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When we teach our students about tonal music we generally concentrate on two fundamental aspects: in harmony courses we teach about the structure of chords, and in counterpoint courses we talk about the structure of lines. Although harmony and counterpoint are mutually dependent in tonal music, we separate them to focus on their individual structures and tendencies. We are right to do so, up to a point. But unfortunately, this unnatural separation often leaves students with a distorted view of tonal music. To correct this, it is necessary to teach students about the combination of harmony and counterpoint, for only then can they begin to understand the intricacies of musical structure.

When we describe the combination of harmony and counterpoint, we describe voice leading. Studying voice leading, however, is not considered to be a glamorous pursuit. All too often we present voice leading as a mindless task performed merely to connect chords in a chorale harmonization. We readily give advice about the process of selecting interesting chords, but neglect the process of connecting them to form beautiful lines. As a result, students think of voice leading as a mechanical task, rather than as a creative art.

This limited view of voice leading is both unfortunate and inaccurate. Voice leading principles do not merely govern chorale harmonization, they shape all tonal music. Because every pitch in a piece performs both a harmonic and contrapuntal role, voice-leading considerations influence its path. Voice leading is the realization of a composer's melodic and harmonic ideas within the confines of the tonal system. In this way voice leading is much more than the skill of moving smoothly from one chord to the next; it is at the heart of the compositional process.

Given that voice leading is such a fundamental aspect of music, how can we best present the topic to our students? For while methodologies for teaching harmony and counterpoint as separate disciplines are well established, techniques for the analysis and implementation of voice-leading principles are comparatively neglected. We have not been able to focus on local voice-leading techniques because we have lacked a systematic way of doing so. Instead, we have been limited to warning students against certain parallel intervals and giving them vague advice on doublings and voicing.

To understand compositional choices at the foreground level, however, we must teach our students that pitches play a dual role in music, and function both as a member of a chord and as a member of a line. To do so, we require a system that enables us to interpret a pitches' contrapuntal and harmonic functions simultaneously.

Unfortunately, such a system is not readily available. For one thing, we have not yet fully determined how harmony and counterpoint combine in music. Even a basic component of this combination, namely the relative role that each force plays, is still controversial; indeed, theorists have disagreed for centuries about which of the two forces impels musical progression. Theorists in the tradition of Rameau favor a harmonic explanation for musical progression, while Schenkerians, whose antecedents are in figured-bass practice, emphasize contrapuntal forces.

In the effort to explain how these forces motivate music, all theorists have looked for similarities that transcend apparent differences in individual pieces. To do this, they have overlooked foreground connections and have concentrated instead on abstract theoretical relationships. Their methodologies include reductive techniques designed to omit certain foreground events and to reveal a common background set of pitch relationships. Once established, background relationships become the basis upon which interpretation of foreground pitches depends.

Whether or not these methodologies are sufficient for describing foreground voice leading is not at issue here; more to the point is whether they can help students to understand tonal procedures. While these methodologies do provide students with a general outlook on music, they do not provide a systematic procedure that is easily accessible to them. This is because the type of reductive analysis crucial to these systems requires that a student make sophisticated choices—choices that beginning students are not yet ready to make.

Because it is important to introduce students to the combination of harmony and counterpoint early on in their studies, we must describe pitch relationships in familiar, rather than abstract terms. In this paper I propose a methodology that makes it possible to assign voice-leading roles to pitches based on their dual harmonic and contrapuntal function. The methodology, which does not require any advanced reductive techniques, is simple to employ and thus suitable to students at any level. While I will concentrate here on the specific ways that the methodology helps students in chorale harmonization, I will also suggest some of its more advanced applications for analysis and free composition.

TEACHING VOICE LEADING

THE METHODOLOGY

The focal point of my methodology is a model designed to describe foreground voice leading. To do so, the model must take into account the way harmonic and contrapuntal forces combine at the local level. In my view, chord progression is the necessary point of departure for such a model. It is not mere chance that certain recognizable chords appear at specific places in tonal music, and it is not the accidental concurrence of independently conceived lines that makes this happen.

I have decided to read the voice leading of a passage in terms of its fundamental bass line. Another more obvious option is to use the actual bass line of a passage to establish the voice-leading model. I discarded this option because actual bass lines are specific to a single passage and it is rare that the same bass line will appear in many musical passages. Since the actual bass line determines voice leading for that passage, any observations about that voice leading are only relevant for one particular bass line and thus not directly comparable with other passages. More useful for this task is an abstract *cantus firmus* used as a reference for all compositional lines, including the bass line. The fundamental bass line, or the succession of functional roots, works well in this regard for classical music because functional progressions are fairly limited. While there may be few passages based on the same melodic line or on the same bass line, there will be many passages in music of this period based on standard root successions, and thus many more possibilities for comparison.

The model is based on the premise that most passages in music from the Classical Period can be reduced to a series of chords that are related by standard functional norms. Once established as members of a model chord progression, individual pitches can be viewed in terms of their harmonic roles. Then, by connecting each pitch in one chord with a pitch in the next, lines can be formed. These theoretical lines provide pitches with a contrapuntal role that may be different from the one they play in the passage under consideration.

Unfortunately, forming these theoretical lines is not a straightforward procedure. While it is standard to identify a pitch as a member of its parent chord, it is not clear how pitches from these chords should connect with one another to form lines. In actual music, of course, chords are connected in countless ways. But there are no model pitch connections for standard chord progressions; even within the confines of chorale-style harmonization there is rarely only one possible voice-leading connection between any two chords. While dissonant tones have prescribed destinations, consonant pitches can go anywhere in free composition, limited only by the restrictions on parallels. Thus, while we can determine norms of progression for dissonant tones, it is necessary to define similar norms of progression for consonant pitches.

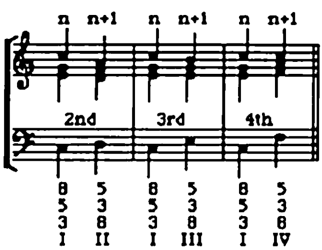
For consonant pitch connections to become norms, they must be relevant in all musical textures. For this reason, we base the connections on basic voice-leading principles that hold for all harmonic and intervallic progressions. In this way we can provide each pitch with a theoretical contrapuntal role that has relevance beyond its specific setting in any particular texture.

Thus, we connect consonant pitches from one chord to the next according to three familiar principles. First, we hold the common tone. Second, we move the pitch by step. And finally, if no stepwise connection is possible, the pitch leaps by third.

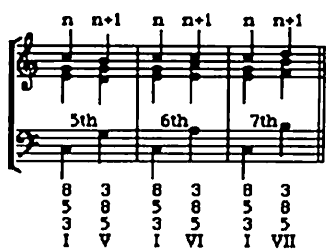
When we apply these three principles we find that only two operations are necessary to generate all functional chord progressions. Operation #1, which is shown in Figure 1a, applies to progressions of chords whose roots are separated by rising intervals of a second, third, and fourth. In this case the norm of progression is from the octave above the root in the first chord to the fifth in the second, from the fifth in the first chord to the third of the second, and from the third in the first chord to the octave in the second. Operation #2, shown in Figure 1b, applies to progressions of chords whose roots are separated by rising intervals of a fifth, sixth, and seventh. In this case the fifth of the first chord moves to the octave of the second, the third of the first chord moves to the fifth of the second, and the octave of the first chord moves to the third of the second. These two operations, when applied as described, are the simplest motions that will result in complete triads, work in any inversion without causing forbidden parallels, and produce a model that is not dependent on specific octave placement and inversion.

Figure 1.

a. Operation 1



b. Operation 2

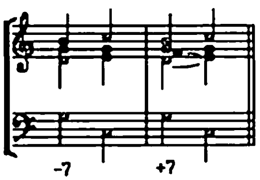


Thus the two operations provide a self-sufficient model for consonant pitch motion. Dissonant pitches then elaborate this model. The seventh, the first dissonance that students meet, shall serve as our example of dissonance treatment.

In my view, dissonant tones do not redefine the harmonic structure of a passage, but serve instead to intensify a particular melodic motion. Thus, because dissonance serves to alter the contrapuntal, rather than the harmonic motion of a passage, it has a secondary place in the model. The seventh, for example, is not an essential part of the V-I progression, for without the seventh, the *harmonic* function of the V and I chords remains the same. The seventh is added, instead, to intensify a specific *contrapuntal* motion within the progression from V to I.

Because sevenths are not considered an indispensable part of harmonic progression, they do not alter, but are added to the existing model. For this reason, they do not inhabit an independent strand, but instead, share a strand with another essential pitch. In general, a seventh joins the strand occupied by the tone of its resolution, thus the seventh in a V7-I progression shares the same strand as the fifth, which progresses to the third of I in the model progression. When the seventh is added, then, both pitches progress to the third, as we see in Figure 2.

Figure 2.



The model itself consists of three individual contrapuntal lines called *voice-leading strands*. These three strands flow above a fundamental bass line that reflects the harmonic succession of a passage; the strands intersect with the fundamental bass tones to form a series of triads and seventh chords that I shall refer to as states, after William Benjamin.[1] Figure 3 shows the foreground events that make up individual states. In Figure 3a we find a collection of pitch classes that occur at the same attack point and together form a recognizable chord. In Figure 3b we find a collection of pitches that occur at adjacent attack points and that together also form a recognizable chord. Each one of these chords is represented in the model in terms of its root, and occupies a single state. Every functional harmony in a passage is represented in the model, which is irreducible after this point. Beginning students can perform this reductive procedure easily, as all that is required of them is to distinguish chord tones from non-chord tones.

Figure 3.

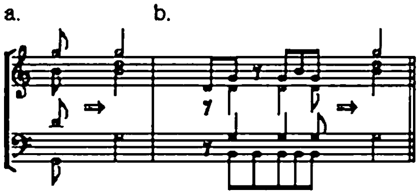


Figure 4a contains a setting of the chorale tune, "Wachet auf," which will serve as a basis for a sample voice-leading model. This particular setting appeared in the Bennett/Goldschmidt *Chorale Book* and was reprinted by Mary Wennerstrom in her *Anthology of Musical Structure*.[2]

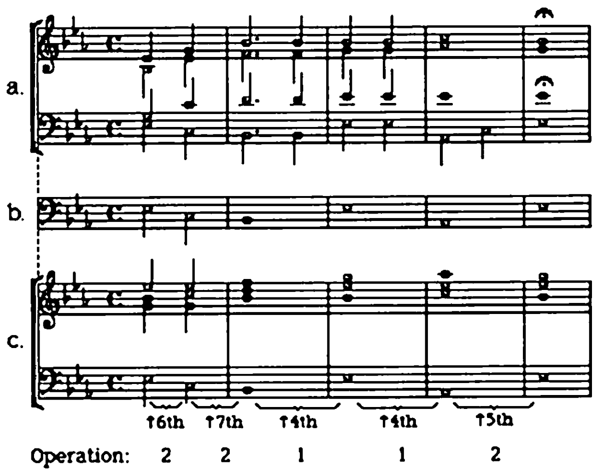
The first step is to determine a fundamental bass line that reflects the harmonic succession for the passage; Figure 4b shows the fundamental bass for the opening phrase of this chorale. Once a fundamental bass line has been determined for a passage, our next task is to devise the voice-leading strands. These strands consist of the root, third, or fifth of the triads represented by the fundamental bass. No pitch will appear in more than one voice-leading strand at any one state, so the strands are completely independent and each pitch has only one contrapuntal norm of motion.

Although the harmonic succession of the passage determines the fundamental bass line in the model, the passage itself cannot determine the manner in which the pitches are connected to form the voice-leading strands. This is where the operations of motion discussed earlier, come in. First, we choose an opening position for the first chord in the series. This decision is purely arbitrary, for, as we have seen, the operations produce contrapuntal lines that are completely invertible. Then, we apply either Operation #1 or #2 for each change of fundamental bass, depending on the nature of that motion. For example, because the first bass change in this phrase is up a sixth from E-flat to C, we apply Operation #2, so the octave in the first chord moves to the third of the next, the fifth of the first chord moves to the octave of the next, and the third of the first chord moves to the fifth of the next. We then continue this process until we arrive at a model for the entire passage, such as the one we find in Figure 4c.

To use our newly derived model as a basis of analysis we now do two things. First, we represent the model in its intervallic form. Each pitch in the model can be shown as a simple interval above the fundamental bass tone, written in capital letters below it, as we see in Figure 4d.

Second, we construct a voice-leading graph, which is designed to combine the theoretical voice leading from the model with the actual voice leading in the passage. To do this we represent each harmonically supported pitch in the passage as a simple interval above the fundamental bass tone, which is again shown in capital letters at the bottom of the graph. In this example, the passage under examination is a four-voice chorale setting; so we show each vocal voice on a separate line. Then, to complete the comparison of the model and the passage, we superimpose the theoretical voice-leading connections on the actual texture. We do so by drawing three lines that trace the path of each of the strands in the model, as shown in Figure 4e. The pattern that results is very useful in analysis of this passage and also in comparison with graphs of other passages.

Figure 4. "Wachet auf" Harmonization: Bennett/Goldschmidt *Chorale Book.*



d. Model

Measures:	1		2	3	4	5
	8	3	5	3	8	3
	5	8	3	8	5	8
	3	5	8	5	3	5
	E♭	C	B♭	E♭	A♭	E♭

e. Foreground

Measures:	1		2		3	4		5
Soprano	8	5	8	8	5	3		5
Alto	5	3	5	5	3	8		3
Tenor	3	8	3	3	8	5		8
Bass	-8-	-8	8	8	8	-8-	-3-	8
F.B.	E♭	C	B♭	B♭	E♭	A♭		E♭

To interpret the pattern of lines found in the voice-leading graph, it is helpful to identify some basic techniques that composers use. The first of these, called a *linear pair,* and shown in Figure 5, refers to two pitches in a texture that we can connect theoretically because they are adjacent members of the same voice-leading strand in the model. An *exchange* occurs when two voices in a texture trade members from different strands of the model. There are two types of exchanges; the more basic type occurs when actual pitch-classes are exchanged, as in Figure 6a. Figure 6b demonstrates a *strand-exchange.* Here, the same pitch classes are not traded; instead, we find that different members of the same voice-leading strands are exchanged. One final technique remains to be discussed. This technique, which is called *cyclic rotation,* involves a systematic shifting of pitches among three or more voices, as in Figure 7a. Strands can also be traded systematically in this way, as in Figure 7b.

Figure 5. Linear Pairs.

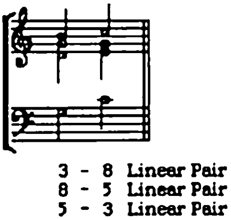


Figure 6. Exchanges.

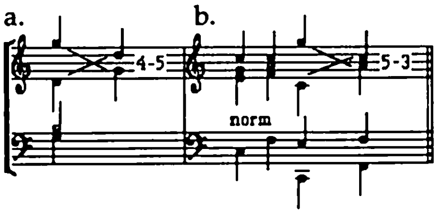
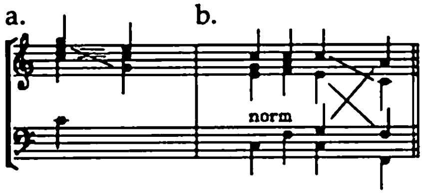


Figure 7. Cyclic Rotation.



Thus, the voice-leading model helps to define normative contrapuntal motion in a harmonic setting, and provides a standard against which we can measure compositional choices. Through study in these terms students learn to appreciate composers' solutions and accumulate techniques for their own writing.

But the voice-leading model helps students in another important way. We all know that the leap from the rigors of four-part writing to the relative liberties of free composition is often a difficult one for students to make. We generally advise them to apply the principles they learned in chorale harmonization, but the correspondence is often uncertain. Because the model defines the voice-leading function for pitches in any texture, comparison of chorale setting and free composition becomes easier. Students then find that the same techniques that were familiar to them in chorales serve an important role in free composition as well.

BASIC COMPOSITIONAL TECHNIQUES

The final section of this paper offers a few brief examples of the ways in which the voice-leading model can aid students. We will now examine each of the voice-leading techniques explained above, the linear pair, the exchange, and cyclic rotation, in chorale settings and in free composition.

1. Linear Pair

We return to the opening measures of the Bennett/Goldschmidt harmonization of "Wachet auf" for a good example of how linear pairs can structure music. The voice-leading graph for the phrase, shown in Figure 4e, consists of three straight lines that stretch from the second half of the first measure to the plagal cadence in measure 5. The appearance of these straight lines in the top three parts suggests that each chord in the phrase is connected in the most basic way possible, with stepwise and common-tone linear pairs. These standard connections, which are well-represented in the literature, become second nature to students of voice-leading norms.

The next example shows how theoretical linear pairs derived from chorale harmonization can help students in free composition. Figure 8a consists of the score and voice-leading graph for Mozart's Piano Sonata in C Major, K. 545. Here I have divided the left hand part into three separate lines, as if Mozart had chosen block chords instead of arpeggiations. Examination of this left-hand part reveals that Mozart voices the chords to express smooth linear pairs; we also notice in Figure 8b that he structures each voice to form a neighbor-note pattern. Particularly striking is Mozart's avoidance of root progression in the bass; in fact, he inverts the chords to produce the neighbor-note figure in the lowest voice as well.

TEACHING VOICE LEADING

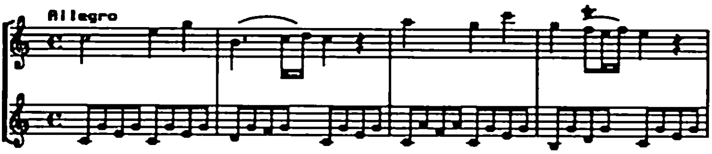
While it may be simple to recognize voice-leading relationships in chordally derived textures, these same relationships are not so easily defined in a single melodic line. The norms of progression, because they identify each pitch as part of a theoretical voice-leading structure, make this possible. Thus we can compare the melodic line with our already familiar linear pairs; when we do, we find some striking correspondences with the left-hand part. Most notable, is the long-range neighbor-note motion that Mozart uses to structure the climax of the phrase. We see in Figure 8c that the opening arpeggiation of the tonic chord leads up to 5, or G. 6, A, then enters to start the second half of the phrase in measure 3. The harmonic progression from I to IV reinforces the aural connection from 5 to 6 in the same register, because 5 and 6 form a linear pair in the progression from I to IV. Thus Mozart weaves the 5-6 linear pair through the melodic texture, and in so doing, insures that the neighbor-note figure is a chief component of the melodic line.

This short example suggest two important points: first, that linear pairs serve to structure free composition as well as chorale settings, and second, that understanding the voice-leading role that melodic tones play is essential to analysis and composition. The voice-leading model is particularly useful in this regard, for it helps to determine the harmonic implications of pitches whose obvious role is contrapuntal.

The voice-leading model is useful in one other way, too. The concept of referential linear pairs does more than provide students with a set of basic voice-leading solutions; it turns their attention from the process of choosing chords, to the process of forming lines. By thinking of tones as members of linear pairs rather than only as members of chords, students address the contrapuntal as well as the harmonic aspect of composition.

We noted in the above example how Mozart avoids a root-progression bass line and chooses instead a specific set of chord inversions designed to express the neighbor-note pattern. Because the neighbor note is an important motive in the piece, the particular inversions that Mozart chooses are not arbitrary ones.[3] Our students should not invert chords arbitrarily, either. Students too often choose to invert individual, isolated chords for variety. The system I propose addresses this problem. By stressing linear pairs, we teach students to think of note-to-note connections and ultimately, of lines. Thus when they choose to invert a chord, they do so to effect certain linear connections in the bass line. Hopefully, they can then construct bass patterns that reinforce other aspects of the piece, just as Mozart does in the opening phrase of K. 545.

Figure 8. Mozart Piano Sonata in C Major, K. 545, Allegro. (mm. 1-4)



a. Model

Measures:	1	2		3		4	
	8	3	8	5	8	3	8
	5	8	5	3	5	8	5
	3	7 5	3	8	3	7 5	3
	C	G	C	F	C	G	C

Foreground

Measures: 1 2 3 4

R. Hand 8 3 5 3 5 8 3—5 8 8 7—3

L. Hand 5———8———5—3—5———8———5-

3———7———3—8—3———5———3-

8- 5 8—5—8———3———8-

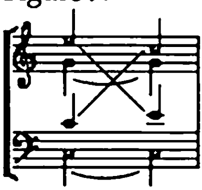
F. B. C G C F C G C

b. c.

2. Exchanges

Certainly there are times when the smooth connections produced by linear pairs are not possible, nor even desirable. Once students have mastered the basic progressions and linear pairs, they are ready to manipulate these pairs in artistic ways. The most common occurs in the chorale-style setting of a leaping melodic line. When a melodic line leaps from one chord tone to another, it is necessary to alter the voice-leading path of at least one other part to insure that the second chord is complete. Because this other part is altered to complement the motion of the melodic line, an exchange of the pitch classes involved in the leap results, as we see in Figure 9.

Figure 9.



The pitch-class exchange serves not only as an isolated voice-leading event, but becomes an integral part of a piece; such is the case in the Allegretto movement of Beethoven's "Moonlight" Sonata, Opus 27, no. 2, shown in Figure 10. The opening idea consists of, among other things, an outer voice exchange of the pitch classes C and E-flat. As we see in the score, Beethoven then repeats the melodic motive sequentially in measures 5 and 6 to form the consequent portion of the phrase where the pitches F and A-flat are exchanged.

Figure 10. Beethoven Piano Sonato, Opus 27, no. 2., "Moonlight"

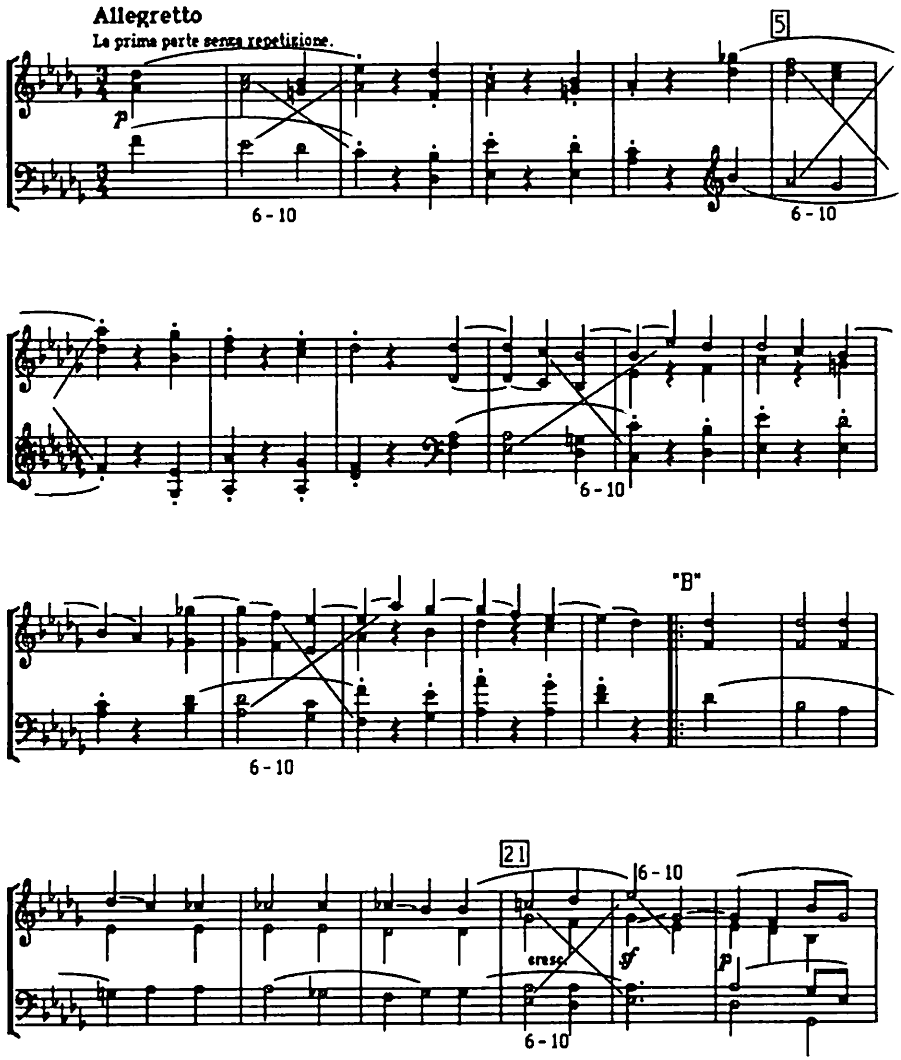


Figure 10. con't.

Figure 10. con't.

The "B" section opens with outer-voice 10ths that descend until Beethoven reverses the trend to complete the phrase in measure 21. Particularly interesting from our point of view is the way he accomplishes this, for the very same outer-voice exchange of pitch classes C and E-flat appears here as well.

A quick glance at the opening of the Trio reveals that Beethoven again uses this technique to structure the opening material. The first four measures prolong the tonic chord, again by way of an outer-voice exchange, this time of the pitches D-flat and F. Meanwhile, we find a second outer-voice exchange imbedded in the first. This one, in which the pitches E-flat and C are traded, serves to prolong V7.

Thus we can see that a simple voice-leading technique, the exchange, becomes a distinctive part of the texture of the movement, just as the neighbor-note linear pair did in Mozart's K. 545.

The technique of exchange, while commonly used to harmonize tones of a single chord, can also be used to harmonize tones from different chords. The concept of linear pairs allows us to employ exchanges that do not literally involve the same pitch classes. This concept is very useful in teaching, for once students think of leaping pitches as a combination of voices from different voice-leading strands, they can better perform the voice-leading manipulations that must occur.

We all know that whenever voices leap, students are tempted to write awkward or even forbidden progressions, simply because they often have difficulty recognizing the stepwise connections that are possible beneath the leaping melody. By teaching chord progressions in terms of linear pairs, however, we can combat this problem directly. The technique of strand exchange requires that one voice leap to offset the leaping melody, while the linear pairs in the other two parts are maintained. And because of the nature of the pairs, it is impossible to produce a forbidden parallel when the tones of any two strands are exchanged.[4]

For example, the only fifth in a triad occurs between the root and the fifth. If one triad progresses to another, parallel fifths will result only if the fifth of one triad moves to the fifth of the other over the root progression. Clearly then, the linear pair 5-5 cannot be used as a norm of progression. Instead, as we have seen, the fifth must progress either to the third of the next chord, as it does in Operation #1, or to the octave, as it does in Operation #2. This third or octave will never form a fifth with the tone that the octave in the original chord progresses to, nor will it form a fourth:

<u>Operation #1</u>			<u>Operation #2</u>		
<u>5</u> - 3			<u>5</u> - 8		
3 - 8	6		3 - 5	6	
		3			8
<u>8</u> - 5			<u>8</u> - 3		
<u>8</u> - 8			<u>8</u> - 8		

And, because no fourth can be formed in this way, no progression of parallel fifths is possible if one interval is inverted by exchange:

5 - 3	6		5 5	3
8 - 5			8 8	

A phrase from J.S. Bach's setting of "Wachet auf," shown in Figure 11, demonstrates the procedure of strand exchange. Here Bach chooses to harmonize each tone of the leaping melodic line with a new chord. The voice-leading graph shows that Bach selects harmonies that maintain linear pairs when the melody moves by step in measures 13-14, and 14-15. And yet, he cannot do the same when the melody leaps, simply because each note of the melody is in a different strand. We see that in these cases the voicing Bach chooses results in outer-voice strand exchanges, while the inner parts hold linear pairs. For example, because Bach harmonizes the opening three chords of the phrase as (V7)-IV-(V7), the melodic pitch in each chord is the fifth. To avoid parallel fifths between this melody and bass, Bach cannot use simple root progressions in the bass, but must use a voice-leading pair there instead. For this reason we find the 7-3 linear pair in the bass for the progression from measure 12 into 13. This produces an outer-voice strand exchange. And because the third of the A-flat chord comes about through exchange, the inner parts can hold their own linear pairs, and each chord will be complete.

Figure 11. "Wachet auf" Harmonization: J. S. Bach. (mm 12-16)

Model

Measures:	12	13		14		15		16
	7 5	3	7 5	3	8	7 5	3	8
	3	8	3	8	5	3	8	5
	8	5	8	5	3	8	5	3
	E♭	A♭	E♭	A♭	C	F	B♭	E♭

Foreground

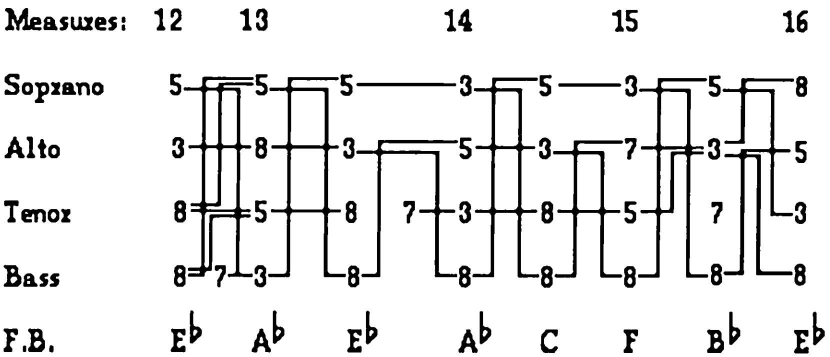
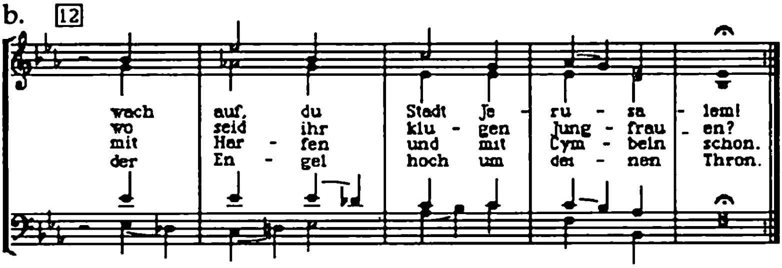


Figure 11. con't.

b. 12



In measure 13, Bach again adds a seventh to the E-flat chord, thus producing a doubled third in the A-flat chord on the downbeat of measure 14. In this case a strand exchange is again necessary to complete the A-flat chord; because the seventh takes the place of the doubled root, no 8-5 or common-tone linear pair is possible. Thus the third of the E-flat chord must leap away from its linear pair, the octave, and moves instead to supply the fifth.

Bach repeats the voice-leading procedure from measure 13 to harmonize the leaping melodic line in measure 14. Although the harmonic motion is different, the concept of voice-leading strands allows us to compare the two measures. In both cases we find that Bach maintains inner-voice linear pairs, while the roots in the bass produce another strand exchange with the leaping melody.

The exchange of standard linear pairs is a particularly useful compositional technique. Although in these examples we see exchanges that concern the outer voices, exchanges between any two parts are possible. For example, measure 13 could have been voiced as

5 X 5
3 X 8
5 - 8
8 - 3

as well. In any case, by presenting leaps as potential strand exchanges, students see that smooth linear pairs are still possible if desired.

3. Cyclic Rotation

We have seen how the technique of exchange provides for two complementary leaping voices that trade either pitches or strands. There are times, however, when it is desirable for more than two voices to take an active melodic role. Such is the case in Figure 12, which is taken from the opening of Mozart's "Hunt" Quartet, K. 458. Here the top three parts all participate in non-unison arpeggiation of the B-flat tonic chord. Each part starts and ends on a different chord tone, so that the complete triad sounds throughout.

Figure 12. Mozart String Quartet in B-flat Major, K. 458.
Allegro vivace assai

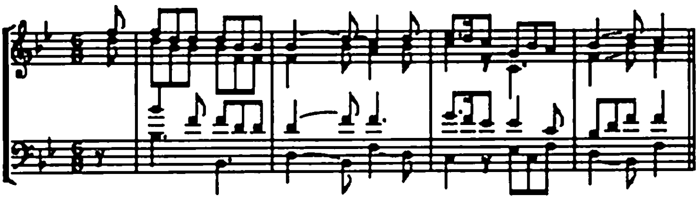


Figure 13. "Wachet auf" J. S. Bach and Bennett/Goldschmidt. (mm. 1-2)

a) Bach

Measures	1		2		
Soprano	8	3	5 — 8		
Alto	5	8	3 — 5		
Tenor	3	5	8 — 3		
Bass	8		8	3 8	7
F.B.	$E^{\flat}$		$E^{\flat}$	$B^{\flat}$	

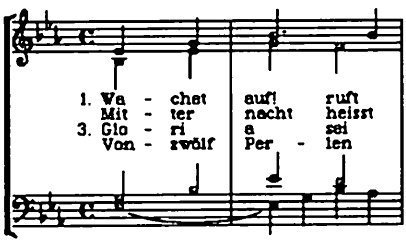
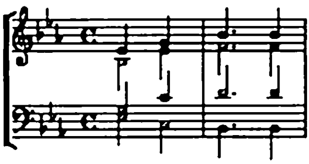


Figure 13. con't.

b) Bennett/Goldschmidt

Measures	1		2	
Soprano	8	5	8	8
Alto	5	3	5	5
Tenor	3	8	3	3
Bass	8	8	8	8
F.B.	E♭	C	B♭	B♭



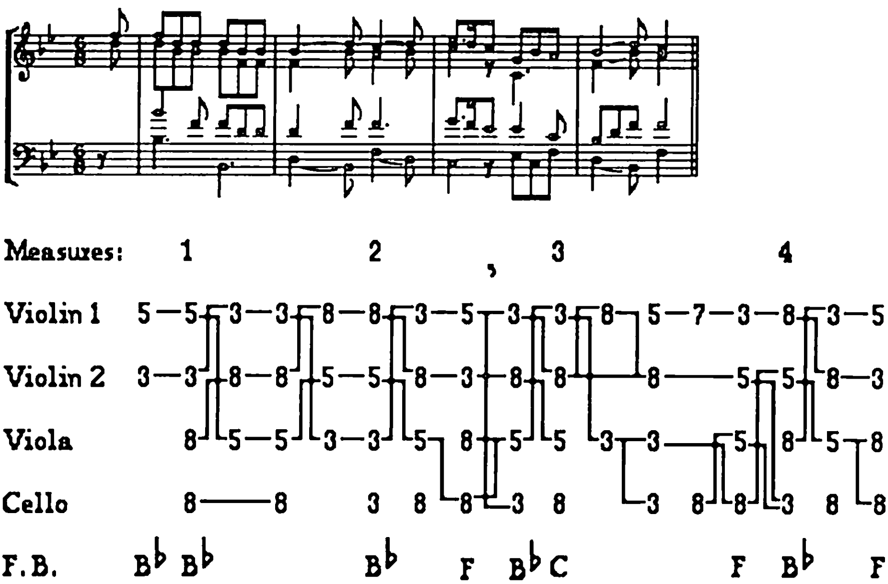
This systematic transferring of tones, or cyclic rotation, is commonly used for the literal prolongation of a single chord. Such is the case in the opening measures of Bach's setting of "Wachet auf." In Figure 13a we see how each of the top three voices arpeggiates the tonic triad simultaneously.

The same voice-leading technique can be used to harmonize leaping melodic lines— even if the same harmonization is not desirable for each pitch. We see how this works when we compare the Bennett/Goldschmidt setting of these opening pitches, for we find that, despite substitution of VI for I here, the technique of cyclic rotation still governs the voice leading. This cycle in the Bennett/Goldschmidt version serves to arrange the strands for the progression from VI to V over the barline.

4. Mozart: String Quartet in B-flat, K. 458

We are now ready to examine a passage that embodies all of the compositional techniques that have been discussed; Figure 14 provides a score and voice-leading graph for the first four measures of Mozart's String Quartet in B-flat, K. 458, Allegro vivace assai. We have already noticed the cyclic rotation that results as the top three parts simultaneously arpeggiate the tonic triad. Meanwhile the bass holds the tonic pitch until measure 2, where it enters the voice-leading texture to punctuate the cadence. Mozart complements the melodic motion from 1 to 3, by an outer voice exchange of these tones. Thus, while the top three parts cycle back to begin measure 2, the first violin and cello trade pitches. In this way the tonic pitch, B-flat, returns to the cello. All of these motions then combine to prepare the half cadence on the second beat of that measure, for we see that Mozart connects I to V by standard linear pairs (which appear as straight lines in the graph).

Figure 14. Mozart String Quartet in B-flat Major, K. 458.
Allegro vivace assai



Mozart then uses these same linear connections to start the second half of the phrase at the end of measure 2. That he chooses to return to 3 in the bass instead of the root is interesting here, but we can understand this choice when we examine the voice leading of the next progression. On the downbeat of measure 3 we find that Mozart harmonizes 4 with a ii chord and we notice that I and ii are connected by cyclic rotation. This results as the top three parts move in parallel motion. Clearly, the bass cannot duplicate any one of these connections without causing parallels, so it is necessary for Mozart to use the 3-8 linear pair.

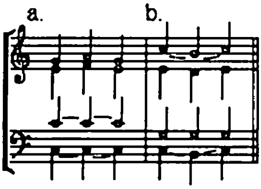
The manner in which Mozart prolongs ii throughout the third measure is interesting in light of his procedures in the rest of the phrase. Despite the melodic line arpeggiation of ii, we do not find the cyclic rotation that Mozart used in the opening measures, but we find instead an exchange of the third and fifth of the triad between the first violin and viola.

The common linear pairs hold for the progression from ii-V at the end of measure 3 in the top two parts only. Meanwhile, the lower two voices participate in a strand exchange, similar to the ones we examined earlier in the Bach excerpt. Here the exchange results because of the leap in the viola, which Mozart presumably chooses because of its motivic quality. That is, instead of moving to its linear pair, the root of the V chord, the third in the viola leaps to the fifth of V instead. Thus we find the strand exchange in the graph when we connect the third in the viola with the octave in the cello, and the octave in the cello (of ii) with the fifth in the viola. In this way the 8-5 linear pair is present in two ways in this progression: first, in the second violin, and then as an exchanged strand between the cello and the viola.

In general, the technique of strand exchange makes it possible to duplicate strands without danger of parallel octaves. This particular strand, 8-5, is not a good example, for (because it is the common-tone strand and thus holds the same pitch in the progression from one chord to the next), it could be doubled in a texture, as we see in Figure 15a.

This is not the case with other strands in which the pitches do change; for example, 3-8 cannot be used in more than one part. Figure 15b shows the parallel octaves that result when a changing note pair is doubled. If a strand is exchanged, however, it is split up in two different parts, so that no parallels result. What this means in practice is that particular pitches can be doubled in a chord without danger of octaves by strand exchange. Thus the notion of exchange allows us to understand these doublings, which result from certain melodic or motivic gestures, in systematic voice-leading terms.

Figure 15.



The strand exchange in the Mozart example results in a doubled fifth in V, which leads to an interesting voice-leading situation in the progression back to I in measure 4. Most noticeable is the large leap that the second violin takes from the fifth of V to the fifth of I. It might seem an unusual move here. We would perhaps expect, especially in light of Mozart's choice of linear pairs in other V-I progressions in this phrase, that he would choose simply to move to the third of I, thus expressing the 5-3 linear pair. Instead, the cello brings in the third, so that we get another strand exchange, this one between the second violin and the cello.

By looking at the voice-leading situation immediately ahead, however, we see the reason for this leap. In measure 4, Mozart offers a half cadence that is very similar to the one he used in measure 2. We noted in that case the way he complements the melodic leap from 3 to 1 with a cello leap from 1 to 3. This relationship appears on the voice-leading graph as an outer-voice exchange. By placing the third in the cello, instead of the second violin in measure 4, Mozart can repeat the same gesture.

Close comparison of the second and fourth measures reveals one important difference, however: instead of a third in the viola at the downbeat of measure 4, we find an octave. We wonder about this, particularly since the fifth of V in measure 3 would lead naturally to the third of I in measure 4. My guess is that Mozart is giving the viola a particularly important melodic role here; in fact, the viola alone arpeggiates the entire tonic triad. The voice leading that results forms a pattern that is very typical for Mozart—namely the double exchange. In this case we see that the outer voices exchange the root and third, as already noted, while the inner voices also exchange— this time trading the fifth and the root. In essence then, Mozart replaces the cycle, which occurred in the top three parts in measure 2, with an exchange.

This passage offers a good example of a texture dominated by sophisticated contrapuntal procedures. This active voice-leading texture results when Mozart gives each voice an important melodic role. Because the harmonic progression of the passage is a standard one, students can focus on the voice-leading manipulations that make the passage distinctive. Studies of this type can thus serve to reinforce the important role that voice-leading techniques play in composition.

CONCLUDING REMARKS

In closing, I wish to address what may be a major objection to the methodology I propose. Some may feel that establishing norms of progression turns an artistic process into a mechanical one. By reducing pieces to patterns of numbers and lines, notes may lose their musical quality and become objects of mathematical manipulation. And, by providing students with a basic set of techniques, we are in danger of limiting their creativity.

We all confront charges like these each time we attempt to explain the creative process in systematic terms. Certainly it is not necessary for me to defend systematic methods for describing music here. But because my methodology is admittedly more technical than many, let me respond briefly to the particular problem it raises.

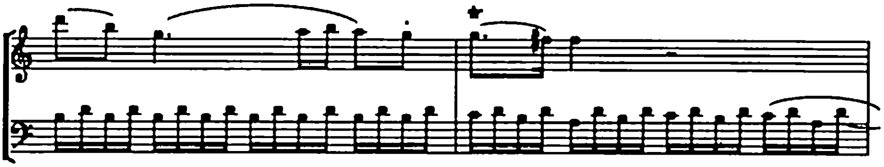
The methodology is used to introduce beginning students to the intricacies of musical structure. The norms of progression are a focal point in this inquiry, but serve merely as a basis of comparison and nothing more. Despite their representation in music of the Classical period, the norms were not intended to be a mechanical set of voice-leading solutions. Instead, the norms and techniques of manipulation become a point of departure and a way for students to explore the compositional process. By providing a systematic procedure with which to study the combination of contrapuntal and harmonic forces, students can focus on fundamental compositional choices on the foreground level of structure. Ultimately, the method will help them to understand and employ foreground voice-leading techniques in artistic ways. At the very least, it will help them to appreciate how these and other techniques shape masterworks of music.

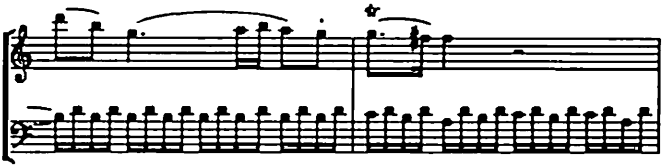
NOTES

[1]William Benjamin, "Pitch-Class Counterpoint in Tonal Music," *Music Theory, Special Topics*, ed. by Richmond Browne (New York: Academic Press, 1981), pp. 3-32.

[2]Mary Wennerstrom, ed., *Anthology of Musical Structure* (New Jersey: Prentice-Hall, 1983), pp. 141-145.

[3]There are many manifestations of the neighbor-note figure throughout the piece; particularly notable are the neighbor notes which help structure the second theme. As in the first theme, both the melodic line and the accompaniment feature striking neighbor-note relationships. We can see in the example below the double-neighbor note elaboration of the primary harmonic tones in both tones:





[4]The procedure of strand exchange has limited usefulness in situations where a root progression bass line is desired because it often produces a line with consecutive 8s or 5s. The theory of linear pairs allows us to see this danger clearly. In general, parallel fifths or octaves will occur in one voice against the bass whenever an exchange is made between a linear pair that comes from 5 or 8 and one that goes to the same 5 or 8. (Clearly there is no problem when the bass itself participates in the exchange, as we will soon see in measure 14 of Bach's setting of "Wachet auf".) For example, in progressions where <u>Operation #1</u> norms are in effect, an exchange between 3-8 and 8-5 produces parallel octaves with the bass, because it places the two octaves in the same voice: 3 X 5 / →8 X 8. Similarly, an exchange between 8-5 and 5-3 will produce parallel fifths: 8 X 3 / →5 X 5. In progressions that follow <u>Operation #2</u> the same restrictions hold, only in reverse order. That is, an exchange of 8-3 and 5-8 will produce parallel octaves with the bass, while a 5-8 and 3-5 exchange will produce parallel fifths. In all of these cases, the technique of cyclic rotation can be used instead.

While it may seem cumbersome for students to remember these exact prohibitions, they can easily avoid exchanging pairs that both begin and end in 5 or 8 above a root progression bass. And, even if this fails, the process of thinking of notes as 5s and 8s brings problematic parallels to their attention.