

*Bi-Tonal Quartal Harmony in Theory and Practice*¹

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In a significant departure from previous theories of quartal harmony, *Bi-tonal Quartal Harmony* employs fourth-based sonorities in two separate layers, which interact to achieve varying degrees of harmonic consonance and dissonance. The intervallic relationship between the two layers (derived by measuring the interval formed between the top note of each layer) creates a cumulative chord that can be considered to have exclusive membership in one of six classes (I – VI) of harmonic dissonance, ranging from pentatonic to diatonic to non-tonal. The ability to construct a chord progression within a pre-defined classification system of dissonance (classes I - VI) has obvious advantages for the ability, in a non-diatonic framework, to control harmonic tension over the course of a phrase, to create harmonic modulation, and to construct a meaningful awareness of consonance and dissonance which can be implemented by the careful use of chord tones and non-chord tones. Most importantly, the bi-tonal aspect of this theory permits non-diatonic chords to be placed in a functional context against sonorities common to diatonic harmony.

Quartal harmonies have captivated composers since medieval times most notably in the use of *vox principalis* and *organalis* in parallel *organum* at the end of the ninth century. Since that time, quartal and quintal harmonies have been incorporated into the tonal vocabulary to emphasize non-tertian sonorities. Because chords built on perfect fourths or fifths form unordered subsets of the diatonic major scale (example 1), these sonorities typically support a diatonic tonal center within a functional chord progression. The exception to this rule typically occurs when chords built on fourths or fifths move in parallel motion in a process called ‘planing.’

¹ Earlier versions of this paper were presented at the 2014 Joint Regional Conference of the College Music Society Mid-Atlantic and Southern Chapters. A recording of the “Paris Préludes, Book I,” which use illustrate theoretical principles described in this article, is in preparation for release on the PnOVA recordings label.

B - E - A - D - G - C - F

Example 1. *Diatonic Major Scale Constructed through Fourth Succession*

As subsets of the diatonic major scale, quartal harmonies can be viewed as severely limited for generating new, non-diatonic sonorities. As a consequence, in the Modernist and Post-Modern periods few composers have used quartal harmonies to any significant extent.

Bi-Tonal Quartal Harmony introduces a “bi-tonal” relationship, which expands the intervallic vocabulary considerably, and allows for the use of non-diatonic harmonies with considerable control, and a broader spectrum, of consonances and dissonances than would be available with previous theories of quartal harmony.

In contrast to theories based on composer-selected pitch class sets, where pitch vocabulary can contrast significantly from that found in music constructed from diatonic major and minor scales, bi-tonal quartal harmony extends the principles of diatonic harmony into a more complex, multi-dimensional, *vis a vis* bi-tonal, construct using sonorities fundamentally similar to those derived from diatonic scales. Bi-tonal quartal harmony extends diatonic pitch vocabulary rather than departs from it. The co-existence of two harmonic layers creates a bi-tonal element not found in normal diatonic relations. Most importantly, the bi-tonal aspect of this theory permits non-diatonic chords to be placed in a functional context against sonorities common to diatonic harmony.

The theory incorporates the term “Bi-tonal” because two distinct harmonic layers occur simultaneously. Both layers are comprised solely of perfect fourths. In simplest form, the upper (treble) layer contains three notes a perfect fourth apart and the lower (bass) layer contains two notes a perfect fourth apart.

The image shows a musical score for two staves. The top staff is labeled 'Layer one' and the bottom staff is labeled 'Layer two'. A red bracket above the top staff spans four measures, with 'm.46' written above the first measure. The bottom staff also has a red bracket below it spanning the same four measures. The music consists of chords in both layers, with notes connected by stems. The top layer has three notes per chord, and the bottom layer has two notes per chord. The notes are arranged in a way that creates a bi-tonal effect with perfect fourth intervals.

Example 2. *Layers in Bi-tonal Quartal Harmony*

A single chord may contain up to five notes. If pitches are duplicated in both layers a vertical sonority may actually have as few as three different pitches. The total combination of three treble chord tones and two bass chord tones comprise a complete chord, which then forms part of a chord progression not unlike one found in tonal harmony.

This theory also codifies the precise relationship between the two simultaneous layers of harmony into chord classes defined first through greater or lesser membership in a “basic” diatonic collection and, second, by classification on a scale ranging from most consonant (class I) to most dissonant (class VI) based on

chord interval content. Collections belonging to the same diatonic major/natural minor scale with similar interval vector reside in the same chord class.

In bi-tonal quartal harmony, chords are defined according to the interval formed by the top note of the bass chord in comparison with the top note of the upper treble chord (example 3).

The image shows two musical staves in 2/4 time. The top staff is in treble clef and contains a chord with notes G4, Bb4, and D5. The bottom staff is in bass clef and contains a chord with notes G3, Bb3, and D4. Two red lines originate from the text 'Unison relation between chord roots' on the left. One line points to the G4 note in the treble staff, and the other points to the G3 note in the bass staff, illustrating that the interval between these two notes is a unison (octave) relationship.

Example 3. Class I sonority

Contrary to root-based diatonic theory, where the lowest note in a chord is the 'bass' and the lowest note of a root position chord is named the 'root,' bi-tonal quartal harmony refers to the top note of each layer as the chord root in any discussion of chord relations and classification. The reason for this is simply that a construction of fourths places the most stable note on the top. One might look at this in another way. By rearranging the tones of each layer in fifths, the root of each layer would reside as the lowest note, much as the root of a diatonic triad. The choice of stacking the chords solely as fourths or solely as fifths is immaterial and does not alter the chord classification presented here.

Root position chords in bi-tonal quartal harmony, illustrated in example 5, show a bass chord (one perfect fourth) and a treble chord (two perfect fourths). Alternate arrangements of tones are clearly possible into respective inversions. Rarely does a pitch exhibit the tendencies of a diatonic root, unless the chord is a subset of the diatonic scale. Thus a root position chord does not have the significance it might have in a diatonic context.

The chord in example 3, a member of class one (I) signified by a roman numeral, would be considered a unison root relation because the top note (root) of each chord layer is 'Eb'. Other class I chords include the major second, perfect fourth and perfect fifth relations between chord roots. All chords in class I are pentatonic, and consequently reside in a subset of the diatonic major and natural minor scales. All class I chords containing the same bass chord root fit into the same diatonic major scale and all but the major second root relation belong to the same pentatonic scale. The major second root relation forms a complete pentatonic scale that is different from the others. Class I chords also contain no semitones.

Class	Relation	Description
I	Unison, M2, P4, P5	Diatonic and pentatonic
II	Major 6 th	Diatonic major (non-pentatonic)
III	minor 6 th	Diatonic major – modulatory
IV	minor 7 th , minor 3 rd	Pentatonic – modulatory
V	Major 3 rd , minor 2 nd	Diatonic – modulatory
VI	Major 7 th , Tritone	Chromatic, non-tonal

Example 4. Chord Classes Defined

Class II (major sixth relation) includes one semitone so it is not pentatonic but is a subset of the same diatonic major scale as chords of class I when both classes share the same bass chord. Neither class I nor class II contains a tritone.

Class III (minor seventh and minor third relation) is pentatonic and derives from a different major scale than classes I and II if all three share the same bass chord: the diatonic scale a major second below. Class III introduces one new pitch to the pitch universe, in the case of the minor seventh root relation, or two new pitches in the case of the minor third root relation.

The image displays six systems of musical notation, each representing a different chord class. Each system consists of a chord diagram in a treble clef and a corresponding composite pitch collection in a bass clef. Red brackets and labels indicate the intervallic structure of each chord class.

- Class I:** Chords U, M2, P4, and P5. Interval content: [010020], [022140], [010020], [021020].
- Class II:** Chords M6, m7, m3, and m6. Interval content: [122230], [021020], [032140], [122230].
- Class III:** Chords m7, m3, and m6. Interval content: [021020], [032140], [122230].
- Class IV:** Chords m6, m3, and m6. Interval content: [122230], [032140], [122230].
- Class V:** Chords M3, m2, M7, and A4. Interval content: [211231], [211231], [310132], [310132].
- Class VI:** Chords M7, A4, M7, and A4. Interval content: [310132], [310132], [310132], [310132].

Red brackets labeled "inversionally equivalent" connect the intervallic structures of related chords within each class and across different classes.

Example 5. Chord Classes, Interval Content and Composite Pitch Collections

From a practical point of view, moving from a class I or class II chord to a class III chord with the same bass chord causes a modulation, if that is what happens when a new diatonic scale is introduced. Class III is considered a modulatory class in this sense. The term modulation does not necessarily mean the music has “modulated” in a tonal sense where tonic – dominant relations have been transposed to a new level. Rather, modulation indicates movement from one scale

“area” to another when all sonorities share a lower layer root. This point is illustrated in example 5 where Bb is introduced (class III) in place of B-natural (class I and II)..

Class IV (major sixth root relation) is a subset of the diatonic scale. It contains one semitone causing it to be more dissonant than class III. Class IV, like class III, is modulatory to the key a minor third above the scale of class I and II given the same lower layer root.

Class V (major third root relation and minor second root relation) is a subset of the diatonic scale, transposed a perfect fifth higher in the case of the major third root relation and a major second lower in the case of the minor second root relation. Both chords in class V contain two semitones so class V is more dissonant than lower classes even though it is diatonic.

Class VI (major seventh root relation and tritone root relation) is not a subset of the diatonic scale. Both chords in this class contain three semitones, two of which occur in immediate succession. These are the most dissonant class of chords.

The chord class table assumes the treble chord and bass chord share the same root but, practically speaking, music composition may or may not proceed with chords sharing the same bass chord. The system of classification presented here relies on chords sharing the same bass chord root because it is the simplest of all relations when viewing the entire catalog of possible chords constructed in bi-tonal quartal harmony – not as a way of prescribing how chords should be constructed in a chord progression.

In practice, all chords within the same chord class can substitute for one another if the bass chord root is shared. One might consider the idea of “chord substitution” often employed by musicians improvising in a diatonic context. In that case, a musician might substitute a submediant (vi) chord for the tonic (I). In the same way, a mediant (iii) chord might substitute for the submediant (vi); a leading tone (vii^o) chord might also substitute for the dominant (V). Chords within a given bi-tonal quartal class share characteristics, which make them ideal as substitutions when a given class needs to be prolonged in the music. Chords residing within the same chord class share abundant common notes, just as 3rd-relation chords in diatonic music.

Example 5 also illustrates the property of inversional equivalence (identical interval vectors) shared by chords. In all but one case, chords sharing inversional equivalence reside in the same chord class. The exception, chord classes II and IV, share the same interval vector but their pitch catalog is diatonically unrelated. Class II chords reside in a different chord class than sonorities in class IV because sonorities in these two classes are derived from different diatonic scales.

Melodic principles basic to diatonic harmony, such as the resolution of a leading tone (scale degree 7 – 1), and the intervallic resolution of the tritone to the minor or major sixth (in the dominant – tonic harmonic progression), remain consistent in the theory described here. However, a fundamentally new ‘bi-tonal’ relation extends traditional intervallic harmonic motion into the principle that *two chords residing in separate layers can now form a ‘leading tone’ or ‘tritonal’ relationship* with one another. The relationship between two ‘dissonant’ tones, such

as form an augmented fourth or major seventh, can now be extended to include two 'dissonant' chords in a tritonal and major seventh relationship (class VI), which ultimately resolve to a more consonant chordal relationship.

Composers have used harmonic dissonance, typically manifest as a pedal tone heard beneath a simultaneous independently moving harmony, since the 17th-century. The theory described herein extends the principle of harmonic dissonance from being defined as a single note (pedal tone) to being defined as a dyad (bass chord). While a pedal tone may exist very temporarily in a composition from the common practice period, the bass chord is omnipresent in order to maintain the two layers necessary for bi-tonality.

All other things being equal, the bass chord of a bi-tonal quartal sonority bears greater importance harmonically-speaking than the treble chord. In a way similar to the bass note of a diatonic progression, the upper note of the bass chord has the capacity to serve as an anchor as a harmonic bass. While the term "key" is not being used here, as it would confuse the term with its meaning in a diatonic context, the use of the word "tonality" suggests a pitch center. In fact, the bass chord serves as a tonal anchor against which the treble chord moves, creating changes in levels of dissonance, moving through classes, or chord substitutions of the same class. When the bass chord remains constant, movement through respective chord classes is all the more obvious to the ear. When the bass chord changes, it can represent a significant harmonic event similar to harmonic modulation in a tonal context.

While the bass chord serves as harmonic anchor, the two (treble and bass) layers do not merge together the way tertiary chords combine to support a common root. On the contrary, despite the sense that a bass chord may anchor the harmony around a particular pitch center or “tonality,” the two layers continue to function conceptually, at least, independently. This bi-tonal context causes the bass chord to be heard as a separate tonality. Thus the bass chord is used in a context that highlights its independence from the treble chord. This principle flies contrary to diatonic harmony controlled by chord root motion, supported by bass movement as a single entity, and voice leading which presents varying levels of consonance and dissonance against the underlying root harmony.

Prelude no. 12

The image shows a musical score for 'Prelude no. 12' from 'Paris Préludes, Book I'. It consists of two staves: a treble staff and a bass staff. The treble staff contains seven measures of music, each with a red number above it (1 through 7). The bass staff contains seven measures of music, each with a red chord symbol below it: M6, M2, M6, M2, M6, m6, and U. The key signature has two flats (B-flat and E-flat). The treble staff notes are: Measure 1: G4, B4, D5; Measure 2: G4, B4, D5, F5; Measure 3: G4, B4, D5; Measure 4: G4, B4, D5; Measure 5: G4, B4, D5, F5; Measure 6: G4, B4, D5, F5, A5; Measure 7: G4, B4, D5. The bass staff chords are: Measure 1: G2, B2, D3; Measure 2: G2, B2, D3, F3; Measure 3: G2, B2, D3; Measure 4: G2, B2, D3; Measure 5: G2, B2, D3, F3; Measure 6: G2, B2, D3, F3, A3; Measure 7: G2, B2, D3.

Example 6. Chord Progression from no. 12 “Paris Préludes, Book I”

Musical examples from the author’s “Paris Préludes, Book One” may help to bear this principle out. The compositional process begins with the formation of a chord progression. Interval relationships between treble and bass chords are noted between staves. Numbers above the top staff indicate the relative position of each

chord in the progression. This labeling helps one keep track of the chord progression sequence when applying transposition for harmonic modulation.

The chord progression in Example 6 illustrates a constantly moving bass chord. Thus the diatonic relationship between layers is in constant flux. Nevertheless, most listeners will likely hear the progression of a class II chord (M6) to Class I chord (M2) as a resolution of relative consonance to more consonance. The motion from a class II chord (M6) to class IV (m6) to class I chord (U) as moving from relative consonance to more dissonance to more consonance. The progression conveys a sense of ebb and flow created by the control of consonance and dissonance. This sensation of dissonance resolution on a harmonic level can be increased dramatically by using chords found in the more dissonant chord classes V and VI.

At the early stages of composition, chromatic semitonal voice-leading may be extracted from the chord progression in order to assist with melodic pathways. This also reveals notes which may facilitate smooth harmonic modulations from chord to chord. Without a sense of leading tones in a diatonic harmonic sense, the voice leading is largely based on the needs of the musical situation and the composer's choice. Nevertheless, the melodic movement by semitone remains an effective way to move from one tonality to another.

The image displays two systems of musical notation for Example 7. The first system covers measures 43-46 of 'Prelude no. 12, mm. 43-46'. It features three staves: 'TREBLE CHORDS' at the top, piano accompaniment in the middle, and 'BASS CHORDS' at the bottom. The Treble Chords staff shows four chords: 'chord 1', 'chord subst.', 'chord 2', and 'chord 3', followed by three '(composite pitch collection)' sections. The piano accompaniment consists of two staves with triplets and slurs. The Bass Chords staff shows four chords: 'chord 1', 'chord 2', 'chord 3', and 'chord 4'. The second system covers measures 47-49. It also features three staves: 'TREBLE CHORDS', piano accompaniment, and 'BASS CHORDS'. The Treble Chords staff shows three '(composite pitch collection)' sections labeled 'chord 5', 'chord 6', and 'chord 7'. The piano accompaniment includes dynamics like *f* and *p*, and fingerings like 5, 6, and 7. The Bass Chords staff shows three chords corresponding to the composite pitch collections.

Example 7. *Prelude no. 12, mm. 43-49*

Example 7 illustrates the treble and bass chords, composite pitch collection drawn from the sum of those chords, and music from measures 43-49 of the author’s “Paris Préludes, Book 1” no. 12. The example illustrates the “correct” use of “dissonances” using principles drawn from diatonic harmony. Moreover, the example shows that harmonic progression does not necessarily occur as a

simultaneity but, rather, in a gradually unfolding process of harmonic change – much the way chords change in the common practice period.

For example, notes in the music (staves 2 and 3) are clearly drawn from the notes in the source chords (staves 1 and 4) except for the repeated F in the top staff of the music. Here the composer elected to use the F as a repeated tone, sometimes as a chord tone (mm. 43, 48 and 49) and sometimes as a non-chord tone suspension (mm. 44, 45, 46, 47). In the treble clef of m. 47, the B-natural also appears as a suspended non-chord tone carried over from m. 46.

Non-chord anticipations occur in m. 45 (A), m. 48 (Bb), and m. 49 (G), where notes in the treble clef anticipate the chord change in the following measure.

The example also illustrates the registral separation of the treble and bass chords. The treble clef only shares notes drawn from the bass chord in m. 44 (Gb), m. 48 (F) and m. 49 (Bb). The bass chord freely draws from notes in both treble and bass chords, mixed in cascading arpeggios.

The progression of chords is clearly apparent in m. 56 of Prelude no. 12 (Example 8) yet, when compared to the music based on the progression, it is apparent that liberties, in order to achieve smooth voice leading, have been taken regarding note choice. Most obviously, the A root from the treble chord is repeated throughout the measure. In addition, the top voice in the music jumps directly from a note in chord 1 to a note in chord 3. The top voice then uses notes from chord 4 while the bass voice advances through notes drawn from chords 3 and 4. The bass voice then repeats a note drawn from chord 5 while the top voice moves to chord 6.

Chord progression

Music

Example 8. *Mm. 46-54 Paris Preludes, Book 1, no. 12, m. 56*

Example 8 illustrates the fluid nature of chord choice, an attribute well-used in diatonic harmony. Yet the decision for note choices, especially on important points of emphasis, is always based on an awareness of the prevailing chord harmony within the chord progression.

While diatonic harmony uses a prevailing scale for the most fundamental of note choice decisions, bi-tonal quartal harmony has no scale other than the composite notes drawn from the two layers. Music composed during the common practice period derived non-chord tones based on the scale being expressed at any

given moment. No such structure is available in bi-tonal quartal harmony unless one uses the scale superset of the chord class currently implied by the composite tones of the two chord layers. Rather than implying a diatonic scale, the composite “scale” tones offer a set of chord tones against which notes outside the composite scale can be chosen as non-chord tones. The relationship between chord tones within the composite scale and non-chord tones outside the composite scale thus establishes a basic and important tension that helps propel the music forward from consonance to dissonance to consonance on a melodic level.

While many elements of compositional practice remain to be developed, the examples in this article are meant to illustrate a few of the practical applications of this theory. It is beyond the scope of this article to propose a practice derived from bi-tonal quartal harmony but one can hope that composers interested in such a harmonic system can define how valuable, malleable and expressive it will be in the future.