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Mapping Voice Leading from Four through Forty Voices: A Tool for Pedagogy

MATTHEW S. ROYAL

INTRODUCTION

This article describes a tool for exploring voice-leading options in pre-tonal and tonal harmonic contexts: the “voice-leading map.” Like many tools, voice-leading maps may be adapted for a number of different uses and applied to a variety of materials. In order to convey something of this multivalence, the description that follows will be divided into three sections: (1) an introduction to maps using 4-voice examples, such as any student might encounter in first- and second-year theory; (2) an application of maps to 8-voice compositional exercises in a late 16th-century style; and (3) a brief exposition of the kind of *analytical* insights that maps afford, using a 12-voice example by Palestrina and a 40-voice example by Tallis.

VOICE-LEADING PATHS AND MAPS IN 4 VOICES

The Aims of Voice-Leading Pedagogy

One might identify two overarching goals of good voice leading: (a) to create truly independent parts within a homophonic or polyphonic texture, and (b) to control dissonance in a stylistically appropriate way. While these two may not be the only objectives of voice leading, between them they surely account for many of the issues encountered in the core-theory or counterpoint classroom. Point (a) provides justification for the strong prohibition of parallel perfect consonances as well as the less strict avoidance of “hidden” perfect consonances and the mild preference for contrary or oblique motion.¹ Point (b) speaks to the approach, the preparation and the

¹ A perceptual rationale for the avoidance of parallels is provided in David Huron, “Tone and Voice: A Derivation of the Rules of Voice-Leading from Perceptual Principles,” *Music Perception* 19 (September 2001): 1-64.

resolution of all tones that are not consonant with a particular triadic harmony, including the treatment of chordal sevenths.

Traditionally, the pedagogy of voice leading has taken two lines of attack, namely composition and analysis. These two activities, broadly construed, are seen as complementary: each offers a perspective on music, a way of “getting to know the notes,” that the other does not. Exercises in part writing or counterpoint provide students with the challenge of writing something that sounds good while working towards these two goals. Such a task can be both intellectually interesting and musically informative, if the exercises are well constructed. Analytical exercises can show how composers of the past routinely negotiated these demands in creating aesthetically satisfying (or even great) pieces of music. As will be shown, voice-leading maps can aid both composition and analysis.

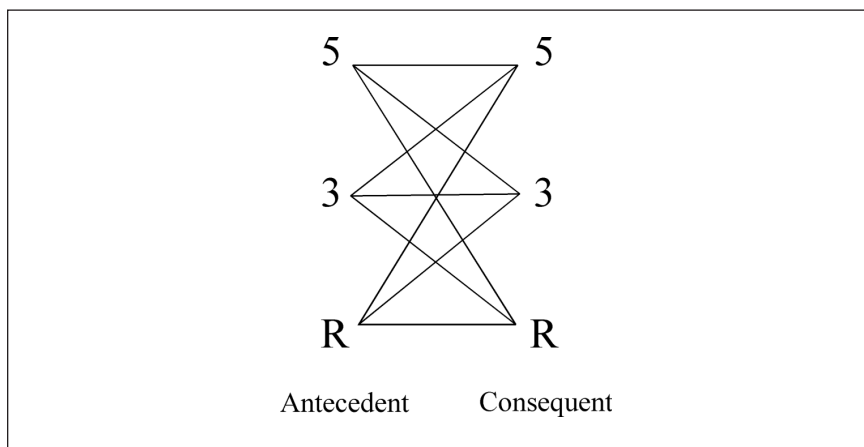


Figure 1: Schematic map of all possible paths between two triads.

Maps and Paths in Four Voices

The approach adopted here is to assume *a priori* that a particular harmonic progression is to be realized in x number of independent voices. To see how this might work, imagine that we have two chords, as schematized in Figure 1. Between the antecedent and the consequent chords there exist a limited number of voice-leading possibilities, or “paths,” from the members of one chord to the other. All the paths in combination produce a voice-leading “map.” Figure 1 gives the total number of potential paths between two triads where R stands for “root,” 3 for “third” and 5 for “fifth.” Note that there are nine possible paths in total: root-root, root-third, root-fifth, third-root, third-third, third-fifth, fifth-root, fifth-third and fifth-fifth. However, when it comes to particular chord progressions, not all maps are created equal; depending on the specific context, some maps may have more paths than others. It should perhaps be emphasized that maps can play two roles. First, they can show all the possible paths for a given progression, several of which may not be used in any given setting; this we shall call a “potential map.” Second, they can be used to keep a tally of the paths actually used in a given setting: this we shall call an “actual map.” In either case, the main purpose of a map is to make sure that no paths are duplicated, which would render parallel octaves or unisons (there are some exceptions to this rule noted later on).

More concrete examples of maps are given over the next few pages in Examples 1 through 5. The map displayed at the top of each example is a *potential* map, while those given under the staves are *actual* maps. The potential map at the top of Example 1 shows the possible voice-leading paths in the simple V-I cadence in C major, the bass-line G-C path being bolded for clarity’s sake. Several other features of this map should be noted. First, the D-G (fifth-fifth) path is not available as it would give consecutive fifths with the bass, so that path is excluded from the map right off the bat. Second, in a typical four-voice setting, only one B will sound in the first chord, in accordance with the usual prohibition of leading-tone doubling. Consequently, either the B-C or the B-G paths will be used, and the B-G path (“falling leading tone”) can only be employed in one of the inner voices. Third, it is preferable to have only one E in the second chord, so the D-E and G-E paths may be seen as alternatives, too. The alternative paths identified in the second and third points above have been annotated with the word “or”. Two of the many

Potential map

a. b.

D — G D — G
 B — E B — E
 G — C G — C 4ths

Example 2: Voice leading for the progression V⁶-I in C major.

Example 3 shows another modification of Example 1, the V⁷-I cadence in C major. Many of the features of the potential map given here are identical to the map shown in Example 1. However, the seventh of the dominant 7th, F, is added to the path between G and E and labeled as the 7th of the chord (realized in Example 3a). This method of labeling shows the voice-leading origin of the 7th and also precludes the possibility of erroneously duplicating the descending approach to the E (i.e. writing F-E and G-E at the same time, a common error in first-year theory assignments [committed in Example 3b]).

Potential map

a. b.

good bad

D G D G

B E B E

G C G C

Example 3: Voice leading for the progression V⁷-I in C major.

A more refractory voice-leading situation is given in Example 4, which shows the potential map for a Phrygian cadence in A minor,

with the bass-line bolded as before. In this case, a couple of problematic pitch classes limit the number of possible paths. First, F cannot proceed to B as this gives a melodic tritone. Second, the G# in the consequent chord can only be approached from A (D-G# and F-G# both being melodically undesirable). Third the A-B path is only possible if it occurs *below* the D-E path, giving parallel 4ths rather than parallel 5ths (Example 3a). Fourth, the A-E path cannot be a descending fourth in the soprano as this will give hidden octaves with the bass (avoided in Example 3b). Fifth, the descending-third path, D-B, cannot be in the soprano as this gives hidden fifths (avoided in Example 3c). With this Phrygian cadence, then, there are only 6 paths on the potential map, and 3 of those paths have warning signs posted.

Potential map

a. b. c.

good okay good

A — B A — B A — B
 F — G# F — G# F — G#
 D — E D — E D — E

Example 4: Voice leading for the progression iv^6-V in A minor.

The final two-chord four-voice progression to be considered is the half cadence, IV-V, in C major, as shown in Example 5. This progression can pose problems for beginning students as there are no common tones between the chords and the danger of committing parallel fifths or octaves is therefore greater. In the potential map, the bass-line path, F-G, is bolded, while the fifth-fifth path, C-D, is excluded at the outset to preclude parallel fifths. The A-G, C-G, C-B, F-D and A-D paths are all possible, though they are flagged as having to descend, either for melodic reasons (e.g. A-G, C-B and F-D), and/or to avoid the possibility of hidden perfect intervals if one of these paths occurs in the soprano. The two possible approaches to the B, A-B or C-B (both stepwise) are mutually exclusive as B is the leading tone and therefore cannot be doubled. Example 5 also shows two possible realizations of this progression using some of the paths identified above.

Potential map

a. b.

good okay

C D C D
A B A B
F G F G

Example 5: Voice leading for the progression IV-V in C major.

The foregoing progressions are all typical of what students might be expected to master within the first couple of months of starting four-part writing. At this level, potential maps are intended as visual cues for discussion. Using this discussion as a springboard, and armed with just a few rules about doubling, spacing and melody writing, the student can then proceed to generate different 4-voice realizations of these chord progressions. The key is to use the maps to have the student experiment and discover for her/himself which paths work best, for instance, that paths involving the smallest possible melodic intervals are generally the easiest to traverse.

Instructors of first-year theory have at their disposal a variety of ways of expressing the rules and norms of common-practice voice leading. One might refer, say, to scale degrees (“the leading tone resolves upwards to the tonic”), to intervals above the bass (“in a cadential $\frac{6}{4}$ the 4th above the bass resolves down by step”) or to members of the chord (“the seventh of the dominant seventh is quit downwards by step”). All these ways of conceptualizing voice leading are useful, necessary and complementary. Why, one might then ask, add a further layer of complication in the form of pitch-class letter names? The answer to this objection is that, in my experience, more often than not, students already *do* write in pitch-class letter names in theory exercises. For example, one might see letter names added as chord tones for a figured-bass realization, or as the available consonant pitches above or below a cantus firmus in species counterpoint. Moreover, these *ad hoc* student annotations are frequently incorrect, incomplete or lacking crucial accidentals (e.g. the notes of the tonic chord in Db major given as D, F and A!). Voice-leading maps simply offer a means of systematizing, checking and extracting the maximum benefit from what is often already done informally.

At this juncture, several other helpful features of voice-leading maps should be highlighted:

1. The pitch-class options for each chord and the possible paths between them are clearly laid out. Rather than learn rote progressions, the student is encouraged to explore alternative voice-leading paths and work out which of these tend to be used for melodic or harmonic reasons.
2. Maps may be annotated in whatever way the instructor feels is helpful or relevant. The above examples show some of the simpler types of labeling that can be employed. In addition,

- other strategies such as color coding for different parts can of course be adopted.
3. Paths that would allow parallel fifths and octaves are discounted from the outset or at least dealt with directly in discussion.
 4. As illustrated with the dominant 7th in Example 3, the essential difference between consonance and dissonance is emphasized. Chordal 7ths are notated conspicuously on the voice-leading map as a visual reminder that they must be controlled carefully.
 5. The more abstract nature of pitch-class notation can actually be a boon: because pitch-classes are by definition octave-neutral, a student can plan out a particular path without immediately having to commit to a specific range or voice. Alternatively, a student may decide to assign a voice-leading path to a particular voice/octave early on, and be prepared to revise that at a later stage. If, then, in the process of revision, the original musical notation is erased, the presence of the map serves to jog the student's memory that a certain path is still required in another voice.

One limitation, the flip-side of point (5) above, should also be noted: these maps do not necessarily represent the spatial aspects of melody, i.e., whether a line descends or ascends and the size of the melodic interval traversed. Instead, the three members of each triad are vertically ordered by root, third and fifth for the sake of consistency. For this reason, maps are best used *in conjunction with* rather than instead of conventional musical notation. As already mentioned, they provide another way of thinking of voice leading that complements but does not replace normal notation.

In order to see the possibilities for voice-leading maps beyond elementary progressions, we shall consider one example of a longer four-voice progression, such as a student might encounter in her/his second year of theory. Example 6a shows what a student might be given to start with: a figured bass that contains, among other things, several seventh chords, an augmented 6th, a secondary dominant 7th and a cadential $\frac{6}{4}$. The student's first task is to write in the implied pitch classes below the staff system and mark in the path taken by the bass line (these are both shown on Example 6a, too). Note that any chordal sevenths are placed to the side of the main column for their chord since this makes them visually more conspicuous and situates them near their likely note of resolution in the next chord. In

addition, there are two sonorities in this exercise which arise purely out of voice leading and for which the conventional ordering of root-third-fifth is either meaningless or unhelpful. These sonorities are the Italian 6th (m.1, b.4) and the cadential $\frac{6}{4}$ (m.3 b. 2). For these, the vertical ordering of the chord members in the map is mutable: in this instance the Italian 6th has been arranged to highlight the notes it has in common with the chord that precedes it; the $\frac{6}{4}$ has been ordered similarly to highlight voice-leading proximity.

Example 6a: Starting map for a figured-bass exercise in F# minor.

6 6 6 6 6 6 6 6 # b # #

5th C# G# F#-F# G#-G# C# E A D A G# C#

3rd A E-D D E#-E# A C# F# B F#-E# A#

7th F# C# B B#-C# C# F# A D G# C#-C# F#

R

Example 6c: Example 6b with common-tone paths added (shown stemmed).

Once the map has been started, it can be used in this more extensive type of exercise as a sort of scratch pad, a space to work out both obligatory and optional paths before they are added. There are several stages to realizing a figured bass like this that can be planned and executed on the map. The first stage, shown in Figure 6b, is to deal with obvious tendency tones, namely the leading tone and sevenths of chords, both of which are easy to find on the map. In this exercise, every occurrence of the leading tone, E#, can be highlighted and linked to an F# in the next chord (if there is one). These resolutions of the leading tone to the tonic can then be provisionally filled in as musical notation in one of the upper voices. Similarly, all sevenths of chords, located conveniently on the side of their respective columns, can be linked to the pitch in the next chord that lies a step lower. Again, these resolutions can be notated on the score, subject to possible octave (and voice) change later on. If these obligatory resolutions connect up with each other, then they can probably be assigned to one voice, as is the case with the putative alto voice in Example 6b.

The second stage, also shown in Example 6b, is to deal with other obligatory voice leadings that are not so obvious, in this exercise the resolutions of the Italian 6th, the secondary dominant and the cadential $\frac{6}{4}$. The map does not help as such with recognizing these voice-leading paths. However, it does allow the student to place them on a kind of “to-do list” once they are recognized. In Example 6b they are part of the potential map shown under the staves and are notated provisionally on the staves.

The third stage, which is not strictly obligatory, but can be very helpful, is to link all common tones between chords that have not already been identified through other means. The voice-leading map, again, makes these more conspicuous than figured bass alone does. This third stage is shown in Example 6c with pitches that arise from linking common tones distinguished with the presence of stems in the musical notation.

Once these three stages have been completed, there is usually not much of the exercise left to do. The remainder can be filled out either using the voice-leading map or not, depending on the exigencies of the exercise. One further pitfall that the map can help avoid is parallel fifths: if both the root-root and the fifth-fifth paths of a progression are used, the student must make sure that parallel fourths rather than parallel fifths are created. This particular hazard is present in the exercise shown in Example 6 between the second

and third chords of measure 1. Here the C#-B path must sit *above* the G#-F# path if parallel fifths are to be avoided. As it turns out, such a requirement means that much of what was put into the tenor in Example 6c will work better in the soprano, necessitating some reworking. Here again, the map serves as a reminder of the paths that have been used and which must be transposed. As can be seen from the completed exercise in Example 6d, almost all the paths that were worked out on the map are used ultimately in one of the voices: the only paths that have been changed are those that make up the resolution of V⁷ at the cadence, in order to allow a fuller final chord.

VOICE-LEADING MAPS AND 8-VOICE WRITING EXERCISES

Why Write in 8 Voices?

A further fact may also be apparent from the previous examples: with a couple of exceptions, four-part voice leading does not usually come close to exhausting all the paths between two triads. It turns out that the limits of triadic voice leading are only reached when one has 8 or more independent lines. I personally have found much pedagogical benefit in having students confront these limits in some of their own writing exercises. Constructing 8 truly independent lines that are singable and that fit together harmonically is a fulfilling challenge for more advanced students. Every voice-leading option has to be weighed in the balance, and the student must consider part-writing possibilities that might otherwise be overlooked. In fact, in setting 8 voices, the use of voice-leading maps becomes almost a necessity if one is to avoid parallel fifths and octaves and control dissonance. Also, after venturing into the realms of 8-voice writing, a return to writing in 4 parts seems simple by comparison. A further bonus is that there exists a splendid corpus of 8-voice music that can be used for both emulation and analysis: the polychoral repertoire from the 16th and early 17th centuries. Exercises in 8 or more voices provide a formal venue for the student to get to know this music in the sort of detail that would otherwise be missing in the theory curriculum.

The Late 16th-Century Polychoral Style

For the purposes of writing exercises, a fairly narrow, stylistically consistent repertoire is most manageable. The styles of Palestrina

(and his continental-European contemporaries) tend to be used most often as the rules of dissonance control, melodic writing and rhythm are the most stringent and therefore make the best training for the student. For these reasons, the model repertoire used here is the corpus of two-choir, 8-voice masses, motets and psalm settings by Palestrina, Lassus and Victoria. The 8-voice writing that I shall describe makes a worthy conclusion to a course in 16th-century counterpoint that has focused on these composers.

As an aside, many of the terms employed here, terms such as “chord,” “triad” and “dominant,” are unabashedly anachronistic for the late 16th century. According to writers such as Zarlino, Burmeister and Lippius, there seems to be an emerging sense of triadic harmony around 1600.² However, we cannot really know to what extent composers of the late Renaissance and early Baroque thought of harmonic sonorities as unified entities rather than just collections of harmonic intervals. Certainly, functional harmony, as symbolized by roman-numeral analyses, would have been alien to these writers, and I eschew such analyses in my discussion of the polychoral repertoire. The modern terminology that is employed is put into service simply because it is comprehensible to 21st-century theory instructors and students. My ultimate concern is to provide an access point to polychoral techniques for modern students rather than to be historically authentic.

Exercises in 8-voice texture do not usually appear in counterpoint texts. The only volume with 8-voice examples of which I am aware is Gauldin’s *A Practical Approach to Sixteenth-Century Counterpoint*, which provides a thorough but extremely condensed overview of polychoral writing in chapters 19 and 20.³ The following nuts-and-bolts description of the polychoral style is therefore necessary to set the scene for detailed discussion of 8-voice writing exercises. Interested readers will find ample illustrations of the principles outlined in any polychoral piece by Palestrina, Lassus or Victoria.

²Gioseffo Zarlino, *Le istitutioni harmoniche* (Venice: Franceschi, 1558), trans. of Part III G. Marco, ed. C.V. Palisca as *The Art of Counterpoint* (New Haven: Yale University Press, 1968); Joachim Burmeister, *Musica Poetica* (Rostock: Ruhnke, 1606), trans. B. Rivera, ed. C. Palisca as *Musical Poetics* (New Haven: Yale University Press, 1993); Johannes Lippius, *Synopsis musicae novae* (Strassburg: K. Kiefer, 1612), trans. B. Rivera as *Synopsis of New Music* (Colorado Springs: Colorado College Music Press, 1977).

³Robert Gauldin, *A Practical Approach to Sixteenth-Century Counterpoint* (Englewood Cliffs: Prentice Hall, 1985).

In 8-voice settings the harmonic rhythm tends to be quite slow, typically with chord changes every whole note or slower. Sometimes a single triad may be extended over several half-note beats. The vast majority of sonorities in 8 voices are root-position triads. Occasionally, and usually only briefly, one may find a first-inversion triad. Second-inversion triads, being a type of dissonance, are not used as an overall sonority. Every so often, one individual choir within a polychoral texture may introduce second-inversion chords, although the root of the chord will usually be present as the lowest sounding voice in the bass part of the other choir. For the duration of any given chord, there is a general concern to maintain a balance between the three pitch classes that make up a triad. Situations where one particular pitch class is underrepresented are avoided, although there are two exceptions: (1) the resolution of a suspension, which is not doubled, and (2) when the third of the chord is raised by *musica ficta*, in which case the raised third is not doubled unless it forms part of a chord that concludes a section.

Voice crossing and overlapping is possible in this style, although the usual choral ranges of the different voice types must be respected. Given that the harmonic rhythm is slow, much melodic and rhythmic activity can occur in different voices while the ensemble "sits" on one chord. We shall call this "within-chord voice leading." However, the student must pay particular attention to the voice leading at the point where a chord changes, what we shall dub "between-chord voice leading." It is with between-chord voice leading that the voice-leading map really comes into its own. With either type of voice leading, parallel unisons, fifths or octaves are avoided, although consecutive perfect intervals in contrary motion are allowed in certain circumstances (see below). Non-chord tones are generally limited to either unaccented neighbor or passing tones, or to 4-3 type suspensions. Needless to say, seventh chords are not part of the style.

The image displays three musical examples, labeled a, b, and c, illustrating voice leading between two chords. Each example consists of a treble staff and a bass staff. Below the staves are chord diagrams showing the root progressions and common tones.

- Example a:** Treble staff shows a D major chord (D, F, A) moving to an A major chord (A, C, E). Bass staff shows a D major chord (D, F, A) moving to an A major chord (A, C, E). The bass line shows a contrary motion: the lower voice moves from D to A (up), and the upper voice moves from A to D (down). Chord diagrams show D and A as roots, with G as a common tone between the two chords.
- Example b:** Treble staff shows a D major chord (D, F, A) moving to a B major chord (B, D, F). Bass staff shows a D major chord (D, F, A) moving to a B major chord (B, D, F). The bass line shows a contrary motion: the lower voice moves from D to B (up), and the upper voice moves from B to D (down). Chord diagrams show D and B as roots, with B and G as common tones between the two chords.
- Example c:** Treble staff shows a D major chord (D, F, A) moving to an E major chord (E, G, B). Bass staff shows a D major chord (D, F, A) moving to an E major chord (E, G, B). The bass line shows a contrary motion: the lower voice moves from D to E (up), and the upper voice moves from E to D (down). Chord diagrams show D and E as roots, with no common tones between the two chords.

Example 7: Availability of contrary motion-bass lines (relaxation 1) and common tones (relaxation 2) for different types of root progressions.

COMMON RELAXATIONS OF RULES IN 8 VOICES

Before considering 8-voice writing through the lens of voice-leading maps, three idiomatic relaxations of rules should be noted.

1. Contrary-motion consecutive parallels are allowed, i.e. octave-unison or vice versa. This technique is particularly common between the two bass voices of 8-voice two-choir music, and works well when the basses sing the root of the chord and the roots move by fourths or fifths (Example 7a, bass staff). This technique does not work so well with root-progressions by a third as this progression would necessitate one of the bass voices moving by a sixth (Example 7b, bass staff), and is highly undesirable in this style with root movements by a second as one of the bass voices must move by a melodic seventh (Example 7c, bass staff).
2. Common tones between two adjacent chords, which do not, of course, actually involve any melodic movement, may be duplicated at octaves and unisons as many times as is feasible while still maintaining a balance of pitch classes. The presence of common tones between two successive chords greatly eases the constraints on voice leading. Chords whose roots are a fourth/fifth apart have one common tone (Example 7a, treble staff), chords whose roots are a third/sixth apart contain two common tones (Example 7b, treble staff), while chords whose roots are a second/seventh apart have no common tones (Example 7c, treble staff).

3. When setting three or more chords in succession in 8 voices, parallels are also avoided by using consonant skips within any one chord. Consonant skips within a chord allow voices, as it were, to reposition themselves for the next chord change (Example 8).

The image displays a musical score for two systems, labeled I and II, in 4/2 time. Each system consists of a grand staff with a treble and bass clef. System I shows a progression of chords: a D major triad (D, F, A) in the first measure, a D major triad (D, F, A) in the second measure, and a D major triad (D, F, A) in the third measure. System II shows a progression of chords: a D major triad (D, F, A) in the first measure, a D major triad (D, F, A) in the second measure, and a D major triad (D, F, A) in the third measure. Below the score is a chord diagram for a D major triad. The diagram shows the notes A, D, F, B, D, G on the strings. The notes A, D, and F are connected by solid lines, while the notes D, B, and G are connected by a dashed line. The notes D and G are underlined. A bracket below the diagram is labeled "Within-chord voice leading (only moving paths shown)".

Example 8: Relaxation 3 (consonant skips within a chord) used to facilitate voice leading.

The diagram illustrates voice leading for an eight-voice progression from G4 to C5. It consists of three main parts:

- Potential map:** A graph showing all possible voice paths between the two chords. The top chord (G4) has notes D, B, and G. The bottom chord (C5) has notes G, E, and C. Lines connect D to G, B to E, and G to C. Additionally, lines connect D to E, B to C, and G to G, representing stepwise motion and common tones.
- Musical notation:** Two staves, labeled I and II, show specific voice leading solutions. Each staff has a treble and bass clef. The notes are placed on the staves to show how the eight voices move from the G4 chord to the C5 chord.
- Highlighted map:** A smaller version of the potential map below the notation, where the path from G4 to C5 is highlighted with a thick line, indicating the chosen voice leading path.

Example 9: Eight-voice voice leading for the progression G-C.

EXAMPLES OF 8-VOICE PROGRESSIONS

To put these principles into practice, we shall consider some potential maps of chord progressions in 8 voices. First, let us return to the G-C progression with which we started, only now considering it in 8 voices (Example 9). The same constraints on melodic lines apply as in 4 voices, namely B-C, D-C and D-E must all be stepwise motion rather than leaps of sevenths. Also, the fifth-fifth path, D-G, is again excluded. However, although we are now handling more voices, the relaxations mentioned above make our job a bit easier. Relaxation 1 allows us to duplicate the G-C path in contrary motion in the basses. Relaxation 2 permits several versions of the common-tone G-G path, if necessary. Also, in 8 voices, we can double the

third in both chords so there are different options leading from the antecedent B and to the consequent E. The potential map at the top of Example 9 reveals at least 10 different paths, depending on the number of G-G paths used. Example 9 also shows a possible 8-voice realization of this progression accompanied by an actual map.

The image displays a musical score and two potential maps for an eight-voice voice leading progression from C to a. The score consists of four staves, two for the upper system and two for the lower system, each with a treble and bass clef. The progression is shown as two chords: C (C4, E4, G4) and a (A3, C4, E4). The potential maps show the connections between the notes of the two chords. The top map, labeled 'Potential map', shows all possible paths between the notes of C and a. The bottom map shows a specific realization of the progression with eight voices, where the path G-A is highlighted with a thick line, indicating an ascending stepwise motion.

Example 10: Eight-voice voice leading for the progression C-a.

The progression C-a, mapped in Example 10, is subject to different constraints and relaxations. In this case, the path G-A will be an ascending stepwise motion (not a descending 7th), and C-A, C-E, and E-C will all be melodic thirds rather than sixths. Although relaxation 1 does not work so well here, relaxation 2 comes into play with two common-tone paths, C-C and E-E. In fact, it is the possibility of multiple C and E common tones that makes this progression viable, with at least 10 paths shown in the potential

map at the top of Example 10. An 8-voice realization is provided at the bottom of Example 10.

Potential map

Actual map

Example 11: Eight-voice voice leading for the progression C-d.

A third example, the progression C-d (shown in Example 11), where the roots are a second apart, is much more tightly constrained and, for this reason, almost never used in 8-voice writing. Let us consider it for a moment, however, in the interests of theoretical completeness. First, the paths C-D, E-D, E-F and G-F must all be stepwise motion rather than dissonant leaps. Likewise, C-A will have to be a descending third rather than a rising sixth. Note that neither relaxation 1 nor relaxation 2 is applicable in this case. In fact, a true 8-voice rendering of this progression is only just possible; all paths shown in Example 11 will have to be used, and thus the potential and actual maps shown in this example are identical.

One last compositional example is given as Example 12. This progression is considerably longer and the task of balancing melodic and harmonic demands is correspondingly more complex. Example 12a again shows what the student might start with: both bass lines, minimal figured bass and the available pitch classes. Note that the map has been started, including within-chord consonant skips shown with wavy lines. Example 12b shows the two soprano lines added. These soprano lines are intended to be smooth, singable (if not particularly inspired) lines in the middle to upper registers of a choral soprano's range. Example 12c has the cadence sketched in for all voices. Most notable at this point is the inclusion of the suspension (with its preparation and resolution) as this requires special treatment and takes the only path involving B in the penultimate chord. These additions are tentative and may be subject to revision. Example 12d shows all voices included with the paths used checked off in the voice-leading map. Note that voice leading from the penultimate to the final chord has been altered in choir II to provide a fuller sonority on the final C chord. Finally, example 12e rhythmicizes example 12d, sets it to the words "alleluia, alleluia" and adds dissonances. Three handy techniques should be noted here. First, those voices that sing a common tone between two chords can, for the sake of a bit of rhythmic zest, introduce syncopation over the chord change (for example alto II). Second, any time a voice moves by a melodic third, that interval can be filled with a passing tone (e.g. soprano I, mm 1 and 2), provided the passing tone does not cause parallel fifths and octaves. Third, the suspension can be ornamented with two eighth-notes (as in tenor I, m. 3).

Example 12a: Possible starting point for the student with a more extended 8-voice exercise.

The image displays a musical score for two choirs, labeled I and II. Each choir part consists of a soprano line (treble clef) and a bass line (bass clef). The time signature is 4/2. The score is divided into two systems, I and II. The first system (I) shows the initial notes, and the second system (II) shows the continuation. The soprano lines in both choirs are identical, starting with a whole note G4 and moving to a whole note C5. The bass lines are also identical, starting with a whole note G2 and moving to a whole note C3. A bracket labeled '4-3' spans the final notes of both systems. To the right of the score is a chord diagram showing the progression of chords. The chords are: G2 (G2, B2), G3 (G3, B3), G4 (G4, B4), and G5 (G5, B5). The diagram uses solid lines for the first three chords and dashed lines for the fourth. Arrows indicate the movement of notes between chords: G2 to G3, G3 to G4, and G4 to G5. A wavy arrow points from G3 to G4, and another from G4 to G5. The diagram also shows the bass notes: G2, G3, G4, and G5.

Example 12b: Example 12a with soprano lines added in both choirs.

The image displays a musical score and a corresponding voice leading diagram. The score consists of four staves, each with a treble clef and a 4/2 time signature. The first two staves are grouped under a bracket labeled 'I', and the last two under a bracket labeled 'II'. The notes are: Staff 1 (I): G4, G4, G4, G4; Staff 2 (I): G4, G4, G4, G4; Staff 3 (II): G4, G4, G4, G4; Staff 4 (II): G4, G4, G4, G4. The diagram on the right shows the common-tone paths between these staves. It features a grid of notes: D, E, G, B, C, A, F, and G. Lines connect notes between staves, with some lines being thick and some thin. A note 'B' is circled and labeled 'suspended'. The diagram is labeled '4-3' at the bottom.

Example 12c: Example 12b with common-tone paths added (shown stemmed).

The image displays a musical score for two systems, I and II, and a corresponding chord diagram. System I consists of two staves: the upper staff is in treble clef with a 4/2 time signature, and the lower staff is in bass clef with a 2/4 time signature. System II also consists of two staves: the upper staff is in treble clef with a 4/2 time signature, and the lower staff is in bass clef with a 2/4 time signature. The chord diagram on the right shows a sequence of chords: D, A, E, C, G, B, F, D, G, E, C, A, D, G, E, C. The diagram uses letters to represent notes and lines to show the voicing of each chord. A circled 'B' is present in the diagram, and a '4-3' marking is located between the two systems.

Example 12d: Example 12c with middle voices sketched in.

The image displays a musical score for a setting of the word "alleluia". It is organized into two systems, each with four staves representing different voice parts: Soprano, Alto, Tenor, and Bass. The music is written in 4/4 time. The lyrics are "Al - le - lu - ia, al - le - lu - ia." The score illustrates various voice-leading techniques, including rhythmic diminutions and passing dissonances, as mentioned in the caption.

Example 12e: Example 12d turned into a setting of the word "alleluia" with rhythmic diminutions and passing dissonances added.

VOICE-LEADING MAPS IN ANALYSIS

The Repertoire for Analysis

For the purposes of analysis, we can cast our stylistic net wider than for writing exercises. There are many examples of pieces in more than 8 voices ranging from the Eton Choirbook (c.1500) through to polychoral compositions of the early 17th century. The grander compositions on this list include the 12-voice "Earthquake" Mass by Brumel, the 19-voice motet, *O Bone Jesu*, by Carvor, a 24-voice canon, *Qui habitat in adiutorio*, by Josquin/Anonymous, and two 40-voice motets, *Ecce beatam lucem* by Striggio and *Spem in alium* by Tallis. This repertoire makes instructive study and can be illuminated by the application of voice-leading maps. Even in settings for large numbers of voices, where transgressions may be very difficult or impossible to hear, composers strive to avoid

parallel perfect intervals. Not surprisingly, to help them in this endeavor, they routinely make use of the three relaxations listed earlier. To these a fourth relaxation may be added:

4. Rests of different lengths are used to break up and therefore “remove” parallel fifths and octaves. The rationale seems to be that, provided two voices do not make the same move at the same time, no parallel fifths or octaves have been committed.

In the early to mid 16th century, rests seem to be able to interrupt melodic lines, almost willy nilly, although control over these increases greatly in the style of Palestrina and Victoria. The following two examples are offered to illustrate some of these stylistic differences.

Example 13 is taken from Palestrina’s 12-voice (3-choir) festive motet on words from Judith, Book 16, *Laudate Dominum in tympanis*.⁴ Most of this motet consists of antiphonal dialogue among the three choirs, however, the extract shown (“mm” 44-46) is the first instance in this piece of true 12-voice writing. The extract consists simply of alternating G and C chords; the compositional skill here lies in the setting of 12 independent lines that are all rhythmically self-sufficient, and, in some cases at least, melodically interesting, too. Note the liberal use of all four relaxations mentioned above. First, every chord change involves a contrary-motion octave-unison or unison-octave motion in two of the three bass voices. Second, numerous G common tones are employed, in some cases moving up or down the octave. Third, within-chord consonant skips are plentiful, some of which are filled in with dissonant passing or neighbor tones which give the parts concerned more rhythmic variety and melodic direction. Consonant skips (shown as wavy lines on the map in Example 13) are particularly noteworthy in m. 45 where the full four beats on the C chord allow various voices ample time to reposition themselves for the chord change on the downbeat of m. 46. Fourth, this very chord change at m. 46 is facilitated further by the use of half-note rests in certain voices, delaying, as it were, their move to the G chord until the second beat of that measure. This “delay” is represented on the accompanying map by a second G-chord on beat two, which is the terminal node

⁴ Gustave Frederic Soderlund ed., *Examples of Gregorian Chant and Works by Orlandus Lassus, Giovanni Pierluigi Palestrina and Marc Antonio Ingegneri*, 3rd ed. (New York: Appleton Century Crofts, 1946).

The image displays a musical score for twelve voices across three measures (44, 45, and 46). The score is arranged in three systems, each with four staves. The first system (measures 44-45) shows the initial chord with notes on various staves. The second system (measure 45) shows the transition between chords. The third system (measure 46) shows the final chord. To the right of the score is a detailed diagram of the within-chord voice leading for the final chord. This diagram shows the movement of individual voices between the notes of the chord (D, B, G, G, E, C, C, G) and includes a dashed line labeled 'desc. 8ve' indicating a descending octave. A bracket below the diagram is labeled 'Within-chord voice leading (only consonant skips shown)'.

Example 13: Twelve-voice voice leading in Palestrina's *Laudate Dominum in tympanis*, showing between-chord and within-chord paths.

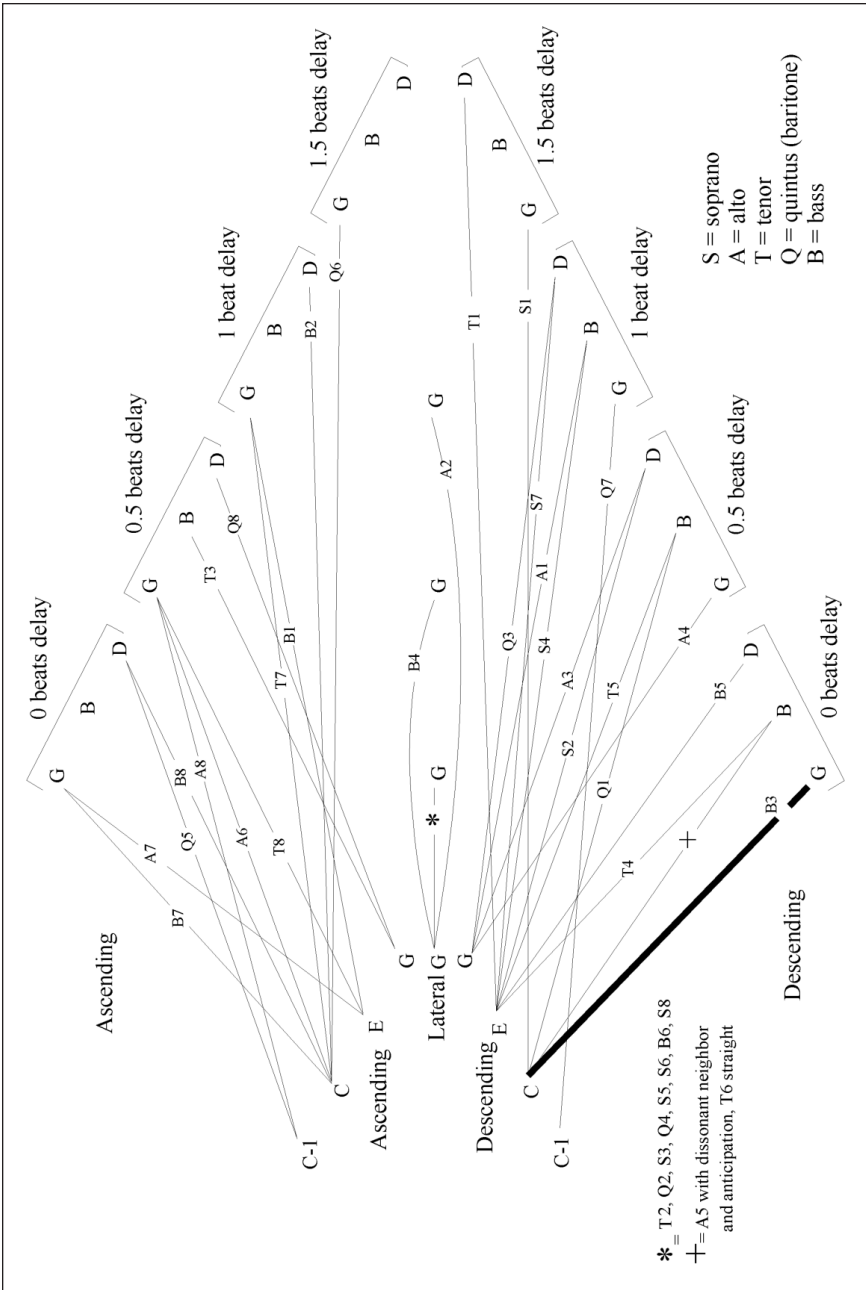


Figure 2: Actual map of the voice leading of the final plagal cadence at "measure" 135 of Thomas Tallis's *Spem in alium*.

for four of the voice-leading paths from the previous chord (those for soprano 2, alto 2, bass 2 and tenor 3). Note that no two voices move along the same path in the same direction at the same time; for instance, both tenor 2 and tenor 3 make use of the C-D path, but tenor 3 arrives at the D one beat later than tenor 2.

If Palestrina had to resort to rests to break up potential parallels in 12 voices, so the need for this technique mounts as the number of voices increases beyond 12. Figure 2 maps the voice leading in the final chord change (the plagal cadence, C-G) of Thomas Tallis's famous 40-part motet *Spem in alium nunquam habui*.⁵ By this point, mm. 134-135 in Brett's modern edition, all 40 voices are singing, with the last four measures maintaining a continuous G harmony following the chord change on the downbeat of measure 135. Despite the huge forces (8 five-voice choirs), Tallis avoids parallels by deploying the following rest lengths in various voices just after the chord change: quarter note (0.5 beats), half note (1 beat), and half plus a quarter note (1.5 beats). In addition, several voices drop out one half note (1 beat) before the chord change.

The antecedent C chord is shown on the left side of Figure 2: the pitch classes of this chord, C, E and G, are given multiple representations to allow the map to distinguish three directions of motion, ascending, lateral (the G common tone only) and descending. In addition, the voices that drop out one beat before the chord change (as it happens, all on the pitch-class C) are represented by the symbol "C-1". On the right side of Figure 2, the different temporal positions of the pitch classes that make up the consequent G chord are shown ordered from left to right, starting with 0 beats delay (those voices that change chord right on the downbeat), then 0.5, 1 and 1.5 beats delay. Each iteration of the G chord is placed on two diagonals, one above and one below, in order to capture something of the melodic direction involved and to minimize line crossing on the diagram. Each voice-leading path is labeled with a letter and a number indicating which voice(s) follow(s) that path: thus, for example, A3 stands for alto in choir 3 or Q7 stands for quintus (first bass) in choir 7. The acting bass line, the descending C-G line with no rest, as presented by bass 3, is bolded. Its contrary-motion partner (following relaxation 1) is presented by bass 7.

⁵ Thomas Tallis, "Spem in alium nunquam habui:" Motet in forty parts, ed. P. Brett (London: Oxford University Press, 1966); reprint of edition in *Tudor Church Music*, vol. 6 (London, Oxford University Press, 1928).

Figure 2 reveals several facts about Tallis's plagal cadence:

1. With two exceptions, Tallis assiduously avoids duplicating paths, i.e. committing parallel unisons or octaves. The exceptions are the lateral common-tone G path which, following relaxation 2, can be used multiple times, and the descending C-B path with no rest. This latter path is presented by both alto 5 and tenor 6, but the alto 5 line embellishes the basic voice leading with a neighbor-tone eighth-note figure so that its B is not approached directly from C.
2. There are several paths that are not used. These unused paths are seemingly avoided because they entail ungainly melodic intervals: C-B ascending (major 7th), E-D ascending (minor 7th), and C-D descending (minor 7th). The descending minor 6th G-B is used in only one voice (alto 1), and that is with one beat's delay.
3. The fifth-fifth path, G-D, is used, but very carefully. It is not employed in either direction (ascending 5th, descending 4th) with 0 beats delay as such a path would introduce parallel fifths with one of the root-root bass lines in bass 3 or bass 7 noted above. The G-D path is used in the following directions and with the following beats delay: ascending with .5 beats delay in quintus 8, descending with 1 beat delay in quintus 3, and descending with .5 beats delay in alto 3. In none of these cases are parallel fifths formed with a C-G path moving at the same time. The quintus 8 path does, however, form parallel 4ths with the alto 6 C-G path, both of which ascend and both of which have .5 beats delay.

All this suggests that Tallis planned and orchestrated his final 40-voice cadence with very great care, and with some sort of awareness of voice-leading paths: parallels, whether unisons, octaves or fifths between voices moving in the same direction at the same time are avoided. This avoidance of forbidden parallels seems to be respected more for reasons of principle than perception, but it is consistent with his practice in the rest of the motet, whether 40 or fewer voices are sounding.

CONCLUSION

To summarize, I have proposed voice-leading maps as a way of clearly displaying the various available paths between the pitch classes of two (or more) chords. The primary advantage of this kind of visual organization of pitch-class material is that voice-leading paths can easily be tracked and parallel fifths and octaves avoided. Second, the student is encouraged to treat voice leading as primarily a phenomenon between chord tones; any dissonances beyond chordal sevenths are then added as a second step of musical enrichment. In conjunction with conventional notation, maps can be used as a method for introducing simple four-part voice leading, or for systematizing more advanced four-part exercises. Moreover, maps are ideally suited for helping the student write exercises in eight voices. I have argued that such exercises are worthwhile as they force students to confront the limits of triadic voice leading. These limits are best evidenced in the large-scale choral works of the 16th and 17th centuries. As two brief examples from Palestrina and Tallis show, maps can provide some detailed analytical insight into this repertoire, in addition to any compositional utility they possess.