Harmonic Progressions as a Gradual Process: Towards an Understanding of the Development of Tonality in the Music of Steve Reich

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Introduction: Steve Reich's Tonal Practice before 1998

In 1970, in the course of making "Some Optimistic Predictions . . . about the Future of Music," Steve Reich wrote that "The pulse and the concept of clear tonal center will re-emerge as basic sources of new music."[1] When the composer's writings were republished thirty-two years later, Paul Hillier (the editor of this subsequent volume)—or, quite probably, actually Reich himself—added an explanatory paragraph to the reproduction of these "Predictions," suggesting that "30 years later [they] seem to have proven largely correct."[2]

Pitch, however—traditionally regarded as the primary musical parameter—had, by 1970, been usurped by rhythm as the prime instigator and driver of Reich's compositional processes. In 1986, the composer insisted, in interview with the present author, that in the late 1960s rhythmic structure was his "*sine qua non*." "In those early pieces," he said, "the focus was on rhythm, and rhythm, and then again rhythm. The pitches were chosen, and they were chosen quite carefully, believe me, but once they were chosen—*finished* with that decision. You load the machine—and it runs."[3] This emphasis on rhythm, and on process, will be familiar to those who have read any of Reich's writings about his early music.[4]

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[1] Reprinted in Steve Reich, "Some Optimistic Predictions (1970) about the Future of Music," in *Writings on Music 1965–2000*, ed. Paul Hillier (New York: Oxford University Press, 2002), 51–52 (52).

[2] Ibid., 51.

[3] Quoted in Keith Potter, *Four Musical Minimalists: La Monte Young, Terry Riley, Steve Reich, Philip Glass* (Cambridge: Cambridge University Press, 2000), 188.

[4] Reich, *Writings on Music*, particularly "Music as a Gradual Process (1968)," 34–36.

At the same time, it is self-evident that a composition for two pianos such as *Piano Phase* (1967), which uses just five discrete pitches of the equal-tempered scale, will inevitably demonstrate a greater focus on pitch *per se* than does, say, a tape composition based on speech samples, such as *It's Gonna Rain* (1965), however pitch-inflected those speech samples may be. By its very nature, the move from *It's Gonna Rain* to *Piano Phase* (the latter being the first of the composer's mature instrumental pieces to use the technique of phasing) involved Reich in a shift in thinking about the role of pitch in his compositions. And once that move was made, one could then summarize the rest of Reich's career as a composer of instrumental and, later, also of vocal music as one driven at least as much by pitch considerations as by other ones: even, and in certain respects particularly, in the sample-based works that he composed following his return to speech as his initial raw material in *Different Trains* of 1988.

What Ronald Woodley has called Reich's "gradual realignment with certain branches of 'mainstream' European music, a realignment achieved, however, through radicalization rather than compliant re-absorption"[5] had, perhaps inevitably, to begin with the purging power of rhythmic repetition of pitch materials themselves so drastically reduced that little remained in them, for the listener, of their possible Western classical associations. The present author has, though, argued elsewhere not only that *Four Organs* (1970) represents its composer's first minimalist work to be based on a chord, rather than on a modal collection, but that it also marks the beginning of Reich's serious interest in harmonic motion.[6] A dominant-eleventh chord constitutes this work's entire pitch material; and it is chordal, rather than melodic and contrapuntal, repetition that forms the basis of what today many would call the "interrogation"

[5] Ronald Woodley, "Steve Reich," in *Contemporary Composers*, ed. Brian Morton and Pamela Collins (London: St. James Press, 1992), 767–69 (768).

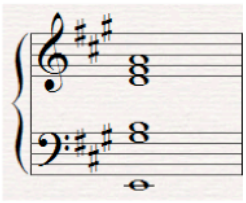
[6] See, for example, Potter, *Four Musical Minimalists*, 200–03.

of its harmonic kernel. The fact that such an "interrogation" is conducted with the aid of a harmonic motion that is best described as implicit, not explicit, makes the approach to tonality in *Four Organs* all the more interesting, and still characteristic of its composer's firmly focused manner at the time. Such an implicit—we might even risk suggesting the description of *illicit*—stance permitted the process of composition and the process of listening to be as intertwined in this work as it is in *Piano Phase*; even if the less followable nature of *Four Organs*' compositional process leads to outcomes for the listener that are almost certain to have less to do with tracing the note-to-note processes of the music than do the listening outcomes arising from Reich's phase compositions of the same period.

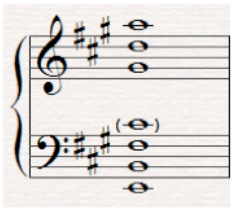
As Example 1 shows, just six pitch classes are used in this composition. Ordered in thirds (see Example 1a), according to the principle familiar from more usual seventh and ninth chords, these would read E G♯ B D F♯ and A, making what would be termed an E11 chord. To present this aggregate in the form of what Reich calls "stacked fifths" (see Example 1b) is to offer a further means of clarifying its relationship both to the composer's earlier modal practice in pieces such as *Piano Phase* and to the jazz traditions from which such an approach to harmony arguably came; this formulation—E B F♯ (but no C♯) G♯ D ♮ and A—is closer to the way in which these pitches are deployed in this work's textural layout. Reich had previously been antipathetic to what he had considered the inevitable functionality of the bass in determining and spelling out a tonal center. With a firm bass note (E) on which this harmonic aggregate can rest for the first time in his minimalist output, the dominant-eleventh chord of *Four Organs* implies a V-I cadence, "hung out to dry" for the listener's inspection over some fifteen minutes. This kind of harmonic material soon became the bedrock for Reich's own "realignment" of the concept of "clear tonal center" to be found in all his output over the ensuing four-and-a-half decades.

EXAMPLE 1, Steve Reich, *Four Organs* (1970): three ways of describing its basic gamut of six pitches

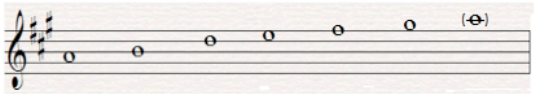
a) In thirds



b) In 'stacked fifths'



c) As a mode



(A Ionian minus 3rd)

The approaches to dissecting such material already entwined in the above description of *Four Organs* can now be teased out a little further, with their potential for the would-be analyst of this composer's music as a whole in mind. First, despite an increasing interest in what one might call a "real bass" part—especially from *Music for 18 Musicians* (1974–76) onwards, though that work retains a highly ambiguous approach to the concept of "bass"—Reich sometimes continues to favor modal terminology to describe his pitch materials. Example 1c follows the composer's lead here and labels the *Four Organs* aggregate as derived from the Ionian mode on A without the third: that is, the familiar major scale, based on A (the tonic note of the major key with three sharps as its signature), but missing the third note of that scale, C♯. The only specific mention, in any guise, of pitch in the composer's "Music as a Gradual Process" essay of 1968 (a kind of manifesto of his own practice around that time) involves reference to "[s]everal currently popular modal musics like Indian classical

and drug-oriented rock and roll,"[7] which he mentions to comment on the way in which such music permits listeners to focus on moment-to-moment details that so much concerned him at the time.

Might a modal-based attempt at describing harmonic materials, as employed in Example 1c, offer a cogent account of Reich's tonal practice in such later compositions as his *Triple Quartet* (1998–99)? Such a "horizontal" rather than "vertical" description could order the pitches used into collections that might, for instance, facilitate comparisons between them more readily than does the terminology of E11 and so on. But it is hard to imagine that descriptors such as "Ionian mode on A without the third" might mean very much, if anything, in the context of the chromaticism embedded into the composer's harmonic language of at least the last twenty years. Modal terminology is, in the opinion of the present author, of dubious analytical value even in the more clearly diatonic context of some of Reich's earlier music.[8]

So might descriptive terminologies for music analysis using E11 or, say, B7, B9, B11, and so on, or, alternatively, the "stacked-fifths" principle, end up telling us anything more meaningful about the music in question? Or would the choices opened up by the principle of the "dominant chord"—already part of his harmonic thinking back in 1970 and subsequently taken much further, as we shall see—allow the would-be music analyst to develop dimensions for interrogating Reich's harmonic practice by working with the terminology for it with which the composer himself was rather obsessed in the late 1990s? His tendency, in a work such as

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[7] Reich, "Music as a Gradual Process," 36.

[8] Modal terminology has, though, been helpfully incorporated by Ronald Woodley into a wide-ranging analytical investigation of Reich's canonic techniques; see Woodley, "Steve Reich's *Proverb*, Canon, and a Little Wittgenstein," in. Katelijne Schiltz and Bonnie J. Blackburn, eds., *Canons and Canonic Techniques, 14th–16th Centuries: Theory, Practice, and Reception History* (Leuven and Dudley, MA: Uitgeverij Peeters, 2007), 457–81.

Triple Quartet, to spice up what are already "dominant chords" of more complex construction than *Four Organs*' "dominant eleventh" with chromatic sidesteps and other kinds of variant to give a new complexity to his harmonic palette would appear to make the maintenance of any kind of terminological coherence difficult, and the achievement of a musically satisfying analytical outcome probably impossible.

Since Reich continued to set great store by deploying the familiar vocabularies of tonal, as well as more self-consciously modal, harmony, perhaps the clue lies in an attempt to integrate all, or at least some, of the above to construct a version of Woodley's "radicalized realignment" that fits this composer's later output better than resorting to the simpler modalities of his early minimalist scores. After all, Reich has found his inspiration not only in non-Western musics and in medieval music of the West (repertoires long close to this composer's heart and with which he is quite familiar) but also in the works of twentieth-century modernists, particularly Debussy, Bartók, and Stravinsky. He has found ways to refresh and extend these approaches to pitch organization by exploiting the potential ambiguities of his basic materials: a project that these composers had, of course, already begun. Key signatures, for instance, can be major, minor, both or neither. And once he returns to thinking more directly in chordal, as well as rhythmic, melodic and contrapuntal terms, and starts using bass notes in ways more familiar from earlier musics than from his compositional approach in *Four Organs*, then the layout of Reich's chords often separates the bass from the upper notes—not only in terms of spacing but also in terms of function, or indeed lack thereof. Thinking in terms of bass notes that are, in practice, ambiguous both about their role within the individual chord of which they are part, and also about their function in connecting chords together to form a sequence, is central to Reich's approach from the early 1970s up to the present day.

Care is, however, required regarding how terms associated with the tonal music of

previous eras are employed in twentieth- and twenty-first-century compositional contexts such as the one described here. Warnings have frequently been issued by music theorists concerned with the output of the Second Viennese School composers about the need to handle "tonal" descriptors such as "augmented triad" and "diminished seventh" with great sensitivity, if indeed at all, in analyzing the music of Alban Berg:

> Because we have ready-made names for certain collections it is tempting to use them, but that temptation should be avoided. One danger is that by privileging certain collections by such names we overlook or ignore what might possibly be more important collections simply because they have no names. Another is that by so describing these collections we bring inappropriate responses to them from our experience of tonal music.[9]

While David Roberts was writing here about the music of Berg, and thus in a context that many would describe as "atonal," such an admonition should surely also be heeded by the analyst of Reich's compositions; for, to put the matter another way, the presence of elements of "vocabulary" commonly linked with earlier tonal musics cannot be assumed to guarantee that such elements are functioning within the "grammar" also associated with such repertoire.[10] The present author once picked a quarrel with Reich over whether he should really be calling the "dominant eleventh" of *Four Organs* a "dominant chord" at all, since this was to risk ascribing to it a tonal functionality that, by any conventional terms, it seemed singularly to lack. An interpretation of putative harmonic motion in this composition such as the one given above goes some way to creating a defense for that term, of course. But even at

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[9] David Roberts, review of *The Music of Alban Berg*, by Douglas Jarman, *Contact* 21 (1980): 25–26 (25).

[10] For two cogent accounts based on this view, see Jonathan Bernard, "Theory, Analysis, and the 'Problem' of Minimal Music," *Concert Music, Rock, and Jazz Since 1945: Essays and Analytical Studies*, ed. Elisabeth West Marvin and Richard Hermann (Rochester, NY: University of Rochester Press, 1995), 259–84; and Bernard, "Minimalism, Postminimalism, and the Resurgence of Tonality in Recent American Music," *American Music* 21 (2003): 112–33.

his most radically reductive, Reich never appears to have given serious consideration to the idea that his "dominant"-based terminology could be viewed as in any way inappropriate.

Yet of course the more Reich's music can be demonstrated to approach Western musics of the past in terms of its "grammar", the less there appears to be a need to avoid the terminology of the "vocabulary" associated with those musics. For instance, the thinking behind Reich's practice of using "dominant chords" in his *Triple Quartet* could be summarized as concerned with the decision to regard the bass of any harmonic aggregate as the dominant, not the tonic, of the key in question. Whatever localized pitch centricity is already to be discerned in that chord itself will, if the fuller implications of using such terminology are accepted, then also provide a tonal context offering wider ramifications for it in the music in which is embedded. The vocabulary of "dominant chords" that results from this—which can vary a good deal in its chromaticism, especially in some of the composer's later output—then gives rise to a tonal grammar of considerable complexity. The Reichian tonal grammar that ensues has, as yet, only just begun to be explored by music analysts, and it would be unwise to make too many assumptions about it based on familiarity with earlier tonal practices. The analytical comments on the composer's *Triple Quartet* that follow should thus be construed as an interim report on progress in this area.

REICH'S *TRIPLE QUARTET*

In *Triple Quartet*, Reich produced what he called in his program note "a piece considerably more dissonant and expressionistic than expected."[11] In adopting this new stance, he seems to have been affected by two other composers, in particular: one of them a long-term influence, the other brand-new for him in 1998. This note additionally claims that "The initial inspiration for the piece comes from the last movement of Bartók's Fourth Quartet. While no musical

[11] Reich, "Triple Quartet (1999)," in *Writings on Music*, 208–10 (208).

material is taken from the Bartók, its energy was my starting point."[12] Though no specific characteristic of the concluding *Allegro molto* of Bartók's Fourth String Quartet (1928) is mentioned in his note, Reich's computer files made during work on *Triple Quartet* include a single page proving that the composer took the trouble to copy out—if, in this case, to transcribe using Finale, not by hand—the opening eleven measures of the fifth and final movement of this Bartók quartet.[13]

The increased chromaticism of Reich's own composition is, though, linked most specifically by him in his program note to the influence of Alfred Schnittke, to whose string quartets the composer was introduced by Betty Freeman, his long-time benefactor. He reports being "struck by his virtuosity, and moved by the incredible mesto of his Second Quartet. Listening to the 'density' of his music goaded me to thicken my own plot harmonically and melodically."[14]. Reich now says that this influence was not in fact very specific, and tells an anecdote about imagining the Russian composer asking him, "Wo ist der Schmutz?" ("Where is the dirt?" Schnittke's Germanic origins presumably influencing the experience).[15]

Example 2, the opening six measures of *Triple Quartet*, demonstrates the way in which the basic harmonies of this work are spiced up by chromatic sidesteps that quickly introduce pitches outside that tonality. Since this procedure is played out across a total of twelve lines in three quartet groupings—all three of which operate with some independence of each other as well as demonstrating strong elements of harmonic, rhythmic, and textural symbiosis—the

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[12] Ibid., 208.

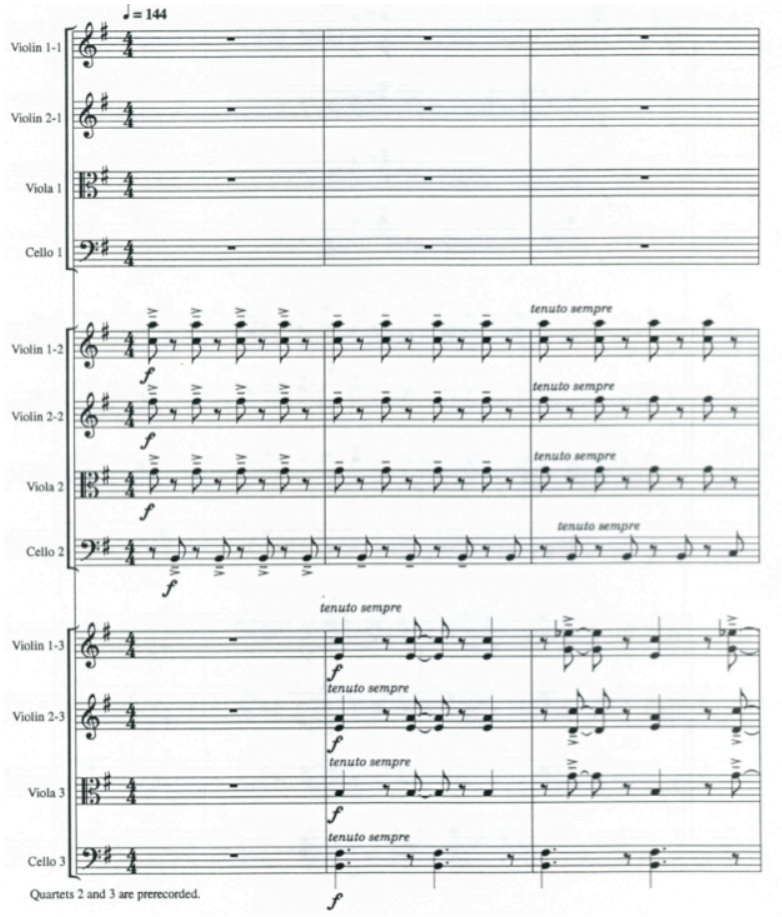
[13] Steve Reich's archival materials, significant in particular for the collection of sketchbooks they include, were acquired by the Paul Sacher Stiftung in Basel, Switzerland in 2009. This archive also incorporates a large number of computer files, the composer's main medium for "composing out" the details of his works from 1986 onwards.

[14] Reich, "Triple Quartet," 208.

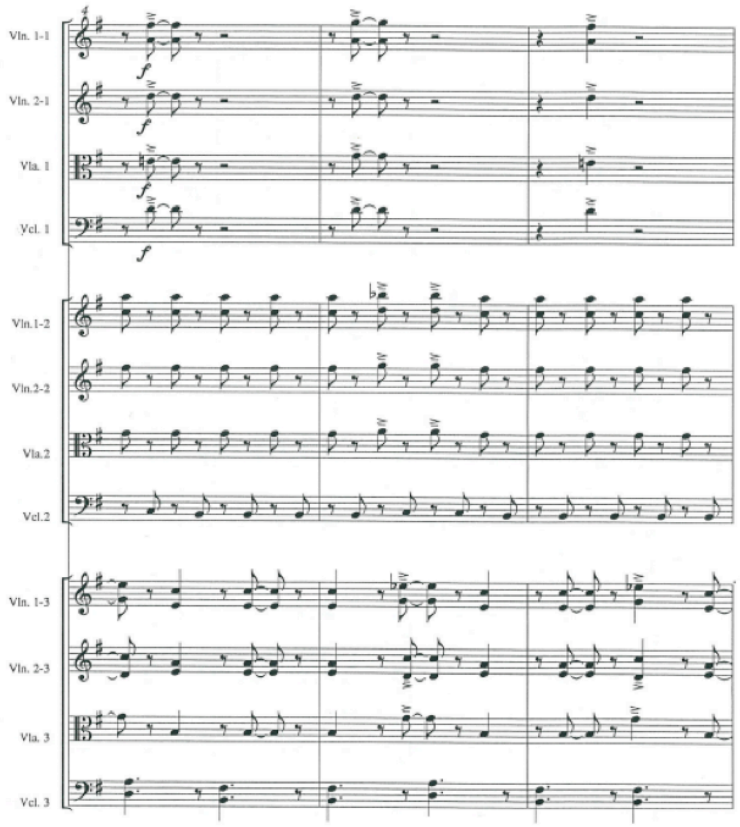
[15] Reich, phone conversation with the author, September 16, 2013.

potential for harmonic complexity is considerable.[16] It is, though, still possible to use the terminologies of either the thirds-based or "stacked-fifths" chords to describe the essential harmonic building blocks here. Since these are underpinned by a bass that usually functions as the dominant pitch of the prevailing tonality, we are thus anyway, in the most basic sense, in a situation comparable to that of *Four Organs*; except that the harmonic motion of *Triple Quartet*, despite still being driven by powerful rhythmic repetition as well as other factors, could now be described—following the distinction made earlier—as a good deal more explicit in its nature than the essentially putative harmonic motion behind *Four Organs*.

EXAMPLE 2: Steve Reich, *Triple Quartet*, first movement (mm. 1–6)



[16] It should be noted that *Triple Quartet* exists in three versions: one for string quartet and pre-recorded tape (the most commonly heard), another for three string quartets (twelve players), and a third for a string orchestra of thirty-six players.



The Tonal and Harmonic Structure of *Triple Quartet*

After some comment on the tonal planning of Reich's *Triple Quartet* as a whole, this chapter will focus attention on the first movement, exploring some of the analytical methodologies that might cast light on the composer's approach to harmony in the late 1990s. Reich himself, in his note, provides the clues about both its overall tonal plan and the basic harmonic structure of its first movement. *Triple Quartet*, he writes

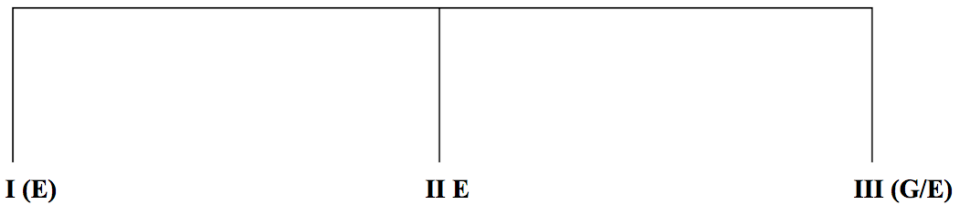
> …is in three movements, fast-slow-fast, and is organized harmonically on four dominant chords in minor keys a minor third apart: E minor, G minor, B♭ minor, C♯ minor, and then returning to E minor to form a cycle.[17]

[17] Reich, "Triple Quartet," 208.

We might—for convenience, and with due caution regarding what has already been said about any wider ramifications here—conceptualize this overall plan in the form of a "diminished seventh" using the pitches E, G, B♭ and C♯.

Example 3 shows the tonal structure of the three movements. The overall tonal center of each movement charts a progress through only the first three of the four pitches of the "diminished seventh": E for the first movement, E again for the second, and G for the third, but eventually returning to E. All these tonal centers are deployed via their minor modes. Breaking the movements down into sections, the 312 measures of the first movement run twice through the sequence of all four pitches: E, G, B♭ and C♯; textures within each section are sometimes varied, usually by the introduction of more contrapuntal material, but some sections offer a largely unitary texture throughout. The slow middle movement has a simplified tonal structure entirely in a single key, E-minor; texturally, it similarly begins simply, with a melody plus accompaniment, but elaborates this melody contrapuntally as the movement proceeds, before a more chordal ending. The finale begins in G minor and alternates this key and B♭ minor before incorporating C♯ minor in an alternating sequence as well, and then finally closes in E minor; essentially chordal, it operates with particular rhythmic drive and interplay between the twelve players involved.

EXAMPLE 3: Steve Reich, *Triple Quartet*: overall tonal structure of the three movements

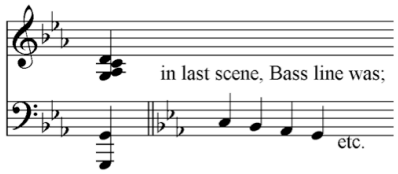


Triple Quartet could thus be described as being "in E minor" as a whole; and its three movements as charting a tonal progression based on the four minor keys of the "diminished seventh" sequence. E minor is retained as the sole tonal center of the second movement, as well as the main center of the first. G minor is then posited as the main tonal center of the third movement, though both B♭ and C♯ are involved in this alternating sequence; and the finale eventually returns to E minor to bring the work as a whole full circle, tonally speaking.

Example 4 reveals that, at around the time of its composition, Reich was sufficiently pleased with the progress in his harmonic thinking that was reflected in *Triple Quartet* to consider using these "good results" in his ongoing work on *Three Tales* (1998–2002), notably the second "tale," "Bikini."

EXAMPLE 4, sketch for "Bikini": using dominant chords of *Triple Quartet* (August 10, 1999).

"Back first to Act I, Hindenburg [which] begins and ends in C min with G dominant thus:

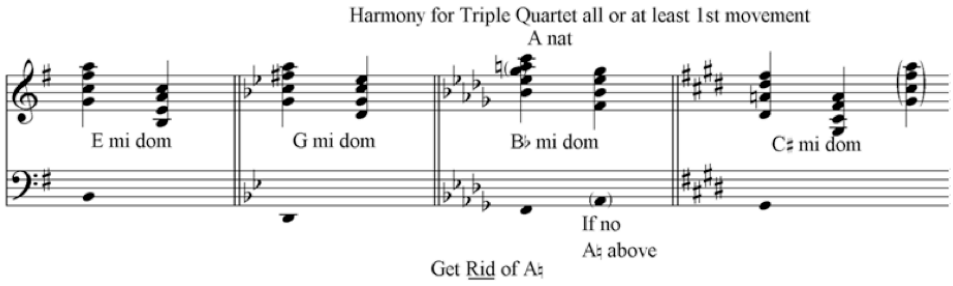


"Now, in light of good results in Triple Quartet, try using similar harmonic structure with 4 dominant chords in minor keys. To be consistent also with end of Hindenburg, move from G dom to a C dom in F minor."

So what are the particular features of the "dominant chords" that do indeed dominate the sketches for *Triple Quartet*? Is there any kind of systematic theoretical proposition to be uncovered here? And what kind of "good results" did they lead to in this composition? To answer such questions, it is clear that we will need to try and establish exactly how Reich is conceptualizing these "dominant chords" in the late 1990s: a task for which his sketchbooks, backed up by interview access, ought to prove invaluable. We shall also, of course, need to attempt to demonstrate how these "dominant chords" operate in the work itself.[18]

The single chord in Example 4 could be described as a G11 chord, with A♭ and C, as well as D, above the bass G. In Example 5, a sketchbook entry made on July 19, 1998, each of the four keys involved—E minor, G minor, B♭ minor and C♯ minor—is supplied with a pair of chords, sometimes also plus an alternative, or more ambiguously additional, chord.

EXAMPLE 5 Steve Reich, sketches for *Triple Quartet*, "Dominant chords," first movement (July 19, 1998).



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[18] There also appear to be some wrong notes in the published score, creating further hazards for the would-be analyst.

The first pair of chords is designated "E m[inor] dominant": B, the bass note here, is, as the dominant of E minor, clearly the fundamental pitch of both the chords built upon it. These chords themselves may also be identified as B13 and B11. This sketch then proceeds onwards through the now-expected sequence of E minor, G minor, B♭ minor and C♯ minor, with a pair of "dominant chords" applied to each key (and a third option considered for C♯ minor). All pitches selected can be argued to fall within their given minor keys; though the inclusion of both A♭ and A ♮ in the B♭ minor chords makes it evident that, even before he has started to add chromatic chords to this basic scaffolding of dominant chords, Reich is thinking of the possible chromatic alternatives for such harmonic aggregates.

The seeker for any theoretical system here needs to bear in mind the discovery that the composer himself emphasizes the importance of intuition and flexibility in mulling over the potential of such "dominant chords," over any kind of systematic approach, still less a fully-fledged "theory." This would seem to apply both to the actual construction of these chords themselves and to their deployment in the work, as the following quotation makes clear:

> I can tell you that outside of the general use of dominants in keys a minor third apart, there is no system being used. There is a basic area defined and the details are worked out by ear at the keyboard and/or computer.[19]

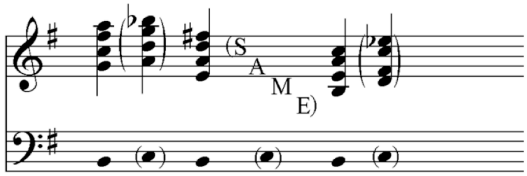
"I'm not analyzing, I work by ear" and "I'm flying blind"—two other comments that the composer has made to the present author about how he worked on the harmonies of *Triple Quartet*—appear further to undermine any notion of constructing a grand Theory of the Dominant Chord based on the extensive materials for this work's composition.

Included among the considerable expenditure of effort to determine chordal structures

[19] This and the two further quotations here are from Steve Reich, e-mail to the author, September 16, 2013.

and progressions in the fifty-five pages of paper sketches for *Triple Quartet* is a good deal of experimentation with added chromatic aggregates. One instance must suffice to illustrate the insights that these sketches give on how Reich structured, and then composed with, such materials. Example 6—dating from August 18, 1998, almost a month after the sketch illustrated in Example 5—accounts for quite a few of the harmonies to be found in the first few measures of this work's first movement:

EXAMPLE 6: Steve Reich, sketch for *Triple Quartet*: further chordal elaboration, first movement (August 18, 1998).



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The first and penultimate aggregates here, with B as their bass note, will be recognized as being the same as the initial pair of chords in Example 5. The "dominant chord" of E minor forms the main initial harmonic material of Quartet 2, the first of the three quartets to play (see again Example 2). The second aggregate of Example 6, placed in brackets by Reich, marks the first occurrence in this sketch of what may be termed an additional, or simply extended, chord. In the score itself, Quartet 2 alternates this Gm11 with the opening B13 from m. 5 onwards. Likewise, the final aggregate of Example. 6, again in brackets, ends up, from m. 3 in the score, performing the same alternating function for the B11 chord with which Quartet 3 opened. One label for this latter alternative aggregate would be Cm11; though, as with its counterpart in Quartet 2, a label not derived from its bass note might seem more meaningful—in which case, a kind of chromatic D9 could be proposed. Thus what Reich

writes out sequentially in the sketch can eventually turn out to be rendered simultaneously in the score itself.

Most of the other aggregate elaborations of Example 6 also find their way into the final score. The identical first and third chords of Quartet 1, in mm. 4 and 6 (the first "solo quartet" chord), are clearly derived from Example.6's third aggregate, though the bass B indicated in the manuscript is, in the score, provided by the continued underpinning "dominant" pitch in Quartets 2 and 3, as is Example 6's alternative bass note here, C.

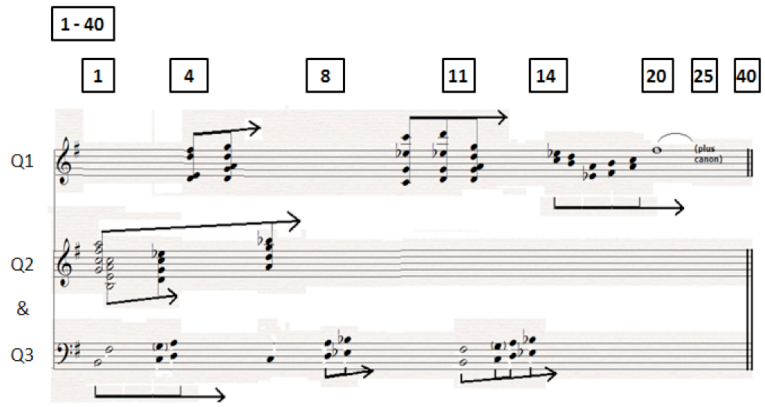
Problems of Terminology and Analytical Methodology

Attempts such as these to describe Reich's sketch materials in order to build on the kinds of harmonic approach outlined at the beginning of this chapter face clear challenges of musical meaningfulness and coherence, as we saw earlier, if they are to contribute to the project of making an in-depth sense of this composer's own tonal and harmonic practice. So what analytical methodology might tell us most about how an approach to harmony such as that in *Triple Quartet* is developed into a fully-fledged tonal structure?

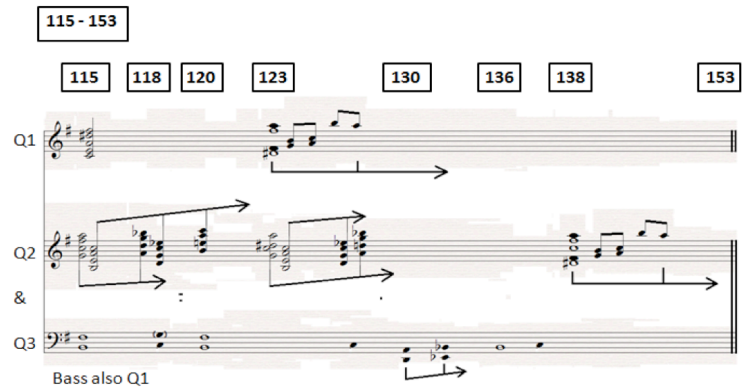
Using Tonal Voice-leading as a Starting Point

Example 7 shows an attempt to reflect the harmonic unfolding of the two sections of *Triple Quartet*'s first movement that deploy the initial key signature of one sharp: mm. 1–40 (Example 7a) and mm. 115–53 (Example 7b), henceforth to be called Sections 1a and 1b. An adapted form of the graphic representation of pitch materials familiar from Schenkerian and post-Schenkerian analysis is used here. It must be emphasized that such efforts, at least as pursued only to this stage, do not aspire to the heights of Schenkerian depths, and Schenkerian notation has been freely adapted in only a limited application; this is merely a preliminary investigation of analytical possibilities.

EXAMPLE 7a, Steve Reich, *Triple Quartet*, voice-leading analysis used to compare the harmonic structures of Sections 1a and 1b: Section 1a, mm. 1–40



EXAMPLE 7b, ---, Section 1b, mm. 115–53



In this notation, arrows on note stems—or, occasionally, attached to groups of notes without stems—indicate that a sequence of such notes or chords is subject to repetition or, when it represents the last sequence in a series, that it continues throughout the remainder of the section. Among the initial observations that can be made here are the following:

Both the pitch content of these sections themselves, and their mixture of separate layering of essentially fairly familiar harmonic structures and shared features, seem to be exposed quite clearly with such a method. One can, for instance, readily appreciate how, in both these sections, the bass moves away from and back to the note B. The main harmony

above this, in Quartets 2 and 3, is also clearly shown as departing from a basic chord in which the shared upper pitches are A and C, each quartet adding two further pitches to this to form, with the bass, a six-note aggregate in which all notes of the one-sharp mode based one E are represented, except D. The chromatic departures from this aggregate are, again, readily observable, with both their common pitches (D and G) and their independent introduction of notes foreign to the one-sharp mode (E♭ and B♭) clearly evident.

It is perhaps the less apparently "grounded" pitch content of Quartet 1 that is best revealed by this means. In Section 1a, the musical material here becomes more melodic and, eventually, contrapuntal, rather than essentially chordal. In Example 7a, the total pitch gamut of seven pitches (E, F♯ , A, B, C, D and E♭) that it explores—Reich calls this "altered Phrygian" in the sketch materials for the work—has both E♭ and C contending for a kind of tonal centricity that extends the tonality found in Quartets 2 and 3.

Examples 7a and 7b taken together provide quite a promising basis for a comparison of the two sections. Note, for example, the way in which Example 7b clearly shows how Quartet 1 is, in mm. 115–53, now at first more chordal (and sustained), and how the pitches of its D9 chord relate to those of Quartets 2 and 3 (which, we should observe, have exchanged harmonic materials here). The pitches A and C are now common to all three quartets (so maybe some way of highlighting this on this graph would be appropriate in future attempts); E is now found only in Quartet 2 and F♯ in Quartet 3.

In both sections, the bass outlines a stepwise progression from B to E ♭ , mainly accompanied by notes a perfect fifth above. In Section Ib, a descent to low D at m. 130 is also indicated in Example 7b; though this also featured in Section Ia, Example 7a omits it on the grounds that this feature is less significant in the earlier context, due not least to the fact that more extended rhythmic repetition renders this descent more telling in Section Ib than in

Section Ia. The dilemma this raises for the analyst attempting to apply such methods, perhaps especially to music involving a great deal of repetition, can perhaps stand for the more general problem it suggests: how much detail of this kind can be included without making any graphic representation too cluttered to be really informative, and musically revealing?

Finally here, a comment on the chords at mm. 120, 123 and 138 in Example 7b, where both black and white note-heads have been used within the same chord. The intention of this is to signal the difference in function between a main chord (white notes) and a more temporary subsidiary one (black notes). For the chord in m. 120, one might question the choice of black rather than white for what is, after all, only the same aggregate as the opening chord of Quartet 2 at m. 115, now simply raised an octave. Yet though this chord lasts three measures (mm. 120–23) at the upper octave before descending again, the black-note notation seems to correctly represent this upper octave's subsidiary status when compared to the chord at the lower octave.

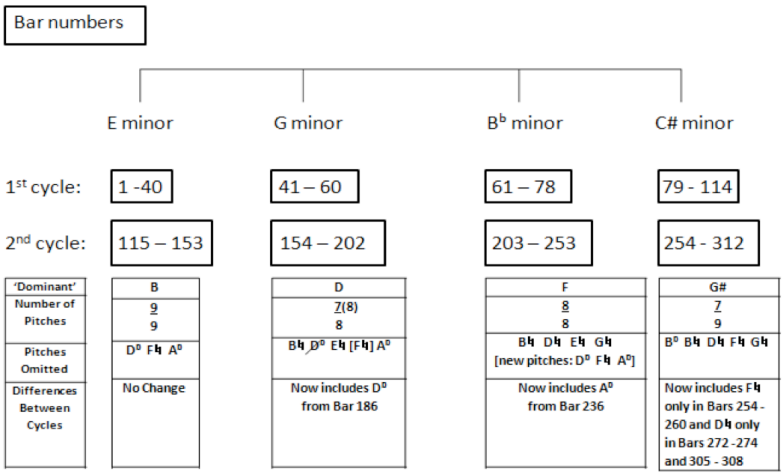
In Quartet 1 in m. 123, on the other hand, the separation into black and white notes in this analytical notation is intended to indicate the different emphases placed on the two pairs of notes that make up this aggregate of just three pitch classes. The top note, A, and the lower of the two F♯'s , given in black, are really just components of the ensuing repeated melody, partly in thirds, that now replaces the initial chordal structure in Quartet 1. The upper F♯ and the low D♯, on the other hand, given in white, suggest both the extent to which F♯ is rhythmically repeated and the fact that both these notes are held several times for around two measures, while the melody intermittently swirls around them.

Using Overall Pitch Content Identification as a Starting Point

To find out if the total pitch gamut of music such as this can be analyzed with greater consistency, we must take another approach. Example 8 charts the complete pitch content of

the whole of *Triple Quartet*'s first movement, showing how much of the total chromatic pitch-class gamut is occupied in each of its eight sections. This diagram demonstrates how many pitch-classes are in play, indicating which notes are omitted. Each of the eight sections includes between seven and nine of the twelve available pitch classes. Example 8 also includes some basic information about keys and dominant-functioning notes.

EXAMPLE 8, Steve Reich, *Triple Quartet*, pitch structure of first movement



Both one-sharp sections discussed in detail above deploy the same nine pitch classes, omitting D ♭ , F and A ♭ . In all the other three pairs of sections, however, there is some difference between the pitch-class content of each one. In Section IIa, mm. 41–60, the first of the two one-flat sections, there are basically just seven pitch classes in play. The "triad" of D ♭ , F and A ♭ noted in Section Ia continues to be absent (except for one moment in m. 46, when an eighth pitch, a quaver F♮ , fleetingly occurs as a kind of "passing-note", marked in brackets in Example 8). The remaining two missing pitches, B♮ and E♮, are newly omitted here; we should note that these notes have only just previously underpinned the whole "dominant harmony" of Section Ia's E minor. The change in pitch content from mm. 1–40 to mm. 41–60 thus reflects a move away from the two central pitches of the work's opening,

strengthening the new focus on G and its dominant, D.

Section IIb, mm. 154–202, initially retains the same pitch aggregate as Section IIa, omitting the "triad" of D♭, F♮and A♭ (not even a fleeting F can be heard here), and both B♮and E♮. However, in this "second pass" through a two-flat key signature with D and G as the central pitches, D♭ arrives over halfway through, at m. 186, meaning that the later part of Section IIb has eight pitches, compared to the basic seven of Section IIa.

There is insufficient space here to do more than make a few quick points concerning the possible significance behind the shifting pitch gamuts of the remaining sections of the first movement. Section IIIa, mm. 61–78, is the first to add the previously missing D♭, F♮ and A♭ "triad" to the pitch gamut of *Triple Quartet*. After 60 measures without these three pitches, Section IIIa's tonality of B♭ minor quite readily accommodates them, of course, as the third, fifth and seventh of what might be regarded as its "tonic chord," with B♭ strongly underpinned by F functioning, as before, as the dominant of the key in question. The full chromatic gamut has thus now been put into play in the work; though it must be noted that the pitch-class aggregate of Section IIIa itself is not, in fact, a twelve-note one. Only eight pitches are deployed here. Following the earlier-discussed strategy whereby a new section omits the central pitches of its predecessor, Section IIIa, and also its counterpart, Section IIIb, now omit all four of the pitches (B and E, previously also missing in Sections IIa and IIb; and now additionally D and G) that have held dominant or tonic functions up to that point. In Section IIIb, mm. 203–53, A♮ is preferred over A♭ until m. 236, around two-thirds of the way through this section, when A♭ enters. The flat seventh does not, though, now displace the "raised," sharp seventh at this or any other point in this section; both continue to its end.

Finally, Section IVa, mm. 79–114, with a key signature of four sharps and a tonal center of C♯ underpinned by its dominant G♯, reduces the total pitch gamut to seven, with

B ♭ , B♮ , D, F and G all omitted. As before, this means that both the dominant and the tonic (F and B ♭) of the immediately preceding section are left out, as are the dominant and tonic (D and G) of the section before that, plus the dominant of the first section (B). The E that would have completed the set of missing pitches now functions as the third of the tonic chord of C♯ minor. Such consequences of this gamut-shifting may, of course, be merely, or even mainly, accidental by-products of the "diminished-seventh"-based key scheme that Reich is employing here. Nevertheless, these observations still appear interesting outcomes of an approach to tonality that is sufficiently chromatic, and also sufficiently systematic, to make considerations about the scope of the total pitch gamut at work across this music a valid topic for discussion— and something to which the listener will also respond, even if not to all its details.

As Example 8 shows, in the process of closing the first movement, Section IVb, mm. 254–312, is rather equivocal in its treatment of F and D, two of the five pitches previously omitted in Section IVa. Section IVb, running for 59 measures, is not only significantly longer than its counterpart, four-sharp section, Section IVa (a mere 36 measures), but also much longer than any other section of this movement. Clearly, the proportions in which these keys are used must be investigated in the course of a more comprehensive analysis of the first movement as a whole.

CONCLUSION

Any conclusions must be provisional at this stage, pending further research. If inevitably limited thus far, the outcomes of these preliminary efforts to engage modified versions of Schenkerian and pitch-class content analytical methodologies in order to "interrogate" Steve Reich's late-twentieth-century brand of tonality and harmonic practice seem to hold some promise. Using thirds- and "stacked"-fifths-based terminology, and the scaffolding of modal

practice that might shed light on this, should not be rejected outright at this stage, but both these look likely to have only modest analytical advantages. Voice-leading methods, on the other hand, offer much potential, especially in music such as Reich's *Triple Quartet* that takes a texturally multi-layered, and sometimes contrapuntal, approach to musical materials that are still, in essence, often harmonic in character. A voice-leading analysis much more developed than the example given here, that takes care to estimate the extent to which Reichian tonal practice meshes with the previous kinds of tonal practice for which such analytical methods were devised, seems a wise route to take.

Attempts at analyzing pitch content such as the one illustrated above raise the question as to whether the extension, and refinement, of such an approach via recourse to the set theoretical methods of Allen Forte and others might offer even greater potential for understanding Reich's harmony, especially in his later compositions. Such methods have been applied quite successfully not only to the repertoires of the Second Viennese School composers from which set theory originally grew—music from which Reich has usually distanced himself—but also to Bartók and Stravinsky, both of whom have always been close to Reich's heart, and seemingly also his own tonal thinking.[20]

[20] A set-theoretic approach was first applied to Bartók's music in George Perle, "Symmetrical Formations in the String Quartets of Béla Bartók," *Music Review* 16 (1955): 300–12. In a large theoretical literature since then, two among the leading analytical articles on Bartók's Fourth String Quartet, the work referenced by Reich in the composition of his own *Triple Quartet*, also cover relevant ground here, including, in addition to musical symmetry (not discussed in the present chapter, though it doubtless ought to be), what may be termed post-Schenkerian as well as voice-leading approaches; these are Leo Treitler, "Harmonic Procedures in the Fourth Quartet of Béla Bartók," *Journal of Music Theory* 3 (1959): 292–98, and Roy Travis, "Tonal Coherence in the First Movement of Bartók's Fourth String Quartet," *Music Forum* 2 (1970): 298–371. For an overview of the broader issues here, see Joseph N. Straus, *Remaking the Past: Musical Modernism and the Influence of the Tonal Tradition* (Cambridge, MA: Harvard University Press, 1990). Though a textbook, Straus's *Introduction to Post-Tonal Theory* (Harlow, UK: Pearson Education Limited, 3rd edition, 2014) includes a pitch-class-set analysis of,

We must, however, remain wary, as music theorists advise, of the dangers of what Joseph Straus calls "[engaging] the entire apparatus of [Western] tonal theory" in analyzing the works of any twentieth-, or indeed twenty-first-century, composer whose music can reasonably be regarded as "clearly post-tonal in nature."[21] While Reich's "post-tonality" is clearly of a different order from Bartók's, never mind Schoenberg's, Straus's condemnation of any strategy that will cause us to view the works under scrutiny as merely "strange, deformed tonal compositions that employ traditional techniques grudgingly, incompletely, and unsuccessfully" seems apt. For the present author, too, strategies that fail to take due account both of the crucial ambiguities found in Reichian tonality and to integrate the *listening* process that throws such essential ambiguities into full focus into the analytical process are worth very little.[22]

It nevertheless seems that an analysis of tonal and harmonic processes in such compositions as Reich's *Triple Quartet* might benefit from the invocation of such concepts as pitch-class sets and saturation of chromatic space.[23] Music that appears tonal, or modal, in new ways that are consequent, not least, upon their deployment of an unusual degree of repetition also benefits from the deployment of other analytical methodologies more readily associated with older tonal repertoires: neo-Riemannian theory, for instance, for the output of

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again, the first movement of Bartók's Fourth String Quartet, on pages 73–78.

[21] All the quotations in this paragraph are from Straus, *Remaking the Past*, 184.

[22] For a further discussion of Reich's tonality, including in the context of the listening process, see Linda Ann Garton, "Tonality and the Music of Steve Reich" (PhD diss., Northwestern University, 2004).

[23] Forte's pitch-class theory has already been deployed by Richard Cohn to examine what he terms "beat-class sets" in Reich's music; see, for instance, Cohn, "Transpositional Combination of Beat-Class Sets in Steve Reich's Phase-Shifting Music," *Perspectives of New Music* 30 (1992): 146–77. This approach has also been extended by John Roeder to incorporate concepts of beat-class "tonic" and "mode"; see Roeder, "Beat-class Modulation in Steve Reich's Music," *Music Theory Spectrum* 25 (2003): 275–304.

John Adams, as illustrated by Timothy A. Johnson.[24] Stances influenced by "serial thinking," in particular, will seem an anathema to some, doubtless including Reich himself, when applied to music such as his. They may also be regarded with suspicion by those music analysts who are keen to preserve the integrity of their methodologies. Yet the potential that such approaches have to provide evidence-based answers to specific questions, such as how the shifting gamuts of the first movement of Reich's *Triple Quartet* relate to that work's application of a fixed pattern of tonal centers, seems clear. Constructing an overarching "theory of post-minimalist tonality," on the other hand, will require the deployment of a range of analytical methods previously applied to a variety of different kinds of music.

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[24] See Timothy A. Johnson, *John Adams's* Nixon in China*: Musical Analysis, Historical and Political Perspectives* (Farnham, Surrey: Ashgate Publishing Limited, 2011).

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The above list is mainly confined to the published secondary sources quoted in this chapter, plus a few examples of relevant analytical literature on Bartók as well as on Reich. For a much more comprehensive bibliography for minimalist music, including a number of other publications covering Reich’s tonality and harmony, see:

Potter, Keith, Kyle Gann and Pwyll ap Siôn, eds. *The Ashgate Research Companion to Minimalist and Postminimalist Music*. Farnham, UK: Ashgate Publishing Limited, 2013.