exact transposition (T₄) describes the voice leading required to take chord 1 to chord 2. Similarly, chords 3, 4, and 5 are all related by exact pitch transposition.

² Straus suggests the terms near-transposition and near-inversion. (Straus 1998, 268).
³ I have also included a Straus-style mapping of the voices below 10b here.
Lewin suggests a listener, guided by the $T_2$ transposition in upper voice especially, will likely hear the motion from chord 2 to 3 as (nearly) parallel as well. He charts this transposition, and then shows how close the actualized version is in the music. As it turns out, three of the voices must move an additional semitone from a literal $T_2$ transposition. In Straus’s terms, this is a *$T_2$* operation, with an *offset* of (3). I find this a very attractive way to analyze this passage. Lewin calls this “maximally uniform subjective,” and compares the result to a non-surjective, maximally uniform transformation as related to $T_{-2}$, which has an offset of (2). While the voice leading is smoother in one regard, this understanding denies the preserved cardinality of the actualized musical content. Lewin notes that, “the role of surjectivity is important to savor in the Webern example because another feature of the music, a more immediately salient feature, prompts us to hear chord 3 as a "pseudo-$T_2$" of chord 2.” (Lewin, 61). Both Lewin and Straus encourage the perceptual exigencies of analysis, and their “fuzzy” way of mapping paths between pc sets (even of different cardinalities) generally takes salient features into account in ways that “crisp” analyses often leave out.

Straus then shows how voice leading paths and optimal offsets can be used to describe relationships between set classes. Those related by minimal offsets of near-transpositions near-inversions are closer together, while those more remote are placed further apart. These graphs serve as a launching point for a brief discussion of the relation between traditional similarity measures (usually defined by what Straus calls “internal resemblances”) and his new voice-leading maps. His conclusion is that they are different vantages of the same musical terrain:

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4 This raises one criticism of Cohn’s neo-Riemannian techniques that I share with Straus. For Cohn, the total voice leading work done is directional and additive. If a transformation requires two voices to move up by semitone (+2) and one voice to move down by semitone (-1), the total work done is (+1), not (3). Though it is a convenient way to, say, move between triads in his hexatonic cycles, it seems a little disingenuous to essentially ignore two of the voice-leading transactions in a given exchange. (As a football fan, this reminded me of “offsetting penalties,” in which two people engage in a fight, both are ostensibly penalized, but the net result is that the two fouls offset and there is no effect on the game whatsoever. In this case, $1+1=0$.)
From different points of view, then, both the voice-leading oriented methodology presented here and the harmony oriented methodologies of similarity relations and set complexes appear to be engaged in mapping the same terrain. What this suggests is the deep connection between harmony and voice leading in atonal music. (Straus 341)

To me, this seems like a given. Both methodological perspectives are concerned with the same material: pc sets. These sets are defined in very specific ways, and it is their internal intervallic relations that constitute their identities. Straus himself states that “the internal structure of a set shapes the kinds of voice leading connections it can create with other sets.” (341) One could easily map on a type of similarity relation to his map of voice-leading offset paths for pc sets. Below, I have imposed interval class labels onto Straus’s Example 22. Each set class contains intervals n, m, and m-n.
Essentially, Straus’s offset chart is a different perspective on a more traditional understanding of similarity as interval-class relations, at least in this case. It would require a much more detailed analysis than this essay warrants to prove or show other equivalencies or relationships between the voice-leading and similarity relations. Straus and Lewin do well to suggest a horizontal, fuzzy, transformational approach to atonal analysis, which I believe often comports with perception to a higher degree than mere set class relationships. But both kinds of methodologies are concerned with a robust musical material (set classes). The questions these approaches pose over how the material coheres may differ, but the answers must be the same.

Straus summarizes:

Similarity relations and set-complex relations ask: How much like set-class X is set-class Y? The voice-leading model presented here asks: How smooth, uniform, or balanced is the path from X to Y? How much effort is needed to get from X to Y? It turns out that the answers to these questions are more or less the same. (Straus 341.)