Alan Belkin, composer

General Principles of Harmony

Presentation

This book is the final installment in a series of four short works on the teaching of musical composition. Its aim is to provide some general principles of harmony, in concise, practical terms, and to provide guidance for student composers. This will not be a "theory" text, nor an analysis treatise, but rather a guide to some of the basic tools of the trade.

This book is the last in a series. The others are: Form, Counterpoint, and Orchestration. All are based on my own experience as a composer.

This series is dedicated to the memory of my teacher and friend Marvin Duchow, one of the rare true scholars, a musician of immense depth and sensitivity, and a man of unsurpassed kindness and generosity.

A note concerning the musical examples: *All the musical examples here are my own, and covered by copyright. Unless indicated otherwise, most are intended for piano or for strings.*

Table of Contents

For comments, or to be informed of site updates, please email: belkina_at_yahoo.com (replace _at_ with @)

Introduction: Why this book?

(N.B. This book is **not** a textbook for learning traditional, tonal harmony. Its focus is on general principles, applicable to **all** harmonic styles. As such, certain concepts, only relevant to tonal harmony, will not be discussed in detail. For more on this limitation, please see below.)

Of all musical disciplines, harmony is probably the most written about. Textbooks abound, from the summary to the encyclopedic. Why add to the existing plethora of resources? While we will survey some of this material below, one thing is lacking in all of them: None convincingly connects traditional harmony to contemporary practice. Although some of these books contain a chapter or two about more recent techniques, these are usually described in summary or superficial ways, and few or no connections are made with older practice.

Harmonic relationships can be divided into three categories:

1. Those which are immediately audible.
2. Those which become audible through attentive listening.
3. Those which can never be heard, given the limits of human perception.

In this book we will explore the first two types, and systematically exclude the third. It cannot be sufficiently emphasized that not all harmonic relationships are equally important: Their location in the piece, and, especially, their relative salience must be evaluated with the limits of human perception in mind.

As in the other books in this series, our approach here will be to focus on principles rather than on styles. We contend that there are common principles in operation across various harmonic styles, and that understanding these principles - which arise more from how we hear than from stylistic conventions - can help the composer of today to find a personal harmonic language which makes audible sense.

Finally, we make no pretense here of explaining **all** harmonic languages; our goal here is more modest. We wish to propose some powerful concepts which are relevant to both common practice period and more recent (western) harmony.

Discussion of other approaches

Before starting our search for such general principles of harmony, let us list and briefly comment on the most common traditional pedagogical methods:

- Methods based on a specific style (or a limited group of styles, typically the "common practice period" from Bach to Wagner.) make no claim to universality, but simply aim to define "normal" harmonic practice within a given period. The best example of this approach is Walter Piston's *Harmony*. By definition, such methods remain within relatively narrow stylistic confines, and make no attempt to generalize the principles therein. However, while not all principles of classical harmony are applicable outside the common practice period, the contrary notion - all harmonic thinking can be reduced to stylistic convention - leads to an absurdity: Can recent composers really have discovered entirely new ways of hearing? (I say "discovered" because they can hardly have **invented** new neurological structures and functions.) The human brain's highly evolved, innate capacities for making sense of auditory experience have surely not changed over the past few centuries.
- Another, related method, consists of intensive drill, using harmonic formulas. Based on the notion that

harmony, like language, uses many idioms, the goal here is to learn as many of them as possible, often by rote. While this approach does have some value in learning classical tonal harmony, the formulas learned are not generalizable outside of the source repertoire.

- Piston's method and the "formula" approach both are based on Rameau's theory of chord roots and inversions. The problem with this theory is that the root of an inverted chord is a theoretical concept, not a directly audible one. While there is some truth to the notion that all inversions of a given chord can be heard as part of the same "family", there are important exceptions, as we shall see below. Obvious audible facts, like the actual, heard bass line, the spacing chosen for a given chord, and its linear context, can sometimes go unnoticed with this approach. It is worth remembering that Bach did **not** teach this way.
- Approaches based on the insights of Heinrich Schenker have the advantage that they are more directly based on hearing. Schenkerian "foreground" relationships are especially useful in understanding many harmonic situations. In particular, the notions that not all chords are of equal structural importance, and that harmonic meaning changes according to linear context, are critical insights. While the Schenkerian approach was originally intended for tonal music, certain notions of harmonic elaboration can be easily applied in other contexts; we shall do so, below. Less convincing are some of the more far-flung conclusions of Schenkerian analysis: As the connections posited become more abstract and far flung, they can become downright inaudible, in any normal mode of listening. While it is true that a full Schenkerian analysis, well done, can help refine hearing, at a certain level of abstraction, one wonders whether more emphasis on other aspects of the audible foreground would be more appropriate for most students.
- The traditional French conservatory method of teaching harmony, using mainly given basses with elaborate figures, is an outcome of continuo practice. However, whereas the latter used figures as a shortcut, some of the pedagogical extensions of this method are extremely cumbersome, with the result that the student spends a great deal of time and effort becoming familiar with an elaborate and, finally, fairly useless numeric code. This code supplies very little insight into the way harmony and form interact, and thus provides no help in teaching the student to think harmonically for himself, or to generalise what he knows outside of the realm of tonal music.
- Schoenberg's writings on harmony deserve special mention here. As in all his theoretical writings, Schoenberg has many provocative ideas, and his teaching is based on a profound knowledge of the repertoire. A few of his ideas have influenced our approach here - notably his notion of the structural role of harmony. The main drawbacks of Schoenberg's writings are: his philosophy of historical necessity, his sometimes obscure formulations, and his frequent aesthetic diatribes, many of which today are simply very dated.
- Allen Forte's set theory, like Schenkerian theory, was originally formulated with a specific repertoire in mind, in this case non-serial, so-called "atonal" music. Forte did a useful service in proposing a standard nomenclature and classification for all possible chords in the tempered system. His study of inclusion relationships is also of interest. Within limits, Forte's ideas can provide a useful way of organising and recognizing families of pitches, which can help the composer give coherence to his harmonic language. His main weaknesses - particularly from the point of view of a composer - are:
    - The lack of any serious discussion of what is or is not audible. For example, hearing the presence of a given three note harmonic cell through a short passage is a very different matter from recognizing an eight note set in two far-flung sections of a long piece.
    - The lack of any discussion of issues of harmonic direction, accent, and cadence.
- Probably the best teaching work for traditional harmony is Roger Sessions' *Harmonic Practice*. Written by a fine composer, it explains things in psychological terms more than in terms of convention. For example, Sessions' notion of harmonic accent will prove very useful here. Also, his exercises are the most varied and challenging for a young composer. The limits of his book are:

    - He does not discuss the important differences between vocal and instrumental harmony.
    - His discussion of contemporary practice is very summary.
- Finally, Persichetti's "Twentieth Century Harmony" is an excellent compendium of many twentieth century techniques. Written by an eminent composer/teacher, it is practical in its approach and down to earth in its explanations. However, it does not contain much in the way of general principles which are also applicable to classical harmony, and it contains little reference to long range harmonic organization - that is, to musical form.

To summarize, what is missing from all of these methods are links between tonal and other approaches. And yet such links abound. For example, while some of the specific methods of creating direction and coherence in tonal harmony cannot be transferred intact to other harmonic styles, often the principles underlying these specific solutions can be generalized. As we shall discuss below, the principles of voice-leading are clearly grounded in the way human hearing works, and therefore, appropriately formulated, remain relevant to any harmonic style.

A final inadequacy of most current approaches to harmony is that they often ignore the interaction of harmony, counterpoint, orchestration and form. However, these categories are mere pedagogical conveniences, and not realistic descriptions of the way the musical ear breaks down information. For example, voice leading cannot be separated from counterpoint, and detailed examination of the way a chord is spaced quickly leads to questions of orchestration. For this reason, in our discussions of musical examples, we will often need to refer to several different aspects of the music in order to adequately explain what is happening.

Limits of our discussion

- This book is not a harmony textbook. Both the specifics of classical tonal harmony and of many twentieth century techniques are well treated elsewhere; there is no need to cover the same ground here. What is needed are more general, unifying principles. To the extent that we will be applying traditional principles in broader contexts, we shall assume that the reader is already familiar with their conventional applications. Where these principles are not familiar, we will explain them in more detail. To get the most out of this discussion, the reader should have a solid grounding in tonal harmony, and should also be familiar with the material in Persichetti's "Twentieth Century Harmony". (N.B.: Where a twentieth century technique is well covered in Persichetti, we will not supply examples of it, unless we have some extra insight to add.) Knowledge of the elementary notions of Forte's set theory (in particular: "interval class", "set", "normal form", and "interval vector") will also be useful.
- This book is not a comprehensive method of analysis. The goals of analysis are systematic in a way ours here are not; therefore an analytical method would require a very different approach. As in the other books in this series, our aim here is practical: We are simply trying to propose some basic principles about how (harmonic) hearing works, especially those which cross stylistic boundaries, and which can therefore be useful to composers today. This is especially important given that in the recent past, systems like total serialism and aleatoric music, where the methods used to produce the music have no demonstrable relation to what any normal human can reasonably decipher by ear, were actually taken seriously. (Indeed, in some academic quarters, the preceding sentence is still "politically incorrect".) Unfortunately, anyone who spends most of their effort during composition on what cannot be heard, risks not using audible resources to the full, and consequently producing a work whose effect on the listener can only be tepid at best. While a composer may perhaps explore such systems to break out of stale habits, if the results are not at some point severely filtered through a realistic knowledge of what can be expected from a normal listener, how can the music communicate significantly?

- One final caveat: In this work we will limit our discussion to the tempered scale. This is not to deny the interest or the musical potential of non-tempered and micro-tonal systems. Quite possibly, some of the principles mentioned here also apply to non-tempered harmony, but a thorough discussion of such harmony would require expertise I do not possess. In addition, the tempered scale is so ingrained in our notation, performance practice, and instrumental construction, that serious attempts to work outside of it require groundwork which goes far beyond the scope of this book. Similarly, we will not address harmony which makes significant use of portamento effects.

A new approach to understanding harmony

Since mankind's evolutionary capacities and limitations for hearing and understanding relationships between tones have clearly not changed in a very long time, it follows that there must be connections in the way we hear "old" and "new" music. Recent works by Bergman (*Auditory Scene Analysis*), Deutsch (*Ear and Brain*), and Snyder (*Music and Memory*), shed significant, new light on these basic auditory/cognitive systems. Combined with what musicians already know and intuit about how music works, they provide a useful starting point for a more general understanding of harmony and other musical disciplines.

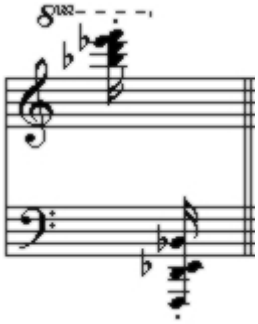
The main theories which will prove useful to us are those which refer to the most easily heard phenomena. (Incidentally, the aspects of cognition we take for granted are often the most complex.) The disdain with which "salience" is referred to in some current (music) theoretical literature is entirely at odds with the practical needs of the composer.

For example, some of the assumptions behind current ideas of pitch structure need to be reexamined. Recent psycho-acoustical research, as well as practical experience, lead to the conclusion that some of these notions are conventions with only limited usefulness, focusing on connections that are often quite obscure to even the most trained and attentive listener. Worse, they often do **not** explain what actually is heard, and thus can lead the analyst or the aspiring composer to ignore factors much more relevant to the sonic result.

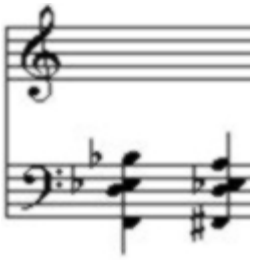
We may draw a parallel here to the exaggerated importance given to chord roots in harmonic theory before Schenker. Schenker`s thinking, by contrast, emphasized the fact that the sounding bass line usually has more effect on the sense of harmonic direction than any theoretical root. Here a widely accepted theory (that of chord roots and inversions) often led to ignoring or undervaluing direct musical experience.

Similarly, the vast literature about pitch class sets and series often veers into the musical equivalent of numerology. Again, overemphasis on extremely subtle intervallic relationships, especially over long stretches of time, where their aural perception is often impossible, easily leads to inadequate emphasis on relationships that are audible even to the uninitiated. This in turn can lead to serious misjudgments about a work's effect. Clearly salient events are always the best pillars supporting musical architecture. (See my article, On Salience, for more on this issue.)

An example of a common basic assumption needing qualification is that of octave equivalence. While in the middle register C3 and C4 are clearly in some sense equivalent, comparing C1 and C7 is quite another matter. In the extreme registers, pitch discrimination is very inexact and dependant on many factors, including orchestration, duration, etc.



The two chords in this example include the same four pitch classes. However, in terms of perception, what does it mean to speak of them as being "identical"? The exact pitches in the first chord are quite difficult to distinguish due to their extreme register, and their short duration makes this harder still. Most important, the differences in register and spacing between the two chords have the effect of thrusting the common pitches into the perceptual background. Even if we concede that, played one right after the other, careful listening might recognize these common pitches, what if the chords are separated by several bars of other music? In this case the similarity between the two chords is surely at best a refinement, compared to their surface contrast. Except in the case where the two are placed side by side for comparison or otherwise "pointed out" to the listener, the pitch similarity between them is relatively unimportant. Note that to make the listener's job easier I have used the same pitch classes. Imagine if I had also transposed the chords (at an interval other than the octave), requiring the listener to compare ***intervals*** *rather than just pitch classes.*



In this example, the first chord is the same as the second one from the previous example. The second chord here contains two new pitches, and different intervals as well. And yet the two chords seem much more similar than the pair in the previous example, because: They are in the same register, share two common tones, and each contains a sharp dissonance in the middle, with richer intervals surrounding it.

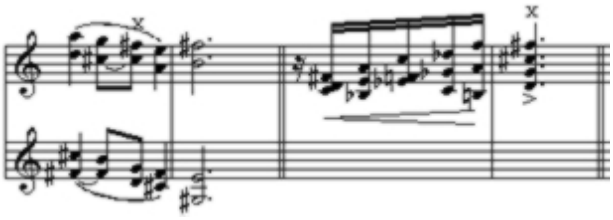
These examples raise two critical questions:

1. How can a composer make pitch identity relationships clear to the listener?
2. When should other relationships (as in the second example) be considered more important?

These questions are largely ignored in the literature, despite their vital importance for understanding musical form - which, after all, works mainly through association and memory. **Both of these cognitive capacities depend on surface salience.** A good deal of our discussion here will therefore focus on the ways composers can create, and realistically differentiate, audible harmonic relationships, to fulfill various formal functions.

Principles of coherence and continuity

Most discussions of harmonic coherence in the common practice period center on tonality. Outside of this period, explanations emphasize relationships of chordal identity or similarity. This is a significant - and usually unnoticed - distinction. Tonality helps create musical **motion**, since it defines goals. A tonal progression cannot be scrambled and maintain its integrity. In the absence of tonality, analysis based only on relationships of identity or similarity overemphasizes the "what", as opposed to the "when". Pointing out pitch cells or algorithms which give rise to all of the pitch material in a work can never adequately explain why a work's harmonic construction is convincing, since music is a temporal art; the sequence of events is essential to its meaning. Even in music without a clear tonic, context radically changes musical meaning. A chord at the climax of a phrase is not equivalent to the same chord at the start of another phrase, since much of its meaning derives from how it is approached and left.



Here, the chord marked "x" is identical in both examples. However, in the first example it is clearly a subsidiary, passing chord: It is rhythmically weak, introduces no new notes, and helps to fill in the space between the chords under the slur. The real accent here is on the last chord, which no longer stays in the D major scale, and has a richer interval (a 6th) on the bottom. In the second example, the same chord is now the climax of the phrase. Not only is it rhythmically accented and longer in duration, but it also culminates a progression of rising harmonic tension. The preceding chords alternate between gentle sonorities, (i.e. without semitone dissonances) and harsher ones (i.e. each containing one such dissonance). The last chord contains two semitone relationships, making it, in this context, a stronger accent.

A more useful way to think about harmonic coherence is as one aspect of a leading thread for the listener to follow as the piece progresses. This formulation does not require that the harmony be based on classical tonal relationships. It also links the notions of coherence and flow, which, in a temporal art, are profoundly connected. The deeper question becomes: How does the harmony engage the listener in the music's flow in compelling ways? Harmonic coherence, seen in this way, has several aspects which we will explore below.

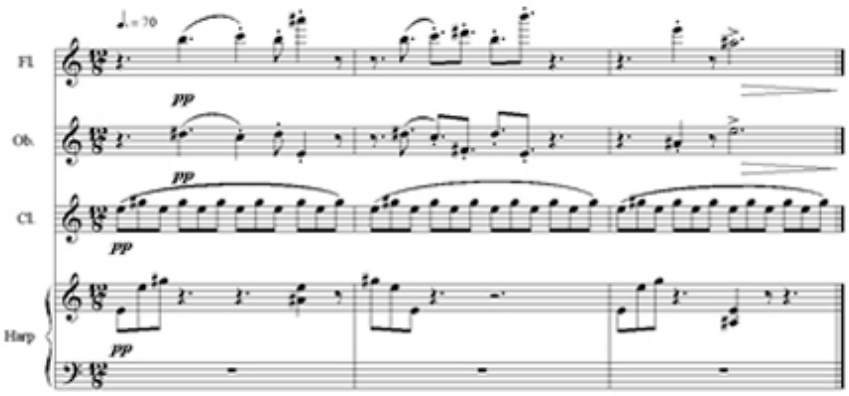
Pitch and interval limitations: Families of chords

As already pointed out, an important aspect of harmonic coherence is limiting the work's pitch content. Establishing such harmonic limits, which engender norms, makes it easier to create harmonic expectations. Such expectations direct and intensify the listener's experience of musical time.

Such harmonic norms generally involve creating "families" of chords. A family is any group of chords with clearly audible resemblances. To carry the analogy farther, a family can include many members who share some obvious characteristics, but who are also more or less individual. This notion has the advantage of allowing for many **degrees** of relationship.

To give only a few examples, families could be organized by:

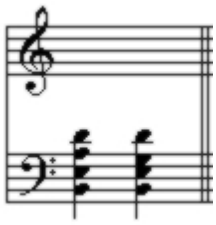
- Basing the music on a given scale or mode.
- Using persistent common tones, especially in the same octave: This generates the simplest kind of audible coherence. It corresponds to the classical pedal point.



In this example, the clarinet tremolo, E-G#, acts like a classical pedal point, providing simple, clear, registral, rhythmic, and harmonic unity. However, the outer parts also contribute to coherence. The flute part starts the first two phrases with the same three notes which emphasize B as a stable tone. This causes the final cadence note, A#, to sound like a lower neighbor. Similarly, the highest note in the first bar, A#, leads stepwise to the highest note in the second bar, B. The oboe part is homorhythmic with, and has similar voice leading to, the flute part: The D# and C in the first bar remain in the second bar; the E of the first bar is "ornamented" by the F# in the second, and the E in the last bar seems to "resolve" the previous D#. The harp is limited to 4 notes.The last bar sounds cadential because of the less animated rhythm, the on-the-beat accent, the softer harmony (which avoids semitone conflicts) and the descent of the harp into a new register. While the common tones in each instrument certainly help to hold the phrase together, we can see that these various other relationships - in rhythm, voice leading, and interval tension - also help the listener to make sense of the whole. Identity relationships are thus only one aspect of a more complex coherence.

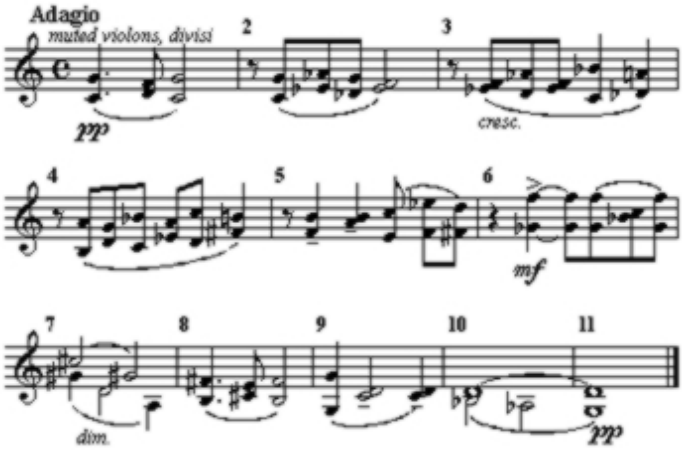
- Intervallic harmony: Transposed intervals are much less easily identified by a naive listener than simple common tones, since the common element is a **relationship**. However, limiting the intervals used in a given passage to one single interval (and its inversion) can define a strong, audible character. Similarly, limiting a passage or a piece to material derived from a **small** unordered cell ("unordered set" in the literature) can also create fairly strong character. (Note that the larger the cell, the more intervals it contains, and therefore the less

distinctive it becomes. If more than three or four intervals are involved, the cell will usually contain all of the chromatic intervals - being unordered, non-adjacent intervals must be counted as well. This is where Forte's notion of "interval vector", i.e. the total number of times a given interval appears within a given set, is useful. Sets with very uneven distributions of intervals tend to have clearer characters.) These techniques can be applied quite rigorously for short passages, or more flexibly over larger stretches (see below for discussion of this important distinction). Flexible applications usually involve either melodic movements which create other intervals as "non-harmonic tones", or vertical stacking, which necessarily results in richer chords. Since stacks of any one interval almost always produce additional, new intervals between non-adjacent notes, this technique allows for harmonic "shading", i.e. moving between sonorities which are highly saturated with the main interval to others where its effect is less prominent.



In this example, the first chord is a simple quartal sonority. The outer notes, however, form a 3rd. Thus it is easy to move from the first chord to the second one, which is triadic, via the the smooth stepwise movement from A to G. The second chord could subsequently either return to the first, acting like a neighbor chord in a generally quartal passage, or else lead into a passage of tertian harmony.

- Since intervals have distinct tension characteristics, using chords with common tension configurations (e.g. one harsh dissonance plus one rich consonance) can unify a passage. Likewise, progressions of tension, e.g. from rich consonance to sharp dissonance, are easily followed by the listener.



This example illustrates a gradual progression from gentle, open intervals to an intense climax on a major 7th (m. 6), and then back. The dynamics and registral

evolution reinforce this progression. Note that the progression is not simplistically linear: Overly obvious progressions tend to be boring. The best strategy is for the overall direction to be well defined, while the details remain somewhat unpredictable: The general direction of the progression allows the listener to develop expectations, but the inability to predict the exact next note maintains interest.

A family often will contain chords associated in more than one way (e.g. through both common intervals and common register). This is logical, since simple voice leading tends to keep parts in one register, or at least to change register without discontinuity. **The more elements which are kept common within a harmonic family, the easier the harmonic character will be to perceive**. This is yet another example of how critical it is for the composer to accurately judge degrees of salience; only in this way can he exercise subtle control over audible gradations of harmonic continuity and contrast.

Linear aspects: melody and bass lines; voice leading

We have pointed out above how pitch and interval limitations help define and unify harmonic character.

Two other traditional concepts contribute significantly to harmonic coherence: leading lines, and voice leading.

Even in contrapuntal textures, all parts are never of equal importance: Interest migrates from one part to another. In simpler, homophonic textures, outer parts are easier to follow than inner parts. Thus, clear linear progressions in the outer parts can clarify the music's sense of direction. For example, a melodic line which gradually attains higher and higher local peaks, leading to a sectional climax, helps give coherent shape to a musical paragraph. In the same way, the combination of stepwise motion in the bass with occasional angular passages - often at cadences - helps clarify harmonic direction.

Voice leading is always a very audible force, both for harmonic continuity and for articulation. The basic principles of voice leading arise from two fundamental facts (for experimental documentation, see Albert Bergman's *Auditory Scene Analysis*): the tendency of the ear to separate musical strands by register, and the fact that voices, and most instruments, are most at ease moving by fairly small intervals. These are facts about human hearing, and they therefore go beyond specific styles. Constantly leaping lines are very demanding to follow and to sing. By contrast, registral continuity, as expressed by common tones, conjunct movement, and stepwise movement between salient tones in the line, are easier to follow and provide the "glue", connecting one harmony to the next.

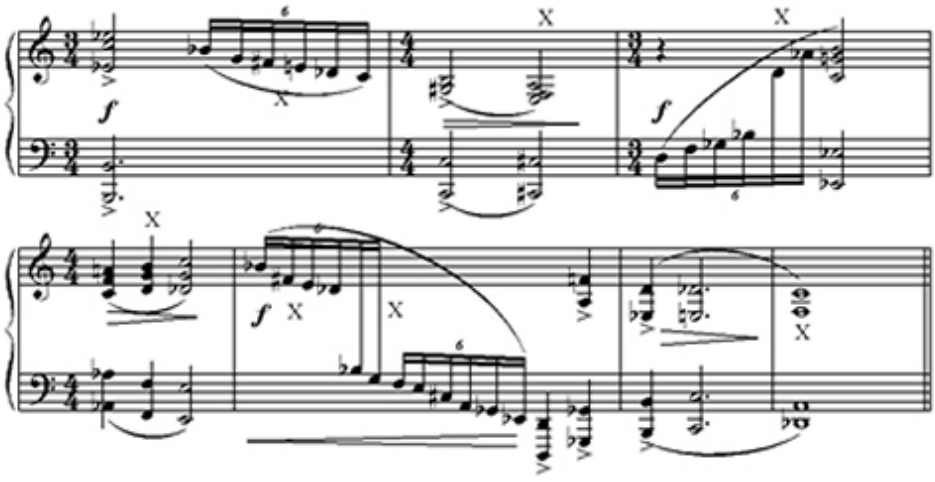
An important consequence of the importance of registral continuity is that ornamental (non-harmonic) tones **arise from the nature of hearing**, since they are virtually always stepwise. They are not just a stylistic peculiarity of tonal music. The fact that many systems for controlling pitch in non-tonal situations do not allow for them is a serious limitation: It deprives the composer of an effective means of creating leading lines which are easy to follow.

An aside: open vs. closed harmonic systems

This leads us to an important distinction: open systems vs. closed systems. An open system imposes audible, but not rigid, constraints, providing aural coherence, while allowing the composer's melodic imagination more freedom. Closed systems are much more mechanical, limiting the composer's options at any given moment in quite rigid ways. The distinction is largely one of degree.

Advantages of open systems include:

- Because most of them came about through evolution, rather than invention, they have usually been "survival-tested" by ear: Evolution tends to filter out approaches which are not effective.
- They are flexible. Contrary to many invented twentieth century systems, they require only a reasonable preponderance of their normative sonorities, rather than 100% saturation. They thus allow the composer's ear to work in more intuitive ways and do not automatically constrain basic linear impulses, such as conjunct lines. **There is no inherent contradiction between non-harmonic tones and coherent, non-tonal music.** For example, a piece using a core harmonic cell at key points could allow for non-harmonic tones between them. As long as the rhythm and phrasing make it clear which sonorities are the structural "pillars", and as long as there are enough such pillars - reference points - to stimulate the memory reasonably frequently, there is no more need for such harmony to derive every note from the basic cell than for classical harmony to insist that every non-harmonic tone be part of a triad.



This example is based on the three note (unordered) harmonic cell: B-C-Eb. The places marked "X" contain intervals not in the cell: major 2nd, perfect 4th, tritone. However, the cell is still very prominent overall, and these "exceptions" are not musically salient. They are easily heard as simple passing or other ornamental movements.

Apart from the flexible kind of cellular harmony seen in the example above, other examples of open systems include:

- Families of chords, as defined above.

- Added note chords.
- Polyharmony.
- Stratified harmony, i.e. harmonic textures where richness comes from simultaneous, but clearly differentiated harmonic strands. A fuller discussion of this technique will be found below. (Note that polyharmony can also be considered a kind of stratified harmony, if the layers are timbrally and/or rhythmically well distinguished.)

All of these techniques create recognizable harmonic worlds, while allowing the composer a great deal of local choice.

Closed systems, by contrast, severely limit the choice of notes available. Worse, they often do so to the extent that the expressive intentions of the composer cannot be fulfilled while respecting the limits of the system.

Examples of closed systems include: most algorithmic, total serial, and rigid mirror procedures. The key feature of such systems is that they do not allow the composer's inner ear to follow its own impulses at every point. While an open system imposes just enough limitation to create a coherent sound world, the 100% saturation imposed by a closed system makes for easy analysis, but usually has very little to do with how people actually hear. If the ear is to remain paramount for both composer and listener, why waste effort creating inaudible connections, and excluding audible ones which do not weaken aural coherence?

Much serial technique has long created problems of this sort, since the "order" in question usually has nothing to do with what can be reliably heard, even by an experienced, attentive listener. Further, chords in serial music inevitably create interval combinations not inherent in the row. And in any case, what is the meaning of "order" in a chord whose notes are heard simultaneously? (Of course, these comments do not imply that no serial music is of any value, but just that serial procedures easily lead to unmusical thinking.)

Hierarchy, landmarks, cadences

Apart from family resemblances, classical tonality provides an example of another important principle of harmonic coherence: hierarchy. The idea of "leading lines", already discussed above, provides a simple application of this notion to simultaneous strands of the musical texture. Applied to successive phrases, sections, etc., hierarchy likewise makes the listener's task much easier, by organizing larger spans into sub-sections, whose limits and relationships to each other are easier to grasp. Hierarchy, in short, makes possible richer and more complex musical structures.

We will first discuss the hierarchical functions of tonality, and then discuss how similar effects can be achieved without it.

Hierarchy applies on several levels. First, tonality itself is based on scales with unequal intervals: If all intervals are equal, there is no harmonic reason why one note will sound more final than any other. Within unequal scales, differences in intervals create points of relative stability and attraction. For example, in major and minor scales, the semitones are points of attraction; the leading tone is a familiar example.

On a higher level, as Schoenberg points out, music requires articulation into units that can be assimilated by the memory in order to remain comprehensible (e.g. phrases, sections, etc.). Such articulation is the function of cadences. **Cadences are necessary, whatever the harmonic language used**.

If the listener is to follow music of any length, he requires gradations of cadence. Such variety of punctuation makes phrase divisions easier to perceive, and clarifies their relationship to one another: Hierarchical tonal cadences tell the listener how far away he is from "home", i.e. the tonic. In tonal music, this hierarchy of cadences is well known, and need not be listed here.

On an even higher level, not only does a tonal center provide a useful point of reference, but it also allows for the creation of secondary centers, permitting still more degrees of punctuation, thus making large-scale coherence easier to grasp.

This points out the necessity of audibly underlining important notes and chords, in effect treating what happens between them as ornamentation (or, to use the Schenkerian term, prolongation). This kind of salient, musical "highlighting" makes it easier for the listener to parse large forms by ensuring that landmarks are easily noticed, and memorable.

These distinctions between harmonic reference points and harmonic ornamentation, and the way reference points are approached and left - in other words the way they are pointed out to the listener - are critical for understanding the interaction between harmony and form. Even in elementary tonal harmony, the tonic will often not be recognizable after substantial harmonic digression, unless it is thus made salient, through coordination with other aspects of the music. (How many people notice that many classical operas - for example, Mozart's *Magic Flute* - do not end in the same key in which they start?) Such salience can be achieved by:

- Accent: extremes of pitch, strong contrast of duration or orchestration.
- Building up to such important moments, with crescendi, rising lines, gradual tempo change.
- Repetition, for emphasis.
- Directed cadential progressions.
- Isolation: framing by silence.

Without such cues, one must assume that listeners somehow memorize the absolute pitch of a work's tonic, and remember it despite all intervening harmonic activity. This is patent nonsense.

Incidentally, this more realistic view of tonality also sheds light on what Robert Simpson, in his book *Carl Nielsen, Symphonist*, calls "progressive tonality". This phenomenon appears in composers like Nielsen and Mahler, where movements sometimes finish in a different key from where they begin. The interesting point about such forms is not simply that they do not end where they begin, but that they **dramatize** the search for a new tonic. As Simpson shows, the first movement in Nielsen's fifth symphony is a fine example of this procedure.

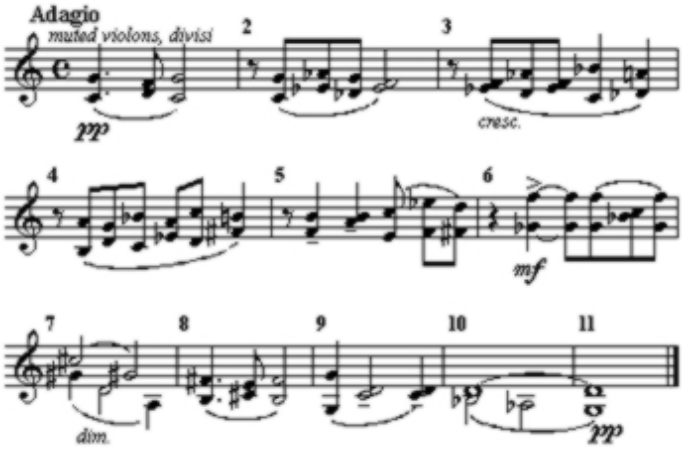
How can the composer create cadences and cadential hierarchy in the absence of classical tonality?

First, all cadences, in any style, imply coordination of harmony with rhythmic resolution and accent. Even in classical tonal harmony, often the only difference between V-I progressions

within a phrase and those at the cadence is rhythmic. Strong cadences combine pitch resolution with rhythmic resolution. While it is harder to achieve a sense of cadence without a regular beat, cadence still will coincide with a sense of rhythmic arrival, or at least break or dilute the rhythmic flow.

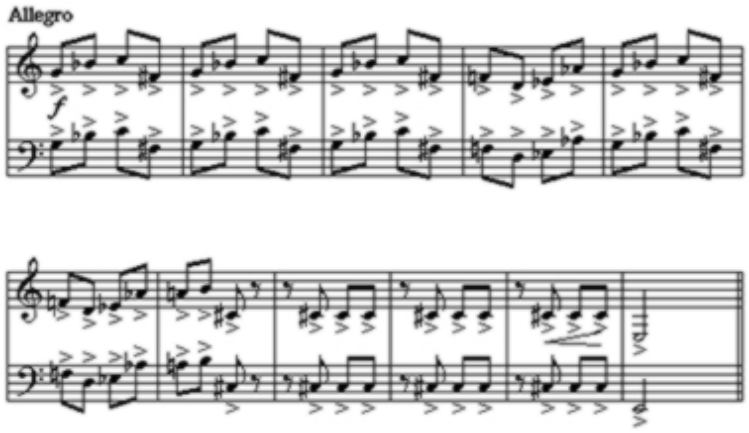
Here are some other aspects of the notion of cadence which can be generalized:

- A cadence always represents a change in the tension level, most commonly a reduction: The Latin "cadere" means "to fall". Falling lines usually sound like endings, perhaps by analogy with the tendency of the human voice to fall at the end of sentences.



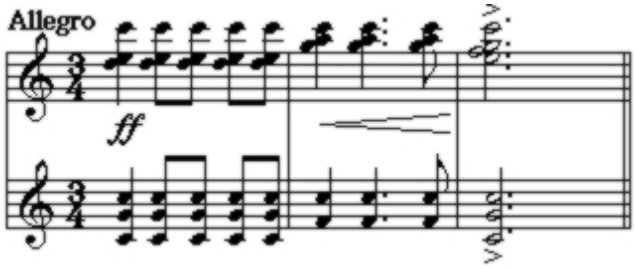
Here, cadence is created by the combination of: a falling line, a reduction in interval tension, and rhythmic slowing down.

- Since "articulation" means setting something apart, cadence is signaled by doing something different from what precedes it (i.e. deviating from some established harmonic pattern). For example, a phrase with a stepwise bass may become more angular, or vice versa. Established harmonic rhythm often changes at the cadence. Both of these techniques require some harmonic regularity and predictability during the phrase. (Incidentally, such changes can also be used to indicate climaxes; however, the latter are associated with increasing intensity rather than reduced tension. A cadence can also be climactic.)



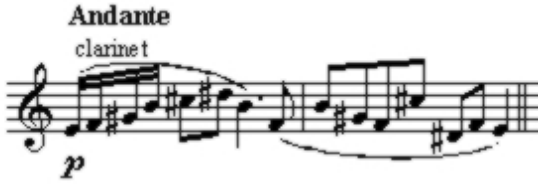
In this example, cadence is achieved by the arrival of a fresh note (E), as well as by an accented leap into a new, lower register. Also, the many repetitions in the preceding measures create a rather slow harmonic rhythm, so that the final novelty is even more marked. Note how the drive to the last note is reinforced by a crescendo.

- A cadence provides resolution or culmination - at least locally - of directional forces. Progressions (using the term as defined earlier) established within the phrase are culminated or dissipated.



The main elements which make the last chord here sound final are: its rhythmically accented position, its duration, and the fact that it contains a cluster, for the first time including a semitone. This cluster creates greater tension (accent): There is a progression in the level of dissonance.

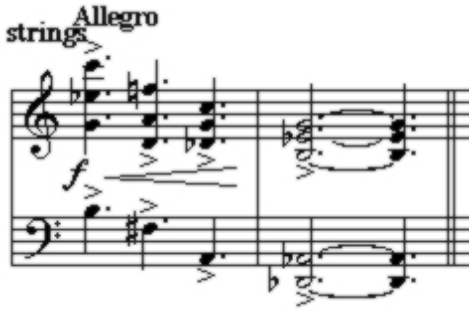
- If unequal scales are used, the smallest intervals can create an effect analogous to leading tones.



The scale on which this theme is based (E-F-G#-B-C#-D#) provides two semitone relationships, above and below E. This makes the cadence's direction clear, since the

two semitones are prominently placed, right before it.

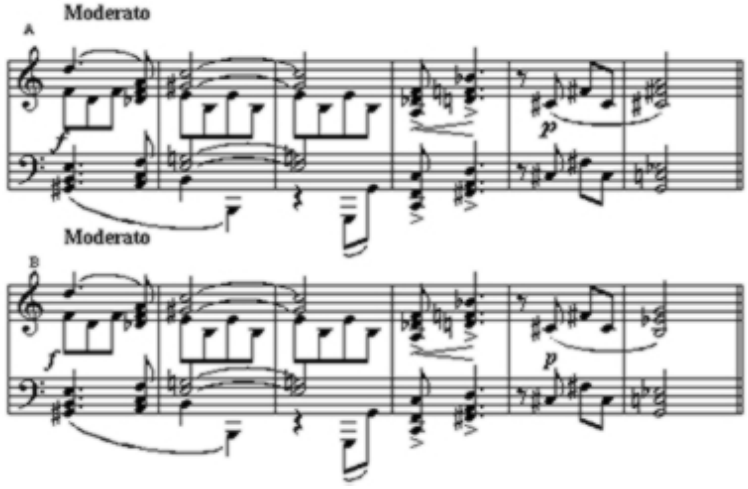
- An acoustically clear interval, like a 5th or an 8ve in the bass can help establish stability at the cadence.



Here, the low fifth in the final chord, combined with its longer duration, and the fact that it culminates a falling gesture, make for clear resolution.

As for hierarchy in non-tonal contexts, tonal polarity - the establishment of secondary centers - can fill this structural function, as can: varying degrees of rhythmic stopping, and the use of mitigating factors during cadences (e.g. motivic anticipation of the next phrase, elision, etc.). The important thing here is that the technique chosen must allow for **easily audible gradations**.

Compare the two cadences for the following phrase:



Phrases "A" and "B" differ only in their final chord. Phrase "B" sounds more final than phrase "A" because the final chord contains more common tones between the two hands, reducing harmonic tension in this generally polychordal context.

Principles of movement, interest, and variety

General aspects of harmonic accent

Music whose only virtue is coherence is simply boring. If a piece is to hold the listener's attention throughout, it requires both continuity and various contrasts. These contrasts come in varying degrees, normally in proportion to the length of the piece: The longer the piece, the more novelty is needed. Varying the music's contour, giving it highs and lows, makes it breathe, and creates an organic sense of tension and release.

Renewal of interest operates on all time scales: locally and across the whole work. It always involves novelty: something different from the preceding norm. (Note that novelty can also result from putting something familiar in a new context.) Novelty creates musical "questions" and thus becomes propulsive: It first attracts the listener's attention, and then calls his previous expectations into question.

In general terms, such questions, or accents, involve one or more the following:

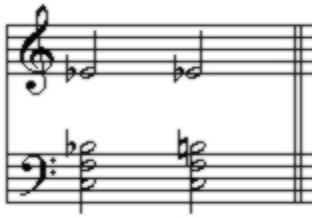
- rhythmic stress.
- change in the level of harmonic tension (e.g. dissonance, in a classical context).
- different density of texture.
- change in register.
- new timbre(s).

Creating momentum and renewing interest on various structural levels

Locally

On a local level, the following elements are propulsive:

- Active tones in scales or modes: As mentioned previously, in any unequal scale some notes are more active than others. These notes create instability, pushing the music forward. (This is one reason why music which relentlessly exploits the total chromatic scale, especially if there is no particular tonal focus, quickly becomes gray and uninteresting.) Active tones modulate the level of harmonic tension.
- Unequal intervals within chords: If all of the intervals in a chord are equidistant, the effect is static, ambiguous. Familiar examples include the diminished 7th chord and the augmented triad (both of which, incidentally, are extreme cases, since even when piled up beyond a single octave they introduce no new notes, unlike, say, a stack of 4ths). Unequal intervals create tension and momentum. Note, however, that if the number of different intervals becomes too great, and especially if the spacing includes multiple, adjacent sharp dissonances, the chord will tend to "clot" (Persichetti's term), bogging down the harmony, since no clear focus of tension can be discerned to suggest subsequent direction.



The first chord here is neutral in direction, due to the stacked perfect 4ths. The second chord is much less stable, due to one single "outlier" (B natural), which engenders a variety of stronger intervallic tensions with the other notes.

- Leaps: Since conjunct motion is the norm for both singing and hearing, a leap is a special event. Even in situations where leaps abound, larger leaps will stick out. Also, the physical effort required to produce them in voices and on most instruments subtly inflects the rhythm.
- Compound lines: Leaping regularly between two or more registers, such lines compress multiple strands of voice-leading into one continuous line. Such lines keep the listener is a constant state of tension, because there is usually at least one strand unresolved.

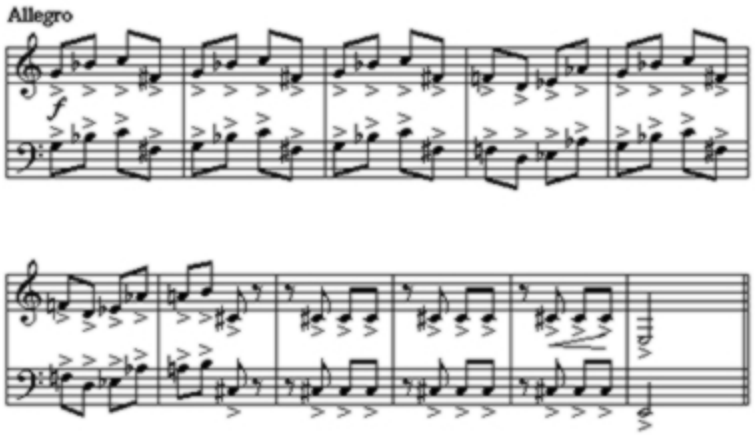
Higher Levels

On higher levels, the following harmonic elements contribute to interest and momentum: harmonic rhythm, and modulation. These require discussion in more detail.

Harmonic rhythm

By "harmonic rhythm" we mean the rate at which chords change, especially when the outer voices move (N.B.: This is independent of the surface rhythmic values, which may include harmonically static repeated notes and trills). Harmonic rhythm determines how much new pitch information the brain must process in a given time. Even in textures where there is no simple harmonic norm, the rate of arrival of new pitches powerfully affects the music's momentum.

However, harmonic rhythm is usually felt in relation to a norm; once this norm is established, all other things being equal, faster changes "raise the temperature", while slower changes seem calmer. Of course arbitrary changes are also possible, but they quickly lose their novelty, since the listener cannot develop meaningful expectations about their continuation. That said, a change from irregular harmonic rhythm to more regular harmonic rhythm, or vice versa, can create a sense of structural movement.



This example (already discussed in another context) plays on the listener's expectations of harmonic rhythm. The first three, repeated, measures create a sense of stability, which is disrupted by the new notes in the fourth measure. The return to the opening pattern suggests a repeat of the process, but there quickly follows even more novelty. Finally, the return of stability with the repeated C#'s makes the sudden arrival of the final E more dramatic.

One last point: Consistency of harmonic rhythm can help unify the music within a section, while change in harmonic rhythm can help to define differences between sections.

Modulation and Harmonic Transition

In music with clear tonal centers, moving to new tonal regions for contrast is an obvious way to underline structural articulations. It is also a very useful means of creating contrast, since it allows for everything from mild local changes to strong long term shifts.

In music without clear tonal centers, modulation acts like a simple extension of harmonic rhythm: the arrival of new pitches is easily noticed, and the rate of their arrival influences the sense of musical momentum. Even in non-tonal situations one can create gradations of modulation, simply by controlling the number of new notes which arrive within a given span of time. The example above again provides a clear illustration of this process.

Technically, the process of modulation is the harmonic side of the art of transition. As in other aspects of musical form, transitions can be sudden or gradual, and can lead to closer or more remote contrasts.

A useful procedure for planning modulation is:

1. Determine the appropriate degree of contrast for where one is in the form.
2. Determine whether a gradual or a more abrupt change is required; abrupt changes occur more rarely than gradual ones, since they are more disruptive to the music's flow.
3. Bring in new notes in ways which attract the ear: as accented notes, peaks, resolutions of suspensions, etc. Create momentum towards these new notes with melodic, rhythmic, or textural progressions.
4. The more gradual the change required, the more important it is to introduce new notes one

at a time.

Note that changing the **rate** of modulation (an extension of the notion of harmonic rhythm) can also create effects of increased or decreased musical movement. As discussed in our book on musical form, incremental progressions - e.g. in the rate of modulation - allow the composer to create expectations. Such expectations, both fulfilled and unfulfilled, connect the musical present and future to remembered events in the past in a pseudo-causal way, thereby unifying larger stretches of music, through suspense.

Where the music uses such progressions, whether in the rate of modulation or in other aspects of the music, a sense of direction will result. Where there is direction, there will also be climax, i.e. a sense of culmination and arrival. Such climaxes are outstanding moments, which the listener will remember.

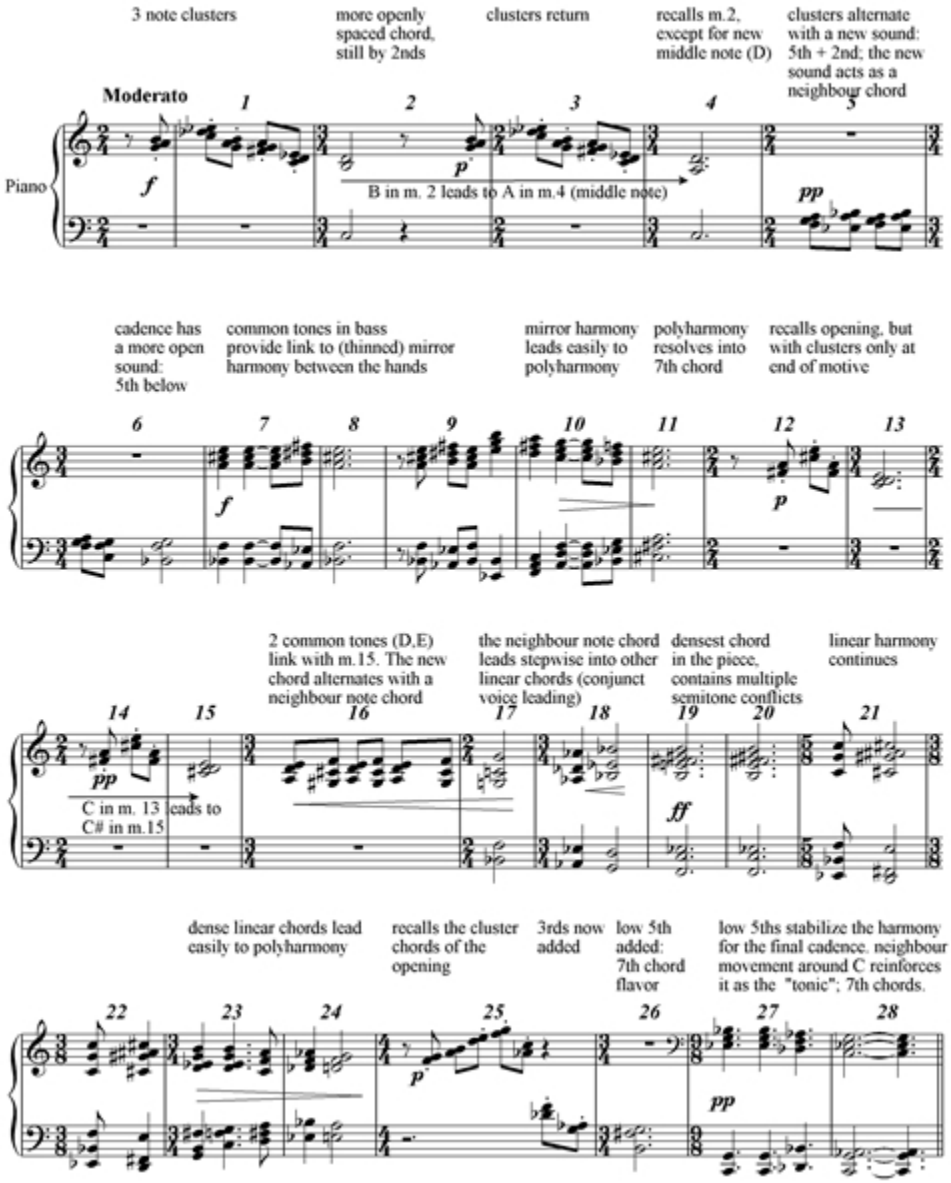
Transitions between various types of Harmony

We have discussed various techniques above for solving an important problem: creating clear, audible, and coherent harmonic character. But it is not necessary, or even always desirable, to use just one harmonic technique over a whole piece. Provided the transition is smooth, it can be musically convincing to move from one harmonic technique to another. The main way to achieve this is via common elements. (Persichetti has an excellent discussion of this subject on pp. 271-5.)

Of course, some techniques can be more easily linked than others, depending on the degree of common ground between the starting point and the ending point. For example, added notes can easily move into to polyharmony (or vice versa), and intervallic harmony can alternate with cellular harmony using the same interval(s). Certain other techniques are harder to connect, because they have so little in common. For example diatonic modal harmony is not easily transformed into serial harmony.

Changes in harmonic technique can be applied within individual phrases or over larger stretches. When making such transitions between sections, that they need stronger emphasis, to make clear to the listener that the change marks an important formal joint.

Here is an analysis of changes in harmonic technique within one small piece:



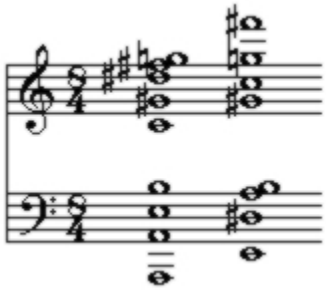
All of the harmonic transitions here occur through common tones, stepwise voice leading, and clear intervallic associations between successive harmonies. Motivic elements help to hold the piece together as well.

Harmony and Texture; Orchestration and Harmony

One unsettling aspect of most books on harmony is that, in reducing harmonic textures for analytical purposes, they dilute or remove some of the most salient harmonic effects: the way the notes are disposed in musical space (register), and the composer's choices of doubling and timbre. Any pedagogical or analytical regime that does not concentrate on what is most audible - these dimensions of sound are **not** minor details - is bound to remain musically feeble.

Spacing and register

The overtone series is a rough guide to harmonic clarity. Generally, the more a chord is spaced with wider intervals on the bottom, and smaller intervals above, the more it will favor blended resonance. Clear acoustic intervals (e.g. octaves and fifths) on the bottom tend to ground the harmony, regardless of what is above.



These second chord here is an "inversion" of the first. (This example once again shows how the concept of "inversion" in chords with many different chromatic notes is meaningless.) Note the enormous difference in effect between the two chords. The first chord sounds like a colorful elaboration of an A minor harmony, due to the octave A in the bass and the supportive fifth above it. The second chord sounds rootless; the only acoustically strong interval is the 5th C-G, hidden in the middle parts.

Of course, a composer may legitimately want expressive effects like dark, close chords in the bass, to suggest confusion or heaviness of spirit. But they should not result inadvertently.

Another point: As we have seen previously, harmonic tension is softened by registral separation, since the ear is less inclined to associate widely spaced dissonant notes with each other. At their most extreme, such gaps create separate planes of tone.

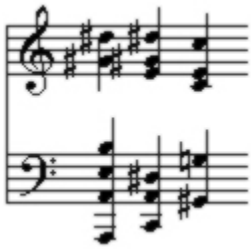
Note that register is directly related to clarity and character. Pitch clarity is always greatest in the middle register, where human hearing has evolved to make the most precise distinctions. (In teaching composition, it is often useful to suggest to students that they try harmonic effects in various registers, before settling on the "default" middle range.)

Doubling

Apart from spacing and register, choice of doubling is also important. One problem with

classical serial writing is its rigid avoidance of octave doubling. Not only does this make clarity in the extreme registers of the orchestra almost impossible, but it also closes off interesting harmonic effects, which use doublings to color a chord in particular ways. Although octave doublings do indeed change the flavor of the harmony, that is no reason always to avoid them; a better goal is to use them in ways that are intentional and expressive.

Doublings are not all equivalent in effect. Doubling will emphasizethe role of the note which appears more than once. Doublings of bass notes add more solidity than doublings of middle notes, and adjacent doublings (unseparated by other notes) are more noticeable than non-adjacent ones.



Note the effects of different doublings in these three chords. In the first chord, doubling the A on the bottom gives it the feeling of a root, as does the fifth above it. In the second chord, doubling the D#, in semitone conflict with the E, creates more tension, and a heavier sound. In the third chord, doubling the C, consonant with both G# and E, gives the chord a richer sound.

Finally, it is worth mentioning that organ registration, with its use of doublings at pitches other than the octave (mutation stops) to create distinct, new timbres, can provide interesting harmonic effects. The classic example of this technique can be found in Ravel's *Bolero*.

Timbre

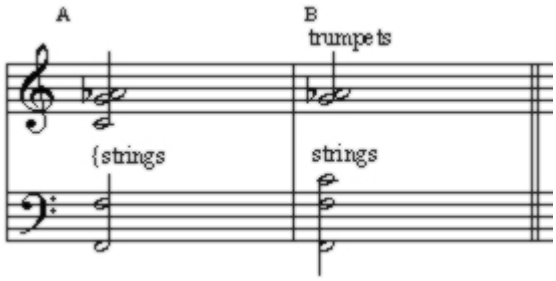
Another element often ignored in traditional harmony study is the difference between instrumental and vocal writing. Suspensions written for the piano are very different when played by the organ; attacked dissonances, difficult for voices, are easier for strings.

In fact, timbre affects the sound of any interval. Clusters are quite aggressive on the organ, but soften enormously when played by strings (possibly because slight, continuous fluctuations of pitch in the latter provide inner mobility). Octaves and fifths in brass instruments have a richness and fullness unequaled by the same intervals played by woodwinds. Low, closely spaced chords in trombones have a richness which is very different from their (relative) heaviness when played by horns. In short, beyond the most elementary work, harmony cannot and should not be separated from orchestration.

Harmony with multiple planes of tone

A chord is normally perceived as a unit. However, it can also include subgroups ("planes"), particularly if the orchestration encourages such "streaming", through registral and/or timbral

separation.



In "A", when the homogenous strings here play the chord, the two highest notes blend with the overall mass. The same chord, orchestrated as in "B" , presents two distinct timbral layers: a background string chord, and a foreground dissonance in the trumpets. Our hearing of the harmony now focuses more acutely on the dissonance G-Ab, leading to different expectations about the music to follow.

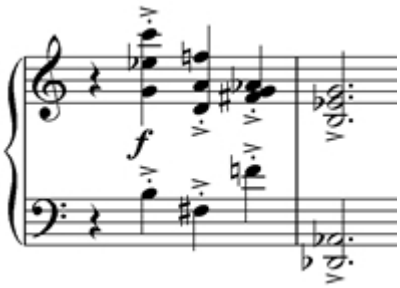
The point here is that virtually all harmony texts assume complete and continuous unity of tone. In real life, however, there is a world of expressive potential to be explored in multi-layered harmonic textures, and in various degrees of blend between planes of tone. Further, such stratification is a powerful means of exploring harmonic complexity without creating heaviness and inertia. This is especially true if the various layers are distinguished by distinct interval characters, timbral and/or registral separation, and rhythmic independence.

Criteria for evaluating harmony

Following our discussion of general principles, we can now specify what poor harmony - in any style - sounds like. Inadequate harmonic sensitivity results in (unmotivated) inconsistency of harmonic worlds, and thus, to unclear expressive intentions.

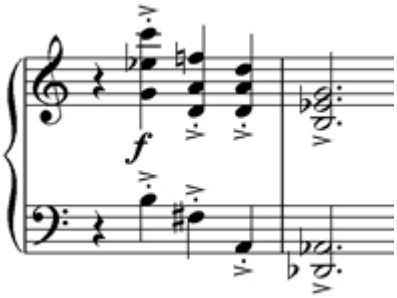
Typical cases include:

- Inappropriate or random accents.



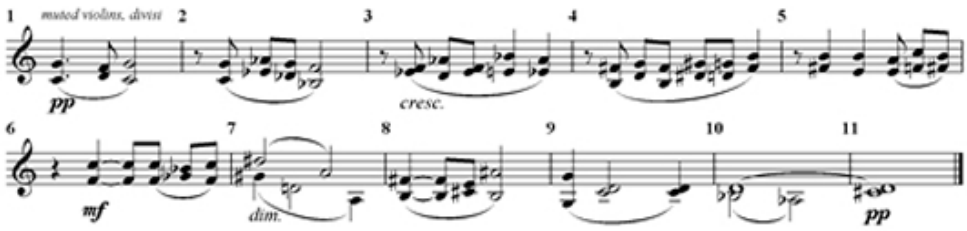
This variant of an example presented previously now has a cluster chord on the last beat of the first bar. This chord disrupts the voice leading and also is more intense than the other around it. It arrives in mid-phrase, at a moment which deserves no special accent.

- Inappropriate or random holes or dead spots.



Another variant of of the same example now has a bare, open chord on the last beat of the first bar. This chord sounds very empty compared to those around it. Again, its position in the phrase merits no special emphasis.

- Lack of direction, often along with a certain grayness, lack of meaningful contour.

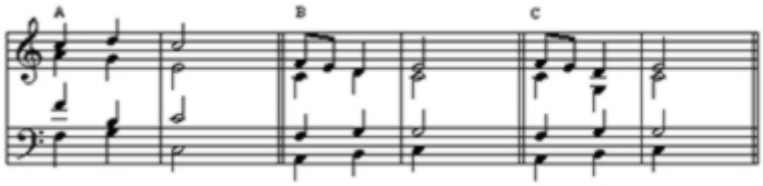


This variant of a previous example has here become aimless. The progression of interval tension now sounds haphazard: Intervals stay static for no reason and change at random places in the phrase. The climax is badly prepared, and the final cadence on the minor second is inappropriately harsh.

Pedagogy

Here are a few suggestions for teaching harmony:

- Usually the "rules" of harmony are presented as black and white: avoid parallel octaves, false relations, etc. This primitive guidance is only useful for a rank beginner. In practice, harmonic effects depend on context, and the real issue is that the composer must be very sensitive to harmonic consistency . For example, in Debussy's *La Cathédrale Engloutie*, parallel fifths and octaves are part of a consistent sound world, and therefore do not stand out inappropriately. In teaching, a good approach is to "grade" harmonic situations on a scale according to aural prominence. Such a focus on gradations (scales of dissonance, accent, modulatory distance, etc.) develops the student's ear for finer distinctions, and encourages more refined musical judgment, which is transferable to other situations, in a way that rigid rules are not.



In a normal four part polyphonic context, the parallel 5ths between outer voices are flagrant in "A". However, in "B", the parallel 5ths are much more subtle: They are in the inner parts, and the soprano distracts attention away from them through activity. In a homogeneous timbre, the (correct) voice leading in "C" is virtually indistinguishable from that in "B".

- Sing and play: Harmony is ear training. The student should regularly sing individual parts while playing the others.
- Try alternatives: Often a fictitious recomposition of a harmonic passage with different voice leading or a different cadence will prove enlightening.
- Look for the leading part at any given time: Harmony is not a democracy. In most harmonic situations, certain notes contribute more to the overall effect than others. For

example, cultivate the habit of searching for which intervals in a chord most influence its character.

- While it is useful to begin harmonic study with four part vocal textures - such a homogeneous texture is a good compromise between fullness and linear independence - exercises should eventually include writing for piano, as well as composing for various small ensembles, so as to explore the varied interactions between harmony and orchestration. Not all exercises should be in four parts.

Bibliography

- Forte, Allen. *The Structure of Atonal Music*. New Haven: Yale University Press, 1973.
- Forte, Allen. *Tonal Harmony in Concept and Practice*. New York: Holt, Rinehart and Winston, 1979.
- Forte, Allen, and Steven Gilbert, *Introduction to Schenkerian Analysis*. New York: W. W. Norton, 1982.
- Hindemith, Paul. *Traditional Harmony* (two volumes). London: Schott, 1968.
- Koechlin, Charles. *Etude sur le Choral d'é*cole. Paris: Heugel, 1929.
- Koechlin, Charles. *Etude sur les notes de passage.* Paris: Max Eschig, 1920.
- Koechlin, Charles. *Traité de l'Harmonie, en trois volumes.* Paris: Max Eschig, 1958.
- Messiaen, Olivier. *Vingt Leçons d'Harmonie*. Paris: Alphonse Leduc, no date.
- Persichetti, VIncent. *Twentieth Century Harmony*. New York: W. W. Norton, 1961.
- Piston, Walter. *Harmony, Fourth Edition*. New York: W. W. Norton, 1978.
- Reger, Max. *On the Theory of Modulation*. New York: Edwin F. Kalmus, no date.
- Schoenberg, Arnold. *Theory of Harmony*, Berkeley: University of California Press, 1978.
- Schoenberg, Arnold. *Structural Functions of Harmony*. New York: W. W. Norton, 1969.
- Sessions, Roger. *Harmonic Practice*. New York: Harcourt, Brace and World, 1951.
- Simpson, Robert. *Carl Nielsen, Symphonist*. New York: Taplinger, 1979.
- Tchaikovsky, Peter Ilyitch. *Guide to the Practical Study of Harmony*. New York: Dover Publications, 2005.

Acknowledgements

Thanks to Andrew Schartmann: His suggestions improved the flow of the text considerably.

---

email: belkina_at_yahoo.com (replace _at_ with @)