BRAD OSBORN

ROCK HARMONY RECONSIDERED: TONAL, MODAL AND CONTRAPUNTAL VOICE-LEADING SYSTEMS IN RADIOHEAD

A great deal of the harmony and voice leading in the British rock group Radiohead's recorded output between 1997 and 2011 can be heard as elaborating either traditional tonal structures or establishing pitch centricity through purely contrapuntal means.¹ A theory that highlights these tonal and contrapuntal elements departs from a number of developed approaches in rock scholarship: first, theories that focus on fretboard-ergonomic melodic gestures such as axe-fall and box patterns;² second, a proclivity towards analysing chord roots rather than melody and voice leading;³ and third, a methodology that at least tacitly conflates the ideas of hypermetric emphasis and pitch centre.

Despite being initially yoked to the musical conventions of punk and grunge (and their attendant guitar-centric compositional practice), Radiohead's 1997–2011 corpus features few of the characteristic fretboard gestures associated with rock harmony (partly because so much of this music is composed at the keyboard) and thus demands reconsideration on its own terms. This mature period represents the fullest expression of Radiohead's unique harmonic, formal, timbral and rhythmic idiolect,⁴ as well as its evolved instrumentation, centring on keyboard and electronics. The point here is not to isolate Radiohead's harmonic practice as something fundamentally different from all rock which came before it. Rather, by depending less on rock-paradigmatic gestures such as pentatonic box patterns on the fretboard, their music invites us to consider how such practices align with existing theories of rock harmony while diverging from others.

Functional tonal systems (FT), the first of three systems I will apply to Radiohead's voice-leading practice, will corroborate the observation made by such scholars as Walter Everett (2008) and Drew Nobile (2011): that many rock harmonic structures can be fruitfully understood as elaborating a highly functional tonal syntax which relies on descending-fifth root motions to harmonise $\hat{2}$ and $\hat{7}$ (leading note) converging on the tonic. Pitch centres that are not created through FT structures may also be established through relatively simple passing, neighbour and plagal motions and thus belong in my second category, *contrapuntal systems* (CP). In the wake of a rigorous definition and illustration of the first two systems, a clear niche emerges for *functional modal systems* (FM), in which the minor dominant is used to support $\hat{2}$ and $\flat\hat{7}$ (the subtonic) converging on the tonic.⁵ Rather than identifying modes through mere scalar construction, this third system recognises modal syntax only in terms of

harmonic function and voice leading. The FM dominant-tonic axis must use the same scale steps as FT systems and, in so doing so, relies on traditional harmonic function in ways that CP pre-tonic chords do not.

My recasting of these three systems highlights a difference between Radiohead's harmonic practice and modal systems of rock harmony advanced by theorists such as Allan Moore (1995), Trevor de Clercq and David Temperley (2011), Philip Tagg (2009) and Alf Bjornborg (2007). This is largely due to the scarcity of the minor dominant in Radiohead's music. We might visualise this as a peak collapsing into either side of a valley. Collapsing in the FT direction, potentially modal centres may actually function as subordinate prolongations within larger spans of a tonal progression, as is often the case with Aeolian verses that function as submediant prolongations preparing the arrival of dominant and tonic *Stufen* in the chorus. Collapsing in the CP direction, many of Radiohead's riff-based or otherwise static passages owe their sense of pitch centre not to any functional harmonic *Ursatz* (or smaller *Ursatz* parallel), but instead to simple neighbouring (e.g. ♭VII–I), passing (e.g. I–♭VII–♭VI) or plagal (e.g. IV–I) contrapuntal motions that embellish such a pitch centre with stepwise voice leading. Proof of the applicability of these three systems of voice leading in Radiohead's music may be gleaned from this article's appendix, which documents their role in each song on Radiohead's six studio albums released within this fourteen-year span.⁶

Apart from methodological objections that may be levelled at such a conservative, Schenkerian-influenced rubric for a style of music generations removed from the common-practice (Austro-German) music for which it was developed,⁷ some may point towards several pre-existing systems for rock harmony, especially Everett's highly influential SRDC model and his six tonal systems, and question the need for yet another taxonomy in the study of rock harmony.⁸ My focus on Radiohead provides the answer to such a question. Systematic studies of rock harmony by Moore (1995), Nicole Biamonte (2010) and de Clercq and Temperley (2011) all aim towards an assessment of older rock practices. Everett (2004) and Christopher Doll (2007), while including more modern musical examples, aim to represent practices as disparate as that of the Beatles (highly tonal with functional chromaticism) and non-tonal metal that utilises parallel tritones and other non-functional dissonances. By contrast, I do not aim to cast a net so wide as to encompass diverse styles of rock, but one just large enough to allow us to catch and sort the three techniques used by Radiohead.⁹

Having laid out the theoretical premises for this study of Radiohead's harmony and voice leading, the stage is set for detailed discussions of the three systems. To support the theoretical claims made therein, each system will include a thorough analytical narrative of a song exemplifying the system in question. This will be followed by a series of sketches providing further graphical examples, with limited commentary. Table 1 provides a concise, comparative account of FT, CP and FM systems that will assist readers in situating the examples throughout the article.

Table 1 Three primary systems for voice leading and harmony

Functional tonal (FT)	Contrapuntal (CP)	Functional modal (FM)
Major and minor tonality. Keys established by descending-fifth root motion supporting melodic $\hat{2}$ and $\hat{7}$ (leading note) resolving to tonic; may contain stylistically appropriate chromaticism	Pitch centricity created through contrapuntal means rather than functional tonic-dominant motions; includes all plagal, neighbor, and passing pre-tonic chords acting in place of functional descending-fifth root motions	Dorian, Lydian, Mixolydian or Aeolian pitch centers established by descending-fifth root motion supporting melodic $\hat{2}$ and $\hat{7}$ (subtonic) moving to tonic; may contain stylistically appropriate chromaticism

Ex. 1 Radiohead, 'Let Down', verse-chorus 1: graph

1

The musical notation shows a sequence of chords and melodic lines. The chords are labeled with Roman numerals: I, (IV), I, V, I. The pitch levels are indicated by hats and numbers: $\hat{3}$, $\hat{2}$, $\hat{1}$. The time markers 0:22 and 0:59 are shown above the staff.

Functional Tonal (FT) Systems

Whereas the other two systems for harmony and voice leading to be presented later in this article will require extensive methodological exegesis, my FT system needs little because it is firmly rooted in common-practice tonal function. The FT system merely represents music in which tonal centres are established by descending-fifth root motions and leading notes resolving to the tonic. This does not necessarily mean that there is only one such pitch centre in a piece, only that, for any given pitch centre, that centre is established by what sounds like a dominant-functioning chord relative to some tonic, present or implied, the root of which lies a perfect fifth below the dominant-functioning chord. In all cases (and this will be important for contrasting tonal vs. modal systems), there must be a leading note present, even in minor keys.¹⁰ This can manifest in at least three

Table 2 Formal design of Radiohead, 'Let Down' (1997)

Section	Clock time	Description
Intro	0:01	Five-crotchet signature riff ($\times 4$); after three crotchets continues as 5-vs.-4 dissonance throughout verse
Verse 1	0:22	Cyclic progression [A–E–F $\sharp$ m–E] ($\times 2$); voice elaborates fourth-progression from a to e
Chorus 1	0:59	Cyclic progression [D–A–F $\sharp$ m] ($\times 2$) elongated to [D–A–F $\sharp$ m–E] at third occurrence, PAC on A elided on beginning of transition
Transition	1:20	Introduction shortened to 17 crotchets (5×3) + 2
Verse 2	1:30	Recap verse; voice elaborates c $\sharp$ 1–a third
Chorus 2	2:07	Recap chorus; guitar descent enters one beat earlier
Bridge	2:28	Guitar elaborates verse's vocal fourth progression in retrograde (e1 to a1); bass plays tonic pedal on A
Verse 3	3:41	Recap verse; voice reaches up to e1 then a1
Chorus 3	4:18	Recap chorus; guitar retains early descant entrance, additional vocal layer added
Outro	4:39–4:58	Arpeggiated tonic triad

different ways and must be accompanied by melodically fluent counterpoint at some level of structure appropriate to each harmonic move:¹¹

1. the dominant function can be an imperfect cadence in which the dominant does not resolve down a fifth to tonic;
2. the dominant function can resolve down a fifth to establish a perfect cadence on the tonic; or
3. the dominant function may appear somewhere in the middle of a phrase or part of a looped progression and, while engendering either an elided cadence or no cadence at all, may still signify a dominant-tonic axis.

Note that each of these criteria for functional tonality is couched in terms of the dominant-functioning chord, not the tonic. In FT systems, the tonic chord is established only through its relationship to a dominant-functioning chord whose root lies a perfect fifth above. This is why in case number three, for example, we cannot identify a FT system by a *tonic*-functioning chord appearing in the middle of a progression. Indeed, without a functional dominant present, there can, by definition, be no FT centre.

An analytical narrative of Radiohead's 'Let Down' (1997) will serve to demonstrate the extent to which the band's music can, from time to time, resemble common-practice music in terms of harmony and voice leading (Table 2 and Audio Extract 1).¹² Functional A major tonality is established firmly at the voice's first entrance, although any perceived cadences are elided between repeated phrases. From a voice-leading standpoint, these chord roots alone are not enough to produce functional tonality, but when coupled with the attending $\hat{1}-\hat{7}$ and $\hat{5}-\hat{1}$ melodic gestures in bars 2 and 8 respectively, they strongly

Ex. 2 'Let Down': background graph

assert an FT system directly in the musical foreground. The first chorus makes an immediate move to the subdominant chord, resulting in a hypermetrically (and formally) emphatic composed-out plagal neighbour within the broader monotonicity of A major. The diamond-shaped note heads in Ex. 2 represent pitches that appear in the instrumental parts rather than the voice.¹³ For example, the b and a at the end of Ex. 1 appear in the arpeggiated electric guitar chord and the strummed acoustic guitar chord, respectively. The end of the first chorus at 1:21 also provides the song's first cadence, this one a perfect authentic cadence (PAC) when the dominant chord that ends the chorus resolves to tonic with clear $\hat{2}$ – $\hat{1}$ counterpoint against the V–I bass motion. Since the only cadence occurs at the end of the chorus, this means that the verse and chorus combine to make one continuous phrase composed of an overarching motion from tonic through plagal neighbour to dominant, ending in tonic.

This analysis of the verse/chorus pair complements Lori Burns's (2008, p. 69) argument that the structural basis of most rock harmony is a function of essential outer-voice counterpoint between the bass and lead vocal, with the guitar and other instrumental parts providing inner voices or cover tones. Throughout my article a simplified system of voice-leading notation will serve quickly to impart the basic principles of such counterpoint. As usual, stems indicate not only notes which have harmonic support, but also those that possess more structural function than the ones related through passing motion or arpeggiation. Flags clarify neighbour notes (only when they require additional clarification), but also the structural intermediate harmony of a *Bassbrechung* if beamed as such. Slurs and beams connect notes which are related through arpeggiation (with

or without unstemmed passing or neighbour notes placed between) or stepwise motion, while broken slurs indicate a note which is retained or coupled in more than one octave. Finally, open note heads, roman numerals and scale-degree numbers will be reserved only to indicate notes which form an *Ursatz* (or *Ursatz* parallelism). Like Burns, I will not distinguish graphically between *Ursätze* at different levels of structure. In popular music we can often discern a harmonically complete structure within a single section or verse-chorus pair (see again Ex. 1), as well as a larger background structure that incorporates several sections with one specific unit differing in such a way as to participate more fundamentally in the background (Ex. 2).

The complete phrase of the verse-chorus pair forms the basic voice-leading unit of 'Let Down'. While the second and third verse-chorus pairs do little to alter the basic harmonic and melodic structure shown in Ex. 1, a plausible background structure can be heard by comparing the first, second and third verses. Note that in the first verse-chorus pair, there is little sense of an *Anstieg* to the *Kopftön* C#. The vocalist, Thom Yorke, reaches up to this c#1 several times throughout the second verse, emphasising it further with its dissonant upper neighbour, d1. In the third verse Yorke reaches all the way up to e1 ('one DAY') as an upper third of the c#1 before entering falsetto range to intone on a1 a variation of the guitar's descant motive from the chorus ('you KNOW who you A-ARE'). While not quite a textbook arpeggiated ascent (there is good reason to hear e1 as the upper third of c#1 rather than as the *Kopftön* itself), this large-scale structural arpeggiation of the tonic triad does provide a deeper structural reinforcement of the A tonic and rewards a hearing that recognises the hierarchical relationship between, on the one hand, the structural verse-chorus core of the song, and on the other, the unfolding of the tonic triad that guides the song's dramatic narrative.

Ex. 2 provides one possible graph representing this kind of background tonal coherence. Especially rewarding in this mode of hearing is the unfolding of the A major triad that prolongs the tonic through the first, second and third verses, culminating in a coupling of the tonic A in the higher octave (a1) as Yorke unfolds one extra note of this triad in the third verse. What I find most meaningful about the extra note that Yorke unfolds in the third verse is that it is actually foreshadowed in the second chorus by a rhythmic irregularity in the lead guitar. In the first chorus, the lead guitar's [a1–g#1–e1 motive occurs exactly on the downbeat of the third bar. However, in the second chorus that same motive's appearance is transposed backwards one crotchet to begin on beat four. If the guitar merely played the same descant pattern as in the first chorus, it would not be marked perceptually, but through this unexpected metric transformation the ear is drawn to it. It can thus be heard as foreshadowing the voice's climactic ascent to a1, which completes the unfolding of the tonic triad (a–c#1–e1–a1) begun in the first verse.

Exs 3–7 sketch similar instances of functional tonal systems in Radiohead's music. Most such songs (see also the Appendix) involve a functional harmonic

Ex. 3 Radiohead, 'Exit Music (for a film)' (1997), bridge: dominant preparation, Neapolitan. The motivically salient descending sixths in the lead-vocal melody are transposed to reveal a third-progression that prolongs the B minor tonic present throughout the song, while the arpeggiation of the F# dominant seventh chord at the end of the phrase, preceding by the Neapolitan chord, prepares the song's final climactic verse with a *Kopfton* and subsequent descent (see Ex. 4) one octave higher than in all previous verses.

2:49

(3rd)

(prepares *Kopfton* for verse)

I bII V

Ex. 4 Radiohead, 'Exit Music (for a film)', verse 3: perfect authentic cadence. The support for $\hat{3}$ in this progression is a root-position B minor triad, but Everett (2015) and Nobile (2011) have both advocated for understanding this gesture as a cadential $\hat{6}_4$ chord when it functions in this way. Interestingly, in his recorded piano transcription of this track, Christopher O'Riley (2003) does actually play $\hat{5}$ in the bass of this chord, a facet which betrays his classical training.

I IV V $\frac{6}{4}$ $\frac{7}{3}$ I

progression that spans two or more distinct formal sections. This occasionally necessitates hearing the beginning harmony of a section not as the tonic, but as part of a larger progression. The pre-dominant functioning D major that begins the chorus of 'Let Down' does not mark a move to any modal system based on D (Lydian), just as the E minor harmony that begins the chorus of 'Motion

Ex. 5 Radiohead, 'Motion Picture Soundtrack' (2000), Verse/Chorus Pair: half cadence. Two half cadences end the two verse-chorus pairs before the outro finally presents the song's only PAC. This final cadence is engendered by a rather bizarre substitution in which $\hat{1}$ arrives over a $C^\#$ half-diminished seventh chord, which slides through semitone bass motion to C^{maj7} before finally arriving on the G tonic.

Ex. 6 Radiohead, 'Wolf at the Door' (2003), verses: looping harmonic progression. Though Yorke is the only member of the band who does not read traditional notation, he composes the overwhelming majority of Radiohead's songs. This particular passage was composed entirely by the guitarist Jonny Greenwood, whose classical training seems to have inspired this overtly common-practice structure.

Picture Soundtrack' (2000, *Kid A*) is not a move to E Aeolian but part of a larger expansion of the pre-dominant arpeggiation within the global tonic of G major. Hearing functional tonality lurking in the background of these songs necessitates two strategies of harmonic organisation common to pop-rock music: (1) non-tonic beginnings and (2) absent or emergent tonics. Radiohead is by no means

Ex. 7 Radiohead, '2 + 2 = 5' (2003), A section: phrase ending in half cadence. A purely chord-based analysis of this passage would fail to illuminate the contrapuntal movement from F^7/E_b (V_2^4 of IV) to D^7 (V^7 of II). However, the sketch clearly reveals a descending stepwise chromatic line from F to D. The lead vocal in this passage seems as if it might intone all four notes of the *Urlinie* until it leaps into falsetto range to sing the cover notes g–f–e over the last two *Stufen*.

unique in their usage of these two strategies, as the following pop-rock examples will illustrate.

For non-tonic beginnings we must be careful not to conflate hypermetric emphasis with tonic function. For example, no Aeolian fundamental structure is possible within the standard pop-rock vi–IV–I–V progression heard in the chorus of Sarah McLachlan's 'Building a Mystery' (1999, *Mirrorball*).¹⁴ Without III, any sense of 'resolution' from $\hat{2}$ on V to $\hat{1}$ on vi is instead the result of a simple V–vi neighbour motion – what Doll (2007, p. 21) calls a 'rogue dominant', and which both Koozin (2011) and Burns (2008) have treated as dominant substitutes. But such a definition of 'dominant', roughly congruent with 'pre-tonic', is incongruous with a theory of harmony based on a functional harmonic *Stufenkreis*. On the contrary, the presence of a functional dominant-tonic axis (I–V), as well as recurring $\hat{3}$ – $\hat{2}$ – $\hat{1}$ melodic gestures in 'Building a Mystery' and many such pop-rock songs, strongly assert a major-mode FT system: the cyclical, recurring progression merely appears to 'begin' (read: is emphasised hypermetrically) on a vi chord.

Non-tonic beginnings can also mimic Lydian scales. Such is the case in the New Pornographers' 'Challengers' (2007), the recurring verse unit of which is graphed in Ex. 8. Each phrase begins with a short pre-dominant expansion via voice-exchange, then moves to an authentic cadence (IAC) resulting in a repeated auxiliary cadence. A more complex case involves the verse's chord progression ($Fmaj7$ –C–G) in Third Eye Blind's 'Jumper' (1997), shown in Ex. 9.¹⁵ Despite the fact that the roots of these three chords form an

Ex. 8 The New Pornographers, 'Challengers' (2007), verse: graph

Ex. 9 Third Eye Blind, 'Jumper' (1997), first three sections: C major FT structure

undifferentiated upward circle of fifths, the lead vocal melody reveals a highly functional song in C major, complete with traditional voice leading and harmonic function (note especially the V/V on D). The rewards for hearing this in C major, rather than F Lydian, are both immediate and prolongational. Not only does the vocal melody clearly outline C major tonality over each three-chord progression in the verse, but also, because there are neither intermediate nor dominant functions supporting F Lydian in the bridge or chorus, the three sections can only be reconciled into one larger, functional phrase model in C major.

Secondly, in what Mark Spicer (2016) has deemed an 'absent tonic' situation wherein the FT system withholds a tonic triad until later in the song, the present vi or IV (more rarely, ii or V) may temporarily mask the functional tonal centre. For example, the vi–IV–ii–V verse of Counting Crows' 'Mr. Jones' (1993) withholds the C tonic chord until the first presentation of the title lyric at the beginning of the chorus. Likewise, the IV–V–vi–V verse progression in the Gin Blossoms' 'Hey Jealousy' (1992) reveals itself as a prolonged subdominant neighbour relative to the clear A major tonic emerging in the chorus.

Ex. 10 Peter Gabriel, 'Here Comes the Flood', verse and chorus: monotonal FT sketch

Ex. 11 Neighbour, passing and plagal bass motions for CP systems

Nearly all of Radiohead's FT songs, in which this fundamental structure involves a verse-chorus pair, necessitate hearing either non-tonic beginnings or absent tonics in one or more sections. This way of hearing Radiohead's music departs from mode-based harmonic theories. For example, Moore's analysis of Peter Gabriel's 'Here Comes the Flood' (1977) switches modes for analysing adjacent sections, even when these two modes are derived from the same diatonic collection (Moore 1995, pp. 193–8). As can be seen in the graph in Ex. 10, a more economical mode of hearing these two sections of the song, especially as they relate to each other hierarchically within an overarching E tonic, involves hearing a vi–IV–V–I auxiliary cadence in the verse,¹⁶ which is then prolonged by an elaborated plagal motion throughout the chorus.

FT systems form the clearest link with traditional tonality, as understood in the Western world for at least the past 300 years. By that I mean not only the refined common-practice tonality learned by classical listeners and scholars (see especially the Neapolitan chords in Exs 3 and 6), but also the basic sense of tonality present in most pop songs, jingles, children's songs, and so on. To some degree, we all have expectations centred around FT systems. This clarification of what constitutes functional tonality in rock music should further bring out similarities and differences with my other two primary systems – CP and FM – with respect to these inherited expectations.

Contrapuntal (CP) Systems

Contrapuntal voice-leading systems in Radiohead's music are defined by three essential bass motions: neighbour, passing and plagal. Ex. 11 sketches bass voice-leading paradigms for each of these. Note that, for the first time, these gestures are described in terms of voice leading only and include no description of harmonic function. In CP systems the underlying structure is an essential bass motion, rather than root motion. This explains the lack of roman numerals other than I, since each of the characteristic motions serves to prolong a given *Stufe* (though bass motions such as these can embellish *Stufen* other than tonic). These characteristic bass motions may be paired with myriad inner-voice and lead-vocal melodic patterns. Often these additional voices move in parallel octaves, fifths or thirds, or even in parallel tritones, ninths and other dissonant intervals in heavier rock styles.

Neighbour bass motions are perhaps the simplest of the three, consisting of little more than a neighbour note in either direction. The parenthetical flat signs in Ex. 11 show that these contrapuntal gestures embellish a given scale step in exactly the same way regardless of the specific interval size. In all cases, it is only the generic interval size (whether second or third) that matters, and it may be either diatonic or chromatic. Passing motions prolong a given *Stufe* by inserting a passing note on the way up or down to a third-related chord. Thus, they function almost exactly as an arpeggiation in the middleground. Plagal bass motions are really a combination of two distinct motions: a fourth above the bass – itself an upper neighbour to the prolonged harmony's third – and an additional upper neighbour above the embellished harmony's fifth. Since they contain the tonic scale degree, plagal motions, like all generic contrapuntal motions, can also appear with no change of bass and are thus part of the less specific category of pedal point.¹⁷

To be clear, contrapuntal prolongations such as these are part and parcel of all harmonic systems, FT and FM included. Ex. 5 contains at least one neighbour, passing and plagal prolongation in the tonic region alone. What differentiates CP systems is that, while FT and FM systems feature pitch centres established by functional harmonic progressions and directed linear motion to the tonic, CP systems feature no such functional root motion. Thus, in CP systems, pitch centricity is established only through surface-level contrapuntal gestures such as the neighbour, passing or plagal motions shown in Ex. 11. As the Appendix shows, most CP-system songs maintain this single pitch centre throughout the entire song, usually through some sort of recurring riff or ostinato.

Two adaptations of Schenker's theories bear prominently on this observation. First, by allowing for contrapuntal motions that do not necessarily involve a change of chord (see especially Exs 12 and 13), the analysis may rely on implied notes heard in an imaginary continuo (Rothstein 1990). Secondly, CP systems recall Felix Salzer's category of *contrapuntal-structural* chords.¹⁸ According to Salzer, 'If a contrapuntal chord is used to support a structural note in the

Ex. 12 'Lotus Flower', verse: plagal unfolding

0:58

I will shrink my-self in - to your pock-et in- vis - i ble___ do what you wa

nt do what_ you_ wa - nt.

Ex. 13 Verse plagal structure from neighbour unfolding

(from)

melody, it has the significance of a structural chord [...] the neighbour-note chord becomes a structural chord (CS, which means *contrapuntal-structural*)' (Salzer 1962, p. 161). To be sure, there are nuanced differences in the ways in which I will come to apply this analytical presupposition, which elevates otherwise contrapuntal chords to a structural level. However, just as Salzer's broader project might be described as discovering a voice-leading basis for music which he heard to be tonal but which did not necessarily conform to common-practice structural norms, so my goal with CP systems is to demonstrate the ways in which Radiohead's contrapuntal music articulates a pitch centre without relying on functional harmonic progressions.

Sketches and an accompanying analytical narrative of Radiohead's song 'Lotus Flower' (2011, *The King of Limbs*; see Table 3 for a formal diagram) should demonstrate how these systems function within the environment of a song completely devoid of functional root motions. The central groove of the song, transcribed in the bass staff of Ex. 12, demonstrates contrapuntal gestures at two levels of structure. In the first four bars the upper third and the lower neighbour

Table 3 Formal design of Radiohead, 'Lotus Flower' (2011)

Section	Clock time	Description
Intro	0:01	Bass and drums groove from pre-chorus; 5 vs. 4 metrical dissonance introduced by hand claps
Verse 1	0:58	See Ex. 12 (×2)
Pre-chorus	1:31	See Ex. 14 (×2)
Chorus	2:01	See Ex. 16
Transition	2:31	Recap intro
Verse 2	2:47	Recap verse; shortened to one presentation
Pre-chorus	3:05	Recap pre-chorus; shortened to one presentation
Partial chorus (bridge function)	3:28	Vocals begin at 'All I want is the moon'; beat drops out, returns for chorus 2
Chorus 2	3:51	Recap chorus
Outro	4:20–5:00	Recap bass and drums groove from intro/pre-chorus

c form a repeated riff that, in conjunction with the voice (see especially the a–g–f passing motion and the upper boundary pitch c1), emphasises a Dm7 centre with no harmonic movement. The change of bass in bars 5–6 of the riff further emphasises the Dm7 prolongation by adding a pair of upper neighbours (G above F and E above D) which are interpreted in the Ex. 13 sketch as unfolding a two-voice neighbour structure over the eight bars. The B $\sharp$ in the voice that accompanies this change of bass, in addition to engendering a salient c1–b–a upper voice, could also support an interpretation of this two-bar contrast as a G-based plagal motion, the E in the bass prolonging G through its lower third. Already in this opening-verse gesture the D pitch centre is reinforced on two different levels through contrapuntal motion. No harmonic function – tonal or modal – is responsible for D's centrality. An explanation of these eight bars that defers to the modal descriptor 'D Dorian' would misrepresent the system by which this music establishes pitch centrality. CP-system songs such as 'Lotus Flower' establish pitch centrality in a manner wholly different than that used in FT- or FM-system songs.

The pre-chorus (transcribed in Ex. 14) differs from the verse in two important regards. First, Yorke moves into a falsetto tessitura to repeat an f1 almost maniacally, decorated first through its lower third, next through its lower neighbour e1 over the change of bass, and finally through the a $\flat$ 1–g1–f1 'blue-note' passing motion wrapping around to the phrase repeat. Second, the bass contour over this change of bass – previously <201> – is now altered to form an <012> upward passing motion between E and G. Ex. 15 sketches the fifth and sixth bars of the pre-chorus as more of a textbook passing motion than the unfolded neighbours in the verse. A hierarchical structure is revealed in this

Ex. 14 'Lotus Flower': pre-chorus

there's an emp - ty space in - side my heart where the weeds take root so now I'll set you

I will shrink my-self in - to your pock-et in- vis - i ble__ do what you wa

nt do what you__ wa - nt.

fr - ee__ I'll set you free the-re's an

Ex. 15 'Lotus Flower': sketch of pre-chorus upper and lower neighbours

(from)

eight-bar phrase as the E, itself an upper neighbour to the prolonged D, is decorated on the surface by the passing gesture E–F–G. Though passing third-progressions such as these are often too generic to hear as specifically motivic, it does remind the ear of similar passing motions in the lead vocal in both the verse and the pre-chorus.

In verse-chorus songs without a bridge, one central function of the chorus (apart from sheer memorability) is to provide the song's essential contrast with the verse. Since 'Lotus Flower' features a constant D pitch centre, the way to achieve this contrast in the chorus is not through modulation or presenting a previously withheld tonic (as in FT systems), but through contrapuntal motions not heard in the verse or pre-chorus. Ex. 17 shows a deep middleground sketch of the chorus,¹⁹ itself transcribed in Ex. 16. Like the verse, the chorus does present a descending third-progression in the lead vocal (I find this motivic parallel particularly easy to hear on the surface), but it is obviously transposed and, additionally, is enabled by a sufficiently different harmonic structure.

Because B $\flat$ is given hypermetric emphasis for the first time, a modally driven understanding of the chorus might note the shift from 'D Dorian' in the verse and pre-chorus to 'B $\flat$ Lydian' in the chorus. Aside from the lack of directed modal harmonic function, there are strong musical reasons, directly on the surface, to eschew a modal interpretation of this song. Firstly, while Yorke makes plain his desire for B $\natural$ in the verse, his vocal melody avoids either B $\natural$ or B $\flat$ in the pre-chorus, as does the chordal accompaniment. As such, the 'mode' of the pre-chorus is largely underdetermined. Likewise, the chorus's move to a hypermetrically strong B $\flat$ – which is, in fact, the first B $\flat$ of the song – could inspire yet a third modal shift. But again, Yorke's melody conspicuously avoids the choice between E and E $\flat$ that might differentiate the underdetermined collection as either major or Lydian, and seems altogether ambivalent between A $\natural$ and A $\flat$. A modal analysis would then face the unfortunate dilemma of choosing between *four* different incomplete modes on B $\flat$: (1) a Lydian mode would assert the continued presence of E, which, though absent from the chorus, is retained from the verse and pre-chorus, and perhaps preserves a 'default' F major collection for the whole song (hearing Yorke's b in the verse as a modal mixture in the relative minor); (2) an Ionian interpretation would read a1 as the major seventh of the local modal centre and the a1 as modal mixture,²⁰ while replacing the E so vital to bass motion in the verse and pre-chorus with an absent E $\flat$; (3) a Mixolydian interpretation flips the roles of A and A $\flat$, likewise asserting the E $\natural$ rather than E $\flat$; and (4) an 'acoustic' (a.k.a. Lydian-Mixolydian) hearing attempts to split the difference between option 2 and option 3, hearing the A $\flat$ locally and retaining the E so vital to the verse and pre-chorus.

As noted by Capuzzo (2009), the underdetermined nature of such collections is often due to rock's propensity for gapped cycles of fifths. One such example, the pentatonic scale, cannot establish convincing tonal centres because it lacks tritones and leading notes.²¹ Other such gapped cycles generated by interval class 5, such as the six-scale-step collection that Yorke seems to be working with (he avoids the pitch class E in the chorus), as well as the triad- or fifth-doubled 4–23 collection that underpins many pop-rock progressions, lead to ambiguous pitch centres that can be reconciled only by a clear tonic arrival in a contrasting section.²² However, without such a tonic arrival anywhere in 'Lotus Flower',

Ex. 16 'Lotus Flower', chorus: elaborated plagal motions

2:01

slow - ly we a - ll un - furl as lo - tus flow - ers 'cause

all I want is the mo - on u - pon a sti - ck just to see wh -

at if just to see what if you can't kick the ha - bit

just to feed your fa - st ba - lloon - ing he - ad lis - ten to your hea - - - rt.

to verse

2:31

Ex. 17 'Lotus Flower', chorus: deep middleground reduction

2:01

2:31

Ex. 18 Radiohead, 'Sit Down, Stand Up' (2003): plagal ostinati throughout. The ever-present inner voice F in this F–A–B–F ostinato achieves two things: (1) ensures that the second bass note is not heard as supporting III and (2) demotes B $\flat$ to a mere upper neighbour to i⁶, rather than a bona fide 'chord' in and of itself.

there are no functional harmonic progressions, and thus the entire song is revealed as neither modal nor tonal and must be analysed as a CP system.

If an FT progression did occur in a contrasting section, a background graph would reveal an *Ursatz* in which the verse's contrapuntal system acts as part of a prolongation within an FT system. However, conspicuously absent from this analysis of 'Lotus Flower' is any attempt at a background graph that might reconcile the three main sections of the song into a larger *Ursatz*. While this was desirable in FT systems such as that of 'Let Down', owing to the fact that the chorus contains both the intermediate and dominant *Stufen*, songs whose pitch centres are governed entirely by CP systems contain no real *Stufen*. They contain a pitch centre established by contrapuntal motions, which may function analogously to a tonic. But without a dominant *Stufe* I caution that the term 'tonic' is potentially misleading in its association with common-practice harmonic structures. Readers should not, however, mistake this lack of functional tonality for an aesthetic shortcoming. On the contrary, the various voice-leading gestures taken up by the verse, pre-chorus and chorus do much to reveal strong connections between neighbour and plagal contrapuntal functions and the formal functions they enable.

Exs 18–22 show, with limited commentary, several graphic analyses of CP systems at work in Radiohead's music; I then address truly modal systems in the third section of this article. Compared to FT sketches, these CP sketches include a higher level of foreground detail because, lacking any functional *Stufenkreis*, pitch centricity is established solely through the passing, neighbour and plagal gestures usually reduced out in tonal systems.²³

Functional Modal (FM) Systems

To privilege contrapuntal structures in 'Lotus Flower' and other Radiohead songs is to depart from mode-based theories of rock harmony, such as that advanced by Biamonte (2010), which is perhaps the most sustained and systematic argument

Ex. 19 Radiohead, 'Optimistic' (2000), verse and chorus: double-neighbour counterpoint. Though staggered rhythmically, the lead vocal (treble) and lead guitar (tenor) both participate in double-neighbour motions during the verse in parallel sixths (note that there are parallel sixths in the outro as well). The guitar and bass play a scalar passage in the chorus which unfolds two chords (note the augmented fourth, B $\sharp$ and E, in the second chord, which resolves outward) leading to a modally mixed triad. Hearing the complete fifth-progression in the chorus on the text 'the best you can is good enough' encourages an ironic reading inasmuch as the penultimate $\hat{2}$ receives only cursory inner-voice support while the tonic pedal remains in the bass throughout the final $\hat{3}$ – $\hat{2}$ – $\hat{1}$ – a structure which Schenker himself believed was 'good enough' at the end of Chopin's Etude, Op. 10 No. 3 (Schenker [1935] 1979, Fig. 153, 3).

Ex. 20 Radiohead, 'Packt Like Sardines in a Tin Box' (2001): verse and chorus. With its D centre, bass pedal, modally mixed $\hat{3}$ and unsupported $\hat{2}$ – $\hat{1}$, this example is remarkably similar to Ex. 19 (a graph of 'I Might Be Wrong' [2001] would reveal almost the same yet a third time). 'Packt' further reinforces the sense of pedal point by adding a constant drone in the tenor voice. It is thus also remarkably similar to 'Everything in its Right Place' (2000) inasmuch as both tracks begin their respective albums with tenor-voice pedal point; 'Everything' features a constant C, which eases the pivot between C and F chords on the downbeats of successive sections.

on the topic. Because her methodology is not only based on chordal collections, but also incorporates melodic voice leading, Biamonte avoids conflating pitch centrality and hypermetre.²⁴ Despite this attention to counterpoint (see the terms printed in boldface in Table 4), she still presents these passages under the guise of

Ex. 21 Radiohead, 'Bodysnatchers' (2007): tonicised neighbour $\frac{6}{4}$ and modal mixture. The prototypical plagal neighbour (G major) is tonicised in the verse, hypermetrically emphasised in the chorus and then replaced by B $\flat$ major in the post-chorus. This latter gesture recalls the chorus of 'Lotus Flower' (see Ex. 16).

Ex. 22 Radiohead, 'There, There' (2003): elaborated plagal motions. Guitar tablatures for this song list no fewer than four chords for the verse's simple plagal motion: B minor, G, D/F $\sharp$ and E minor. Though the melody in the chorus might initially seem to hint at a pitch centre of D, the D harmony appears only in the middle of a circle-of-fifths sequence (in first inversion) and contains a dissonant major seventh, which resolves only when the G–F $\sharp$ –E plagal gesture from the end of the verse returns.

modal harmonic progressions. Note that each of Biamonte's progressions can be sketched as one or more of the contrapuntal gestures shown in Ex. 11. Because these are precisely the contrapuntal motions that characterise CP systems in Radiohead's music, the definition of modal systems I offer is significantly more

Table 4 Selected contrapuntal descriptions of modal progressions in Biamonte (2010)

Sample chord succession	Commentary in Biamonte (2010)	Page no.
[I-♭VII] (Doors, 'The End')	'[T]he neighboring position of the chord root, creates a flattened affect'.	97
[I-IV] (Santana, 'Evil Ways')	'The Dorian major IV often serves its common tonal function of a plagal upper neighbor to the tonic'.	97–8
[I-♭VII-IV-I] (Beatles, 'Hey Jude')	'[T]he double- plagal progression is a linear motion deriving from neighboring 6/4 chords that are given consonant root support.'	98
[I-IV-I, IV-♭VII-IV] (Buddy Holly and the Crickets, 'Not Fade Away')	'[T]he double- plagal progression, in which I is prolonged by an upper- neighbor IV, which is in turn elaborated by upper- neighbor ♭VII'. '[In] neighboring and passing progressions, linear relationships take precedence over the immediate chordal successions'.	99
[I-IV-♭VII-IV] (Romantics, 'What I Like about You')	'[N]ested upper neighbors in the form of melodic 5–6–♭7–6 progressions in the guitar or vocals, in which 6 is a neighbor to 5 and ♭7 is a more foreground-level neighbor to 6'.	100
[I-♭VII-IV-♭VII] (Led Zeppelin, 'Communication Breakdown')	'[In t]he passing progressions ... the motion is an inverted arch from I through ♭VII to IV and back'.	100
[I-♭VII-♭VI-♭VII] (Bob Dylan, 'All Along the Watchtower')	'In neighboring and passing Aeolian progressions, the tonic is prolonged through linear motion '. 'Because the chord structure of the Aeolian progression spans a stepwise third, it lends itself much more readily to passing patterns than to neighboring ones'.	102

constrained than that of Biamonte and others, including Moore (1995), de Clercq and Temperley (2011) and Clement (2014).

As the name implies, FM systems are still based on the functional descending-perfect-fifth motion from dominant to tonic. Melodically, this root motion is supported by $\hat{2}$ and $\hat{7}$ (subtonic) moving stepwise to the tonic. Note two vital attributes of FM systems: (1) like FT systems, they are functional in that they rely on descending-fifth root motion at multiple structural levels to attain tonic closure; and (2) by insisting on collections other than tonicised major or minor, they indeed draw from a diatonic modal collection. Both factors combine into one central tenet of the FM system: it relies on the minor dominant chord for closure.²⁵ However, whereas FT systems (with their required leading notes) only

Table 5 Formal design of Radiohead, 'Where I End and You Begin' (2003)

Section	Clock time	Description
Intro	0:01	Keyboards introduce main [C–G–A $\flat$ –F–G–C–E $\flat$ –G] ostinato; bass and drums enter at 0:16, introducing main groove to accompany all verses
Verse 1a	0:48	'There's a gap in between' (c1–e $\flat$)
Verse 1b	1:05	'I'm sorry for' (e $\flat$ 1–c)
Break	1:21	Bass riff modified to tonic pedal; voice counts '1' to '7' on downbeat of each of seven measures
Verse 2a	1:34	'I'm up in the clouds' (e $\flat$ 1–b $\flat$)
Verse 2b	1:50	'I can watch and not' (f1–g)
Break	2:06	Bass pedal returns; syncopated guitar riff
Verse 3a	2:21	'X will mark the place' (a $\flat$ 1–d1)
Transition	2:37	Bass tacet, <i>Ondes Martenot</i> feature
Terminal climax	2:53–4:29	Bass enters on new riff (E $\flat$ –C) previewing vocal melody; lyrical hook 'I will eat you alive / There will be no more lies' repeats

come in two flavours, major and minor, FM systems in Radiohead's music may colour the remaining five scale steps (besides tonic and dominant) to yield any mode. Of these five, Phrygian would be extraordinarily rare, inasmuch as it would require a V chord with a consistently flattened fifth, and Locrian, under the current definition of 'functional', would be logically impossible since it lacks a perfect fifth above the tonic. Indeed, Everett (2008, p. 157) states that '[t]he pure Phrygian and Locrian modes are probably nonexistent.'

A formal outline of the C Aeolian song 'Where I End and You Begin' (2003, *Hail to the Thief*) is given in Table 5. The transcription of the vocal melody and bass line in the opening verse (see Ex. 23) should sufficiently demonstrate the FM system at work. Note especially that tonic C minor and dominant G minor triads control almost the entire verse. The A $\flat$ and F in the bass merely act as double neighbour notes around the G, and, unlike the C and G, which are adorned by E $\flat$ and B $\flat$ respectively, these double neighbours are not supplied with the requisite thirds to form bona fide triads.

In terms of large-scale voice leading and form, like 'Let Down', 'Where I End and You Begin' unfolds successively higher members of the tonic triad in each of its verses: c1 in verse one ('there's a GAP IN [...]'), e $\flat$ 1 in verse two ('I can WATCH [...]') and finally g1 in the final verse ('X WILL MARK [...]'). Unlike 'Let Down', this song contains no contrasting chorus. Instead, it features a simple strophic design where verses one and two each present a couplet of phrases, labelled in the formal diagram as verses 1a and 1b. Unlike traditional AABA forms, the song's contrast comes not from an internal bridge, but from an unrelated closing section called a 'terminal climax' (Osborn 2013, p. 23). Germane to post-millennial rock music, these thematically distinct ending

Ex. 23 'Where I End and You Begin', verse 1a: cyclical Aeolian progression

Ex. 24 'Where I End and You Begin': background graph

sections typically present a repeated lyrical or melodic theme and, in doing so, also serve as the song's memorable high point.

However, as can be seen in the background sketch (Ex. 24), this terminal climax does not play a role in the piece's overarching background structure. Following the culmination of the arpeggiated ascent (the attainment of *Kopftón* $\hat{5}$ at the beginning of verse three), the expected descent occurs entirely within that verse. Given that verse three is half the length of all the previous verses, this is somewhat unexpected, providing something of a hasty conclusion.

Following the structural close in verse three, the terminal climax prolongs the tonic scale degree through a relatively simple composed-out upper third. Thus, while the terminal climax does not play a primary role in the *Ursatz*, it does play

Ex. 25 Radiohead, 'Jigsaw Falling into Place' (2007), bridge: interrupted Aeolian period. The A $\sharp$ in the bass of this passage is clearly a chromatic passing note en route to V 9 of VI, rather than a back-related raised leading note (hence Aeolian rather than minor). The tonic arrival at the end of this period is an elided cadence at the beginning of the outro.

Ex. 26 Radiohead, 'Separator' (2011): Mixolydian elided cadence and chromaticised voice exchange. Whereas the A $\flat$ had previously only been heard as the chordal third of the minor dominant, its placement in the bass at the end of this passage nearly tonicises D $\flat$ major when it moves up a fourth. Only the chromaticised voice exchange, which reveals D $\flat$ as the bass of a first-inversion B $\flat$ minor triad, keeps the B $\flat$ Mixolydian pitch centre in play.

a pivotal role in the song's dramatic structure by embellishing and prolonging a tonic which was not sufficiently emphasised by the elided cadence at the end of verse three. In fact, Yorke sings the final tonic scale degree only in the terminal climax; the resolution of the d1 at the end of verse three appears only in the guitar. The repeated lyrical-melodic gesture of the terminal climax adds further emphasis to this final tonic scale degree by sounding it in the lower octave (c) at the end of each segment.

The preceding discussion of 'Where I End and You Begin' shows that a Schenkerian understanding of form and voice leading may be adapted to fit a song with a functional modal structure. The sketches of selected FM

Ex. 27 Radiohead, '15 Step' (2007), Dorian verse and chorus. While the F#/D in the bass appears as merely a Dorian-flavored plagal embellishment in the verse, its reappearance as the altered II of the chorus, supporting $\hat{2}$ in the melody, acts as the structural intermediate connecting verse and chorus, confirming the resilience of A Dorian as the functional modal centre.

Ex. 27 Radiohead, '15 Step' (2007), Dorian verse and chorus. The notation shows a piano accompaniment with a treble and bass staff. The melody is in the treble staff, and the bass line is in the bass staff. The key signature is one sharp (F#). The time signature is 4/4. The notation includes a 3-measure rest in the melody at 0:54, followed by a 2-measure rest at 1:13. The bass line features a Dorian-flavored plagal embellishment (F#/D) in the verse and chorus. The functional modal center is A Dorian.

Ex. 28 Radiohead, 'Pyramid Song' (2001), verse: recurring Mixolydian half cadences. Though Taylor (2009) argues for F# and G pitch centres at various points in the verse, Yorke's vocal gestures consistently emphasise c#1, treating b as a brief lower neighbour (thus rendering G improbable), while F# lacks the linear motion and dominant-tonic axis necessary for true modal functionality. Hesselink (2013, p. 20) seconds the F# center, based on the presence of an 'Andalusian' I→II→III progression, but with no concern for voice leading save for briefly mentioning the suspended G over the first chord.

Ex. 28 Radiohead, 'Pyramid Song' (2001), verse: recurring Mixolydian half cadences. The notation shows a piano accompaniment with a treble and bass staff. The melody is in the treble staff, and the bass line is in the bass staff. The key signature is three sharps (F#, C#, G#). The time signature is 4/4. The notation includes a 3-measure rest in the melody at 0:36, followed by a 2-measure rest. The bass line features a Mixolydian half cadence. The functional modal center is F#.

songs in Exs 25–29 help to illustrate exactly how some of these modal systems work in graphic notation. These graphs show that FM systems in Radiohead's songs rely on the same *Ursatz* patterns as FT systems and are not (1) rotated versions of FT systems, (2) intermediate prolongations within FT systems or (3) the result of a pitch centre derived through largely contrapuntal means.

Ex. 29 Radiohead, 'All I Need' (2007), verse, chorus and terminal climax: Lydian set class 4–11 motive (α , transposed and inverted). As argued, truly functional Lydian centres are absent from Radiohead's catalogue and are difficult to hear in any functional rock music because of the more common tonal implications of $\sharp 4$. There are in fact no other chords in 'All I Need' that disrupt the continued presence of the extended tertian sonority C^{maj13} . While this chord itself saturates the C Lydian collection, the entire *chromatic* collection is saturated by Jonny Greenwood's viola in the terminal climax, in which he overdubs a single note twelve times on a different pitch class.

Voice-Leading Systems in Context

I hope, by offering models for, and analysing examples of, three distinct systems of harmony and voice leading in Radiohead's music – FT, CP and FM – to have provided a simple, coherent set of criteria by which we can differentiate these musical phenomena. Because I am more interested in harmonic functioning than simple taxonomy, I focus more on passages that combine, defy or blur the lines between these three systems. However, it is only by first being able to discern these three systems as inherited largely from common-practice tonality that we can begin to appreciate exactly what makes others aberrant. For example, the verse of 'Knives Out' (2001, *Amnesiac*) derives most of its surprise by first setting up the expectation of a descending step sequence alternating $\frac{5}{3}$ and $\frac{6}{3}$ chords, only to thwart the expected I6 harmony (Cm/Eb) with $C\sharp$ half-diminished.²⁶ Likewise, Yorke's subtle word painting of 'ghost' on $b\sharp$ at 0:53 in 'The Tourist' (1997, *OK Computer*) can be appreciated only by recognising the underlying I–v–I structure as it moves toward a modally functional cadence in B Mixolydian, unexpectedly replacing the cadential b in the melody with its doppelgänger, $b\sharp$.

My current and continued research into Radiohead's experimental harmonic language seeks to explain meaning in such passages. But a coherent explanation of the expectation/realisation chains involved in such perceptual claims must begin with a firm grounding in the tonal expectations espoused in this article. Though I have largely addressed the harmonic practice of a single group, I hope that readers may find my investigation useful for the analysis of other recent rock music. Since my theory highlights the significance of raised leading notes, functional dominant harmonies and contrapuntal motions in Radiohead's music, one might use it to reconsider a great many styles.

Appendix: FT, CP, and FM Systems in Radiohead's Corpus, 1997–2011

Year	Song	System	Key, mode, or pitch centre	Section(s)
1997	'Airbag'	FT	A major	Verse/chorus pair
	'Paranoid Android'	FT	D minor	Bridge (chorale)
	'Subterranean Homesick Alien'	CP	G	Verse
	'Exit Music (for a film)'	FT	B minor	Verse, bridge
	'Let Down'	FT	A major	Verse/chorus pair
	'Karma Police'	FM	A Dorian/Aeolian	Verse
		FT	G major	Chorus
		CP	D	Terminal climax
	'Fitter, Happier'	n/a	n/a	n/a
	'Electioneering'	CP	D	Verse/chorus pair
	'Climbing Up the Walls'	CP	B	Verse/chorus pair
	'No Surprises'	FT	F major	Verse/refrain pair
	'Lucky'	FM	E Aeolian	Verse
		FM	E Dorian	Chorus
	'The Tourist'	FM	B Mixolydian	Verse
2000	'Everything in its Right Place'	FM	F Mixolydian + $\flat 6$	Throughout
	'Kid A'	CP	F	Verse
		FT	F major	Chorus/outro
	'The National Anthem'	CP	D	Throughout
	'How to Disappear Completely'	FT	A	Throughout
	'Treefingers'	CP	F $\sharp$ and B (underdetermined)	Throughout
	'Optimistic'	CP	D	Verse/chorus pair
	'In Limbo'	CP	E	Verse/chorus pair
	'Idiotique'	CP	E $\flat$ and G (underdetermined)	Throughout
	'Morning Bell'	CP	A	Verse
		CP	D	Chorus
	'Motion Picture Soundtrack'	FT	G major	Verse/chorus pair
2001	'Packt Like Sardines in a Crushd Tin Box'	CP	D	Verse
	'Pyramid Song'	FM	A Dorian	Throughout
	'Pulk Pull Revolving Doors'	CP	C	Throughout
	'You and Whose Army?'	CP	C $\sharp$	Terminal climax
	'I Might Be Wrong'	CP	D	Verse/chorus pair
	'Knives Out'	FM	C	Verse/chorus pair
			Aeolian/Mixolydian	
	'Morning Bell'		see 2000 version	
	'Dollars and Cents'	CP	B	Throughout
	'Hunting Bears'	CP	D	Throughout
	'Like Spinning Plates'	FT	C $\sharp$ minor	Chorus
	'Life in a Glass House'	FT	A minor	Chorus

Year	Song	System	Key, mode, or pitch centre	Section(s)
2003	'2 + 2 = 5'	FT	F minor	A section
	'Sit Down, Stand Up'	CP	F	A section
	'Sail to the Moon'	CP	A	Verses
	'Backdrifts'	CP	B	Verse/chorus pair
	'Go to Sleep'	CP	G	Throughout
	'Where I End and You Begin'	FM	C Aeolian	Throughout
	'We Suck Young Blood'	FT	E $\flat$ minor	Verse
	'The Gloaming'	CP	E	Verses
	'There, There'	CP	B	Throughout
	'I Will'	FT	C $\sharp$ minor	A section
		FM	C $\sharp$ Dorian	B section
	'Punchup at a Wedding'	CP	E	Verse/chorus pair
	'Myxomatosis'	CP	E	Verse/chorus pair
	'Scatterbrain'	CP	D	Terminal climax
	'A Wolf at the Door'	FT	D minor	Verse
2007	'15 Step'	FM	A Dorian	Verse/chorus pair
	'Bodysnatchers'	CP	D	Throughout
	'Nude'	FT	E major	Throughout
	'Arpeggi/Weird Fishes'	FT	D major	Verses
	'All I Need'	CP	C	Throughout
	'Faust Arp'	CP	B	Verse
		CP	G	Chorus
	'Reckoner'	FT	G major	Verses
		FT	E minor	Bridge
	'House of Cards'	CP	F	Verse/chorus pair
	'Jigsaw Falling Into Place'	FM	B Aeolian	Bridge
	'Videotape'	FT	A major	Throughout
2011	'Bloom'	CP	D	Verse
	'Morning Mr. Magpie'	CP	C	Verses
	'Little by Little'	CP	D	Verse/chorus pair
	'Feral'	CP	G	Throughout
	'Lotus Flower'	CP	D	Throughout
	'Codex'	FT	F major	Verse
	'Give up the Ghost'	FM	D Mixolydian	Throughout
	'Separator'	FM	B $\flat$ Mixolydian	Verse/chorus pair

NOTES

I should like to thank Frank Samarotto and Drew Nobile for graciously reading over earlier versions of this article. The graphic analyses contained herein have especially benefited from suggestions offered by both.

1. This approach to hearing traditional Schenkerian tonal structures in rock music is exemplified throughout Everett's (1992, 2008 and 2015) analytical output. Nobile's (2011) adaptation of Everett's analytical methods for analysing early Beatles songs also identifies traditional tonal structures,

and is modified to include such rock substitutions and variations as the ‘cadential I’ and the ‘cadential IV’ chords.

2. See, for example, the extensive cataloguing of such gestures in Biamonte (2010) and Koozin (2011).
3. Kenneth Smith’s article in this volume (pp. 000–00) employs a root-based methodology in service of a greater neo-Riemannian function theory. Chord roots also form the basis of de Clercq and Temperley’s (2011) computational study on *Rolling Stone’s* ‘Top 500 Songs of All Time.’ To simplify the data points in their study, only roman numerals were used in determining tonal centres.
4. Moore’s (2012, p. 167) distinction between ‘idiolect’ and ‘style’ offers a way to distinguish the Radiohead of post-1997 from the more general Britpop tendencies many commentators hear in the band prior to that. Moore and Ibrahim, for example (2005, p. 144), note that *OK Computer* represents a separate idiolect divorced from the palpable impact of Nirvana and the Pixies in previous albums.
5. Though Ionian is also a mode, my definition of ‘modal’ connotes only modes which contain the minor dominant. This disqualifies Ionian as a matter of principle, and Lydian for more substantive musical reasons to be discussed soon.
6. For more on how Radiohead’s newest album, *A Moon Shaped Pool* (2016), continues many of the compositional trends heard in this 14-year period, see Osborn (2016).
7. This anti-Schenkerian objection is made perhaps most fervently in Moore’s article on the flattened seventh in rock music (1995, p. 186) and has been rebutted rather thoroughly by Burns (2008, pp. 66ff).
8. See Everett (1999), p. 16, and (2004), Table 1, respectively.
9. Some direct comparisons between the aims of a theory crafted specifically for Radiohead and the aims of existing harmonic theories may help to clarify the scope of this study. For one, since my corpus contains only two examples of a I–♭VII–IV ‘double-plagal’ progression and no examples of the IV–♭III–I ‘axe-fall’ progression described by Biamonte (2010, p. 106), nowhere in my systems do I account for such fretboard-specific geometrical patterns. Comparison to Everett’s and Nobile’s studies on the Beatles is instructive as well. While both adopt Schenkerian functional tonality as their underlying theoretical framework, both must accommodate myriad gestures that are commonplace in the music but not represented by Schenker’s theory, especially the progression II–IV, which facilitates their characteristic 5̂–♯4̂–4̂–3̂ counterpoint and their use of IV or ♭VII as a functional dominant

at the end of phrases supporting $\hat{2}-\hat{1}$ – neither of which is heard in my corpus of study. A widely applicable theory of rock harmony would then do well to consider the modal ramifications of fretboard patterns and the retrogressions inherent in the II–IV progression, or leave room for IV–I and $\flat$ VII–I as dominant substitutes. On the other hand, my study of Radiohead’s music reveals what remains when a theory of rock harmony does *not* depend on the rock-specific idioms that have been illuminated by previous scholarship, partly because those idioms are simply not present in the music.

10. This will help to distinguish minor FT systems, which would require a raised leading note, from FM and CP systems, which would feature minor dominant-functioning chords and subtonic neighbour notes, respectively.
11. Such textbook melodic structures associated with these three gestures include: (1) arrival on $\hat{2}$ or $\hat{5}$; (2) resolution from $\hat{7}$ (leading note only) to $\hat{1}$, from $\hat{4}$ to $\hat{3}$ or from $\hat{2}$ to either $\hat{1}$ or $\hat{3}$; and (3) stepwise motion (but not resolution, as in a cadence) in either direction between constituent scale degrees.
12. The reader can discern the basic structure of these phrases from the widely available recordings and from the published transcriptions.
13. This practice of notating instrumental pitches with diamond-shaped note heads and backing vocals in smaller, round note heads will distinguish them from lead vocal pitches throughout the course of the article.
14. This progression was made somewhat infamous under gendered nomenclature proposed by Hirsh (2008). Koozin (2008) and Doll (2011) both advocate for more mode-based agnosticism in their treatment of ‘Building a Mystery’, as does Murphy (2014) more generally regarding this progression in film music.
15. The same ascending-fifths progression, in which the true tonic is the second in a stack of perfect fifths, occurs in Neil Young’s ‘Down by the River’ (1969); see Biamonte (2010), p. 98.
16. Nobile’s graph of the Beatles’ ‘All I’ve Got to Do’ (2011) also shows an opening $\hat{3}$ being supported by vi rather than I.
17. Temperley (2011) and Nobile (2011) have each suggested pre-tonic roles for the IV chord, labelling it the ‘cadential IV’. While I would explain most of Temperley’s examples as CP systems, I find Nobile’s account more convincing inasmuch as he locates cadential IV chords only in syntactically appropriate places within the SRDC model where the dominant *Stufe* fits (Temperley seems to consider IV chords that support $\hat{2}$ at the end of a repeated chord progression a sufficient condition). I have not come across

a convincing example of the cadential IV from the 1997–2011 Radiohead corpus, largely because, like Nobile, I hear IV as cadential only when it functions within a developed *Stufenkreis*.

18. Salzer (1962, p. 161) here draws our attention to four examples from the literature which illustrate the contrapuntal-structural category. In all four cases, the contrapuntal-structural chord is a lower neighbour which resolves to root-position tonic. However, unlike the examples I will show, Salzer's examples proceed to firm dominant and tonic *Stufen* that propel the music to a functional authentic cadence.
19. I have chosen a deeper level of structure here, largely to avoid sketching four repetitions of the same basic structure. The B $\flat$ –G motion is presented several times before arriving on D at the end of the chorus, which elides with the beginning of the introduction/verse. The F in the bass serves as a fleeting arpeggiation of the hypermetrically reinforced B $\flat$ harmony.
20. Contrapuntally, both A and A $\flat$ are non-functional sevenths that resolve downward to G when the B $\flat$ chord moves to G minor. As such, there is no reason to differentiate them in CP systems.
21. Both the bridge (B $\flat$ –G–F) and the main riff of the verse (D–F–C) rely on what Doll (2013) has called a pentatonic scale *fragment*, in this case, set class 3–7. According to Doll, these fragments are often combined in a manner that shows little regard for total scalar content and are thus in direct opposition to Biamonte's (2010) idea of five distinct rotated modes of the pentatonic scale.
22. Osborn (2013, p. 30) uses this harmonic facet as the basis for terminally climactic forms.
23. Of course, non-pitched elements such as timbre, dynamics and articulation add to our sense of pitch centrality in these and other CP-system rock songs.
24. See, for example, Biamonte's discussion of Lynyrd Skynyrd's 'Sweet Home Alabama' (2010, p. 99). The chordal roots in 'Jumper' (see Ex. 9) represent the dualist flip (Lydian vs. Mixolydian) of those in 'Sweet Home Alabama'; both are 3–9 set classes.
25. This comparatively conservative definition of modal systems is suggested by Everett in an argument, ironically, for pentatonic systems: 'examples truly in the Aeolian mode would typically use a minor dominant; such a chord would have no place in these pentatonic-system songs' (2004, p. 19). The obvious exception here is Lydian, but I hear no songs in Radiohead's catalogue with functional Lydian centers within this Schenkerian mode of hearing. When $\sharp 4$ is present in an otherwise major system, I am likely to

hear it one of three ways: (1) as the third of an applied dominant of V, (2) as a lower chromatic neighbour to $\hat{5}$ or (3) as part of the $\hat{5}-\sharp/\hat{4}-\hat{4}-\hat{3}$ voice-leading trope accompanying I–II–IV–I. None of these three disrupts an otherwise coherent FT or CP system.

26. In so doing, it also replaces the expected large-scale voice exchange of C and E $\flat$ with a doubly chromaticised version in which E $\flat$ /C is exchanged with C $\sharp$ /E $\natural$.

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NOTE ON CONTRIBUTOR

BRAD OSBORN is Assistant Professor of Music Theory at the University of Kansas. His work on Radiohead and other post-millennial rock music has been published in *Perspectives of New Music*, *Music Theory Spectrum*, *Music Theory Online* and *Gamut*. Osborn's book, *Everything in its Right Place: Analyzing Radiohead*, was published by Oxford University Press in 2016.

ABSTRACT

A great deal of the harmony and voice leading in the British rock group Radiohead's recorded output between 1997 and 2011 can be heard as elaborating either traditional tonal structures or establishing pitch centricity through purely contrapuntal means. This mode of hearing Radiohead's music departs from theories of rock harmony that (1) focus on fretboard-specific melodic gestures, (2) highlight the role of modal scalar collections or (3) associate pitch centricity with hypermetric emphasis. Willingness to hear Radiohead's contrapuntal practice – a keyboard-centred affair in this mature period – in such a prolongational way demands hearing non-tonic phrase beginnings and even entire formal sections in keys for which no tonic chord is present. Graphic

techniques ultimately derived from Schenker (though adapted for rock music by Everett, Burns and Nobile) illuminate this comparatively conservative way of hearing rock harmony. Under this rigorous model, which privileges descending fifth motions and melodically fluent contrapuntal structure, Radiohead's 1997–2011 corpus reveals three distinct systems of voice leading and harmony: functional tonal, functional modal and contrapuntal.