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Symphonic Hearing: Mastering Harmonic Dictation Using the Do/Ti Test

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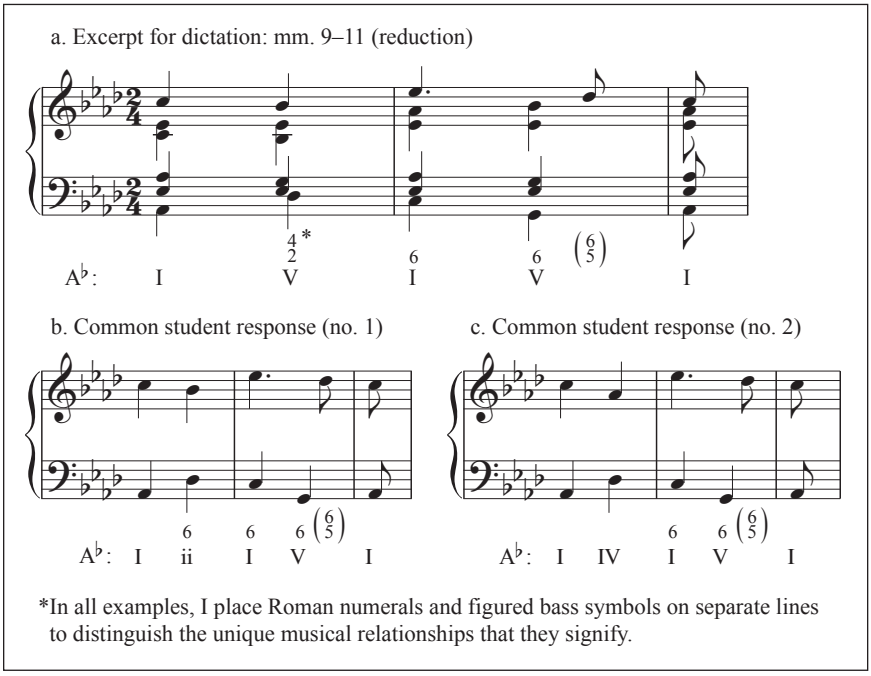
By Daniel Stevens

Many students struggle to aurally identify the harmonic progression that opens the Adagio cantabile of Beethoven's Piano Sonata No. 8 in C Minor, op. 13 ("Pathétique"), given in Example 1a, despite its idiomatic character. Examples 1b and 1c show two common incorrect responses.[1]



Example 1. Beethoven Piano Sonata in C Minor, op. 13, Adagio cantabile, mm. 9–11

For their many helpful comments and suggestions, I thank William Wheeler, Philip Duker, and three anonymous reviewers.

[1] I have used the progression in Example 1a in harmonic dictation assessments of undergraduate and graduate students for over a decade, and I have seen the responses in Examples 1b and 1c numerous times from students at every level. At my current institution, only a handful of incoming graduate students correctly identify the progression each year.

What might be going wrong? In Example 1b, the bass and soprano are correct, but the function and quality of the second chord are incorrect. Students who provide this response probably approach harmonic dictation by notating the outer voices, and then deducing the harmony. Instead of coordinating the notated pitches with elements like chord quality, function, and idiomatic harmonic expansions, such students may make a series of faulty calculations and premature assumptions (e.g., "the chord most likely to contain *re* and *fa* is ii," "*fa* in the bass indicates a predominant," "the chord sounded funny, kind of like a ii^{6}"). [2] Deducing harmonic function from outer voices becomes even more problematic when students incorrectly notate those voices. Combined, these errors and premature assumptions spell disaster for identifying harmonies later. Other students, perhaps recalling that ii^{6} does not typically expand tonic, may "correct" the soprano line to produce the syntactically acceptable (though still incorrect) harmonic progression shown in Example 1c. These students take their mistake one step further, changing a correctly identified note in the soprano voice to fit their false conclusion that the second chord is a subdominant. Still other students might catch their mistake(s) after several playings and eventually provide the correct outer voices and harmonic analysis given in Example 1a. But can we steer students to the correct result more directly, more musically, and with fewer opportunities to go astray?

The mistakes shown in Examples 1b and 1c illustrate a worse problem: namely, that harmonic dictation as it is conventionally practiced may not support the holistic musical skills such exercises ought to instill, such as perceiving the harmonic and linear design of phrases and larger sections, applying listening techniques outside of class in a wide range of listening and performance contexts, using listening techniques to analyze music by ear, and listening in a way that integrates multiple areas of learning (written theory, aural skills, outside listening and performing experiences, etc.). [3]

[2] Compounding these difficulties, beginning students of harmonic dictation also tend to latch on to premature decisions, making it difficult for them to consider that a chord could be anything other than what they initially thought it to be.

[3] By "conventional practice," I refer primarily to atomistic methods of harmonic dictation in which students focus on notating individual elements (usually specific notes) and retrospectively deduce harmonic identity only after the music has ended (see Michael Rogers, *Teaching Approaches in Music Theory: An Overview of Pedagogical Philosophies* (Carbondale: Southern Illinois University Press, 1984), 121). Some

Students who struggle over multiple semesters to identify basic diatonic progressions may ultimately learn to distrust their ears and to disconnect their theory training from their other musical experiences. When lengthier harmonic dictations require numerous playings to complete, even high-achieving students may rightfully suspect that the activity has limited relevance for their day-to-day listening, and that understanding the harmonic design of real pieces by ear without the advantage of multiple playings is well beyond their capacity. These problems challenge music theory teachers and other musicians to reconsider the relevance and applicability of harmonic dictation as it is conventionally taught to developing an aural understanding of real pieces of different styles and genres. How might listeners quickly and accurately identify harmonies in real time, so that notation signifies musical perceptions instead of deductions and guesswork made after a listening experience? How might theory teachers change their approach to harmonic dictation so that the skills developed are applicable while hearing longer excerpts and full pieces?

Part 1: The Do/Ti Test

The *Do/Ti Test*, an extension and update of the guide-tone method, offers an effective response to these challenges by enabling listeners to understand harmonies quickly, accurately, and holistically, in both chordal examples and real pieces.[4] This article introduces and

teachers recommend a hybrid approach in which weaker students first notate the harmonies they recognize by ear, then fill in the blanks with educated or even random guesses. For instance, see Thomas L. Durham, "Teaching Harmonic Dictation," in *AP Music Theory Teacher's Guide*, ed. David Lockart (New York: The College Board, 2007), 138, http://apcentral.collegeboard.com/apc/members/repository/ap07_musictheory_teachersguide_2.pdf. Holistic hearing, by contrast, could be likened to recognizing a face: it is a synthesizing mode of hearing in which each individual element is considered in relation to the others to form a perception of the whole. For a critical overview of seven approaches to harmonic dictation, see Gary Karpinski, *Aural Skills Acquisition: The Development of Listening, Reading, and Performing Skills in College-Level Musicians* (Oxford: Oxford University Press, 2000), 117–127.

[4] The guide-tone method was first described in print by Jay Rahn and James R. McKay, who reported its use at the Eastman School of Music in the late 1930s, and then much later in the 1980s at the University of Toronto, York University, and the University of Oklahoma (Jay Rahn

explains the Do/Ti Test, suggests ways of implementing it using modern technologies, and offers further support and justification for the method's use in college and high-school theory classrooms.

The guide-tone method establishes a set of guide tones that students audiate and compare to music that is heard in order to help identify harmonies in real time. The Do/Ti Test refines and extends the guide-tone method, systematically introducing a set of primary guide tones (*do*, *ti*, *te*, *di*, and *ra*), secondary guide tones (*fa*, *sol*, and *le*), and consideration of chord quality and phrase function as harmonic dictation increases in complexity. The Do/Ti Test begins with students learning to identify harmonies based on whether a harmony fits with a particular guide tone, beginning with only *do* and *ti* (all solfège syllables reflect moveable *do*, and *do*-based minor). As they listen to chord progressions, students sing or audiate *do*, sustaining this guide tone and only moving to *ti* when the harmonies require it. Students begin harmonic dictation by noting which diatonic chords fit with *do* and which with *ti*.[5] Distinguishing between "*do* chords" and "*ti* chords" narrows the possibilities for each chord in the progression, increasing the chance that listeners will arrive at the correct label.

The Do/Ti Test encourages active, responsive listening in which listeners make music along with the sounds they hear as a way to

and James R. McKay, "The Guide-Tone Method: An Approach to Harmonic Dictation," *Journal of Music Theory Pedagogy* 2 (1988): 101–111). The effectiveness of the guide-tone method has been supported experimentally by Manuel Alvarez in "A Comparison of Scalar and Root Harmonic Aural Perception Techniques," *Journal of Research in Music Education* 28, no. 4 (Winter, 1980): 229–235; and "Effects of Sequencing, Classifying, and Coding on Identifying Harmonic Functions," *Journal of Research in Music Education* 29, no. 2 (Summer, 1981): 135–141. More recently, variations of this method have been employed by Joán Groom at the University of North Texas, Cynthia Gonzales at Texas State University, Barbara Wallace at Dallas Baptist University, and Cynthia Folio at Temple University, among others.

[5] Rahn and McKay provide excellent ideas for introducing the guide-tone method to students ("The Guide-Tone Method," 103–106). For example, they suggest that instructors begin by asking all students to sing the guide tone aloud. This activity provides a self-correcting mechanism, in which weaker students can hear stronger students change guide tones and thereby learn to move as the harmonies require. From its first use forward, the guide-tone method trains students to think in sound.

understand them. I call this intentional, structured form of active participation *symphonic hearing*, because listeners who hear in this way become performers, creating a new part within the musical texture in a manner experientially similar to playing in a symphony. Because the Do/Ti Test involves active listening in real time, it can be readily applied while listening to didactic chord progressions and to real musical works. In fact, implementing the Do/Ti Test at my institution has allowed the use of examples from the repertoire (from Baroque to popular styles) almost exclusively beginning in the first semester, allowing students to apply their aural skills while listening throughout every stage of the learning process. The following sections explain the application of the Do/Ti Test in the major and minor modes and extend the method to hearing sequences, chromatic harmonies, and modulations.

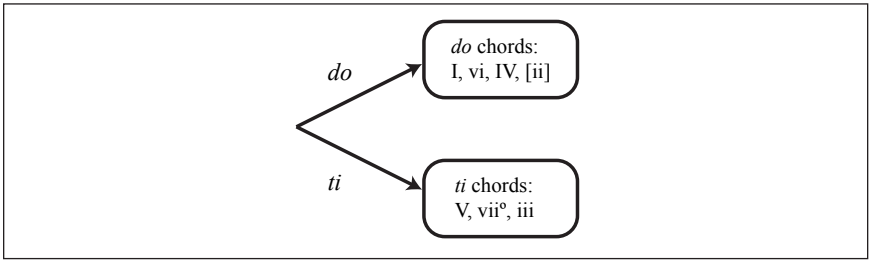
The Do/Ti Test in the Major Mode

The Do/Ti Test presents the listening process as a series of stages in which listeners make distinctions involving guide tone, chord quality, and *phrase function*—tonic (T), predominant (P), or dominant (D)—that progressively narrow the harmonic possibilities.[6] While presenting the Do/Ti Test in stages has pedagogical advantages, these stages are not ultimately meant to result in a strictly linear thought process; rather, students should learn to hear and think

[6] Rudy Marcozzi uses a similar approach to harmonic dictation involving a different set of distinctions in his "The Use of Binary Logic and Processing to Enhance Learning and Instruction in the Undergraduate Theory Classroom," *Journal of Music Theory Pedagogy* 12 (1988): 25–38; and *Strategies and Patterns for Ear Training* (Upper Saddle River: Pearson Prentice Hall, 2008). Throughout this article, I distinguish between a harmony's *chordal function* and its *phrase function*. Chordal function primarily refers to the root of a harmony in relation to tonic and is indicated using Roman numerals (e.g., ii, V, vii^{o}) and scale degrees (e.g., supertonic, dominant, leading-tone chord). Identifying the chordal function of each harmony in a progression is the primary goal of the Do/Ti Test. The phrase function of a harmony indicates its role within the context of a phrase (e.g., tonic, predominant, or cadential dominant), harmonic prolongation (e.g., tonic-expanding V chords), or function group (e.g., dominant-functioning chords). A chord's designation as a *do* or *ti* chord does not indicate its phrase function; for instance, the mediant is a *ti* chord but does not share the dominant function of the other two diatonic *ti* chords (V and vii^{o}). Conversely, phrase function can be used with the Do/Ti Test to help determine chordal function.

through the stages simultaneously, coordinating guide tone, quality, and phrase function to identify chord function. The stages presented below are intended to prioritize and organize the multiple layers of information to which listeners attend.

At the first stage of the Do/Ti Test, represented in Example 2, listeners distinguish between *do* and *ti* chords (i.e., chords with which listeners sing either *do* or *ti)*. In most chords in Example 2, *do* or *ti* is contained in the chord itself. Although the supertonic triad contains neither *do* nor *ti*, I include it with the *do* chords (albeit in brackets) for reasons explained in greater detail later. Suffice it to say that the basic categorization of *do* and *ti* chords is not meant to be rigid or taxonomic, but instead is based on the notes that students are inclined to sing along with the harmonies. Thus, my implementation of the method does not necessitate that the guide tone be a member of the chord in question, however normative a goal this may be. In other words, in the process of listening to a real piece, a listener may fleetingly sing *ti* along with a IV chord, conclude that the *ti* does not fit, and adjust the guide tone accordingly. Similarly, one may sing *do* along with a ii chord and acknowledge that while the guide tone may be dissonant to and not contained by the chord, this guide tone fits better in context than *ti*. The question of whether to introduce a new guide tone (*re*) for the supertonic is addressed in greater detail below, and is one that instructors must decide for themselves.[7]

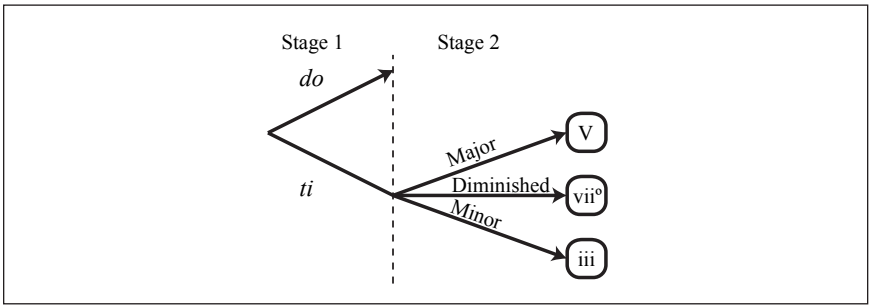


Example 2. Do/Ti Test, major mode, stage 1: diatonic harmonies distinguished by guide tone

Next, listeners focus on chord quality and phrase function to determine each chord's function. For diatonic *ti* chords, guide tone and chord quality are sufficient to identify chordal function. If the chord is major, it is dominant (V); if diminished, leading-tone (vii°);

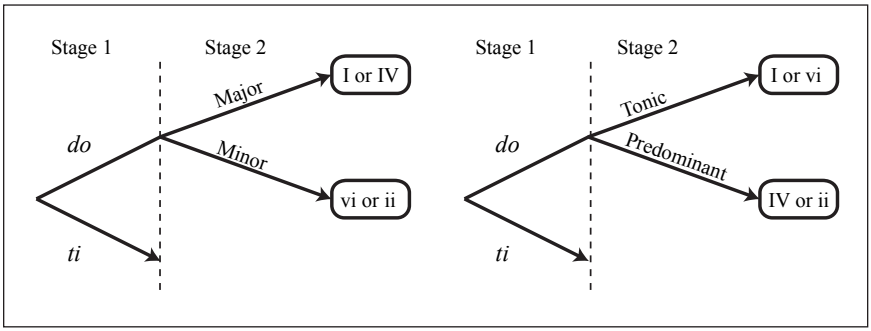
[7] One other diatonic harmony, the I^7, frustrates the Do/Ti Test because it contains both guide tones. Both of these exceptional harmonies (I^7 and ii) will be discussed in greater detail later.

if minor, mediant (iii) (see Example 3).



Example 3. Do/Ti Test, stage 2 (major mode): *ti* chords distinguished by quality

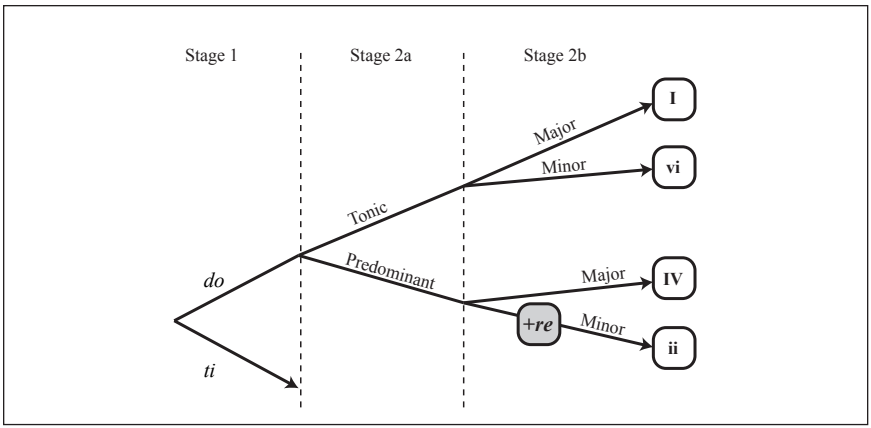
Identifying *do* chords requires identifying both phrase function (tonic or predominant) and quality: neither is sufficient by itself (see Example 4).



Example 4. Do/Ti Test, stage 2 (major mode): *do* chords distinguished by quality and phrase function

Listeners must combine quality and phrase function to arrive at harmonic identity (see Example 5). I consider phrase function before chord quality in order to reinforce the connections between I and vi and between IV and ii, though the reverse order also works.[8]

[8] The phrase function of each chord on the Do/Ti Test refers to its prototypical usage within short model phrases (e.g., I–ii^6–V–vi–IV–V–I). As students learn other idiomatic usages of each harmony (e.g., tonic-expanding V chords, vi as a predominant), instructors may invite students to move beyond the classifications of the Do/Ti Test. In my courses, students group harmonic expansions by bass line and guide-tone pattern, as I explain in "So You Want to Write a Chord Progression?: Teaching Core Music Theory Using the Phrase Model Handout," *Music Theory Pedagogy Online* 6 (2016), https://music.appstate.edu/about/jmtp/so-you-want-write-chord-progression-teaching-core-music-theory-using-phrase-model-handout. Whereas the



Example 5. Do/Ti Test, stage 2 (major mode): *do* chords distinguished by phrase function and quality

Guide-Tone Figurations and the Supertonic

Guide-tone figurations provide students who struggle with stage 2a and 2b distinctions an effective tool that builds on the guide tones already being sung or audiated. Guide-tone figurations are short, simple, memorable patterns that ornament guide tones and explore the intervallic structure and unique pitches of the harmonies to which they are applied. Guide-tone figurations can be learned in advance or improvised while listening as a type of musical "noodling."[9] Either way, they reinforce the core principle of

Do/Ti Test places focus on perceiving individual harmonies, listening for harmonic expansions helps students understand harmonies in their contrapuntal and prolongational contexts. The following textbooks cover harmonic expansions in a manner useful for developing aural skills: Steven G. Laitz, *The Complete Musician: An Integrated Approach to Tonal Theory, Harmony, and Listening*, 4th ed. (New York: Oxford University Press, 2015); Edward Aldwell and Carl Schachter, *Harmony and Voice Leading*, 4th ed. (Boston: Schirmer, 2011); and William E. Caplin, *Classical Form: A Theory of Formal Functions for the Instrumental Music of Haydn, Mozart, and Beethoven* (New York: Oxford University Press, 1998).

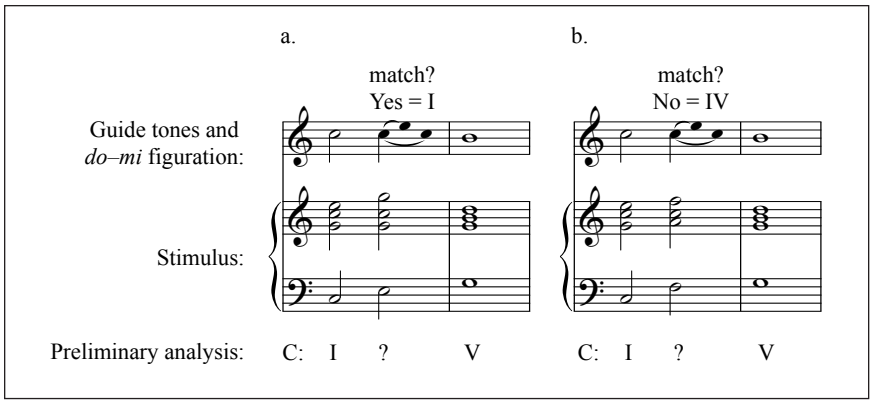
[9]I borrow the idea of musical "noodling" from David Lewin, who writes, "I imagine [a 'theory of music'] including the broader study of what we call people's 'musical behavior,' a category that includes competent listening to be sure, but also competent production and performance. Here I understand production and performance not only in the sense of high art but also as manifest in everyday acts of musical 'noodling,' and in a whole spectrum of intermediate activities….

the Do/Ti Test that understanding music by ear involves comparing music that is heard with sound patterns that are already in the mind, and they provide a quick and accurate means of clarifying the music that is heard.[10] For instance, listeners prone to confuse I and IV could sing a simple "*do–mi–do*" guide-tone figuration and hear whether *do* and *mi* are consonant with the harmony (see Example 6). If *do* and *mi* are consonant, the chord is tonic; if not, the chord is subdominant.[11]

Creation is thus a species of perception." See David Lewin, "Music Theory, Phenomenology, and Modes of Perception," *Music Perception: An Interdisciplinary Journal* 3, no. 4 (Summer, 1986): 377.

[10] This use of guide-tone figurations builds on Rahn and McKay's suggestion that students distinguish between I and IV by arpeggiating tonic above the guide tone *do* and the subdominant below *do*, using either numbers to indicate chord members or solfège syllables ("The Guide-Tone Method," 107–108). By extension, students may also focus on the guide tone's position within the chord: if listeners can arpeggiate through at least two thirds above the guide tone *do,* then the guide tone is the root, and the chord is tonic; however, if the guide tone *do* is perched at the top of the chordal structure and two descending thirds drop below it, then the chord is subdominant. Cynthia Gonzales and Bonnie Smith employ similar arpeggiated figurations in their engaging implementation of the guide-tone method ("From Harmonic Looking to Harmonic Listening: Harmonic Dictation via Harmonic Singing," paper presented at the Pedagogy Into Practice conference, Lee University, Cleveland, TN, June 2, 2017). In general, I refrain from teaching the extensive figurations discussed by Rahn and McKay due to the practical difficulties of singing complete arpeggiations in real musical contexts and the propensity for students either to incorrectly identify the notes of sung arpeggiations or to become distracted from other musical elements (e.g., quality, function, bass). In my own experience, adding simple figurations only when necessary is sufficient for most students.

[11] Of course, the IV^7 contains both *do* and *mi*, problematizing the *do–mi* figuration for listeners who overly rely on this single listening technique. However, IV^7 is rare, and students who encounter it later in their studies are able to perceive bass line and harmonic function, so I have not found this chord to frustrate students' use of guide-tone figurations. This chord is best addressed after students have mastered applying the Do/Ti Test to common diatonic harmonies.



Example 6. Do/Ti Test, stage 2 (major mode): *do–mi* guide-tone figuration for distinguishing between I and IV

Students often face similar difficulties with the stage 2 distinctions (phrase function and quality) when identifying minor *do* chords. Generally, the submediant (vi) is not problematic: most students easily recognize that the chord is minor and can sense that the guide tone *do* is the chordal third of the harmony, fitting between the root below and the chordal fifth above.[12]

The supertonic (ii) is more challenging. When the supertonic triad in root position is clearly minor, students almost always perceive that the guide tone *do* sounds foreign to the harmony. When the supertonic is used in inversion, *do* fits much better with the harmony, but many students perceive the harmony as major, not minor, though less stable than a root position IV.[13] Example 5 labels all supertonic chords as minor, though some students may find it beneficial to distinguish the root position supertonic, which sounds minor, and the supertonic in inversion, which may sound major or unstable.

[12] Rahn and McKay ("The Guide-Tone Method," 109) recommend a new arpeggiation for harmonies in which the guide tone is the chordal third (i.e., V and vi): 3–5–3–1–3 (chord members) or *do–mi–do–la–do* and *ti–re–ti–sol–ti*.

[13] For such listeners, the major triad formed between the harmony's chordal third, fifth, and seventh (present either literally or in the overtones) of the ii^{6} and ii$^{6}_{5}$ is perceptually dominant, giving the chord an unstable but decidedly major quality, similar to Maj^{add6} chords common in jazz and popular styles. Rameau described this chord as a "Sixte ajoûtée à l'Accord parfait" ("sixth added to a perfect chord"). See Jean-Philippe Rameau, *Traité de l'harmonie reduite à ses principes naturels* (Paris: Jean-Baptiste-Christophe Ballard, 1722): 64.

Given the absence of *do* from the supertonic, why call the supertonic a *do* chord at all (as in Examples 2 and 5)? Rahn and McKay suggest using a new guide tone, *re*, to identify the supertonic, and for many teachers and students, this may seem like the best option.[14] Many listeners feel drawn to sing this note when they first encounter the supertonic, and including *re* will satisfy those who prefer singing a guide tone that is a member of the given harmony.

Despite these reasons for singing *re* during the supertonic, I have found several advantages to grouping the supertonic with other *do* chords by sustaining the tonic pitch through this harmony. Practically speaking, expanding the number of guide tones can destabilize weaker students' sense of tonic and increase their anxiety. In addition, *re* is also consonant with the dominant—the chord that most often follows the supertonic—making it easy to remain on *re* and thus sing the incorrect guide tone for the dominant. Singing *re* during the supertonic requires a skip down to *ti* for the dominant, whereas limiting guide tones to *do* and *ti* means that all movements between guide tones are stepwise, decreasing the chance for error.

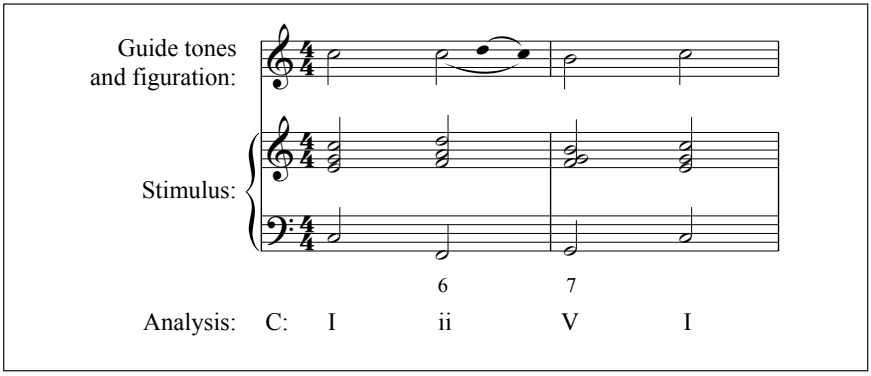
Further still, guide tones can be equally productive when they do not belong to the chord that is heard: the absence of either guide tone (*do* or *ti)* in the supertonic triad signals this predominant harmony. When added to the root position supertonic, the guide tone *do* creates a dissonant chordal seventh; the strong tendency of the guide tone to resolve down by step further characterizes the supertonic, distinguishing it from every other harmony. By persistently audiating *do* throughout the supertonic, students are better able to discriminate the presence or absence of the chordal seventh. Finally, *do* is acoustically present whenever the supertonic chord is used in first inversion, either as a chordal seventh or as an overtone above *fa* in the bass.[15] Given the prevalence of first-inversion supertonic chords in common practice classical music and their typical predominant function, training students to sing *do* through the supertonic has significant practical and musical value.[16]

[14] Rahn and McKay, "The Guide-Tone Method," 109.

[15] The distinction between ii^{6} and ii$^{6}_{5}$ is difficult for many students to perceive by ear, given their acoustic similarity. Paying close attention to the presence or absence of the guide tone *do* and the chordal dissonance it creates in the first-inversion supertonic is enormously helpful in this regard.

[16] There are some contexts in which using *re* as a guide tone is warranted both musically and practically, including passages where

Guide-tone figurations provide a useful middle ground between adding a new guide tone and sticking rigidly to *do* during the supertonic. Given the supertonic's juxtaposition of *do* and *re*, listeners might respond by singing or audiating the guide-tone figuration shown in Example 7. In most harmonies, the closest chord tone to the guide tone is a third away; in the supertonic, however, the chord tone *re* is only one step above the guide tone.[17] Singing from *do* to *re* reinforces this distinctive intervallic relationship and distinguishes the supertonic from the subdominant by highlighting its unique pitch (*re*). By returning to the dissonant, downward-trending *do* at the end of the figuration, listeners better anticipate the chord most likely to follow, the dominant.



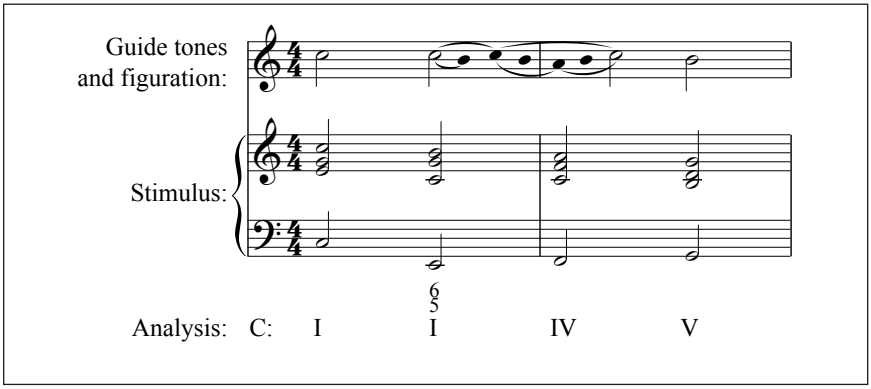
Example 7. Do/Ti Test, stage 2 (major mode): *do–re* figuration

In addition to the supertonic, only one other diatonic chord frustrates the binary logic of the Do/Ti Test: the I^7, which contains both *do* and *ti*. That the I^7 contains both guide tones is its unique hallmark, one that students may highlight by embellishing the guide tone *do* with a quick move to *ti*. This guide-tone figuration is more complex than most others: because *ti* is a chordal seventh that resolves down by step, the guide-tone figuration concludes by following *ti* down

the supertonic is prolonged and/or tonicized, and in modulating progressions. In cases of harmonic emphasis, I recommend that listeners who audiate *re* be prepared to shift quickly back to *do*. In examples that modulate to the supertonic, *re* (in the original key) is sung only until the new scale degree (*do*) is assigned to the new tonic. While I think that neither case warrants including *re* in the group of primary guide tones alongside *do* and *ti*, the guide-tone method may be applied flexibly according to the demands of the music and needs of the students.

[17] The I^7 and vii^{o7} also feature pitches adjacent to their guide tones.

to *la*, then returning stepwise to *do* during the subsequent IV chord (see Example 8).[18] The linear quality and flexible application of this guide-tone figuration allows teachers to point out the passing status of the chordal seventh in many I^7 chords. Students who trace linear motions as a means of tracking harmonic relationships are often well prepared to conceptualize the play between music's horizontal and vertical dimensions. Although the I^7 (as a vertical sonority, rather than the product of passing motion) appears infrequently in the musical and didactic examples used in my classes, students tend to relish its paradoxical status and savor the salient dissonance created by audiating both guide tones at once.



Example 8. Guide-tone figuration for identifying I^7 (in all positions)

The Do/Ti Test: Later Stages and Secondary Guide Tones

In stage 3 of the Do/Ti Test, listeners identify the bass note of each harmony in order to determine chord inversion. Keep in mind that this stage should ultimately occur simultaneously with stages 1 and 2. For most listeners, developing a holistic understanding of each chord helps with identifying the notes of the bass line. For instance, students are less likely to confuse a bass motion from *do* to *fa* with a motion to *sol* if they have already understood the second chord to be subdominant (IV).

[18] Of course, other chords may follow the I^7, so students must be prepared to alter and adjust guide-tone figurations on the spot. Commonly, *ti* moves to *te*, converting the I^7 into a V^7/IV. Students who master the guide-tone figuration for I^7 are well prepared for the chromatic variant.

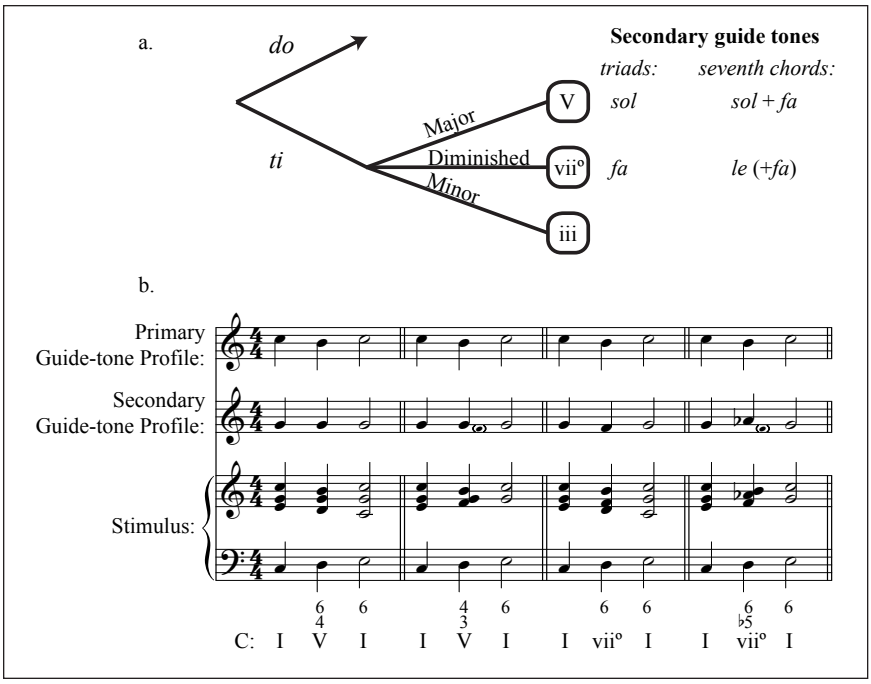
In stage 4 of the Do/Ti Test, listeners synthesize all they have heard and place the harmonies they have identified in context. The bass line helps listeners understand chord inversion and distinguish the intervals above the bass, represented by figured bass symbols. At this stage, listeners with a solid written theory background may also consider likely chord progressions, especially in the case of harmonies whose resolution is restricted (e.g., ii^4_2 or V^6_5). Finally, listeners may consider whether particular harmonies participate in idiomatic or harmonic-expanding progressions (e.g., $I–V^4_2–I^6$) and how each harmony functions within the phrase as a whole.[19]

A final extension of the guide-tone method is the use of secondary guide tones and guide-tone profiles.[20] Generally, the notes of guide-tone figurations described above function as secondary guide tones because they help clarify the identity of difficult harmonies. In addition to those figurations around *do* and *ti*, secondary guide tones around *sol*, shown in Example 9, can assist students who struggle to distinguish between V, vii^o, and vii^{o7}. For example, hearing a static *sol* line through a I–V–I progression clarifies the dominant root of the middle chord. Hearing *sol* and *fa* together signals a V^7, and hearing *fa* or *le* without *sol* signals a vii^o or vii^{o7}, respectively. Example 9b shows the primary and secondary guide-tone profiles for four tonic-expanding progressions.[21]

[19] Each stage of the Do/Ti Test explained above is available as a one-page student handout, including a list of the idiomatic harmonic expansions in which each harmony participates. See Daniel Stevens, "The Do/Ti Test Handouts," *Music Theory Pedagogy Online* (2016), https://music.appstate.edu/about/jmtp/doti-test-handouts.

[20] A guide-tone profile (or guide-tone line) is a melodic sequence of guide tones that fits a particular harmonic progression. Idiomatic progressions such as those in Example 9b can be identified partly by their unique guide-tone patterns. In this article, guide-tone "lines" and "profiles" are nearly synonymous. I use guide-tone profiles primarily in reference to idiomatic and sequential progressions with identifiable patterns of guide tones. Guide-tone lines, by contrast, refer to longer sequences of guide tones such as those created when listening to whole phrases and real pieces.

[21] As helpful as secondary guide tones can be, listeners should take care not to become distracted from the primary guide tones *do* and *ti*. After all, there is positive value (and perhaps even partial credit) in recognizing a chord as dominant functioning, even if the quality and Roman numeral are mistaken. When grading harmonic dictation, I often give partial credit when an incorrect dominant-functioning harmony is given, as long as the correct bass note and plausible figures are included in the response.



Example 9. Secondary guide-tone lines

I have suggested that some approaches to listening, such as those that require students to notate outer voices before deducing harmonic identity, do not support the broader skills that harmonic dictation ought to instill and develop. Since the Do/Ti Test also involves listening for specific pitches, how is the Do/Ti Test different? A key difference is that the pitches that receive focus when using the Do/Ti Test all have strategic value for identifying the harmony holistically and for differentiating between closely related chords. The Do/Ti Test limits the pitches that students must hear to the two most salient pitches in the diatonic collection, *do* and *ti*, making them easier to hear accurately and quickly. While students do listen for specific pitches in the stimulus, they actively audiate and compare what is heard to known musical patterns, thus developing true harmonic hearing from the outset. Further, listening for pitches other than *do* or *ti* is done only after a holistic (albeit partial) understanding of the chord has been developed within the Do/Ti Test framework. In short, the Do/Ti Test provides an organized system of thought that allows each observation, perception, and source of input to converge on a particular chordal identity. Equally significantly, by teaching students which pitches do not lead directly to a holistic perception

of harmony, the Do/Ti Test eliminates extraneous musical data that impedes understanding. When harmonic dictation is done in real time, ignoring the incidental is as important as identifying the vital.

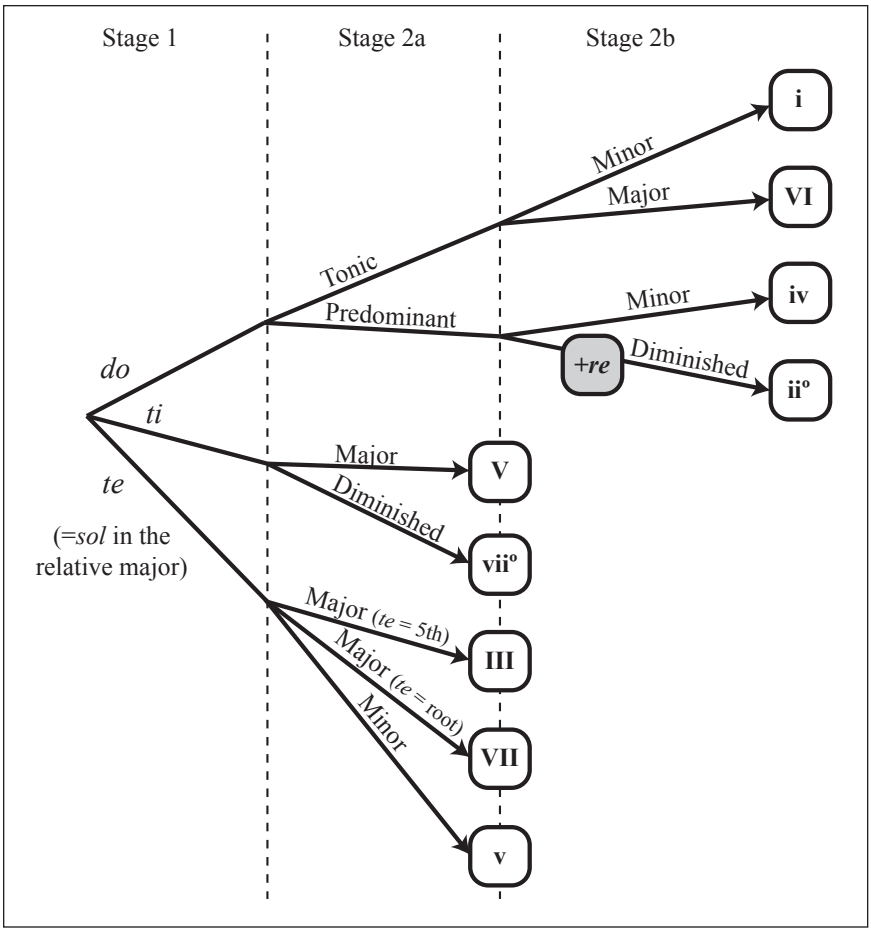
The Do/Ti/Te Test in the Minor Mode

Applying the Do/Ti Test in the minor mode is similar to its application in major. One obvious difference is the change in chord qualities, most of which need not be spelled out. The minor mode has two diminished triads (ii° and vii°) versus one in the major mode, and the half-diminished supertonic seventh chord. Another change in the minor mode is the new guide tone *te* and the introduction of *te* chords. The changes in chord quality, new guide tone, and new harmonies that occur in the minor mode are shown in Example 10.[22]

Students face a number of new challenges when identifying the three possible *te* chords. The first involves the perceived shift to the relative major caused by the loss of the leading tone. This scale-degree shift from *te* to *sol* is illustrated in stage 1 in Example 10. Instructors may also wish to point out that VII to III in minor may be heard and notated as V to I in the relative major, though the Roman numerals provided in Example 10 all presume a minor tonic. Another challenge to identifying *te* chords is that two of the three are major. Thus, it is necessary to perceive whether *te* is the chordal root or fifth of major *te* chords. If *te* provides the chordal root, the harmony is the subtonic (VII). If *te* is the chordal fifth, the chord is mediant (III). As Example 10 shows, the minor *te* chord is the minor dominant (v), which is typically used in minor-key sequences, to harmonize a lament bass, or to set-up a Phrygian cadence.[23]

[22] Given their infrequent usage in real and didactic examples, III+ and vi° are not included in Example 10 or on the Do/Ti/Te Test Handout. See Stevens, "The Do/Ti Test Handouts."

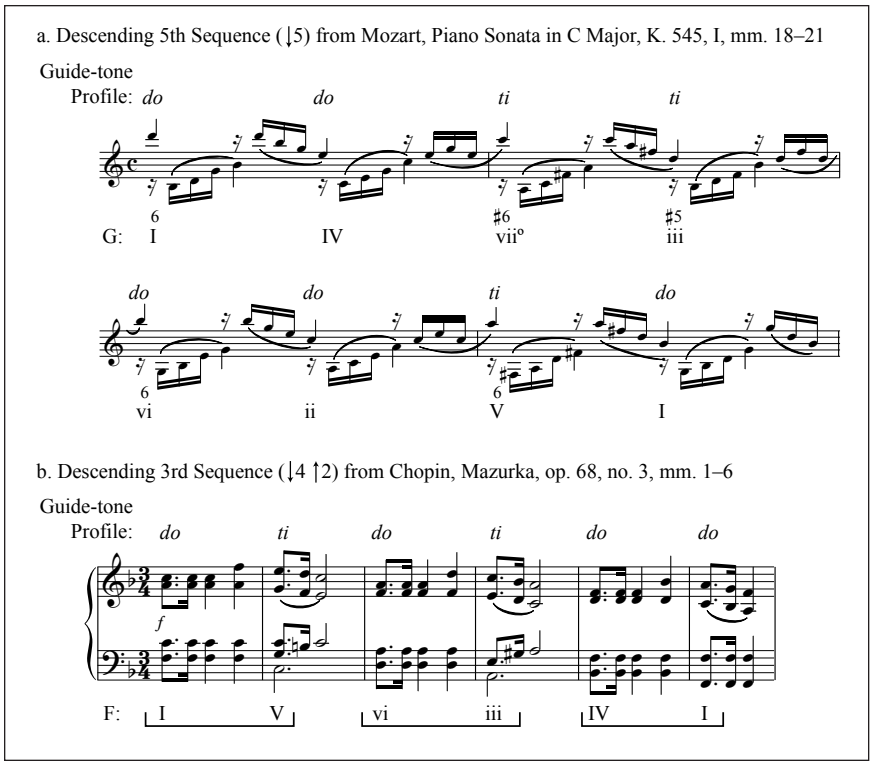
[23] Differentiating *te* chords can also be accomplished using chord member or scale degree arpeggiations, as suggested by Rahn and McKay, "The Guide-Tone Method," 107–109.



Example 10. Do/Ti/Te Test (minor mode)

Diatonic and Chromatic Sequences

The most common harmonic sequences are easily recognized by their guide-tone profiles, which remain consistent no matter which chordal inversions are employed. Example 11 provides the guide-tone profiles for descending fifths and descending thirds harmonic sequences. In Example 11a, the unit of harmonic repetition is a single chord; in Example 11b, the unit of harmonic repetition is two chords (as indicated by the brackets).

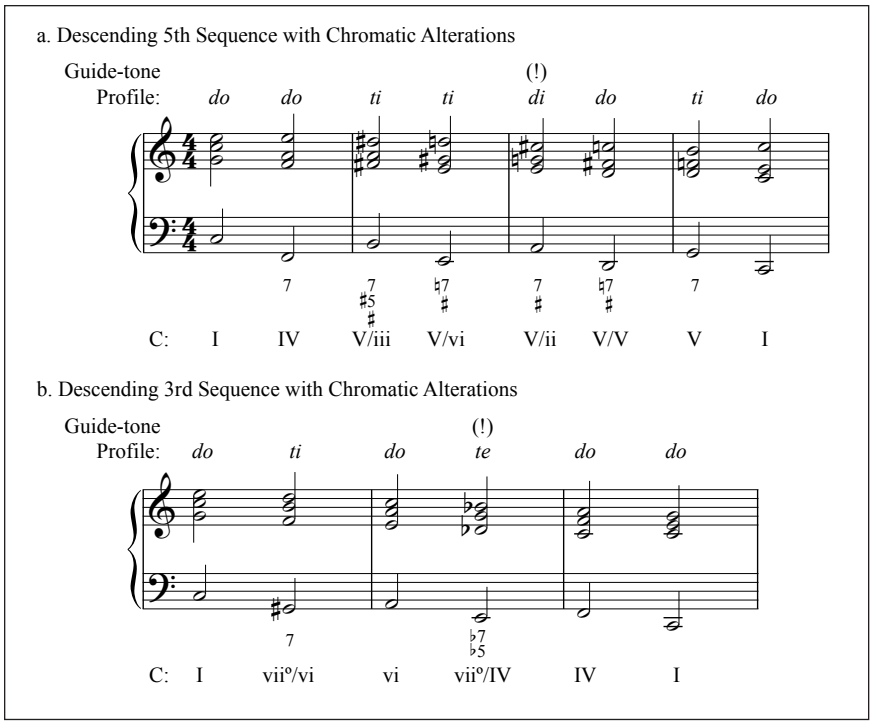


Example 11. Guide-tone profiles of two common sequences

As Example 11 illustrates, the guide-tone profile associated with descending fifths sequences begins with a recognizable pattern—*do–do*, *ti–ti*, *do–do*—which is followed by a cadential *ti–do* pattern. (In minor, the guide-tone profile is *do–do*, *te–te*, *do–do*; the second pair, *te–te*, profiles the major *te* chords VII and III.) In contrast, the descending thirds sequence features alternating *do* and *ti* guide tones until the sequence returns to tonic: *do–ti–do–ti–do–do*. In minor, the guide tone for the second and fourth chords is typically *te*.

Sometimes, the chords of diatonic descending fifths or thirds sequences are chromatically altered to create secondary dominant or leading-tone seventh chords. As Example 12 shows, these alterations do not change the guide-tone pattern enough to obscure the underlying harmonic sequence. In each sequence, only one guide tone, marked with (!), differs from its diatonic counterpart.[24]

[24] The new guide tones introduced by secondary chords, *di* and *ra*, will be discussed in the following two sections.



Example 12. Guide-tone profiles of chromatically altered harmonic sequences

Maintaining guide tones through chromatic sequences (those that ascend or descend by chromatic step) is more difficult. Chromatic voice leading patterns destabilize the scale degrees associated with the guide tones; remaining anchored to the correct pitches and solfège can be extraordinarily difficult. Upon encountering a chromatic sequence, listeners can (1) sing the same guide tone (*do* or *ti*) throughout the progression, or (2) employ "floating" guide tones by tracking the sequence's pitches, then assigning new scale degrees once the sequence reaches its conclusion.[25] Example 13 demonstrates both approaches using an excerpt from Haydn's Piano Sonata in E♭ Major, Hob. XVI:52. In the sonata's transition, a diatonic 7–6 sequence is embellished with chromatic inflections in the two lowest voices. Listeners unfamiliar with the piece would

[25] It can be difficult for listeners to determine during a first hearing which strategy is best suited to a given chromatic passage. In some cases, either strategy will work. I generally recommend that students employ the first strategy until the music makes sustaining the original guide tones impossible or unnecessary (as in cases of modulation or extended chromaticism).

most likely follow the guide-tone line through the first three notes of Example 13b. Once they realize by beat 2 or 3 of m. 11 that they are hearing a chromatic sequence, it may already be too difficult to reestablish E♭ as the guide tone. At this point, tracking the melodic pitches of the sequence may be the only option. Listeners who know the piece and anticipate the sequence may also choose to sustain the guide tone *do* until the sequence ends. In this excerpt, the entire sequence serves to prolong *do* (and the tonic harmony) following an initial 5–6 contrapuntal expansion. At the sequence's conclusion, E♭ (*do*) ascends to E♮, which functions as the leading tone to F.

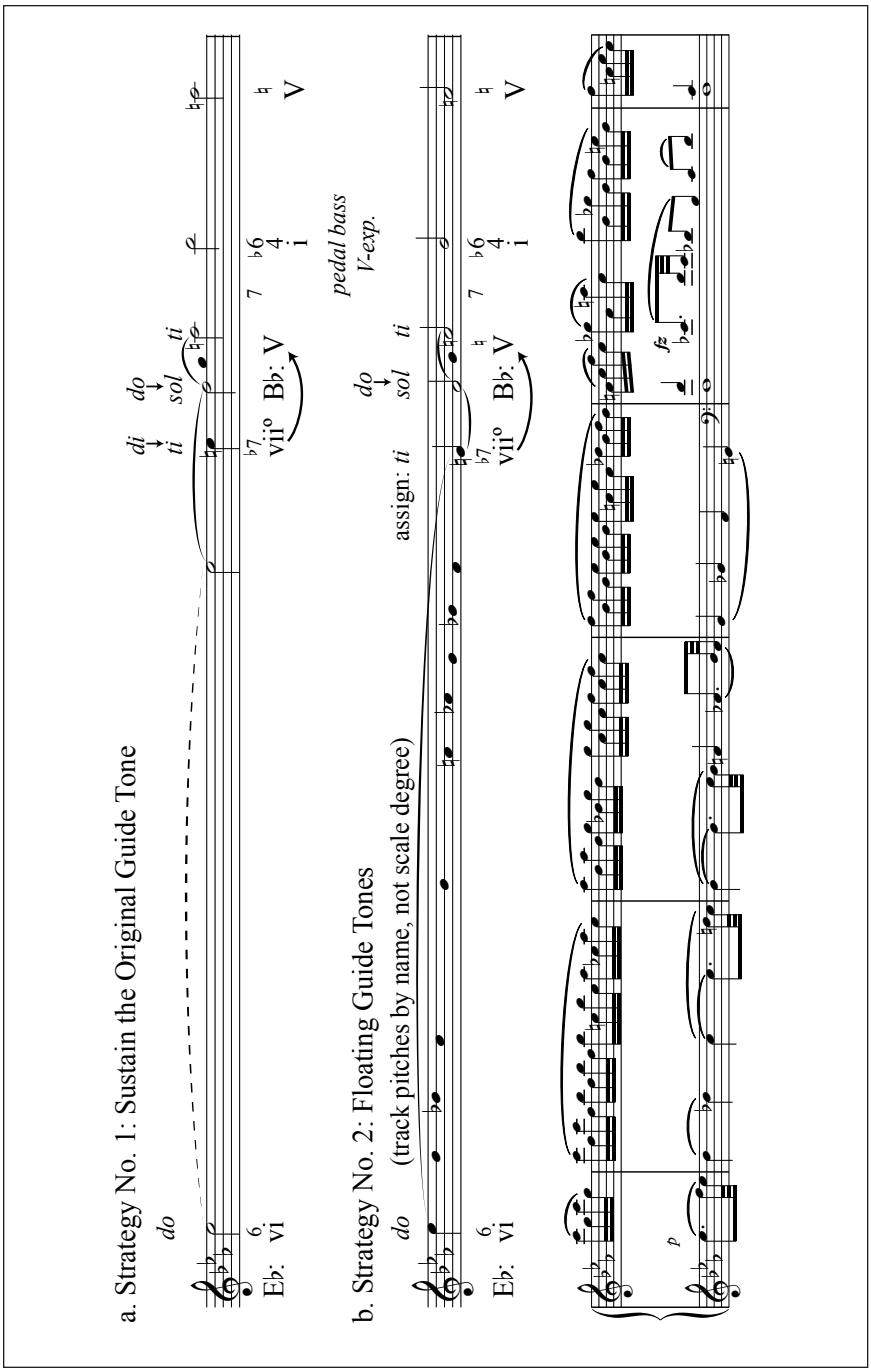
Examples 13a and 13b show two ways listeners might reassign scale degrees to the pitches at the end of the sequence. The general principle that raised chromatic pitches should be interpreted as leading tones at points of modulation or transition is applied in both cases. In Example 13a, *di* (E♮) is quickly reinterpreted as *ti,* and F is provisionally understood as *do*.

Once it becomes clear that F is a dominant pedal, this note is reinterpreted as *sol*, allowing the listener to step up to the new guide tone *ti* (A♮). Listeners who successfully employ the second strategy, shown in Example 13b, simply assign *ti* to the final note of the sequence and *do* to its note of resolution (F). Like the first strategy, *do* is then reinterpreted as *sol*, establishing B♭ as the new tonic. This shift in scale-degree assignment would likely take place during the first two beats of m. 14 when listeners hear that F is a dominant pedal.

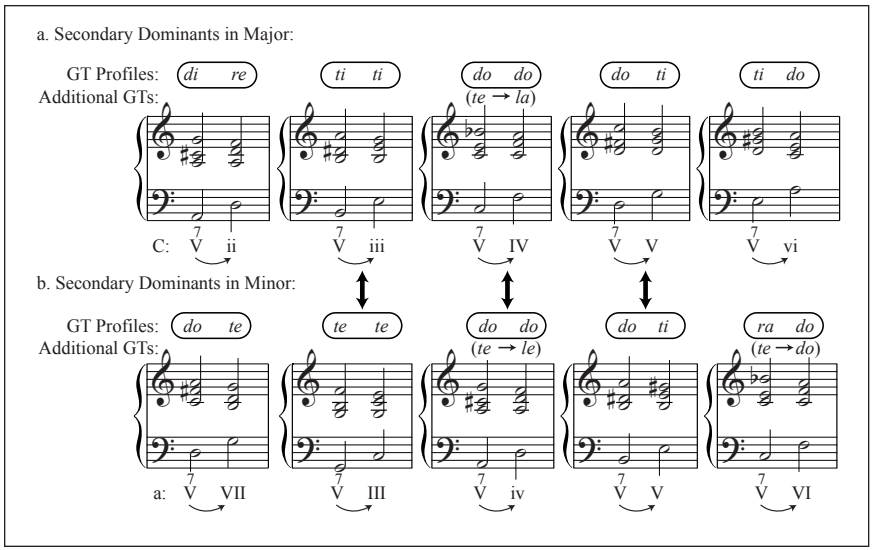
Secondary Chord Guide-Tone Profiles

Guide-tone profiles provide a useful way to identify secondary dominants while maintaining the guide-tone line. As Example 14 shows, the guide-tone profiles of each secondary dominant chord and resolution are unique. Listeners who recognize the presence of a secondary dominant need only follow its guide-tone profile to identify which type of secondary harmony it is.[26] The alignment between three major-mode and three minor-mode profiles (V/III, V/IV, and V/V) makes them easier to learn.

[26] Students who struggle to distinguish chromatic applied chords from diatonic chords may find guide-tone figurations (covered in the next section) more helpful than guide-tone profiles.



Example 13. Haydn, Piano Sonata No. 52 in E♭ Major, Hob. XVI:52, I, mm. 10–15: chromatic 7–6 sequence



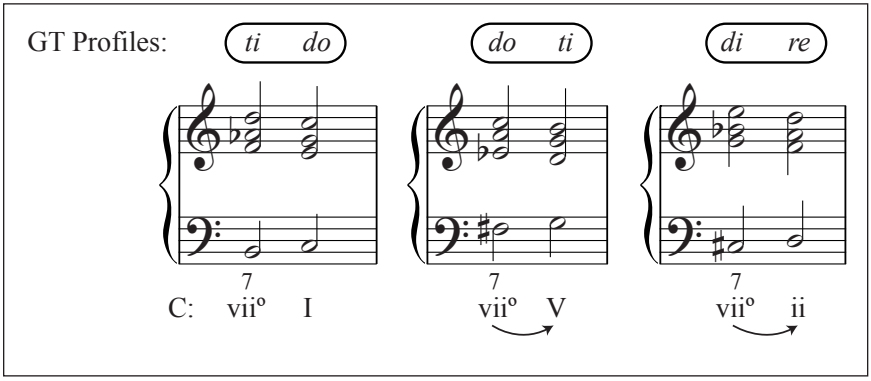
Example 14. Secondary dominant and resolution guide tone profiles

Two of the profiles feature new guide tones. The V/ii in the major mode requires the listener to move up a half step, from *do* to *di*. The raised tonic, *di*, temporarily becomes a leading tone and resolves to *re*. Once *re* has been sung, listeners should move back to the guide tone *do*, as the supertonic figuration shows in Example 7. The second new guide tone, *ra*, is introduced by the V^7/VI in minor. This harmony takes practice to identify correctly, since two of its notes—*te* and *ra*—could be sung as guide tones. As students learn the V^7/VI in minor, they should train their ears to follow the guide tone upward by half step to the pitch that marks this particular harmony, *ra*, whose status as chordal seventh creates a strong downward tendency.

Although the examples in Example 14 feature seventh chords, in most cases, the guide-tone profiles correspond to members of the applied triad and thus work equally well when no chordal sevenths are used. Only in the V^7/V and V^7/VI (in minor) is the first guide tone of the profile a chordal seventh. As with the supertonic, I recommend that students sing *do* during the V/V regardless of whether or not the seventh is present. Persisting on *do* allows students to use the same figuration outlined in Example 7, helping cement the idea of V/V as an altered ii chord. Further, singing *do* helps students maintain their sense of tonic during the chord that strongly challenges it and provides them a stable point of

reference for singing figurations that include the applied chromatic tone (*fi*), as explained below. The V^7/VI in minor, like the V^7/IV in major, requires the addition of the chordal seventh to be recognized incontrovertibly as a secondary dominant. Thus, it is appropriate for students to associate the guide tone *ra*, the seventh of the V^7/VI in minor, with this chord.

Guide-tone profiles are of limited use in identifying secondary leading tone seventh chords and their resolutions. Unlike secondary dominants, different secondary leading tone sevenths and resolutions can have the same guide-tone profile. Further, composers commonly respell fully diminished sevenths using enharmonic equivalents when modulating to distant keys. When listeners encounter fully diminished seventh chords, it is generally advisable to track one or more specific pitches from the fully diminished seventh chord to its resolution, where the relevant scale degrees can be reestablished. Nevertheless, the three guide-tone profiles shown in Example 15 can be provisionally associated with the corresponding fully diminished seventh chords and their resolutions; listeners must confirm each chord's function by identifying the diatonic chord of resolution of every fully diminished seventh chord.



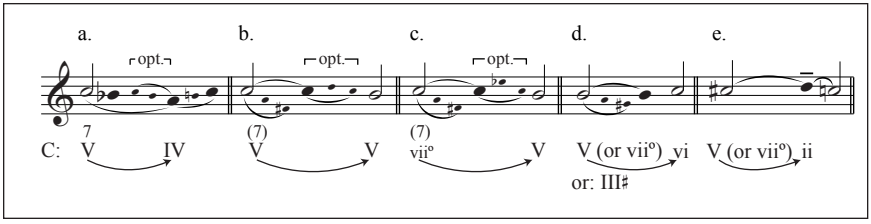
Example 15. Guide-tone profiles for fully diminished seventh chords

There are advantages and disadvantages to using guide-tone profiles to identify secondary dominants and leading tone chords. The main advantage is that these profiles add another application to the guide tones that students are already singing. With almost no extra effort, students who memorize the profiles can identify most applied dominant and leading tone seventh chords. However,

if a student fails to identify a chord that is chromatic and dominant functioning, the guide tones alone will not usually signal an applied chord. Another disadvantage is that it can to encourage atomistic, deductive hearing, in which one element is interpreted to identify a harmony, without hearing other essential musical elements such as the applied leading tone.

Secondary Chord Guide-Tone Figurations

Guide-tone figurations may also be used to identify secondary dominants. As noted earlier, guide-tone figurations can be simple or ornate, improvised or learned in advance. Example 16 offers some examples of guide-tone figurations used to identify secondary chords. Not every secondary chord is covered, nor are the figurations provided the only ways to sing and hear through each harmony.



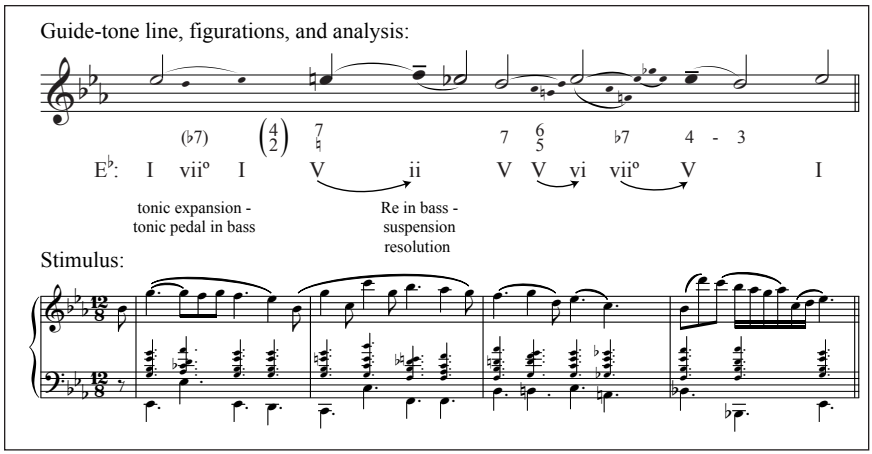
Example 16. Guide-tone figurations for selected secondary chords

The figuration for the V^7/IV in Example 16a is similar to the figuration for the I^7 shown in Example 8. The optional movement back and forth between *do* and *te* highlights the unique chromatic element of this chord. The second and third figurations, shown in Examples 16b and 16c, are of higher value for students: the *do–la–fi* figuration and the diminished fifth it outlines are clearly audible in harmonies that tonicize the dominant. Both figurations highlight the common chromatic pitch, *fi*, and the two minor third intervals that connect *do* and *fi* make the patterns easily singable and identifiable. Once listeners hear *do–la–fi*, they need only determine the chord quality to tell whether the chord is an applied dominant or leading tone chord. Tempo permitting, an optional *do–re–do* or *do–me–do* may be added to the figuration to distinguish between the two possible applied chords. Each figuration ends with a return to *ti*, the arrival of which may be delayed by a cadential $\frac{6}{4}$.[27] The

[27] In pieces with expected modulations to the dominant (such as during the exposition of a major-mode piece in sonata form), the *do–la–fi*

fourth figuration, shown in Example 16d, may be used to identify V^7/vi and vii^{o7}/vi. These applied chords disrupt the primary guide tones *do* and *ti* more strongly than do the applied dominants of V and IV; by tonicizing *la*, V^7/vi and vii^{o7}/vi make *ti* feel like *re*, a shift that can be disorienting for some students. In order to remain anchored on the correct guide tone, listeners may sing the entire *ti–la–si–ti* figuration as a melisma on a single syllable *ti*, which returns to *do* only when the V^7/vi or vii^{o7}/vi resolve to vi. Like the guide-tone profile discussed earlier, the figuration for the V^7/ii and vii^{o7}/ii given in Example 16e articulates the guide tone *di* resolving to *re*. Although I recommend using *do* as the guide tone for the supertonic in general, when the supertonic is tonicized, I suggest that students stress and hold *re* (as indicated by the tenuto mark on the figuration) before returning to the supertonic's guide tone *do* in order to capture the special emphasis given to *re*. Many of the figurations above are employed in the guide-tone analysis of the opening of Chopin's Nocturne in E♭ Major, op. 9, no. 2, given with a reduction of the left hand figuration in Example 17. The level of analysis represented in Example 17 might be expected of an undergraduate music major nearing the end of a unit on applied chords. In this analysis, open noteheads are reserved for guide tones *do* and *ti*, large solid noteheads indicate secondary chord guide-tone profiles or embellishments of the guide-tone line (such as the 4–3 suspension before the cadence). Small noteheads are used to show guide-tone patterns and guide-tone figurations that expand the given harmonies. For this excerpt, students could be asked to dictate the bass line and add figured bass symbols as well.

guide-tone figuration is particularly useful for shifting to the new tonic. In cases where the modulation occurs in the transition (before the medial caesura), listeners simply redefine *fi* as *ti*, and continue singing the guide tones in the new tonal area of the dominant.



Example 17. Guide-tone analysis of Chopin, Nocturne in E♭ Major, op. 9, no. 2, mm. 1–4

Common-Tone Diminished Sevenths and Augmented Dominants

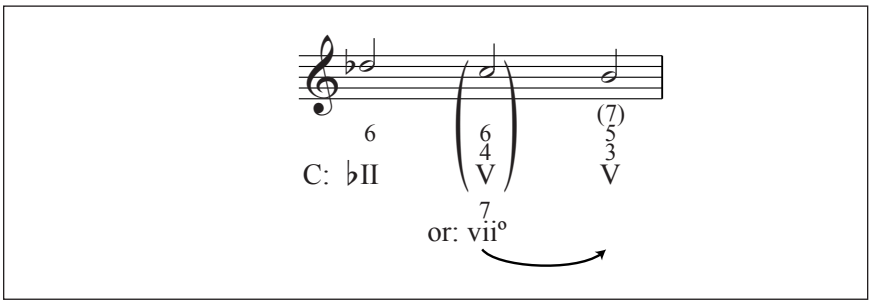
Common-tone diminished seventh chords (ct°7) merit special attention due to their frequent confusion with secondary diminished seventh chords (°7). The ct°7 that prolongs the tonic chord (typically built on ♯$\hat{2}$) and the vii°7/V are both consonant with *do* and contain enharmonically equivalent pitch material. However, the ct°7 of I does not tonicize V. The two harmonies can be distinguished by their guide-tone profiles: while the progression from vii°7/V to V creates *do–ti* profile, the guide-tone profile of the tonic-expanding ct°7 resolving to I is *do–do–do* (when situated between two tonic chords). Students are not likely to confuse the dominant-expanding ct°7 (typically built on ♯$\hat{6}$) with the vii°7/ii, even though both contain *di*, due to the distinctive guide-tone profile associated with the ct°7 (when situated between two dominant chords): *ti–li–ti*. The unique guide-tone profiles of the common ct°7 chords make it possible to identify and distinguish them from enharmonically equivalent secondary diminished seventh chords.

Altered tonic and dominant harmonies fit nicely into the harmonic dichotomies of the Do/Ti Test. Like tonic (I), the augmented triad built on tonic is a *do* chord. The altered tonic typically acts as a secondary V+/IV, which leads to another *do* chord, IV, via the chromatic voice leading *si–la*. Similarly, V+ is consonant with *ti* and typically resolves to a tonic *do* chord. Beyond their guide-tone profiles, altered tonics and dominants provide a unique opportunity for students to create

figurations that outline augmented triads. Students who regularly use guide-tone figurations to explore harmonies will often express delight as they move through the successive major 3rds around the guide tones *do* and *ti*.

Guide-Tone Figurations for Chromatic Predominants

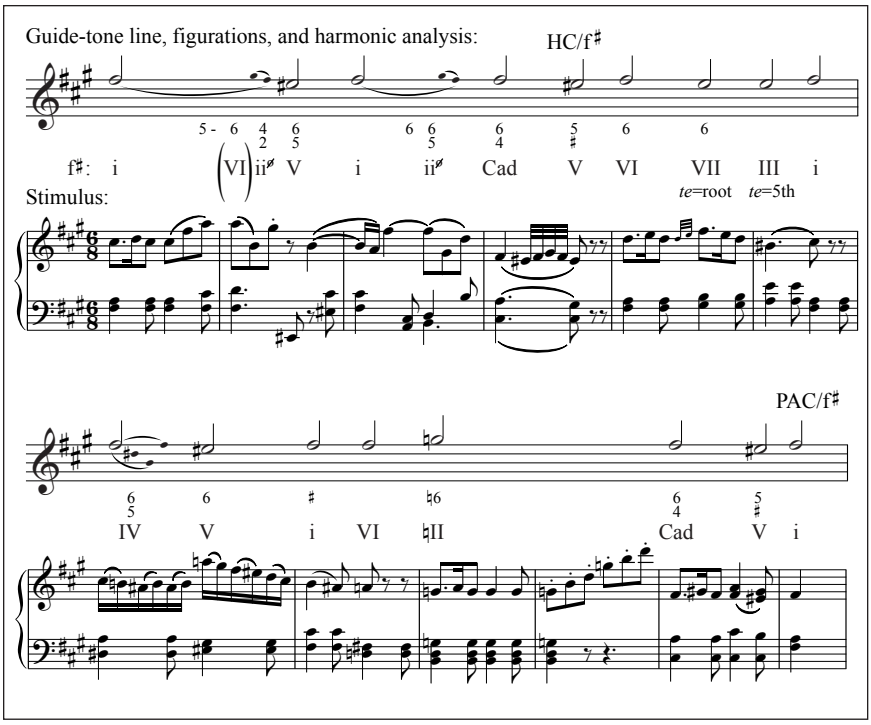
The Neapolitan is identifiable by its unique guide tone, *ra*—the final guide tone in the set of primary guide tones (i.e., *do*, *ti*, *te*, *di*, and *ra*).[28] Distinguishing between *ra* and *di* is not a problem for most students: *di* tends to resolve up to *re*, while *ra* resolves down to *ti*, sometimes passing through *do*. As Example 18 illustrates, if the diminished third between *ra* and *ti* is filled in by *do* as a passing tone, *do* is typically harmonized as a vii^{o7}/V, a cadential $\frac{6}{4}$, or both (in that order). Also, students may listen for the Neapolitan's function as a predominant harmony, most often with *fa* in the bass. The guide-tones profiles that involve *ra* and its continuation to *ti* add a linear dimension to students' understanding and aural experience of the Neapolitan and its resolution. Example 19 provides a guide-tone analysis of a minor-mode excerpt that employs the Neapolitan, taken from the Adagio of Mozart's Piano Concerto in A Major, K. 488.[29]



Example 18. Guide-tone profiles of the Neapolitan and its resolution

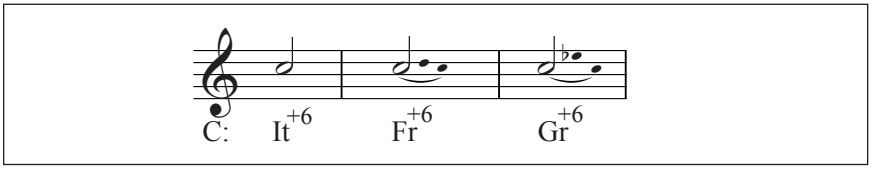
[28] See also Rahn and McKay, "Guide-Tone Method," 110.

[29] The first chord in m. 7 of Example 19, a major IV$^{6}_{5}$, is challenging due to its dominant seventh quality, which may imply a V/VII function to students. However, as is typical in minor, this harmony functions as part of a tonic expansion spanning from beat 2 of m. 6 to the downbeat of m. 8, over *la–ti–do* in the bass. This prolonged tonic itself participates in a descending third progression (III–i–VI) whose final chord (iv) is substituted by the ♮II^{6}.



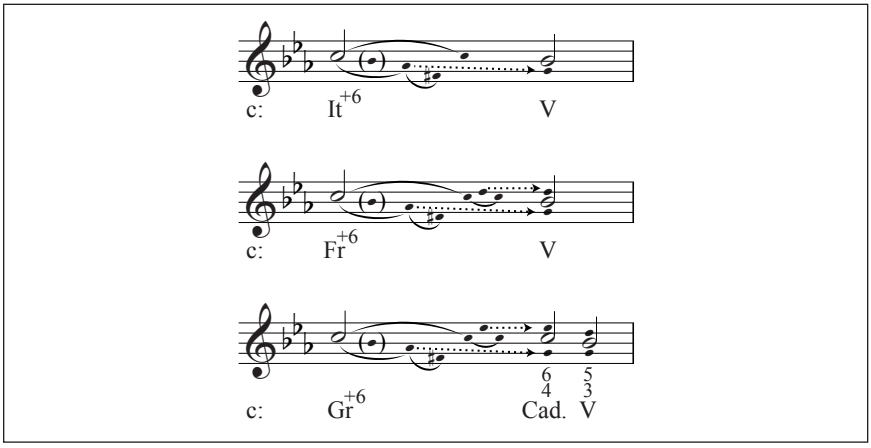
Example 19. Guide-tone analysis of Mozart, Piano Concerto in A Major, K. 488, II, mm. 1–12

The Do/Ti Test and guide-tone figurations are useful for distinguishing between different types of predominant-functioning augmented sixth chords. However, they are less helpful for identifying augmented sixth chords in the first place, for two reasons: all predominant-functioning augmented sixth chords are *do* chords, and the unique chromatic features (*le* and *fi)* are not easily accessible via guide-tone figurations. Listeners who have already identified an augmented sixth harmony can use the guide-tone figurations in Example 20 to identify the augmented sixth type. The It^{+6} is identifiable because it does not contain a second or third above the guide tone: it only contains *le*, *do*, and *fi.* The Fr^{+6} contains a major second above the guide tone (*do* + *re*), and the Gr^{+6} a minor third (*do* + *me*).



Example 20. Guide-tone figurations for distinguishing augmented sixth type

Some listeners may find it helpful to create a guide-tone figuration for recognizing augmented sixth chords or for distinguishing them from other chromatic harmonies. The figurations in Example 21 build on those in Example 20 to suggest one possible approach. These figurations begin with passing motion through *te* to get to *le* and *fi*. The diminished third descent from *le* to *fi* is different enough from the minor-third descent from *la* to *fi* associated with the V/V and vii°/V that these figurations may be beneficial. Comparing these augmented sixth and secondary dominant figurations can help students attune their ears to small but significant intervallic differences (*do–la–fi* vs. *do–le–fi)*.



Example 21. Guide-tone figurations for identifying augmented sixth chords and types

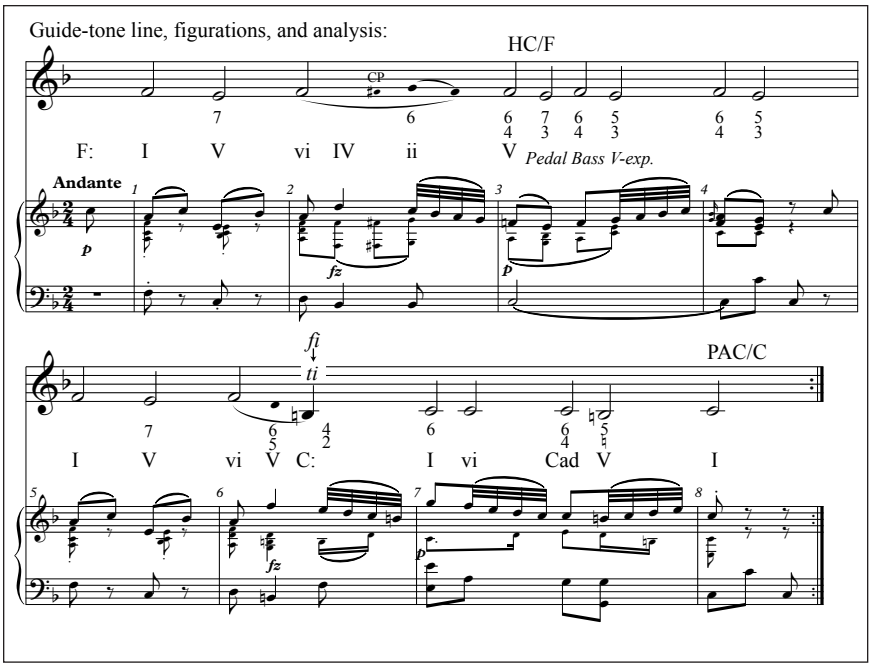
Alternatively, some students have more success identifying the tones that comprise the augmented sixth interval in relation to the secondary guide tone *sol*, to which both *le* and *fi* resolve by half step. Given that augmented sixth chords only last for a moment in real musical contexts, I have found that guide-tone figurations are primarily useful for distinguishing their type. Once students have learned to identify augmented sixth chords by their characteristic interval and resolution, the guide-tone figurations in Example 20 provide a handy guide for making finer distinctions.

Extending the Do/Ti Test: Modulations to Closely Related Keys

Using the Do/Ti Test as an introduction to identifying modulations may be one its most promising applications.[30] Unlike modulating phrase-length examples often used in theory classes, real pieces rarely afford the listener time after a modulation to figure out the new tonal center. The Do/Ti Test and figurations offer listeners a means of identifying modulations in real time in the phrase. In most cases, listeners need only sing the guide-tone figuration of the chromatic chord used to modulate, then reassign scale-degree and solfège to the tones of that figuration. The guide-tone analysis of the parallel period that begins the Andante of Haydn's Symphony No. 90 in C Major, shown in the orchestral reduction in Example 22, demonstrates this application. The antecedent phrase (mm. 1–4) reaches a half cadence in the tonic. The consequent phrase modulates to the dominant, ending in a perfect authentic cadence. At m. 6, listeners who have learned a guide-tone figuration for the V/V should respond to the harmony by singing or audiating *do–la–fi*. Given the parallel phrase structure and the cadential bass line that follows this chromatic harmony, listeners should be able to hear rather quickly that *fi* in m. 6 is reinterpreted as *ti* and resolved to the new tonic, C.[31]

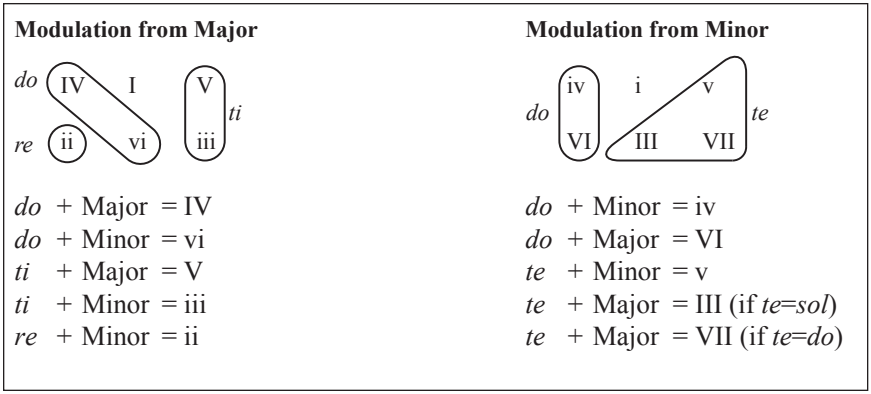
[30] Identifying modulations by ear is a topic that has received relatively little treatment in pedagogical literature. In *Aural Skills Acquisition*, Karpinski focuses primarily on sight reading modulating passages, and Michael Rogers, in *Teaching Approaches in Music Theory*, mentions modulations only in passing, and not at all in relation to harmonic dictation. In "Listen Up!: Thoughts on iPods, Sonata Form, and Analysis without Score," *Journal of Music Theory Pedagogy* 22 (2008): 149–176, Brian Alegant offers an excellent model for teaching students to analyze large forms by ear. In his model, teachers provide, then gradually remove, visual aids (including changing tonal centers) that serve as listening signposts for the students, whose task is to write the time points of each signpost while listening. Timothy S. Cutler addresses modulation directly and thoroughly, providing a collection of exercises and analyses that illustrate different ways that modulations produce a change in tonal context in "An Aural Skills Approach to Context and Modulation in Tonal Music," *Journal of Music Theory Pedagogy* 16 (2002): 79–104.

[31] This beautifully crafted Andante provides further excellent listening examples. The subsequent two phrases (mm. 9–16) contain three applied harmonies. The B section, in the parallel minor, features a modulation to the mediant (♭III), another back to the minor tonic, and includes an excellent example of the Neapolitan followed by vii^{o7}/V and the cadential $\frac{6}{4}$.



Example 22. Haydn, Symphony No. 90 in C Major, Hob. I:90, II, mm. 1–8: Guide-tone analysis

Another application of the Do/Ti Test to modulation is best suited for single phrases with diatonic modulations like the didactic examples often used in aural skills classes. In this approach, listeners persist in singing the guide tones of the original key (*do*, *ti*, or sometimes *re* for phrases that begin in major; *do* or *te* for those that begin in minor) to an authentic cadence in the new key. When working on modulations in major, I include *re* as a guide tone given the possibility of a modulation to the supertonic (in which *re* will be reinterpreted as *do*). Based on the guide tone from the original key and mode of the new tonic, listeners determine the new key using a thought process similar to the Do/Ti Test (see Example 23). Before each new dictation exercise begins, I encourage students to sketch the chart modeled in Example 23 (using either Roman numerals or letter names) on their practice sheets. As they listen, students can use the final guide tone to limit the possibilities to the corresponding options circled on their chart, then distinguish by mode and sometimes by scale degree to determine the new tonal center. In minor, a new cadential tonic that is consonant with the original key's *te* is the mediant (III) when *te* is the chordal fifth and the subtonic (VII) when *te* is the chordal root.



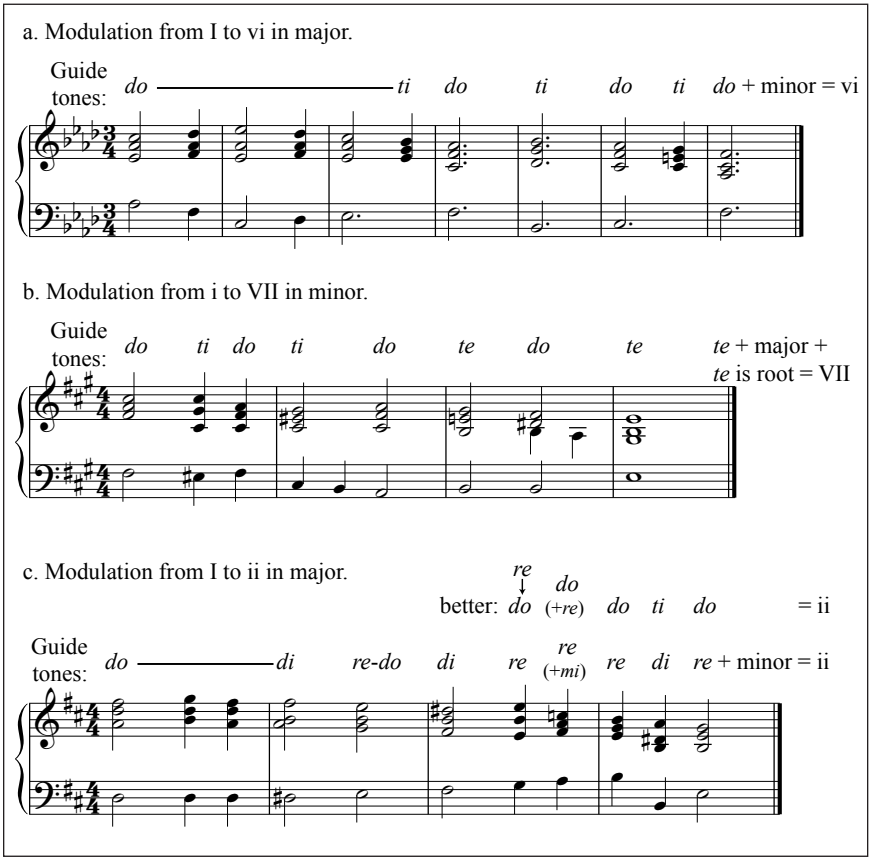
Example 23. Closely related keys: guide tones and quality

Example 24 demonstrates how students can apply this technique to modulating harmonic dictations in class. In the first two modulations shown in Examples 24a and 24b, listeners can easily persist in using the original guide tones to the cadence. In Example 24c, maintaining the original *do* is much more difficult after the supertonic has been tonicized. In this case, it is advisable to sing *re* as soon as it has been tonicized and to reassign *do* to this pitch as soon as a modulation is suspected, even before the cadence has been reached.

In this approach, modulations are identified only after they have been confirmed by an authentic cadence in the new tonal area. Pedagogically, this approach reminds students of the widely held definition that modulations (as opposed to tonicizations) must be established and confirmed by a cadence in a new tonal area. Further, it trains students to keep all the closely related keys in mind when listening to phrases. A disadvantage of this approach is that it is designed primarily for phrase-length examples: the method is difficult to apply to musical compositions that continue without pause following a cadence. Methodologically, this approach is limited in that the diagrams in Example 23 are designed to work only with authentic cadences in the new key. Neither creating additional diagrams for half cadences nor training students to imagine the tonic after a half cadence in the new key is practical or reliable.[32] Teachers who employ this method may choose to bypass

[32] Applying this method to modulating phrases ending in half cadences would simultaneously require students to imagine and compare a guide tone from the original key and the tonic chord of the new key. To

this problem altogether by simply using phrases that end with authentic cadences until students become more comfortable with the method.



Example 24. Three modulating phrases

Once students have identified the key of the final cadence, they are often better able to identify the point of modulation by finding the first chord with the leading tone in the new key and sketching out the bass line at the cadence. For some students, singing *do* through the phrase can help them pinpoint when the old tonic no longer holds, helping them to model a viable pivot-chord modulation in their analysis. More advanced students may use the guide-tone figurations and modulations described above to better discern the point of modulation. And for weaker students who struggle with

avoid this difficulty, I recommend using guide-tone figurations to identify the cadential dominant (and the new key to which it points).

harmonic dictation in modulating contexts, the Do/Ti Test can provide a vital confidence boost by helping them accurately identify the final tonic.

Concluding Thoughts on the Do/Ti Test

The Do/Ti Test and its extension to chromatic harmonies and modulation provide a method for organizing musical observations to quickly and accurately arrive at a holistic understanding of harmonic identity. It is effective because it allows students to concentrate their efforts on the most vital elements of what they hear: the five primary guide tones (*do*, *ti*, *te*, *di*, and *ra*), three secondary guide tones (*fa*, *sol*, and *le*), chord quality, and phrase function. All other harmonic pitches are identified using guide-tone figurations. Methodologically, the Do/Ti Test invites students to make music as a way of listening, ensuring that the notations produced during dictations reflect real musical experiences, and enabling teachers to measure each student's ability to think in sound.

Part 2: Implementing the Do/Ti Test in the Core Theory Sequence

The Do/Ti Test's unique approach to harmonic dictation invites new ways of implementing harmonic dictation activities in core aural skills classes. In this section, I describe five aspects of course and curricular design that changed as a result of using the Do/Ti Test in the aural skills sequence at my institution and share strategies for integrating the Do/Ti Test with other approaches to harmonic dictation already in use.

Strategies for Developing Active Listening

The core pedagogical principle of the Do/Ti Test is that musical understanding occurs when the listener links music that is heard with patterns that are already in the mind. Thus, from the beginning of instruction, students should actively make music as they listen. Having the entire class perform the Do/Ti Test at the same time is an excellent way to introduce the technique. During group singing,

weaker students can learn from their peers how to move between guide tones with the music, and respond to the stimuli with energy and confidence. As Rahn and McKay point out, at this stage, "much of the communication is truly musical rather than verbal or notational."[33] Between class singing and individual listening practice lie numerous variations and approaches. For instance, students can work in small groups to create a guide-tone analysis of a passage, a process that balances individual accountability with the benefits of group learning and peer-to-peer feedback. After each group has finished their analysis, they can teach it to the class as a whole, sharing how they learned to hear through difficult passages.

Alternatively, students can bring their instruments to class and play along with an example, dividing the bass line, guide-tone line, and guide-tone figurations between different instruments and voices. Still another approach is to assign a problem-based learning activity in which each student chooses a popular song and then teaches a non-music student on campus how to identify the tonic note and sing guide tones with each harmony. This activity requires that students learn the listening strategy well enough to teach it to someone without a similar musical background and to reflect on the experience of each participant in the teaching and learning process. In-class activities can be supplemented by listening assignments outside of class and facilitated by assessment tools available in most course management systems, allowing students and teachers to closely follow student progress. No matter which approach is used, training students to habitually respond to music by thinking creatively in sound helps them to cement the connection between the music they audiate and hear, so that the analytical symbols they eventually notate capture real musical experiences rather than only the results of rational calculations or deductions.

In the methods described above, students are allowed and encouraged to sing the guide tones aloud while listening. In general, beginning students apply the Do/Ti Test more accurately when singing than they do when audiating. Because students are not used to singing while listening, especially in a classroom setting, some students may need to be encouraged to sing aloud during the earlier stages of implementation. However, the time will come when the demands of assessing student progress en masse necessitate audiating guide tones silently. In addition to allowing plenty of time for singing in class, it is important that teachers allow enough time

[33] Rahn and McKay, "The Guide-Tone Method," 104.

to train students how to audiate while listening. Further, students who struggle to audiate the Do/Ti Test during in-class assessments may be offered alternative assessment opportunities in which they can sing in a different environment or even play the guide tone on their instrument. Ultimately, students should be encouraged to develop the ability to audiate while listening so that they can apply their listening skills in a wide variety of contexts (e.g., concerts, other music courses, study halls).

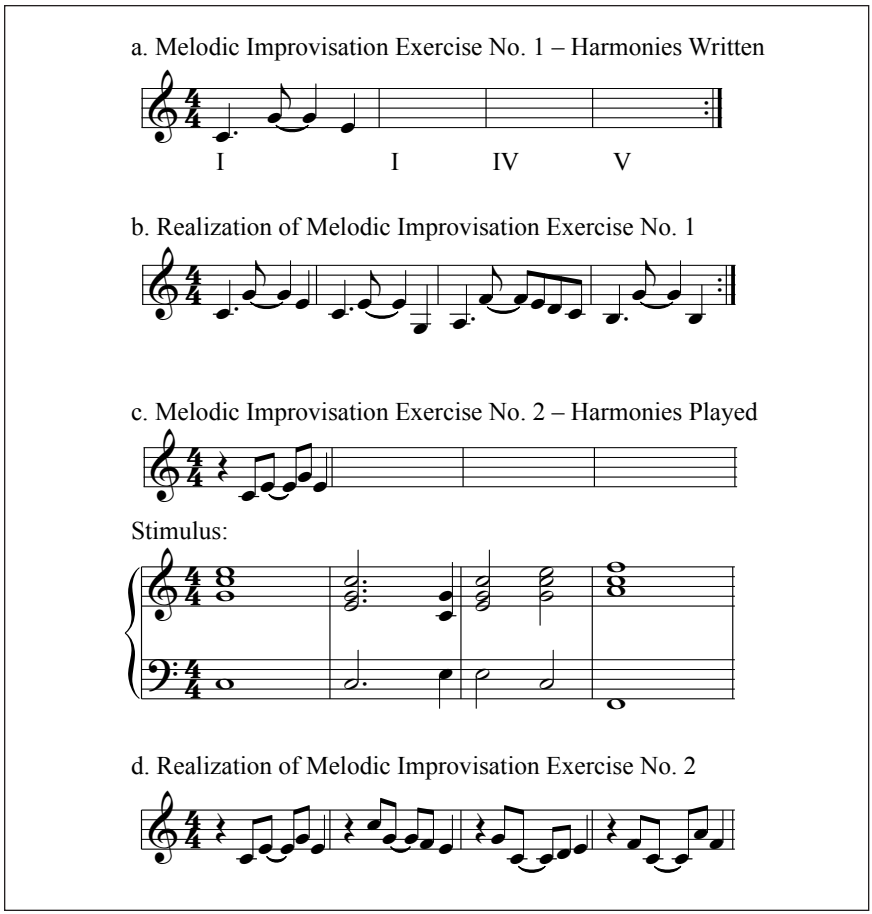
Because the Do/Ti Test, at its earliest stage of introduction, is focused on only two guide tones, it can be applied to a wide variety of styles, genres, textures, and harmonic rhythms. The wider the variety, the likely students will be to find something relevant to their own everyday listening experiences, and the sooner they will begin to apply the technique outside of class. In addition to using recorded examples, teachers can improvise extended melodies over a variety of accompanimental figurations and styles, including Alberti bass, waltz, minuet, pop/rock, and so on. Improvised examples allow the teacher to directly target the needs of the class, and control the harmonic rhythm. It can be effective to engage students' whole bodies by having them stand at their desks, walk around the room, conduct, or improvise some other set of movements that correspond to the guide tones or chordal functions that they hear.[34] Such activities help students develop the ability to listen actively while performing other tasks, a skill that is essential for musicians.

Recent editions of *Music for Sight Singing*, by Robert Ottman and Nancy Rogers, provide improvisation exercises that could be adapted for use with the Do/Ti Test.[35] Example 25a provides an example improvisation similar to those suggested by Rogers. In this exercise, students continue the melodic and rhythmic pattern

[34] For more ideas on incorporating movement and signing into listening activities, see Nicholas Bannon, "Embodied Music Theory: New Pedagogy for Creative and Aural Development," *Journal of Music Theory Pedagogy* 24 (2010): 197–216.

[35] See Robert W. Ottman and Nancy Rogers, *Music for Sight Singing*, 8th ed. (Upper Saddle River: Pearson Prentice Hall, 2011), 278. In addition to authoring the improvisation exercises in recent editions of *Music for Sight Singing*, Rogers also applies improvisation to the development of aural skills more broadly in "How Structured Improvisation Can Improve Sight Singing Performance (and More)," in *Teaching Sight Singing* (New York: The College Board, 2008), 49–58, http://apcentral.collegeboard.com/apc/public/repository/Music_Teaching_Sight_Singing_SF.pdf.

in a manner that realizes the harmonies provided under the staff. Example 25b provides one possible melodic realization of the chord progression. To adapt this exercise for use with the Do/Ti Test, the instructor provides a starting figuration like the one in Example 25c but plays the harmonies at the keyboard (at a slow tempo) rather than provide them under the staff. As students listen, they sing a melodic pattern outlining the harmony being played and transition from one melodic figuration to another when the harmonies change. At first, students may need to drop out for a measure when a harmonic change occurs, but with practice, most students are able to make this transition within one or two beats. To facilitate harmonic changes, instructors may modify the starting melodic pattern to provide a space on the downbeat, as in Example 25c. Giving students slow harmonic changes can often be helpful at first: staying on a single harmony for several measures allows students time to find suitable melodic patterns and explore the melodic possibilities of each harmony. In addition, when students first try this improvisation, they may be encouraged to start their figurations on a guide tone (*do* or *ti*) to reinforce the connection between Do/Ti Test and the melodic figurations. As students become more comfortable, many will naturally choose to improvise more freely, producing music like that in Example 25d.



Example 25. Sample improvisation exercises

At my institution, Rogers's exercises provide the basis for free melodic improvisations. During these improvisations, students work in small groups of three to four students, using patterns and chord progressions like those in Example 25a. In turn, each group member improvises a free melody over the harmonies sung by the other members of the group and signals impending harmonic changes to the other members by holding up one (I), four (IV), or five (V) fingers.[36] In this activity, students directly experience

[36] For more suggestions about using improvisation to teach theory, see Kate Covington, "Improvisation in the Aural Curriculum: An Imperative," *College Music Symposium* 37 (1997), http://symposium.music.org/index.php?option=com_k2&view=item&id=2135:improvisation-in-the-aural-curriculum-an-imperative; and Garrett Michaelsen, "Improvising to Learn/Learning to Improvise: Designing Scaffolded

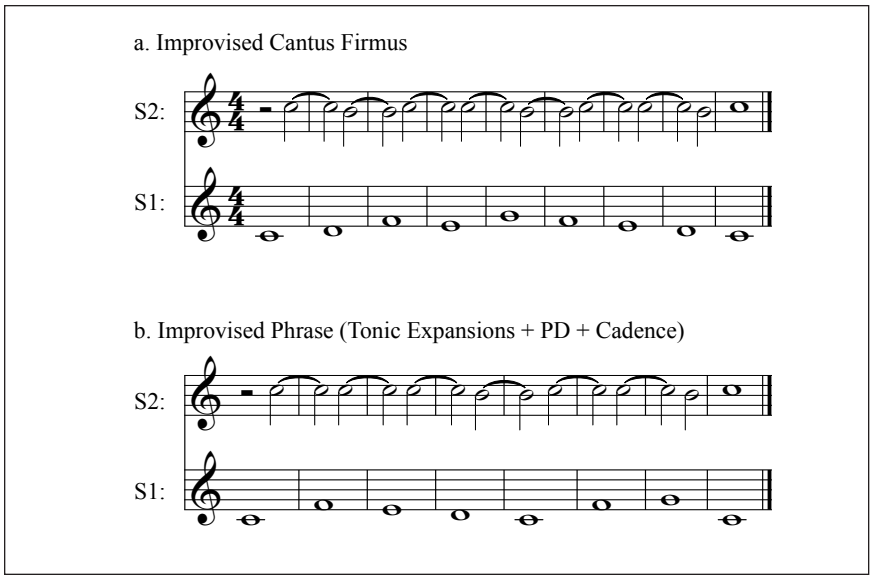
how melodic and harmonic structure relate and learn to choose harmonies based on melodic design (and vice versa).

Another improvisation activity is designed to apply the Do/Ti Test to learning the contrapuntal structures and guide-tone profiles of idiomatic tonic expansions. In this activity, students work in pairs, with one student (S1) freely improvising a bass line similar to a *cantus firmus* and the other (S2) singing guide tones. The result is music similar to first-species counterpoint: the notes are sung in a 1:1 relationship and all intervals must be consonant (thus any *re* in the *cantus firmus* will be dominant function, and take the guide tone *ti* rather than *do*). Unlike first species, the upper voice in this activity is limited to singing only *do* or *ti*. Students begin the improvisation singing at a perfect octave; they sing in whole notes while conducting in $\frac{4}{4}$. At the downbeat of every measure, S1 leads by changing bass notes by step, skip, or leap in any direction. As Example 26a illustrates, S2 responds by changing as quickly as possible (by beat 3 at the latest) to the guide tone that is consonant with the new bass note.[37] Once the students are comfortable with the exercise, S1 is asked to create a phrase by singing several tonic-expanding bass progressions followed by a predominant and cadence (see Example 26b).[38]

Group Improvisations for the Music Theory Classroom," *Engaging Students: Essays in Music Pedagogy* 2, http://www.flipcamp.org/engagingstudents2/essays/michaelsen.html.

[37] Even though the rhythms are staggered, the students are asked to imagine that the changes are aligned, thereby eliminating the need to worry about fourth-species rules.

[38] For a single-page collection of idiomatic tonic- and non-tonic-expanding progressions, see Daniel Stevens, "The Phrase Model Handout," *Music Theory Pedagogy Online*, 2016, https://music.appstate.edu/about/jmtp/so-you-want-write-chord-progression.



Example 26. Contrapuntal Do/Ti Test improvisations

Once students are comfortable creating consonant intervals, teachers can loosen the rules to allow dissonances in limited contexts. For instance, students might be allowed to form a dissonant seventh between *re* and *do*, indicating the supertonic, with the added rule that the bass must resolve up to *sol* and the guide tone down to *ti*. Similarly, an augmented fourth could be allowed between *fa* in the bass and the guide tone *ti*, as long as the dissonance is correctly resolved. Adding the possibility of dissonance allows students to explore new intervallic relationships and dissonance resolution. More significantly, these changes give S2 the power to influence the direction of the improvisation. If S1 sings *re* or *fa*, S2 gets to choose whether to create a consonant or dissonant interval.[39]

Listening journals, in which students notate on staff paper their musical responses to the pieces they hear, are an excellent way to help students develop the habits of active listening and musical thinking. While listening journals can be scaled to fit the learning goals of any course in the aural skills sequence, they are particularly

[39] In all the improvisations above, a third student could be added to the group and given the role of calling out which expansion type is being modeled in the counterpoint. The improvisation activity is complete when all students have had a chance at each role. For a similar improvisation activity more focused on learning the voice leading patterns of harmonic expansions, see Stevens, "So You Want to Write a Chord Progression?"

valuable once students have advanced to chromatic harmonies and modulation, in which audiating both guide tones and figurations are appropriate forms of response. Another benefit is that students can scale the complexity of their musical response to their comfort level in both improvisation and dictation. The resulting notations provide teachers a much better idea of each student's progress and can help teachers better customize instruction to the needs of the class and the individual student.[40] As a structured form of improvisation itself, the Do/Ti Test provides teachers multiple ways of connecting music listening with music making. The inclusion of improvisation activities is critical because it helps students integrate their musical understanding, performance, listening, and creativity.

Strategies for Incorporating Real Pieces

At many institutions, harmonic dictation assessments require students to notate the bass line, soprano line, Roman numerals, figured-bass symbols, cadence type, and in some cases, phrase function, idiomatic harmonic usages (e.g., $\frac{6}{4}$ type, harmonic prolongations), and pivot chords. The high level of complexity of these required responses virtually necessitates the use of simplified didactic examples played at the keyboard while teaching and assessing students. As a result, the complexity of the stimulus and that of the responses teachers can reasonably expect students to provide are inversely related.

It follows that the primary strategy for meaningfully incorporating real pieces into the curriculum is to teach techniques that can be flexibly scaled to the demands of listening to real music. Such techniques need to be holistic in orientation, since an approach that retrospectively relies on deducing harmonic design from atomistic details cannot easily be applied to hearing real music in real time. To develop listening strategies relevant to understanding real pieces by ear, and to master their application, students need to spend significant time focusing on real musical examples rather than didactic progressions.

[40] The guide-tone analyses in Examples 13, 17, 19, and 22 model the types of notations that students might be expected to record in their listening journals.

Using the Do/Ti test, we emphasize the use of examples from the repertoire almost exclusively beginning in the first semester.[41] Because the timbres, textures, melodic figurations and embellishments, and harmonic rhythms of real pieces are so different from those of didactic chord progressions at the piano, students whose training centers around the piano tend to struggle applying their dictation skills to pieces played by multiple, varying instruments. Using popular and art pieces of different instrumentations throughout the aural skills sequence easily solves this problem. Appendix 1 suggests excerpts for dictation at every stage of the learning process.

Given the complexity of real pieces and the variability of recording quality, dictating outer voices is generally quite difficult for students at the earliest stages of their training. Instead, I have found it beneficial for students to indicate guide tones, chord quality, phrase function, and cadence type and location for most of the first semester. Pursuing these listening goals helps students build a strong foundation for future growth.

When students move from singing to audiating and notating the guide-tone line, this new mode of attention tends to make them focus more on details than on listening holistically. Consequently, choosing real pieces for dictation practice at this transitional stage can become surprisingly difficult. In some pieces, melodic or contrapuntal embellishments complicate hearing the guide tones, leading students to notate too many guide tones rather than listening for changes of harmony. In other pieces, accented dissonances in the melody, galant-style cadences, and pedal tones might cause confusion about which guide tone is active. Though students only learn how to handle these difficulties through experience, teachers may wish to avoid these problems early on by carefully selecting examples for class. When ambiguities arise, teachers can ask students to choose the best guide tone for an entire measure, or to focus on the harmonic rhythm, and then notate guide tones no shorter than the shortest duration of the harmonic rhythm. Another approach is to give students the harmonic rhythm above a difficult portion of the dictation so they know when to expect changes of harmony or guide tone.

[41] Playing chord progressions at the piano remains a useful tool for assessing how well students can apply the Do/Ti Test to musical examples that lack the textural complexities of real pieces, and in situations where students may benefit from listening to an acoustic instrument instead of a recording.

In my classroom, listening to real music beginning in the first semester has had two significant consequences. First, harmonic dictation is no longer treated as the culminating aural skills exercise. As students learn more pieces through scaffolded listening exercises in and out of class, they become motivated to make finer distinctions and observations. Listening to real pieces can motivate students to attend more closely to chord quality, phrase function, harmonic expansions, and melodic profile in order to better comprehend and articulate musical structures and experiences. A piece that students first encounter as an example in which to identify harmonies can return later in the semester as an example for melodic dictation, deepening students' knowledge of the repertoire.

Second, by focusing on real music, students acquire both the confidence that they can understand music well by listening as well as the techniques and skills to do so. The ability to analyze music by ear changes a student's relationship with the score, which becomes a tool used to clarify an aural impression rather than the starting point for serious analysis. Further, learning to analyze music by ear is far more enjoyable and efficient than plodding measure by measure through a score. Prioritizing analysis by ear enables students to aurally discover those spots that are particularly interesting, beautiful, or troublesome. They then approach the score with questions that are personal, meaningful, and specific.

Strategies for Using Multimedia and Classroom Response Technologies

Modern technology offers new ways to create practice and assessment materials and to monitor students' hearing in real time. Using video creation programs (e.g., iMovie or Windows Movie Maker) or screen-capture software, it is easy to make videos with visual markers synchronized to harmonic changes in an audio track. These videos can be used by students to practice and self assess, or they can be used by teachers to assess students' progress. (Two sample videos designed for practice and self-assessment can be viewed at http://tinyurl.com/DoTiTestVid01 and http://tinyurl.com/DoTiTestVid02.) By removing the answers, teachers could use videos like these as the basis for take-home dictation assignments or in-class assessments. The quiz options found in most course management systems (e.g., Blackboard, Sakai, Canvas) can also be used for this purpose; instructors can then see how well each student is doing and which parts of the assignment caused the most problems for the class as a whole.

Classroom response systems (CRSs) offer teachers real-time insight into their students' thinking.[42] Using CRS software, teachers can pose multiple-choice questions, and students respond in real time using either a "clicker" or an application or web page on their smart phone, tablet, or computer. The instructor and students then see the aggregate responses from the entire class immediately, including the number of students who have chosen a particular answer and the percentage this number represents. The lag time between a student's response and its appearance on the screen is near zero, making CRSs useful for capturing real-time listening. Most CRS systems are limited to multiple-choice responses; appendix 2 provides a sample set of CRS questions for use throughout the aural skills sequence.

The three videos discussed below demonstrate CRS technology in action. They illustrate how a group of students responded to each chord in a progression. Because the graph showing students' answers updates in real time to reflect the latest response of each student, it reveals the challenges some chords present.[43] For some chords, the graph shifts quickly to the correct answer, while for other chords, a slower shift indicates a more tentative commitment to a guide tone. In many CRSs, it is also possible to collect individual assessment data in real time. In the first video (http://tinyurl.com/DoTiTestVid03), the students were asked to identify whether chords were consonant with *do* or *ti*. In the second video (http://tinyurl.com/DoTiTestVid04), the introduction of the supertonic calls for a new clicker response: the *do* + *re* figuration. In the third video (http://tinyurl.com/DoTiTestVid05), students respond to the music by indicating both guide tone and quality. In this video,

[42] Philip Duker has described a variety of innovative applications of CRS technology in the theory classroom, including using CRSs to assess the application of the Do/Ti Test by the class as a whole. See Philip Duker, "Capturing Thinking in Time—Using 'Clickers' to Measure Student Understanding," in *Engaging Students: Essays in Music Pedagogy* (2013), http://www.flipcamp.org/engagingstudents/duker.html.

[43] These videos were made with a group of sixteen first-year music majors at the University of Delaware who had been introduced to the Do/Ti Test only a few weeks before. During the exercises, the students could not see the graph shown in the video. Students were asked to hold their CRS clickers in a manner that did not allow other students to see their responses, eliminating the possibility that one student's response could affect another's.

the students seem more hesitant to choose a response, perhaps due to uncertainty or confusion with the response options.

Web-based examples and classroom response systems offer teachers new ways of creating assignments and measuring student growth. Because these measurements can be made in real time during class, teachers can better adjust their teaching to the needs of students and ensure that lessons do not proceed until prerequisite skills have been mastered.[44] Finally, teachers who employ flipped pedagogy and just-in-time teaching may find these web-based and CRS applications an effective way to engage students outside of class and quickly measure their learning in class.[45]

New Approaches to Dictation and Assessment

How might teachers implement the Do/Ti Test when students add notation to their listening skills? What assessment techniques might measure students' acquisition of the listening skills and values supported by this new approach? One approach asks students to notate harmonic dictations in layers, beginning with guide tones (in rhythm) and later adding cadence types (PAC, IAC, HC, or evaded cadences), chord quality, and phrase function (see Example 29).[46]

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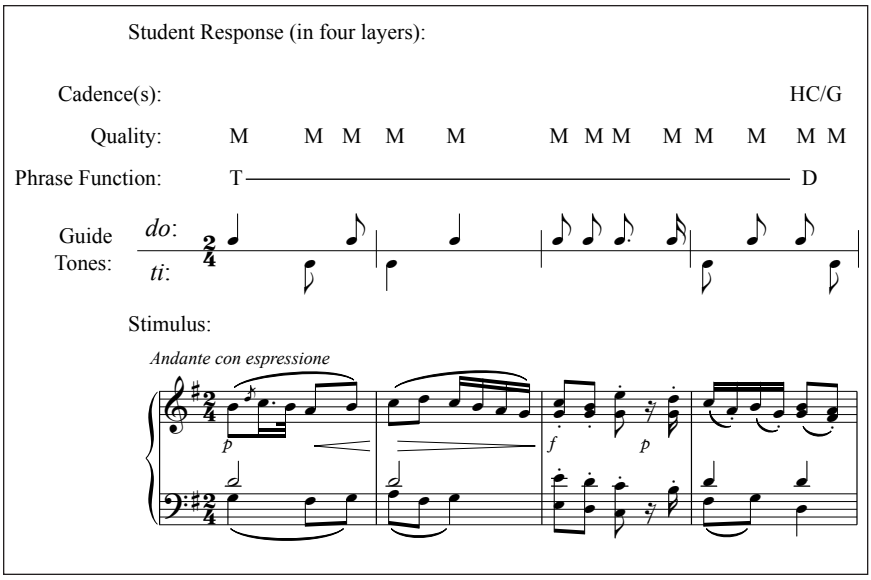
[44] Crystal Peebles's suggestions for using Audacity to foster active listening could also be adapted for practicing and assessing harmonic dictation using the Do/Ti Test. See Crystal Peebles, "Using Audacity to Participate in Active Musical Listening," in *Engaging Students: Essays in Music Pedagogy* (2013), http://www.flipcamp.org/engagingstudents/peebles.html.

[45] Kris Shaffer and Bryn Hughes, "Flipping the Classroom: Three Methods," in *Engaging Students: Essays in Music Pedagogy* (2013), http://www.flipcamp.org/engagingstudents/shafferintro.html. See also Philip Duker et al., "Hacking the Music Theory Classroom: Standards-Based Grading, Just-in-Time Teaching, and the Inverted Class," *Music Theory Online* 21, no. 1 (March, 2015), http://www.mtosmt.org/issues/mto.15.21.1/mto.15.21.1.duker_gawboy_hughes_shaffer.html.

[46] As students begin learning to notate their musical thoughts on paper, instructors may wish to provide selected guide tones. This can keep student's ears on track and help them remain focused on listening actively instead of being distracted by the task of filling an empty staff. As students improve, the provided guide tones may be removed gradually.



Example 27. Mozart, Piano Sonata in D Major, K. 311, II, mm. 1–4: harmonic dictation

At this first stage, guide tones can be indicated using solfège or notated on a single-line staff, using the space above and below the line to indicate *do* and *ti*.[47] In this example, *ti* is present only by implication on the downbeat of m. 2; teachers may wish to suggest that students choose the guide tone that best fits the entire beat. Alternatively, teachers can use this beat as a teaching moment, pointing out after the dictation how Mozart gracefully unfolds the dominant.

Once students have learned to hear guide tones, quality, and function, they begin studying the bass line, developing a holistic impression of how the bass articulates phrase structure. At this second stage, students are first asked to notate the solfège or pitches that occur in the bass at the onset of tonic, predominant, and cadential dominant and tonic. Later, students are asked to indicate any harmonic expansion types they notice, which helps draw their attention to the bass's contour, even if they cannot yet dictate every pitch. Example 28 shows what a completed guide-tone and harmonic analysis might look like at this stage. In this example, students use guide tones, quality, and function in addition to Roman numerals. With the addition of new layers (RN and harmonic expansions),

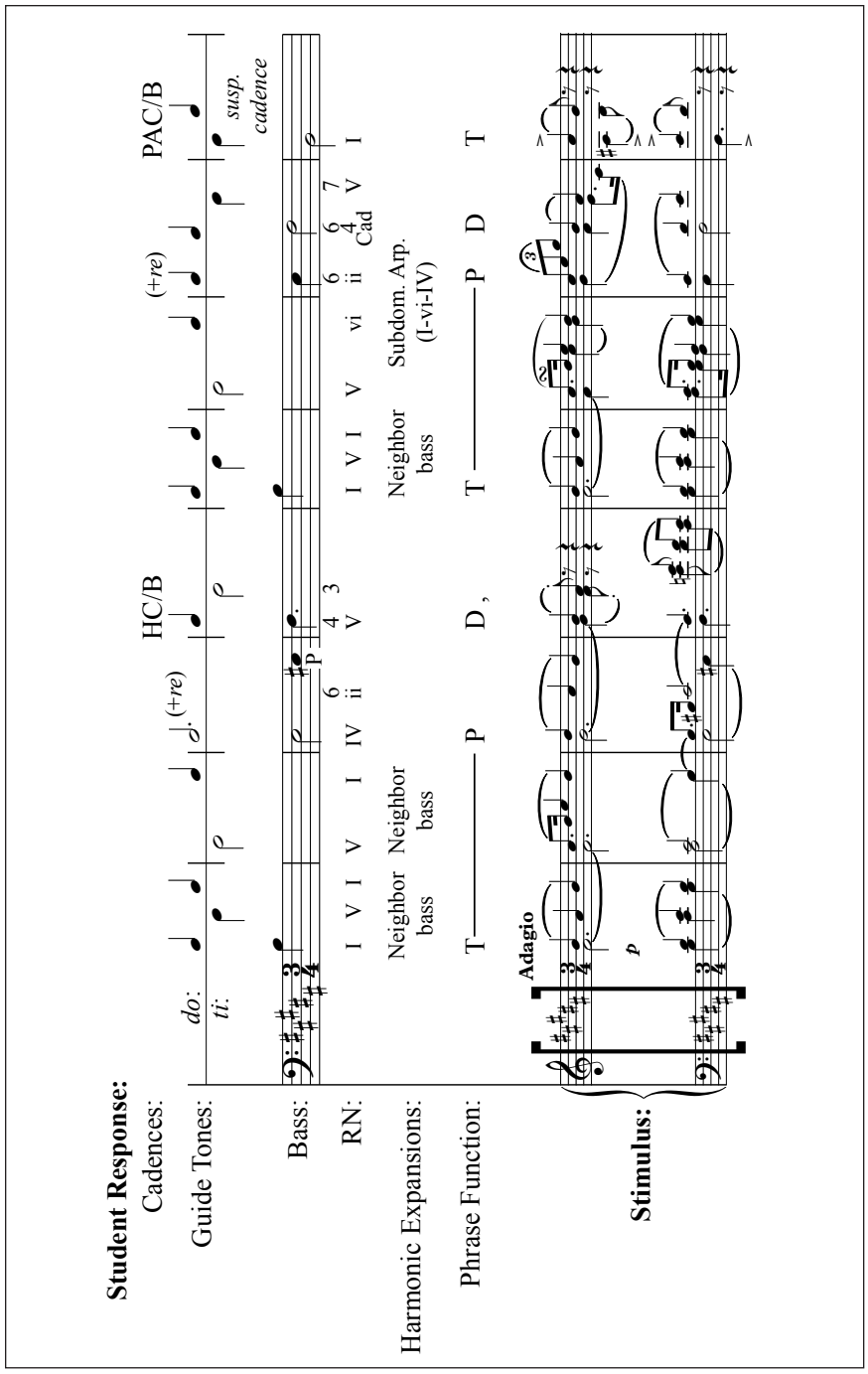
[47] A five-line staff only becomes necessary when students begin notating the bass line and guide-tone figurations.

it is advisable to remove other elements, such as chord quality, to keep the required notations manageable.

In the third stage, students dictate the entire bass line to identify chord inversion and contrapuntal structure with figured bass symbols, to notate tonic-, predominant-, and dominant-expanding bass progressions, and to better understand how the bass shapes the phrase as a whole. A dictation at this stage of the Haydn String Quartet excerpt in Example 28 includes a complete bass line and figured bass symbols in addition to the information already notated. At this stage, the one-line guide-tone staff may be replaced with a regular treble clef staff, so that students can begin notating simple guide-tone figurations, such as the *re–do* figuration associated with the supertonic.

The fourth stage of this approach to harmonic dictation involves developing guide-tone figurations to identify secondary chords, other chromatic harmonies, and modulations. In this stage, students are expected to produce analyses similar to those in Examples 13, 17, 19, and 22. In one or two hearings, students should be able to fully grasp the harmonic structure of phrases 8–10 chords in length, including their cadence types and keys, the locations of predominants and cadential dominants, harmonic expansions, and chromatic harmonies. After the third or fourth playing, students should be able to sketch the bass line and most guide tones and figurations.[48]

[48] I recommend keeping the number of playings to a minimum, so the relevance of the activity is not sacrificed in an effort to capture every detail.



Example 28. Haydn, String Quartet in E♭ Major, op. 76, no. 6, II, mm. 1–8: guide tone dictation

Instructors can also assess students' development of active listening skills in ways that do not involve notation on paper. For instance, students can demonstrate listening skills by singing a guide-tone line while listening, or even by playing a guide-tone line on their instrument. Students can also play an excerpt of music they are studying (on their instrument, if they are able to sing and play at the same time, or using a recording otherwise) and sing a guide-tone line with the music.[49] Listening journals that record responses in musical notation provide another assessment point and reinforce the values of applying techniques learned in aural skills habitually and widely. These alternative assessment strategies allow teachers to understand and assess how students hear and think through passages in real time, apply their skills to pieces they are learning, and articulate the knowledge and insights they have gained through listening.

Using a variety of assessment techniques benefits both students and teachers.[50] Students who struggle with translating musical thoughts into symbols on paper are offered alternative ways to demonstrate their competence and are encouraged to work with the instructor to develop useful assessment strategies. Conversely, using varied assessment techniques challenges students who excel at rendering a dictation example on paper but find it difficult to communicate musical thoughts verbally or by using an instrument

[49] These activities further reinforce that the music we play can become a key to perceiving musical structure; in other words, musical playing is musical thinking. As an active pianist, my personal experience of applying the Do/Ti Test as I play fundamentally transforms the way I hear, think about, and experience the music as I perform it.

[50] Linda Suskie asserts that valid assessment practices always involve multiple points and forms of measurement in *Assessing Student Learning: A Common Sense Guide*, 2nd ed. (San Francisco: John Wiley & Sons, 2009). Kris Shaffer discusses the purpose and ideology of assessment in "Part 3: Assessing Problem-Based Learning," *Engaging Students: Essays in Music Pedagogy* 2 (2014), http://www.flipcamp.org/engagingstudents2/essays/shaffer.html. Bruce W. Quaglia addresses ways in which music theory teachers can address learner variability in "Planning for Student Variability: Universal Design for Learning in the Music Theory Classroom and Curriculum," *Music Theory Online* 21, no. 1 (March, 2015), http://www.mtosmt.org/issues/mto.15.21.1/mto.15.21.1.quaglia.html.

or their voice.[51] Granting students flexibility in how they are assessed allows them to develop trust in their learning and instruction, and helps them understand and develop their own unique modes of musical expression and response. Teachers gain greater insight into the musical intelligence of their students, allowing them to tailor their instruction to build on and develop students' musical understanding.

Integrating the Do/Ti Test and Other Harmonic Dictation Methods

While the Do/Ti Test works effectively as the primary method for harmonic dictation, it can also be used to complement other approaches. Guide tones provide a third point of reference that, when combined with the bass and soprano, enables listeners to better triangluate the harmonic terrain. Returning to Beethoven's Adagio cantabile from op. 13, shown in Example 1a, students who correctly apply the Do/Ti Test will likely call the second chord—a major *ti* chord—not ii^6 or IV, but V (dominant). Students who identify the bass notes will likely get the figured bass symbols as well. The Do/Ti Test can also be used in conjunction with the phrase model and harmonic expansions so that students learn to listen contextually. The Do/Ti Test is not intended to supplant other effective methods already in use, but to strengthen them.

While the Do/Ti Test complements other methods, it also challenges them in both theory and practice. We have already seen how the Do/Ti Test reverses dictation procedures that start with hearing outer voices: these voices are the last things students focus on when applying the Do/Ti Test. Transcribing the soprano is focused on only in those situations where the harmonic movement is governed by the outer voice structure, such as diatonic sequences, chromatic predominants, and the Phrygian half cadence.[52] Other

[51] During theory entrance exams, I ask prospective graduate students to talk through a seven-chord harmonic progression and to sing the pitches they hear in harmonies that they cannot immediately identify. The students get two playings, and then describe what they hear during the third. The results are often not encouraging: most students struggle to identify basic diatonic harmonies, and the idea of freely singing pitches as a means to explore and identify harmonic structure seems foreign to many students.

[52] Hearing upper melodic lines is important when analyzing formal structure by ear or when listening for outer voice contrapuntal or

practical differences include the applicability of the Do/Ti Test to real pieces and its efficiency in producing accurate results in fewer hearings.

The Do/Ti Test and methods involving harmonic deduction are also different in theory. While the end product of each method might be similar on paper (i.e., Roman numerals, figured bass symbols, bass line, and cadence identification), the quality of musical experience and the array of learning goals are distinct. By focusing the listener's ear on guide tones, the Do/Ti Test draws attention to the contrapuntal relationship between the bass and guide-tone lines (rather than bass and soprano) while simultaneously throwing the activity of outer parts (vs. abstracted outer voices) of real pieces into greater relief. By establishing *do* as a stable point of tonal reference against which students habitually audiate and compare what they are hearing, the Do/Ti Test helps listeners develop a spatial sense of harmony, one in which harmonic changes can shift a listener's orientation to the surrounding chord tones and prompt them to anticipate where the music might next move.[53]

The Do/Ti Test also addresses a unique array of learning goals and aural skills. While conventional approaches require students to respond to musical stimuli with labels (e.g., Roman numerals and figured bass symbols) that may not immediately be tied to real musical experiences, the Do/Ti Test begins by encouraging a musical response to sound through active listening. Active listening involves numerous competencies of great value to musicians, including listening while singing or playing, handling multiple input streams, and comparing music that is heard with musical patterns already in the mind.

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linear melodic structures. In my experience, students are better able to appreciate melodic design, the interaction of melody and harmony, and the formal implications of melody in more advanced undergraduate and graduate courses. However, as Gary Karpinski notes, there is an important difference between "parts" and "voices," and it is not safe to assume that years spent dictating upper voices in chordal dictations prepare students to comprehend the upper parts in real pieces. See Gary Karpinski, *Aural Skills Acquisition*, 125–126.

[53] For example, the move from I to vi is not only heard as a major sonority followed by minor but also as a shift in space in which *do* changes from being a strong foundation (as the root of I) to being suspended between root and fifth (as the chordal third of vi).

Developing a Curricular Plan

Developing a curricular plan that integrates the Do/Ti Test into the theory core sequence involves several challenges, some of which are institution specific. The curricular plan offered in Appendix 3 provides a model that can be adapted to different institutional and curricular situations.

The first issue is pacing. The fundamental learning goals addressed by the Do/Ti Test and the application of this technique to real pieces take significant time to introduce and develop if students are not accustomed to this approach. Thus teachers may wish to dedicate nearly an entire semester to the first stage of implementation, illustrated in Example 27 above. The pacing of later stages will depend on curricular demands and the students themselves: each year's class may require different pacing, although at my institution, integrating the Do/Ti Test into the first two semesters of the sequence has not caused us to reduce the number of topics covered in the remaining two semesters. Flexible pacing allows the focus to stay on developing and applying active listening to a wide variety of music. The second issue is clarifying educational goals and deciding how best to align desired learning outcomes (active, creative listeners) with teaching, learning, and assessment practices; when harmonic dictation is understood not as a goal in itself (in which students reduce sound to symbol) but as an exercise to develop active listening (in which students respond to sound with sound), the ways harmonic dictation is taught, practiced, and assessed become thoroughly transformed. Taking changes in teaching, learning, and assessment into account in the curriculum design will help ensure successful implementation of a new curriculum.

A final issue involves approaching curriculum development in such a way that students are kept at the center, so that their goals drive learning and their expertise is welcomed and valued. The Do/Ti Test is a listener-centered pedagogical tool, inviting the listener to co-create alongside the music, allowing the agency and creativity of the listener to become an integral part of what it means to listen. As such, the Do/Ti Test lends itself well to pedagogies and curriculums that are student-centered. Jesse Stommel argues that student-centered pedagogy:

> "[1] centers its practice on community and collaboration;

> [2] must remain open to diverse, international voices, and thus requires invention to reimagine the ways that communication and collaboration happen across cultural and political boundaries; [3] will not, cannot, be defined by a single voice but must gather together a cacophony of voices; and [4] must have use and application outside traditional institutions of education."[54]

This article has explored ways of teaching the Do/Ti Test that involve collaboration and active participation by every member of the class, whether through class singing or small group improvisation activities. The community-building potential of the Do/Ti Test can be further developed in later semesters, when students can share, compare, and critique different ways of listening through difficult passages of music. Students can work in small groups to create improvised voice-leading structures of music heard in class. This approach values students' diverse ways of hearing by opening active listening to the creative impulses and ideas of every listener in the class. Rather than limiting students' voices to the analytical notations they submit on paper after a dictation, the Do/Ti Test encourages students to contribute their musical ideas to the listening experience. As they do so, they learn to think and listen critically to how their ideas relate to the music and to the contributions of their classmates. Because the creative musical contribution of every student is as essential to symphonic hearing as each member of the orchestra is to a symphonic composition, this mode of hearing remains open to a "cacophony of voices" in the most literal sense. Most importantly, the Do/Ti Test gives students a technique that is relevant to their everyday listening and performing experiences.[55]

[54] Jesse Stommel, "Critical Digital Pedagogy: A Definition," *Hybrid Pedagogy: A Digital Journal of Learning, Teaching, and Technology* (Nov. 18, 2014), http://www.hybridpedagogy.com/journal/critical-digital-pedagogy-definition/; cited by Kris Shaffer, "Student-centered Curriculum," blog post (Dec. 6, 2014), http://kris.shaffermusic.com/2014/12/student-centered-curriculum/. Shaffer offers several suggestions for making the music theory core more student-centered without necessarily changing its content.

[55] Commenting on the decentering of disciplinary authority caused by inviting students to participate in the creation of disciplinary knowledge and focusing on music that students learn in ensemble, Kris Shaffer writes that "using a piece being performed by the college orchestra, choir, opera, etc. in class can help students connect course content

Toward Symphonic Hearing

The Do/Ti Test effectively meets the challenges of teaching harmonic dictation set forth at the beginning of this article by providing a technique that is both relevant to a musician's work outside the classroom and applicable to hearing real pieces from a variety of different musical styles and genres. By enabling listeners to perceive harmonic function quickly, accurately, and in real time, this technique supports a variety of transformative pedagogical objectives of value to professional musicians. Using the Do/Ti Test, listeners learn to listen horizontally as a way of organizing vertical sonorities. Critical distinctions are placed at the beginning of the listening process, allowing listeners to quickly understand harmonic progressions. The Do/Ti Test fosters a mode of musical response that is creative, yielding a richer, more stimulating listening experience. Because the Do/Ti Test is readily applicable to hearing real pieces, it allows teachers to prioritize analyzing music by ear. Most importantly, the Do/Ti Test draws students into active listening. By joining the creative process through symphonic hearing, they are not overwhelmed by the listening experience, but empowered to enter into it with pleasure.

Understanding Harmonies by Ear in One Playing

Shortly after arriving at the University of Delaware, three students from my sophomore aural skills course—call them Sarah, George, and Jennifer—arrived at my office completely exasperated. They had spent hours working together on some phrase-length harmonic dictations (eight to ten chords) posted online for practice, and claimed that after six hearings, they had each arrived at different responses for every dictation. Their work showed the same errors and guesswork discussed in Example 1 of this article: incorrect bass and soprano lines led to problems identifying harmonies, causing confusion and frustration. After some words of encouragement, I asked the students to put aside the approach they were using and to think through the Do/Ti Test one more time, focusing exclusively on the distinctions it presents. They were allowed to write down parts of the bass line only if it did not distract them from applying

to other professional activity—and can empower them to contradict both the theory instructor and the orchestra conductor, as the students are in the midst of engaging the piece from multiple perspectives simultaneously." See Shaffer, "Student-Centered Curriculum."

the Do/Ti Test and hearing the chords holistically. I turned to the piano and played a new ten-chord phrase. After a moment, I turned around and beheld a sight I will not soon forget: as the three students compared their answers, Sarah's mouth fell open, George began to laugh, and tears welled up in Jennifer's eyes. After a single playing, they had each written down nearly identical Roman numerals and figures. To this day, I remain grateful to have witnessed Sarah, George, and Jennifer's breakthrough and hopeful that the Do/Ti Test will enable more students to share their joy.

Appendix 1. Suggested Pieces

The implementation stage(s) for each piece is indicated below. The four stages are summarized below for reference:

Stage 1: Guide tones, chord quality, phrase function, cadences

Stage 2: Guide tones, phrase function, Roman numerals, bass notes at onset of TPD, harmonic expansions, and cadences

Stage 3: Stage 2 notations plus the entire bass line, simple guide-tone figurations

Stage 4: Stage 3 notations plus advanced guide-tone figurations

Although pieces with chromatic harmonies are treated most comprehensively by a stage 4 dictation, some of these pieces are also suitable for an early stage 1 dictation in which the focus is primarily on hearing guide tones. Each of these excerpts cadences in the original key.

Piece	Stages			
	1	2	3	4
The Beatles, "I Want to Hold Your Hand," first verse + refrain	X			X
Haydn, String Quartet in C Major, op. 76, no. 3, II, mm. 1–21	X			X
Mozart, Piano Sonata in D Major, K. 311, II, mm. 1–12 (PAC after repeat)	X			
Mozart, Piano Sonata in A Major, K. 331, I, mm. 1–8	X			
Johnny Cash, "I Walk the Line," first verse + refrain	X			
Barber, Violin Concerto, op. 14, II, mm. 1–14 (opening and oboe solo)	X			
Mozart, Horn Concerto in E♭ Major, K. 447, II, mm. 1–8	X	X		
Mozart, *Missa Brevis* in C Major, K. 259, Kyrie, mm. 1–8	X	X		
Mozart, "An Chloe," K. 524, mm. 1–16	X	X		
Mozart, Divertimento in D Major, K. 334, III, mm. 1–12		X		
Beethoven, Piano Concerto No. 5 in E♭ Major, op. 73, II, mm. 1–16		X		
Mozart, Piano Sonata in B♭ Major, K. 333, I, mm. 1–10		X		
Bach, Partita No. 2 in D Minor for Solo Violin, BWV1004, Chaconne, mm. 1–9		X		
Mozart, Piano Sonata in F Major, K. 332, I, mm. 1–22		X		
Mozart, Piano Sonata in C Major, K. 545, I, mm. 1–12		X	X	
Beethoven, Piano Sonata in F Minor, op. 2, no. 1, mm. 1–8		X	X	
Mozart, Serenade in G Major, K. 525 "Eine kleine Nachtmusik," II, mm. 1–8			X	
The Beatles, "I Saw Her Standing There," first verse + refrain			X	
The Beatles, "Ob-La-Di, Ob-La-Da," verse + chorus + bridge			X	
Brahms, Piano Quartet in C Minor, Op. 60, I, mm. 70–77 (2nd theme)			X	X
Regina Spektor, "Firewood," first verse	X		X	X
Schubert, Piano Sonata in B♭ Major, D. 960, II, mm. 1–13	X		X	X
Billy Joel, "Piano Man"	X			X
Bach, Suite in E♭ Major for Solo Violoncello, Prelude, mm. 1–7	X			X
Mozart, Piano Concerto in C Major, K. 467, II, mm. 1–22	X			X
Mozart, Symphony in C Major, K. 425 "Linz," mm. 1–19	X			X
Mozart, Overture to *Die Zauberflöte*, K. 620, mm. 1–16	X			X
Beethoven, Piano Variations in C Minor, WoO 80, theme, mm. 1–8	X			X
Beethoven, Symphony No. 5 in C Minor, op. 67, II, mm. 1–8				X
Beethoven, Piano Sonata in C Minor, op. 13 ("Pathétique"), II, mm. 1–8				X
Mozart, Trio in E♭ Major, K. 498 ("Kegelstadt"), I, mm. 1–16				X
Chopin, Nocturne in E♭ Major, op. 9, no. 2, mm. 1–8				X

Appendix 2.
Classroom Response System (CRS)
Remote Responses

The following sample responses can be used with a variety of musical examples when a five-button CRS remote ("clicker") or application or web-based response system is available. The options below can be reconfigured according to teacher preference.

Guide tones only:
A: *do*
B. *ti*
C. *te*
D. *do* + *re*
E. *di*/*ra*

Three-chord guide-tone patterns:
These patterns may be used to practice hearing harmonic expansions.
A. *do–ti–do*
B. *do–do–do*
C. *ti–do–ti*

Four-chord guide-tone patterns:
These patterns may be used to identify the guide-tone profile of numerous short progressions.
A. *do–do–ti–do*
B. *do–ti–ti–do*
C. *do–do–do–ti*
D. *do–do–ti–ti*
E. *do–do–do–do*

Phrase function only:
A. Tonic
B. Predominant
C. Dominant

Guide tones plus quality (in the major mode):
A. *do* + major
B. *do* + minor
C. *ti* + major
D. *ti* + diminished
E. *ti* + minor

Guide tones plus quality (in the minor mode):
A. *do* + minor or major
B. *do* + diminished
C. *ti* + major
D. *te* + major
E. *te* + minor

Guide tones plus phrase function (in the major mode):
A. *do* + tonic functioning
B. *ti* + tonic functioning
C. *do* + predominant functioning
D. *do* + dominant functioning (e.g., neighboring I^{6}_{4} or Cad $^{6}_{4}$)
E. *ti* + dominant functioning

Guide tones plus phrase function (in the minor mode):
A. *do* + tonic functioning
B. *ti* + tonic functioning
C. *do* + predominant functioning
D. *do* or *ti* + dominant functioning (listen for *sol* in bass)
E. *te* (VII, III, or v)

Secondary dominant-functioning chords:
A. V or vii^{o}/ii (or VII in minor)
B. V or vii^{o}/iii (or III)
C. V or vii^{o}/IV (or iv)
D. V or vii^{o}/V
E. V or vii^{o}/vi (or VI)

Chromatic harmonies:
A. Secondary Dominant (V)
B. Secondary Leading tone (vii^{o})
C. Neapolitan
D. Augmented Sixth
E. Common-tone diminished seventh

Appendix 3.
Model Harmonic Dictation Curriculum for a Four-Semester Sequence

Semester 1:

- Pre-requisite knowledge: none
- Materials covered: all diatonic harmonies in the major mode; limited use of inversion; introduce minor mode (toward the end of semester); cadences (AC and HC); introduce tonic expansions; phrase functions (TPD); chord quality
- Do/Ti Test implementation (described in article, summarize here) stages: 1 and 2 (begin)

Semester 2:

- Pre-requisite knowledge: harmonic expansions
- Materials covered: all diatonic harmonies in the minor mode; greater use of inversion; most tonic and non-tonic expansions; bass line dictation; AC types (PAC and IAC); hearing longer excerpts
- Do/Ti Test implementation stages: 2 (complete) and 3

Semester 3:

- Pre-requisite knowledge: secondary and other chromatic harmonies
- Materials covered: secondary dominants and leading tone chords; chromatic predominants; ct^{o7}
- Do/Ti Test implementation stages: 4 (chromatic harmonies); hearing longer excerpts with chromatic harmonies

Semester 4:

- Pre-requisite knowledge: modulation schemes
- Materials covered: modulation to closely-related keys; mode-change modulations; sequential modulations; enharmonic modulations; hearing extended passages and full pieces
- Do/Ti Test implementation stages: 4 (modulation to closely related and distant keys)

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