

Expertise, Difficulty, and Recognizing Chords in “More Complicated” Contexts: Harmonic Analysis as a Pedagogical Bottleneck

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This article draws on the literature on expertise to interrogate the pedagogical challenge of equipping students with the skills needed to recognize harmonic phenomena in any analytical context (as opposed to in the curated textbook examples that we often use to introduce such concepts). I argue that navigating this pedagogical challenge requires us to: (1) guide students towards developing deeper, more connected, understandings of harmony concepts and (2) draw attention to the ways that harmony interacts with other features of the surrounding tonal rhetoric. Through this discussion, this article interrogates what it means to understand a harmony concept, scrutinizes the ways that we engage with repertoire in our classrooms, and questions how we structure and present music theory concepts in our courses.



In Lesson 18 of his YouTube series on the *Basics of Classical Harmony & Counterpoint*, Seth Monahan explains to his audience how to “Do Analysis the Right Way” (2019b). To motivate the notion of a “right” versus “wrong” process, he offers a scenario that is all too familiar for anyone who has taught an introductory harmony course: he models the painstaking chord-by-chord analytical process of many beginners, “tallying all the notes, finding the root, and figuring out the inversion for every chord from scratch” (3:29). He then emphasizes that the process a “pro” would use to analyze the same passage is “*not* just a faster version of the chord-by-chord grind” (5:32); instead, as he demonstrates, an expert knows “where to look first” (at the bass line) and then applies their knowledge of familiar patterns of scale degrees and harmonic function to inform their harmonic reading of the passage.

Interrogating the differences between these two ways of executing a harmonic analysis is not only a productive exercise for Monahan’s YouTube followers, but also for music theory pedagogues. In the genre of texts that aim to translate research findings from cognitive science into classroom-ready tips for teachers, one commonly encountered piece of advice encourages pedagogues to be cognizant of how experts

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think differently from novices.² Studies examining expert performance in a variety of domains (from playing chess to solving physics problems) have identified several characteristics of expertise. In comparison to novices, those with more expertise tend to notice more meaningful patterns within their domain, develop better ways of organizing their knowledge, and represent problems according to deeper, more meaningful, properties.

Though these cognitive science studies do not provide a path towards facilitating such expertise, several theories of pedagogy draw motivation from this gap between novice and expert thinking. In their framework called “Decoding the Disciplines,” education scholars Joan Middendorf and David Pace (2004) encourage pedagogues to identify disciplinary *bottlenecks*, that is, places in the curriculum where students get stuck because they are not employing the same mental processes as those used by experts in their field. A separate theory developed by Jan Meyer and Ray Land (2003) refers to similar difficulties as *threshold concepts* which, as they describe, “may represent how people ‘think’ in a particular discipline or how they perceive, apprehend, or experience particular phenomena within that discipline...” (1).

When I first encountered this scholarship, it brought to mind a specific pedagogical bottleneck that I have encountered many times while teaching music analysis: the challenge of equipping students with the skills needed to recognize harmonic phenomena in *any* analytical context—not just in the curated textbook examples that we often use to introduce such concepts. As a concrete illustration of this pedagogical dilemma, compare the cadential six-four chords in the two excerpts shown in Examples 1 and 2. Example 1 contains the opening of Joseph Bologne’s B♭ major Violin Sonata, op. 1a (1770), a piece that I often use to introduce the concept of a cadential six-four chord in my first-year written theory courses. Example 2 features the final passage from Fanny Hensel’s “Ich kann wohl manchmal singen” (1846), a song that I frequently include in an analysis-focused unit near the end of my second-year written theory courses.

² For example, see Bransford et al. (2000, 31–50), Lang (2021, 91–111), and Lovett et al. (2023, 64–83).

Example 1

Joseph Bologne, Violin Sonata in B♭ major, op. 1a, (1770) 1st movement, mm. 1-4.

27 28 29

Schmer - zen Im Lied das tie - fe - Leid. Doch

G major: Ger⁶₅

30 31 32

kei - ner fühlt die Schmer - zen, Im Lied das

cad⁶₄ V⁷ bVI Ger⁶₅

33 34 35 36

tie - fe Leid.

cad⁶₄ V⁷ I

Example 2

Fanny Hensel, "Ich kann wohl manchmal singen" (1846), mm. 27–36.

Not surprisingly, second-year students who would have no trouble identifying the cadential six-four in Bologne's Sonata often have trouble identifying the one in Hensel's song. On the surface, we might just say that the context in Hensel's song is "more complicated"—it certainly would not be a good example through which to initially introduce the concept. But that is *exactly* the problem. Many of us teach a class or two on the cadential six-four chord during Theory 1 or Theory 2, but not all instructors return to this topic to explore "more complicated" examples of this topic later on in the curriculum. When and/or how are students supposed to learn to recognize such harmonic phenomena in more complex contexts? In my experience, this process seems to happen naturally for *some* students—as they get further along in the curriculum, they just seem to be able to navigate more complicated situations—but this does not happen for *all* students.³

This essay interrogates this pedagogical dilemma, dissecting the discipline-specific task of analyzing harmony. Drawing inspiration from the differences in the knowledge structures of experts versus novices, I present a case study examining which features a "novice" student versus "expert" analyst might use to recognize the cadential six-four chords in the excerpts by Bologne and Hensel. I then compare the presentation of the cadential six-four chord in several popular music theory textbooks, illustrating how different ways of organizing one's knowledge of harmony concepts may affect the features one associates with the sonority. After examining some other factors that present difficulty in more complex analytical contexts, I ask how we can best engage with repertoire in our courses in ways that foster the transfer of harmony knowledge to novel analytical scenarios. Inspired by a case-based pedagogical approach that advocates for a mixture of "textbook" examples with messier cases, I then outline a sample unit of a diatonic harmonic course that is organized around repertoire excerpts instead of harmony topics. I ultimately argue that navigating this pedagogical challenge—of getting students from "novice" to "expert" thinking—requires us to: (1) guide students towards developing deeper, more connected, understandings of harmony concepts and (2) draw attention to the ways that harmony interacts with other features of the surrounding tonal rhetoric. Through this discussion, this article interrogates what it means to understand a harmony concept, scrutinizes the ways that we engage with repertoire in our classrooms, and questions how we structure and present music theory concepts in our courses.

3 Middendorf and Shopkow acknowledge this subset of students: "There are always a few students who have little trouble with these bottlenecks (often seen as students who are 'naturally' talented)" (2018, 14).

Characteristics of Expertise

While perusing texts that aim to bridge the gap between the scientific research on learning and instructional strategies for the classroom, it takes little more than a skim of chapter titles to notice the numerous references to expertise. Chapter 3 of Marsha Lovett et al.'s *How Learning Works: Eight Research-Based Principles for Smart Teaching* (2023) asks “How Does the Way that Students Organize Their Knowledge Affect Their Learning?” drawing on the fact that experts are known to develop deeper and more sophisticated ways of organizing their knowledge than novices. Chapter 4 of James Lang’s *Small Teaching: Everyday Lessons from the Science of Learning* (2016), on “Connecting,” shares quick pedagogical tricks to help students facilitate connections between concepts, again with the aim of helping students develop the dense knowledge structures associated with expertise. Chapter 2 of John Bransford et al.’s *How People Learn: Brain, Mind, Experience, and School* (2000) takes the topic of “How Experts Differ from Novices” head on, offering readers a summary of the foundational cognitive psychology studies on expertise and suggesting implications to improve instruction.

Why is there such a focus on expertise in these teaching manuals? In *How People Learn*, Bransford and his coauthors suggest the following rationale (2000, 31):

Understanding expertise is important because it provides insight into the nature of thinking and problem solving . . . experts have acquired extensive knowledge that affects what they notice and how they organize, represent, and interpret knowledge in their environment. This, in turn, affects their ability to remember, reason, and solve problems.

With this motivation in mind, this section reviews some foundational studies in the literature on expertise and begins to hypothesize how this research might inform the ways that we approach the task of teaching harmonic analysis.

Empirical studies in cognitive psychology have demonstrated that some of the main characteristics of expert performance include:⁴

- Experts notice meaningful patterns in their domain that are not noticed by novices.
- Experts develop better ways of organizing their knowledge than novices.
- Experts tend to represent problems in their domain according to deep principles, whereas novices rely on more superficial features.

4 For an overview of the research on expertise, see Bransford et al. (2000, 31–50); Chi, Glaser, and Farr (1988, xv–xxi), Chi (2011); and Ericsson (2018).

- Experts often possess metacognitive skills which allow them to monitor and reflect on their understanding.

These findings come from studies examining expertise in a variety of domains, and they have been replicated in many subsequent studies.

Some of the earliest influential studies of expertise compared the thought processes of master versus novice chess players by asking players to “think aloud” while selecting their next moves. A landmark study by de Groot (1965) initially hypothesized that the players with more expertise would demonstrate greater breadth and depth in their searches, but this was not the case. Instead, the results revealed that experts exhibited similar search strategies as novices, but that experts were able to consider better moves because they recognized more meaningful patterns of chess pieces.

A subsequent study by Simon and Chase (1973) connected these patterns to memory, theorizing that experts organize their knowledge of such patterns into domain-specific “chunks” of information. This study asked chess players to reproduce entire chessboards from memory after viewing them only briefly. As expected, master chess players were able to significantly outperform less experienced players in this task—but this was only the case when the chess pieces were placed in realistic arrangements on the chess board. When the pieces were instead arranged randomly, the experts performed only slightly better than the novices. This study is often cited as evidence for the fact that experts structure their knowledge differently than novices: the experts were able to recall more chess positions because their knowledge of meaningful patterns (i.e., “chunks”) were larger than those of the novices.⁵

What implications might these findings have for the task of harmonic analysis? Consider the numerous domain-specific patterns that an “expert” music theorist might notice when they glance at the score of Bologne’s Sonata (Example 1). Such aural and visual patterns begin from the key signature and pickup: whereas a student might have to consciously identify which major and minor keys have two flats and then calculate which scale degrees are represented by the notes F and B $\flat$, a more experienced analyst instantly recognizes the key-defining leap of the perfect fourth from $\hat{5}$ to $\hat{1}$.⁶ Likewise, such a listener likely observes the $\hat{4}$ – $\hat{5}$ – $\hat{1}$ cadential pattern of the left hand as a single bass-line gesture, intuitively associating it with the functional

5 See Chi, Glaser, and Farr (1988, xvii) for a summary of studies that have revealed similar results in other domains.

6 Bransford et al. (2000, 44) describes “fluent retrieval” as a characteristic of expertise.

predominant-dominant-tonic cadential trajectory. The left-hand's octave leaps represent yet another potential “chunk”: whereas an expert likely intuitively gauges the distance of an octave both aurally and visually (and likely also kinesthetically), a novice may need to meticulously count lines and spaces before realizing that the notes are indeed an octave apart. The memory-related findings from Simon and Chase's study are also relevant to the task of harmonic analysis. It seems plausible that an expert would be more likely to notice musical patterns (melodic contours, harmonic syntax, voice-leading paradigms, etc.) in a progression arranged according to principles of conventional harmonic syntax—that is, in a stylistically plausible arrangement—as opposed to in a series of chords presented in some random order.

Another body of scholarship has built on the work of Simon and Chase to examine how experts versus novices represent problems according to different kinds of principles. Chi, Feltovich, and Glaser (1981) asked beginners and advanced graduate students to sort physics problems into different categories. They found that the beginners tended to group together problems with the same surface-level features (such as those involving inclined planes or pulleys), whereas the graduate students considered problems to be similar if they involved the same underlying physics principles. This experiment is often presented as evidence that experts represent problems in their domain according to deep principles, while novices rely on superficial features.

These findings beg the question: what might these “superficial” versus “deep principles” look like in music analysis? As I discuss further below, the clues that an analyst draws on to recognize a sonority can vary from surface-level details (such as the literal notes contained in a particular chord) to deeper properties (such as the chord's functional role in building expectations that a particular harmonic arrival will follow). I argue that in order to help students learn to recognize harmonic phenomena in more complicated contexts, our pedagogy should encourage them to move beyond the surface-level features and to gain awareness of deeper properties of the surrounding tonal rhetoric.

Another trend in this field of research differentiates between two types of expertise: *routine expertise* versus *adaptive expertise* (Hatano and Inagaki 1986). Whereas routine experts execute their skills with speed and accuracy, adaptive experts are able to apply their skills more flexibly and creatively. One definition distinguishes these two types of expertise by describing adaptive experts as having a *conceptual* understanding of the skill, rather than just a *procedural* understanding of it.⁷

7 See Chi (2011, 30–32).

A concept intertwined with adaptive expertise is that of *metacognition*, the ability to monitor and reflect on one's own level of understanding.⁸ This concept, first coined by John Flavell (1976), has since become a common topic in pedagogical circles, often motivating educators to incorporate activities that ask students to reflect on their own learning. The notion of metacognition has even made its way into the music theory pedagogy literature: Anna Ferenc (2016; 2017) has characterized metacognition as an “overlooked skill” in core theory courses and has proposed ways to incorporate reflective writing assignments in the music theory classroom. In her 2017 essay, Ferenc specifically argues for the significant role that metacognition plays in music analysis:

Hidden within this description [of Caplin's concept of “retrospective reinterpretation”⁹] is the presence of metacognitive reflection in the act of thinking about what we think (or had thought), which enables revision of a previous analytical opinion in light of new information. Consequently, it is prudent to note that students who display weakness in analysis *may not lack subject knowledge, as is often assumed, but rather the metacognitive ability required to interpret retrospectively*. In general, this type of analytical skill is challenging for students to acquire, but it underpins all music analysis, if not all music study in some way, and may be attained effectively through written metacognitive reflection. (emphasis added)

Though Ferenc makes this argument in the context of analyzing form, the ability to reflect on one's own thinking is also relevant while studying harmony. It is possible for students to have knowledge of the textbook features of a sonority—that is, the relevant “subject knowledge”—yet still not be able to identify it in context.

In his video lesson on “Doing Analysis the Right Way,” Monahan makes an implicit appeal to metacognition by encouraging his viewers to reflect on the process that they are using to do harmonic analysis. His depiction of the “pro's” approach also exemplifies several of the other characteristics of expertise described above, specifically pattern recognition and knowledge organization. After emphasizing the importance of using the piano to kinesthetically reinforce common harmonic patterns, he argues (2019b, 13:32):

In the end, it's these common patterns—recognizing common patterns—that's what this is all about. If you're doing more than just slapping labels on chords, if you're paying close attention to how bass lines unfold in time and what harmonic functions they tend to support, you're going to start to see the same short bass-line formulas appearing over and over again.

8 Chi, Glaser, and Farr summarize the literature that suggests that experts have “strong self-monitoring skills” (1988, xx). Bransford et al. (2000, 47) discusses metacognition in relation to adaptive expertise.

9 See Caplin (2013, 61–62, 712) for discussion and a definition of “retrospective reinterpretation.”

In addition, Monahan advises his followers to draw on their knowledge of the “Big 18”—his term for the set of most common diatonic chords in each key—to aid in their analytical process, demonstrating the importance of providing students with systems for organizing their knowledge.¹⁰ Rather than introducing these chords as a list, however, he introduces this set of harmonies within the organizational grid shown in Example 3.

		BASE TRIAD						
		i	ii°	III	iv	V	VI	vii°
SCALE DEGREE IN BASS	1̂	i	ii ^ø ₂ ⁴					
	2̂		ii ^ø ⁷			V ⁴ ₃		vii ^ø ⁶
	3̂	i ⁶						
	4		ii ^ø ₍₅₎ ⁶		iv	V ⁴ ₂		
	5̂	i ⁶ ₄				V ⁽⁷⁾		
	6̂				iv ⁶		VI	
	7̂					V ⁶ ₍₅₎		

Example 3
Monahan’s “Big 18” (2019, 6:11).

Acting like a modern-day Rule of the Octave, this layout provides an efficient way to see which sonorities are available to support each bass scale degree; as such, Monahan’s “Big 18” equips students with a way of organizing their harmonic vocabulary that likely mimics a simplified model of an expert’s way of organizing knowledge.¹¹

Monahan’s video is pitched for students who have not yet been introduced to chromatic harmony, but the distinction between how a novice versus expert engages

¹⁰ Monahan introduces the “Big 18” in Lesson 16 of his video series, on “Building Your Vocabulary” (2019).

¹¹ In her article on “twenty-first century” pedagogical applications of the Rule of the Octave, Sánchez-Kisielewska (2017) hints at the Rule’s rule as a way to organize one’s knowledge of harmony: “the Rule constitutes a meta-collocation of sorts, a chunk of chunks that contains shorter harmonic progressions that appear with high frequency in tonal music” (115).

in harmonic analysis only becomes more relevant as the difficulty of the material increases. As I will explore in more detail below, one of the challenging aspects of harmonic analysis is the fact that every musical context is different. A student cannot simply apply an algorithmic procedure and expect to produce a convincing harmonic analysis; rather, they must develop a kind of adaptive expertise to navigate ever-changing scenarios (e.g., incomplete chords, embellishing tones, unconventional textures), learning to balance stylistic conventions, tonal expectations, and their own individual hearings.

Dissecting the Pedagogical Dilemma

The gap between novice and expert thinking serves as the motivation for a pedagogical approach called “Decoding the Disciplines.”¹² Developed in the early 2000s by education scholars Joan Middendorf and David Pace, this framework encourages pedagogues to identify “bottlenecks” in student learning and then apply strategies to help students overcome the challenges of such mental moves. Rather than introducing new classroom activities or ways of engaging with course content, the focus of the approach is on identifying aspects of disciplinary thinking that seem automatic to experts and then “decoding” these tasks by making the steps involved in the mental operations explicit. The approach itself is presented as a seven-step process that guides instructors through identifying a learning bottleneck, “decoding” the mental operation, modeling the experts’ thinking for the student, and providing opportunities for practice and feedback. During the step of “decoding,” the goal is to uncover and describe the specific steps that an expert would use to execute the skill.¹³ In the spirit of this approach, let us return to our comparison of Examples 1 and 2 to ask: What features might an “expert” music theorist versus “novice” student use to recognize the cadential six-four chords in each of these contexts?

12 In the introduction to their book on *Decoding the Disciplines*, Middendorf and Shopkow write: “In other words, this is a how-to book about the gap between the ways experts and novices think in any discipline (or across fields)” (2018, 1). For other music-related applications of this approach, see Burkholder (2011), Hund (2012), and Attas (2018). Attas’s article applies the approach to the process of music analysis; however, her essay focuses on the holistic activity of music analysis, as opposed to the specific task of recognizing harmonic sonorities. She argues that expert analysts engage in “performance, listening, contemplation, and revision” during the process of music analysis, and she proposes strategies for encouraging students to model this process.

13 The *Decoding the Disciplines* literature offers several strategies for the step of decoding the bottleneck, but the “classic” technique involves an interview; see Middendorf and Shopkow (2018, 36–60) and Pace (2017, 32–53).

The cadential six-four in Bologne's Sonata (Example 1) contains virtually all the features emphasized by any textbook description of a cadential six-four. The chord consists of all the notes of a tonic chord but with $\hat{5}$ in the bass, so it looks like an apparent " I_4^6 " chord. The chord is directly preceded by a predominant (ii^6) and is immediately followed by a dominant (V^7). The fact that it appears at the *end* of the phrase is also important: this V^7 chord leads without question to a tonic resolution at the start of the next measure, creating a PAC. Students would hopefully also make note of details concerning this chord and its relationship to that subsequent V^7 . First, this chord appears in a metrically stronger location than the dominant that follows and, second, the two chords are connected through single-step descending voice leading. In fact, since the violin and piano parts contain four independent melodic streams, the voice leading looks nearly exactly like that of the four-voice SATB examples that students might have engaged with while completing part-writing exercises. This passage even features a characteristic octave leap in the bass (albeit ascending), and the typical doubling of $\hat{5}$.¹⁴

Now turn towards the cadential six-four chord in Hensel's "Ich kann wohl manchmal singen."¹⁵ What features would an analyst need to draw on in order to identify the sonority in this context? This chord is also spelled as an apparent " I_4^6 ," however, the quality of the triad is minor instead of major. Students might be confused by the $B\flat$ accidental; they would need to draw on knowledge of modal mixture in order to justify the borrowing of that scale degree within G major. The syntactic placement of this chord provides mixed clues about its identity. The chord is preceded by a predominant, specifically a German augmented-sixth chord. For a student with enough knowledge of German augmented sixths to know that they are commonly followed by cadential six-fours, this may serve as one of the strongest pieces of evidence that this chord is indeed a cadential six-four chord. With that hypothesis, however, such a student might be confused by what follows: the subsequent chord is not a V or V^7 , and the passage does not seem to immediately lead to any kind of obvious tonic resolution. Even if they manage to make it this far, I would expect any student engaging in this kind of local chord-by-chord analysis to soon begin feeling stuck.

Notice that even a student who has mastered writing cadential six-fours in SATB

¹⁴ According to prototype theory, we might say that these features define the prototype of the category of cadential six-four chords. For a discussion of prototype theory in connection to theory pedagogy, see Bourne (2018).

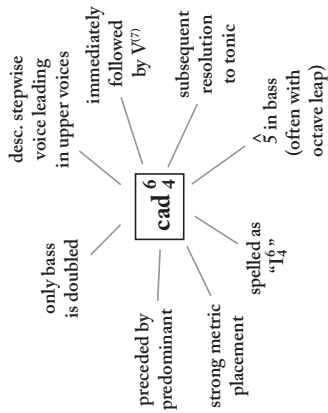
¹⁵ For analytical discussions of Hensel's "Ich kann wohl manchmal singen," see Rogers (2018) and Malin (2021).

textures would likely be confused by the voice leading in this passage. This excerpt features stepwise motion in an *ascending* direction—completely the opposite of what one would have practiced and reinforced while writing cadential six-fours. Moreover, the fourth above the bass (the G) appears to be doubled, contradicting the rules that many textbooks prescribe for the treatment of that dissonant interval. As this vignette suggests, a student who is able to recognize the cadential six-four in Bologne’s Sonata from its textbook features will not necessarily be able to recognize the one in Hensel’s song. In order to recognize the chord in the “more complicated” context, the analyst must have a deeper, more connected, understanding of the features of the cadential six-four chord.¹⁶

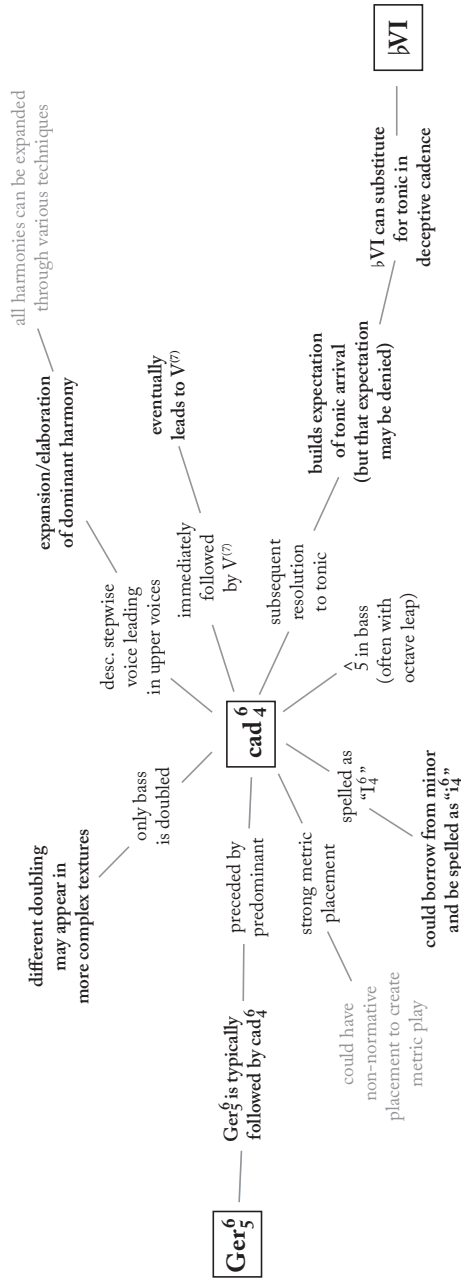
To illustrate the potential differences in how an expert versus novice understands the concept of the cadential six-four chord, suppose that our “novice” is a student who can only recognize the sonority from textbook-style examples. Their knowledge of a cadential six-four might consist of the simple list of typical features shown in Example 4a: the chord’s conventional spelling, bass note, doubling, voice leading, metric placement, and typical location within a phrase. How might this diagram differ from that representing an “expert’s” understanding of the sonority? As illustrated in Example 4b, each of the clues that a listener must draw on to identify the sonority in a more complex context can be understood as a more generalized version of one of these textbook features. Consider the chord’s spelling: rather than assuming the chord must be spelled exactly like a I_4^6 chord, a more expert listener understands that certain scale degrees might be borrowed from the parallel minor. Similarly, rather than expecting a cadential six-four to be *immediately* followed by a dominant chord that resolves to tonic, such a listener recognizes that a cadential six-four should *eventually* lead to some kind of dominant harmony, and that it ultimately increases *expectation* of a tonic arrival, even if that expectation is subsequently denied. Such a listener would likely also understand the conventional voice leading as just one way (of many) to expand or elaborate a passage with dominant function. This listener would likely also recognize that notes that appear doubled might be a result of more complex textures, rather than a violation of rules governing consonance and dissonance.

¹⁶ Readers may notice that the observations described here are intertwined with the stylistic differences between these two excerpts. The expanded harmonic vocabulary, textural complexities, and formal and harmonic ambiguities characteristic of Romantic-era compositions are often the source of the “more complicated” features described in this essay.

(a) Novice



(b) Expert



Example 4
Comparison of features potentially used by (a) "novice" versus (b) "expert" listeners to identify the cadential six-four chords in Examples 1 and 2.

This web could be expanded further to account for other analytical situations. For example, an experienced analyst would likely connect this dominant expansion to their knowledge that *any* harmony can be expanded through various techniques. Even the metric placement can be generalized: whereas a “novice” might think that a cadential six-four can *only* appear with strong metric placement, an “expert” would understand that sometimes composers use that expectation creatively as a way to create metric play.

Notice that this expansion of our concept map aligns with the third characteristic of expertise identified above, that experts tend to organize their knowledge based on deeper, more meaningful properties, whereas novices tend to draw on more superficial features. In Example 4a, the textbook features are all very concrete characteristics that we can point to on a score, whereas the added ones in Example 4b are less distinctive and require a deeper, more conceptual, kind of understanding.

The concept-map representation in Example 4b also reflects another characteristic of expertise: the knowledge structures of experts tend to be more connected than those of novices. For instance, whereas a novice might have a weak expectation that any chord with predominant function might lead to a cadential six-four, a more expert analyst likely has a stronger link between their concept of a German augmented sixth chord and their concept of a cadential six-four chord. Likewise, such an expert might have a stronger expectation that $\flat VI$ can follow V^7 (as a tonic substitute) than does a less experienced listener.

An analyst who associates the sonority with these deeper features has a fundamentally different notion of what constitutes a “cadential six-four chord” than one who can only recognize it by confirming the checklist of textbook criteria. Notice that the cadential six-four in Bologne’s Sonata contains essentially all of the features emphasized by any textbook, whereas the one in Hensel’s song contains surprisingly few of them.

As we will explore further below, a listener with this deeper understanding might also justify their decision using other aspects of the musical rhetoric, observations that one might overlook if they are just labeling chords: the pedal $\hat{5}$ suggests a prolonged passage with dominant function; the semitonal motion of the inner voices suggests a chromatic expansion; and the vocalist’s climb from $\hat{5}$ to $\hat{1}$ contributes a melodic urge for tonic resolution, one that parallels the simultaneous harmonic gesture. A student making *these* kinds of observations is not just labeling chords; rather, they demonstrate a clear move towards a more genuine analysis that goes beyond mere naming.

Textbooks and Knowledge Organizations: On the Concept of the Cadential Six-Four Chord

Constructing concept maps, such as those in Example 4, is one of the pedagogical suggestions that Marsha Lovett and her coauthors offer in *How Learning Works* (2023) as a strategy to reveal one's ways of organizing knowledge. These authors not only encourage instructors to create such concept maps in order to analyze their own knowledge structures, but they also suggest that this activity could be used to help expose the ways that students understand course content. As another piece of advice, the authors encourage instructors to explicitly share the organization of their classes at the levels of both individual lessons and the entire course.¹⁷ As in any discipline, there are multiple pathways through the content of the traditional harmony-focused music theory core curriculum. Just as individual instructors structure their courses in different ways, the authors of music theory textbooks choose to organize their texts to prioritize different features.

In this section, we ask: How might the placement and ordering of harmony concepts in a textbook affect the ways that students organize and connect their knowledge of those concepts? As a route towards answering this question, we compare the presentation of the cadential six-four chord in four popular music theory textbooks, analyzing how the ordering of topics in each text emphasizes different features of the chord and its relationship to other harmony concepts. The four texts examined are: Stefan Kostka and Byron Almén's *Tonal Harmony with an Introduction to Post-Tonal Music*, 9th ed., (2024); Steven G. Laitz and Michael R. Callahan's *The Complete Musician: An Integrated Approach to Theory, Analysis, and Listening*, 5th ed., (2023); Jane Piper Clendinning and Elizabeth West Marvin's *The Musician's Guide to Theory and Analysis*, 4th ed., (2021); and L. Poundie Burstein and Joseph N. Straus's *Concise Introduction to Tonal Harmony*, 3rd ed., (2025).¹⁸ As illustrated in Example

¹⁷ Lovett et al.'s full list of "Strategies to Reveal and Enhance Knowledge Organizations" includes the following: Create a Concept Map to Analyze Your Own Knowledge Organization; Analyze Tasks to Identify the Most Appropriate Knowledge Organization; Provide Students with the Organizational Structure of the Course; Explicitly Share the Organization of Each Lecture, Lab, or Discussion; Use Contrasting and Boundary Cases to Highlight Organizing Features; Explicitly Highlight Deep Features; Make Connections Among Concepts Explicit; Encourage Students to Work with Multiple Organizing Structures; Ask Students to Draw a Concept Map to Expose their Knowledge Organization; Using a Sorting Task to Expose Students' Knowledge Organizations; Monitor Students' Work for Problems in Their Knowledge Organizations (2023, 79–83).

¹⁸ Murphy and McConville (2017, 202–03) include older editions of these four texts in their list of top 5 textbooks used to teach diatonic harmony and chromatic harmony. Van Geest's (2021, 9) survey

5, each pair of authors employs a different underlying organizational strategy to guide their introduction of the cadential six-four: chord structure (Kostka/Almén), an analogy between melody and harmony (Laitz/Callahan), expansion of harmonic areas (Clenndinning/Marvin), and a tour of the phrase model (Burstein/Straus).

The ordering of chapters in Kostka and Almén's *Tonal Harmony* is organized around chord structure. These authors build up a harmonic vocabulary by gradually introducing new sonorities based on their type—root-position triads (Ch. 6), first-inversion triads (Ch. 8), etc.—emphasizing the compositional uses of each new category of chords. As a result of the large-scale dichotomy between triads and seventh chords, the cadential six-four appears an entire five chapters before the introduction of the V^7 chord (Ch. 14). Even within the large section concerning triads, the cadential six-four appears one chapter before the introduction to cadences themselves (Ch. 10) and three chapters before the introduction to non-chord tones (Ch. 12 and 13). Notably, Kostka and Almén's is the only text of the four that does not incorporate the phrase model into its organizational strategy. Though principles of harmonic progression are introduced in a chapter placed between those on root-position triads and first-inversion triads (Ch. 7), harmonic syntax is not heavily emphasized in the following chapters.¹⁹

The ordering of chapters in the other three texts involves the phrase model, but with different emphases. Laitz and Callahan's *The Complete Musician* presents six-four chords by highlighting the link between melody and harmony (Example 5b). These authors motivate the introduction of six-four chords by relating the ways that embellishing tones elaborate melodic lines to the ways that six-four chords elaborate the phrase model. As such, the chapter containing six-four chords (Ch. 11) leads to other ways of expanding and embellishing the phrase model: plagal motion, predominant seventh chords, embedded phrase models, etc. In fact, these authors suggest that an understanding of embellishing tones is a crucial prerequisite to an understanding the concept of the six-four chord: "we will now round out our study of diatonic harmony next. This begins with six-four chords, which are dissonant harmonies *that you are equipped to work with now that you understand suspensions and accented passing tones*" (258; emphasis added). This emphasis on the interplay between melody and harmony is not unique to this portion of the text. Several early chapters draw attention to melodic features (Ch. 2 and 4), and a similar analogy

found these four textbooks to be the most commonly used to teach required undergraduate theory courses.

19 The Kostka/Almén text is notably also the only one of these four that characterizes harmonic progressions based on root motion by fifth instead of harmonic function.

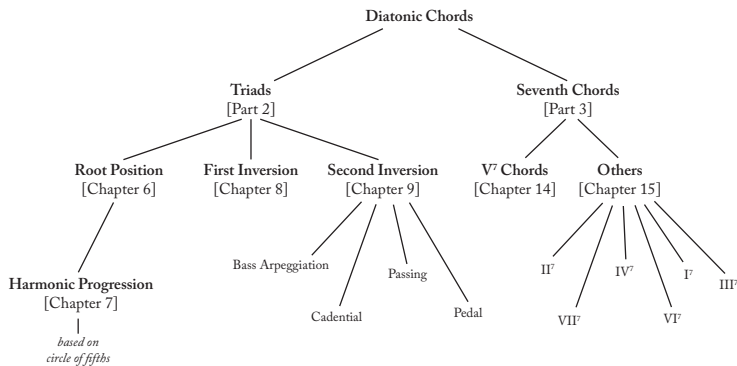
between melodic and harmonic embellishment is used in a prior section to motivate the use of V^7 inversions in tonic expansions (Ch. 9).

Whereas Laitz and Callahan highlight the way in which different types of six-four chords are formed from the coincidence of different kinds of embellishing tones, in *The Musician's Guide*, Clendinning and Marvin emphasize the way the various types of six-four chords can be used to expand different parts of the phrase. Their focus on the concept of expansion is demonstrated by the fact that they pair the section on six-four chords with one on other types of tonic expansions, including those involving V^7 inversions, the submediant, and embedded phrase models. The chapter culminates with an elaborate chart (Example 6) which summarizes how each harmonic area (T, PD, and D) can be expanded via various techniques. In relation to the cadential six-four, this introduction draws attention to the fact that the cadential six-four's function as a way to expand the dominant harmonic function at the end of a phrase can be understood analogously to the way in which other paradigms (e.g., $I-V-I^6$) are used to expand the tonic function at the beginning of a phrase.

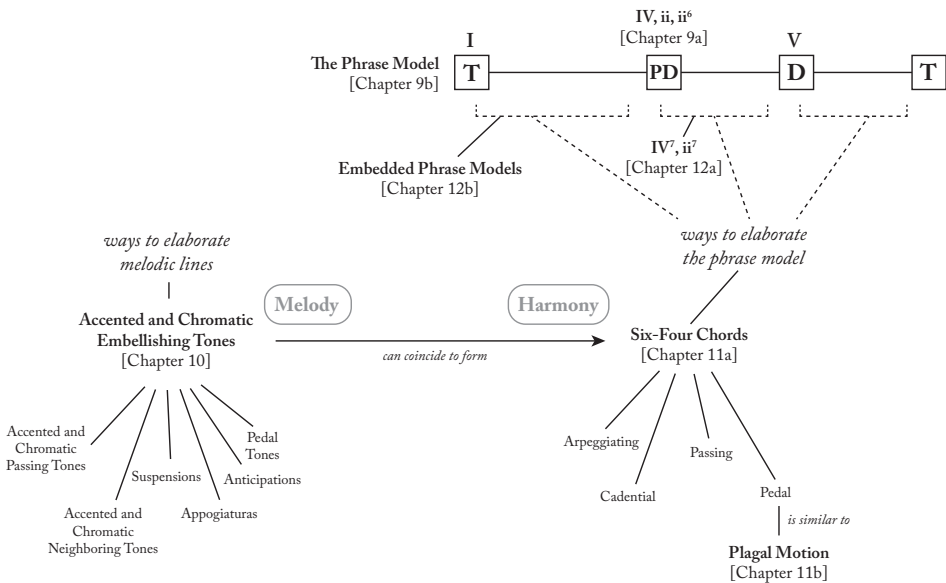
Burstein and Straus's *Concise Introduction* is the only text of the four that separates the cadential six-four chord from other types of six-four sonorities, introducing the cadential six-four eight chapters before other types of six-four chords (Ch. 23). The underlying organizational principle to this text seems to be to provide the reader with a tour of the phrase model. These authors introduce the T-S-D-T framework²⁰ notably earlier than several others (in Ch. 6) and, after introducing I, V, and V^7 (Ch. 9 and 10), they travel around each part of the phrase model: they first introduce chords that embellish tonic (Ch. 12 and 13), then chords that lead to the dominant (Ch. 14), and finally the cadential six-four as a chord that expands the dominant (Ch. 15). In comparison with the others, the organization of this text also suggests a subtle emphasis on bass motion due to the fact that it groups together predominant chords containing in the bass (IV, ii^6 , and ii ; in Ch. 14) and introduces them four chapters before other predominants (IV^6 , ii , ii^7 , and IV^7 ; in Ch. 18).

20 Burstein/Straus use S to represent "subdominant" in their introduction to harmonic progression, whereas Laitz/Callahan and Clendinning/Marvin use PD to represent "predominant."

(a) Chord structure:
Kostka and Almén, *Tonal Harmony*, 9th ed. (2024)



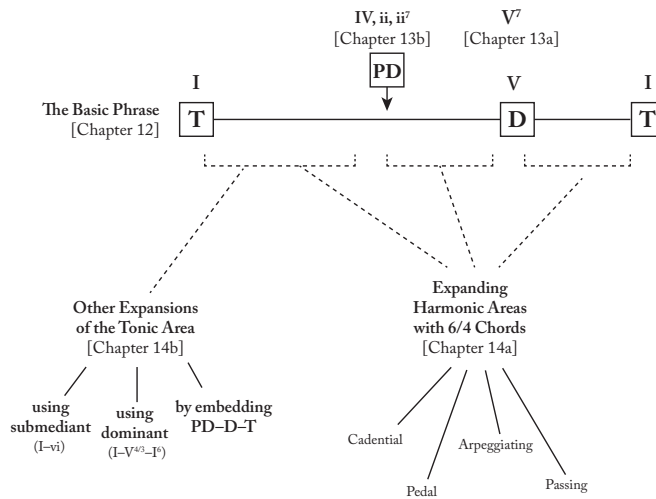
(b) Analogy between melody and harmony:
Laitz and Callahan, *The Complete Musician*, 5th ed. (2023)



Example 5
Comparison of principles underlying the organization of
chapter order in four music theory textbooks.

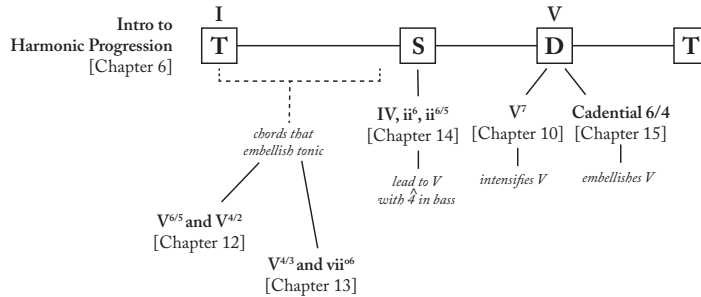
(c) Expansion of harmonic areas:

Clendinning and Marvin, *The Musician's Guide*, 4th ed. (2021)



(d) Tour of the phrase model:

Burstein and Straus, *Concise Introduction*, 3rd ed. (2025)



Example 5 (cont'd)

Comparison of principles underlying the organization of chapter order in four music theory textbooks.

(T)	(PD)	(D)	(T)
C: I $\overset{5}{3}\text{---}\overset{6}{4}\text{---}\overset{5}{3}$	IV or ii^6_5	V $\overset{6}{4}\text{---}\overset{5}{3}$	I
C: I I ⁶ I ⁶ ₄ I	vi or IV ⁶	V $\overset{8}{4}\text{---}\overset{7}{5}\text{---}\overset{6}{3}$	I
C: I V ⁶ ₄ I ⁶	IV I ⁶ ₄ IV ⁶	V $\overset{5}{3}\text{---}\overset{6}{4}\text{---}\overset{5}{3}$	I
C: I IV I	IV ⁶ I ⁶ ₄ $\text{ii}^{(5)}_6$	V or V ⁷	I
C: I V ⁴ ₂ I ⁶			
C: I V ⁶ ₅ I			
C: I V ⁴ ₃ V ⁶ ₅ I			
C: I vi			
C: I $\overset{5}{\text{---}}\overset{6}{\text{---}}$			
C: I vi ii^6_5 V I			
T — (PD D T)			

Example 6

Chart of Chord Expansions (after Clendinning and Marvin [2021, 307]).

In their chapter on knowledge organization, Lovett et al. (2023) emphasize that one particular way of organizing knowledge is not necessarily better than another, but rather, “knowledge organizations are most effective when they are well matched to the way that knowledge needs to be accessed and used” (71). Consider how a student following each of these texts—or courses organized similarly to them—might develop different understandings of what constitutes a cadential six-four chord solely based on the ordering of topics in the course. Those following Kostka/Almén’s text might be best equipped to correctly recognize the sonority when they come across a verticality that appears as a I_4^6 ; however, they might not develop as strong of an expectation for the sonority to appear near the end of a phrase or to embellish or expand the structural dominant. In contrast, those students introduced to the sonority via Laitz/Callahan’s text might develop a better understanding of how the sonority works contrapuntally to delay the arrival of a dominant, and those using Clendinning/Marvin’s text might have a more generalized understanding of the notion that any harmony can be expanded through various techniques. Likewise, followers of Burstein/Straus’s text may develop better expectations for where the cadential six-four is likely to be located within the phrase but may have less clear of an understanding of its relationship to other types of six-four chords.

Though I have used the chapter ordering in textbooks throughout this discussion, my broader point is that there are many different ways of connecting the topics within a traditional harmony curriculum, and that one of the tools that we have to help students develop a deeper, more connected, understanding of the discipline is the ordering of topics that we choose in our courses and curricula.²¹ Since each analytical scenario engages with different properties of the sonority, students may be more or less equipped to identify a cadential six-four chord in “more complicated” situations depending on how well their knowledge organization matches the specific exemplar of that sonority in the piece being analyzed. A more expert analyst would likely have a denser, more-connected understanding of the chord’s properties—that is, their knowledge of the sonority might be imagined as a complex, interconnected web that connects all four of the structures in Example 5.

21 Nilson (2007) proposes that instructors create a “graphic syllabus” of their course to help provide students with a big-picture framework for the information in the course (21). She also suggests that this strategy can help instructors identify topics that do not fit within the logical flow of their course’s organization (88).

On Difficulty: What Makes Some Contexts “More Complicated” Than Others?

Until this point, my focus has been on one’s understanding of the harmony concept itself, but there are also two properties of the musical surface that contribute to making some contexts seem “more complicated” than others: harmonic syntax and texture. What is it in particular about these factors that creates difficulty for students? In a chapter on identifying learning bottlenecks in his book *The Decoding the Disciplines Paradigm: Seven Steps to Increased Student Learning* (2017, 24–25), David Pace identifies some general types of tasks that often serve as pedagogical bottlenecks for students across disciplines. I believe that two of the tasks on Pace’s list correspond to our music-theoretic properties of syntax and texture, respectively: *integration of details* (“learning problems can emerge when students do not understand how to move from the memorization of lists of facts to the integration of elements in a coherent whole”) and *moving back and forth from models to concrete situations* (“in some disciplines, the process of connecting graphs or other models with concrete events can be problematic”). In their comparison of the Decoding the Disciplines and Threshold Concepts approaches, Shopkow and Middendorf suggest that experts often struggle to explain these kinds of tasks to their students because they rely on tacit knowledge to execute them themselves (2019, 39):²²

Just as theories of difficulty require theories of pedagogy to complete them, decoding, as a theory of pedagogy, requires a theory (or theories) of difficulty to explain why students are getting stuck. The main theory of difficulty with which decoding works is tacit knowledge: namely the tacit knowledge of the teacher. Most faculty were acculturated to their disciplines in graduate school and through a process of cognitive apprenticeship...in which the underlying epistemes of their disciplines and dispositions were installed tacitly. Therefore, the teacher cannot, or does not, articulate the disciplinary knowledge that would permit students to negotiate successfully the bottleneck. The result is that faculty members can fly, but find it difficult to teach flying, because they are birds, not ornithologists.

Many music analysts rely on tacit knowledge to navigate the complexities of harmonic syntax and texture; in our role as pedagogues, we must work to make our navigation of such components more explicit.

While engaging in harmonic analysis, the difficulty contributed by syntax results from the need to connect and organize many details. As a student’s harmonic vocabulary

²² In their comparison of these pedagogical approaches, Shopkow and Middendorf situate Decoding the Disciplines as a *theory of pedagogy* and Threshold Concepts as a *theory of difficulty*; for other comparisons of these approaches, see Shopkow (2010) and Pace (2017, 22–23). Perkins (2007) provides a more general discussion of difficulty.

grows, they must not only learn each new chord's spelling, quality in major and minor keys, conventional voice leading, and harmonic function; but they must also learn how that chord interacts with others in their existing vocabulary, details like: "IV usually comes before ii" or "German augmented-sixth chords usually lead to cadential six-four chords." For an expert, these pieces of knowledge all relate to one another through an interconnected web (i.e., these tendencies can usually be explained via aspects of spelling or voice leading), but from the perspective of a student, they might initially seem like an overwhelmingly long list of independent details that each need to be remembered.

As such, the challenge contributed by harmonic syntax depends not only on the vocabulary of sonorities that are present, but also on the ways in which they interact with one another. As one would expect, passages involving more types of sonorities would likely be more challenging to analyze than those with less variety, but the actual sonorities themselves also matter: an excerpt involving only diatonic chords (e.g., the Bologne) would likely be less challenging than one containing several types of chromaticism (e.g., the Hensel).

While these vocabulary-based factors may seem rather intuitive, the difficulty contributed by the relationships *between* sonorities is less straightforward. In the context of our case study, a student with knowledge of the basic features of German augmented-sixth and modal mixture chords would not necessarily be able to identify those sonorities in the final passage of "Ich kann wohl manchmal singen." To successfully analyze that passage, the student must also understand how those types of chromaticism interact with other features of the excerpt (including cadential six-four chords and deceptive resolution) to play with the listener's tonal expectations.

Consider the implications of this observation for our modes of assessment. In a traditional music theory curriculum, students often encounter harmony topics such as modal mixture and augmented sixth chords in different units or even during separate semesters. If our assessments isolate each of these topics and then gauge understanding of them independently, we cannot assume that even students who pass such assessments will have the skills to connect them when they set out to study an actual piece of music that may contain one, both, or neither. If one of our curricular goals involves doing analysis, then we need to make sure that the way we organize, present, and assess knowledge of harmony is properly aligned with the specific task of engaging in music analysis.

Turning towards texture, the easiest passages to analyze tend to share several characteristics with SATB progressions: they typically feature a prominent bass line,

an unobscured harmonic rhythm, and clarity of independent voices.²³ As such, the difficulty contributed by texture stems from the act of relating an abstract model to a concrete situation.²⁴ To illustrate, in Examples 1 and 2, both bass lines are relatively clear; however, in the Hensel, the analyst must consciously identify the bass notes from within the arpeggiated texture, whereas, in the Bologne, the bass notes are already isolated by the keyboardist's left hand. The greatest difference in the texture of these two excerpts lies in their number of individual streams: Bologne's Sonata contains either three or four streams (depending on whether you consider the D-F to belong to the same stream), whereas Hensel's song gives the appearance of having as many as eight individual streams due to several doublings. In addition, the underlying harmonic rhythm in Bologne's Sonata is clearer than that of Hensel's song due to the contrast between the quarter-note surface rhythms of Bologne's bass line and the continuous flow of Hensel's sixteenth-note arpeggiation. Though the texture of Bologne's sonata is more similar to an SATB progression than is Hensel's song, an analyst still needs to understand a few details about texture to move between the abstract model and the actual piece: (1) that the single arpeggiated line in the pianist's right hand can be separated into two abstract voices; (2) that the violin serves as the melodic voice, despite the fact that the accompaniment in the pianist's right hand registrally crosses above that melody; and (3) that the B $\flat$ -D sonority on the downbeat of m. 4 acts as an incomplete tonic chord.

As further evidence of the link between SATB models and textural difficulty, consider the role of SATB progressions in traditional harmony textbooks. When a new sonority or paradigm is introduced, its features are typically first illustrated through abstract four-voice examples, likely because such examples depict these properties in their most simplified context. The further the texture deviates from an abstract model, the more challenging it is to analyze. This observation resonates with L. Poundie Burstein's argument for the usefulness of part-writing exercises (2020, 6):

23 These properties relate to one of my favorite questions to pose in first-year courses when introducing Roman numeral analysis: "How do you decide where the Roman numerals go?" This is a surprisingly difficult question to answer. I teach students use three pieces of information when wrestling with this question: (1) the bass line (as a signal of chord changes and harmonic function), (2) our expectations for what will follow based on the phrase model, and (3) an awareness of whether some notes could be serving as embellishing tones.

24 Monahan emphasizes that the "pro's" strategies for doing harmonic analysis are especially helpful when dealing with "busy or complicated textures." He playfully describes the experience as seeing the music through "analyst goggles," which highlight common bass-line formulas and other patterns (2019b, 20:59).

[T]hese exercises help to teach that tonal music could be understood as involving *chords* that *progress* from one harmony to the next. It is relatively easy to see chords and chord progressions within part-writing exercises. However, these things are not always so readily apparent within real music, not unless one has first trained by working on traditional harmony exercises.

One pedagogical takeaway from this observation is that, when engaging with SATB part-writing exercises, we should consciously guide our students towards understanding the connection between such SATB models and the textural complexity of musical surfaces.

Engaging with Repertoire in Our Courses: Knowledge Transfer, Cognitive Flexibility, and Case-Based Learning

The pedagogical challenge that underlies the difficulties described above relates to the problem of knowledge *transfer*: in order to be able to recognize sonorities in more complex contexts, students must be able to flexibly apply their knowledge to new situations.²⁵ Our goal as pedagogues is to foster ways of organizing knowledge of music theory concepts that allow students to flexibly apply that knowledge when they encounter novel analytical scenarios. Consider how this objective might impact the following pedagogical questions: What is the most effective way to engage with musical examples in the classroom? Should we prioritize showing our students a large number of examples with the aim of generalizing their similarities? Or should we instead prioritize taking deeper dives into fewer pieces with the aim of moving beyond the surface-level features? How much time should we devote to clear, textbook-style, examples versus those that illustrate how the sonority functions in more complex contexts?

One theoretical framework with which to begin grappling with these questions is the theory of cognitive flexibility proposed by Rand Spiro et al. (1988). These authors differentiate between *introductory learning* and *advanced knowledge acquisition*, defining the latter as the stage of learning that happens after introductory learning but before the attainment of expertise. They argue that one of the challenges to advanced learning is that knowledge often becomes *ill-structured* (as opposed to being *well-structured*) as the conceptual complexity increases. Spiro et al. (1987, 184) identify the following characteristics of ill-structured domains:

- There are no rules or principles of sufficient generality to cover most of the cases, nor defining characteristics for determining the actions appropriate for a given case

25 For an introduction to learning and transfer, see Bransford et al. (2000, 51–78).

- Hierarchical relations of dominance and subsumption are inverted from case to case
- Prototypes tend to often be misleading
- The same features assume different patterns of significance when placed in different contexts
- An explosion of higher order interactions among many relevant features introduces aspects of case novelty

These features align with the characteristics identified above that can make harmonic analysis challenging in more complicated analytical scenarios: the textbook prototype of a sonority (e.g., the model shown in Example 4a) can be misleading due to simplification, there are no general principles that can consistently dictate how to parse complex textures, and the interactions between the features of different sonorities often serve as a source of additional difficulty.

Spiro et al. (1987) propose that the best way to achieve cognitive flexibility in an ill-structured domain is through learning that centers on individual cases rather than abstractions and generalizations.²⁶ In the context of music theory courses, this idea suggests that it might be beneficial to organize harmony courses around the study and comparison of individual pieces of repertoire, as opposed to in the traditional ordering as a series of abstract harmony topics.²⁷ But, if this is the case (as we explore further below), then how should we progress from clear-cut to more complicated examples? In a subsequent passage, the authors address the sequencing of cases (Spiro et al. 1987, 191–92):

Part of conventional wisdom is that you start from the simple and then work toward the more complex (Glaser, 1984). In terms of this chapter this would translate into a recommendation to first present material according to some well-structured abstract organizations, followed by the later introduction of complexities and irregularities. There are two dangers in this approach. First, it may inculcate a false impression that the domain is fundamentally simple and well-structured. Second, it may result in initial representations that are so neatly self-contained that they rigidly resist the complicated restructurings necessary to mirror the irregular contours of the domain. The problem with starting with an ill-structured presentation, on the other hand, is that it may be unrealistic to expect that subjects will be able to deal with complexity in material that they are not sufficiently familiar with—the ingredients for flexible idea combination have to be established in memory before such combinatorial play can operate.

26 Spiro et al. (1987), Spiro Coulson, and Feltovich (1988), and Feltovich, Spiro, Coulson (1993) primarily apply their theory of cognitive flexibility to the domain of medical training, though Spiro et al. (1987, 184) also discuss an example involving 20th-century history courses.

27 This resonates with Alegant's (2014) essay on the advantages of "scuba diving" in curricular design, where he encourages pedagogues "to shift the focus from the *input* (the content you want to cover) to *output* (the skills you want the students to acquire, develop, or master" by covering less material in more depth.

These two instructional orders for teaching the same material can be contrasted with a third approach, an intermediate degree of well-structuredness of initial presentations. We expect this to be the most effective in promoting transfer, because it is not subject in extreme degree to the problems that result from having one of the two approaches dominate early instruction. A mixture of well- and ill-structuredness in the early stages of learning should allow sufficient prerequisite material to become well learned prior to operating in a complicated fashion on that material, and at the same time avoid the establishment of an overly rigid presentation that would be difficult to dislodge.

According to this theory, we should embrace messy examples, even in our introductory courses. Such courses should incorporate analytical passages representing a mix of difficulties, some that are straightforward and others that are less clear.²⁸ This strategy aligns with the argument that a course that is too focused on introductory learning might inhibit more advanced learning (Feltovich, Spiro, Coulson 1993, 184):

In addition to being different, the methods of education and assessment in introductory and advanced learning would seem, in some important ways, to be opposed to each other. For example, common strategies of simplification in introductory learning such as teaching topics in isolation from related ones (compartmentalizing knowledge), presenting only clear instances (and not the many pertinent exceptions) and requiring only reproductive memory in assessment are often in conflict with the realities of advanced learning—where components of knowledge are fundamentally interrelated, where context-dependent exceptions pervade, and where the ability to respond flexibly to “messy” application situations is required.

Consider the ways in which the presentation of harmony topics in music theory textbooks often adhere to these principles of introductory learning: textbooks often simplify content, isolate topics from one another, and prioritize clear-cut examples. Rather than replicating this topic-based structure in our harmony courses, we might instead choose to organize our courses in an alternative structure inspired by the case-based approach.

In such a repertoire-based course, the instructor would introduce theory concepts as they are encountered in pieces, frequently returning to previously studied pieces for comparison. Designing such a course would require the instructor to put great care into the selection and sequencing of musical excerpts. Recalling the prior discussion of the ordering of concepts in textbooks, the instructor would have control over what kinds of connections they are making and emphasizing between harmony concepts, perhaps offering students a different approach to organizing topics than the one in an

²⁸ Spiro et al. specifically warn against relying only on “textbook” cases: “The same features that make such ‘textbook cases’ desirable for formal teaching (the way they form a clear-cut illustration of a topic that is being covered) are also likely to impede transfer, because in ill-structured domains true textbook cases are rare, and the immediate, across-topic character of typical cases will be missed” (1987, 191).

accompanying textbook. The aim would be to help students develop ways of organizing their knowledge that align with the ways that this knowledge needs to be used and accessed while engaging in the task of harmonic analysis.

As an illustration of how such a course structure might work, the section below offers an example of how one could structure a unit of a course on diatonic harmony. In such a course, one to two class sessions would be spent exploring each of the five excerpts listed in Example 7. (Scores for these pieces can be found in the Appendix.)

**"Joseph Bologne: Violin Sonata in B-flat major,
2nd movement, mm. 1–18**

Sentence structure
Motivic development
Phrase Model (T–PD–D–T)
Bass Framework: $\hat{1}-(\hat{3})-\hat{4}-\hat{5}$

**Mariana Martines: Keyboard Sonata in A major,
1st movement, mm. 1–3**

Phrase Model (T–PD–D–T)
Bass Framework: $\hat{1}-\hat{2}-\hat{3}-\hat{4}-\hat{5}-\hat{1}$
Tonic Expansion: $I-vii^6-I^6$
Cadences (IAC)
Embellishing Tones (passing, neighbor, arpeggiations)

**Ludwig van Beethoven: String Quartet in
D major, Op. 18, no. 3, 1st movement, mm. 1–10**

Phrase Model (T–PD–D–T)
Bass Framework: $\hat{1}-\hat{2}-\hat{3}-\hat{4}-\hat{5}-\hat{5}-\hat{1}$
Tonic Expansion: $I-V\frac{3}{4}-I^6$
Embellishing Tones (passing, neighbor, suspensions, appoggiaturas)*
Harmonic Expectation
Cadences (IAC)
Cadential 6/4 Chord
Open Score; Alto Clef

**Mariana Auenbrugger: Keyboard Sonata in
E-flat major, 3rd movement, mm. 1–20**

Submediant Chord
Sentence structure (expanded continuation)*
Phrase Model (T–PD–D–T)
Parallel Period (expanded consequent)
Cadences (HC, PAC)
Tonic Expansion: $I-V^7-I$
Harmonic Expectation
Deceptive Cadence
Bass Framework: $\hat{1}-\hat{6}-\hat{4}-\hat{5} / \hat{1}-\hat{6}-\hat{4}-\hat{5}-\hat{1}$

**Wolfgang Amadeus Mozart: "Kegelstatt" Trio,
1st movement, mm. 1–16**

Sentence structure (4+4+8)*
Deceptive Motion
Cadential 6/4
Predominant Sevenths
Cadences*
Open Score; Transposing Instruments; Agency

* indicates "more complicated" instances of these concepts"

Example 7

List of Repertoire and Topics used in a Sample Repertoire-Based Unit of a Course on Diatonic Harmony. (Scores for these excerpts can be found in the Appendix.)

A Sample Repertoire-Based Unit in a Diatonic Harmony Course

The second movement of Joseph Bologne's B $\flat$ -major Violin Sonata can be used to introduce the concepts of sentence structure and motivic development, as well as their relationship to tonic and dominant harmonies. The simplicity of the basic idea (an ascending arpeggiated tonic triad, B $\flat$ –D–F) allows for detailed comparison with the

repetition's dominant version in m. 11 (A–C–E $\flat$) and the further developed appearances in mm. 13 and 14. The piano's arpeggiated accompaniment invites a discussion that connects phrase structure to harmony. In particular, an instructor might highlight the tonic-dominant and dominant-tonic pattern underlying the basic idea and repetition of the sentence, as well as the correspondence between the T–PD–D–T phrase model and the $\hat{1}$ –($\hat{3}$)– $\hat{4}$ – $\hat{5}$ outline of the bass line. The large-scale repetition of mm. 1–8 and mm. 9–18 provides the opportunity to discuss the conventional dialogue-like interactions that often occur between instruments in a duo sonata.

The bass line and phrase model in Bologne's Sonata might serve as a transition to a discussion of the opening phrase of Mariana Martines's Keyboard Sonata in A major.²⁹ The instructor might emphasize how, like in the Bologne, $\hat{4}$ provides support for the PD chord; however, here the PD area is slightly more complicated, as it is expanded via stepwise bass motion down to $\hat{2}$. This excerpt could be used to introduce the concept of a tonic expansion (I–vii^{o6}–I⁶) with corresponding $\hat{1}$ – $\hat{2}$ – $\hat{3}$ bass motion.³⁰ The melodic line provides an opportunity to introduce terminology for embellishing tones, as well as for a discussion of how the embellishments and dotted rhythms contribute to the piece's bubbly, playful character.

As before, the phrase model and bass line can serve as a connecting thread from Martines's Sonata to Beethoven's String Quartet, op. 18, no. 3. One might highlight the similarities between the $\hat{1}$ – $\hat{2}$ – $\hat{3}$ bass lines of the opening tonic expansions, demonstrating how V can serve an analogous role to vii^{o6} in such an expansion. Similarly, the T–PD–D–T skeleton of the phrase (with corresponding $\hat{1}$ – $\hat{4}$ – $\hat{5}$ – $\hat{1}$ bass motion) can also be related to both Bologne's and Martines's bass lines. After noting those similarities, one could highlight $\hat{5}$'s association with the dominant function and introduce the concept of the cadential six-four chord.

Turning towards melody, the first violin's embellishing eighth notes provide yet another connection to Martines's Sonata: mm. 3, 5, and 8 serve as an ideal review of passing and neighbor tones, as well as a potential introduction to suspensions. Whereas these melodic embellishments are relatively straightforward, the “more complicated”

29 For an analytical essay on the first movement of Martines's sonata, see Burstein 2018.

30 Encouraging recognition of bass scale-degree patterns appears in several other places: Monahan (2019b, 20:00) compares the opening bass lines of Beethoven's Piano Sonata in F minor, op. 2, no. 1 with that of Beethoven's Piano Concerto No. 1, op. 15 as evidence for the significance of pattern recognition in harmonic analysis. In an article aimed at pedagogues, Pacun (2003) offers concrete techniques to teach students how to “scan” the bass line in order to become aware of such patterns.

moment in m. 9 provides the opportunity for discussion of harmonic expectation, dissonance, and embellishing tones.³¹ If time allows, one could also discuss the development of the ascending minor seventh motif, referencing the discussion of the triadic motif in Bologne's Sonata.³² An instructor might also make note of the fact that the Martines's and Beethoven's opening phrases both end with an IAC, perhaps asking the students to hypothesize why a composer might choose to end the first phrase of a multi-movement piece with an IAC instead of a PAC. The instrumentation of the string quartet also provides an opportunity to introduce score-reading skills involving the open-score format and alto clef.

The third movement of Mariana Auenbrugger's Keyboard Sonata in E $\flat$ serves as an ideal introduction to the submediant chord, though it also offers numerous opportunities for connections to previously studied pieces. A discussion of the phrase model might note how the simple alternation between I and V⁷ (when placed at the beginning of the phrase) can serve the same functional role as I-vii^{o6}-I⁶ or I- V-I⁶. One can also demonstrate how a $\hat{1}-\hat{4}-\hat{5}-\hat{1}$ bass line can be expanded with $\hat{6}$, as well as how $\#4$ can be used as a chromatic passing tone to intensify the motion towards the dominant. Yet another connecting thread concerns the play of harmonic expectation: whereas Beethoven creates dissonance at the expected moment of tonic arrival (m. 9) via a coincidence of embellishing tones, Auenbrugger similarly plays with the listener's expectations with the classic deceptive cadence in m. 16. One might contrast the HC and PAC in Auenbrugger's Sonata with the IACs in Martines's and Beethoven's pieces, potentially using this excerpt to preview the concept of a parallel period. A discussion of phrase structure could also include a reference back to the sentence structure of Bologne's Sonata; I would highlight the way in which Auenbrugger establishes the prototypical 2+2+4 proportions of a sentence during the antecedent phrase and then challenges our expectations by expanding the sentence's continuation during the consequent phrase via the deceptive cadence.

Finally, the opening excerpt of Mozart's "Kegelstatt" Trio offers numerous connections to concepts from the previously discussed pieces, including deceptive motion, the cadential six-four, the appearance of $\#4$ in the bass line. One topic meriting a more sophisticated conversation is the excerpt's phrase structure: mm. 1-16 of this excerpt form a more complicated example of a sentence than those previously

31 In my experience, many students will enharmonically respell the E $\sharp$ and attempt to label this chord as a i $^{\sharp 7}$.

32 I like to highlight how the melodic surprise of A-C $\sharp$ version of the motif in mm. 15-16 corresponds with the harmonic surprise of the fully diminished seventh in m. 16.

encountered in Bologne’s and Auenbrugger’s Sonatas.³³ Discussion of this expanded sentence could lead to fascinating questions concerning how we define a phrase.³⁴ Like Beethoven’s Op. 18, no. 6, this piece also provides practice analysis in open score and reading alto clef. The presence of the clarinet further offers the opportunity to introduce the concept of transposing instruments.³⁵ Lastly, Mozart’s use of instrumentation allows for comparison of the agential roles of each instrument within the chamber ensemble, facilitating a comparison with Bologne’s duo and Beethoven’s quartet.

The Role of Tonal Rhetoric in our Engagement with Repertoire

In such a course organized around individual pieces of repertoire instead of abstract harmony topics, how should the instructor engage with each piece? One approach suggested by the Decoding the Disciplines framework is that we should explicitly model the way that an expert would undertake such an analysis. This idea echoes Lovett et al.’s advice to “explicitly highlight deep features” and “make connections among concepts explicit” in their list of strategies to reveal and enhance knowledge organizations (2023, 80). Middendorf and Shopkow suggest that one way to model is to incorporate a kind of metacommentary into our lectures (2018, 72):

The solution to this problem is for teachers to not only work through the example but also to call explicit attention to their thinking as they do it, by thinking aloud. In other words they spell out each of their mental actions and make metacomments about why and how certain steps are taken. This is metaexplanation or metacognition, explaining one’s own thinking. This shift from lecture-on-content alone to lecture-on-how-to-think-about-content is subtle but profound. It pinpoints exactly what the students should *do*.

In a theory classroom, an instructor can model the kinds of questions that students should ask themselves while engaging in analysis. This type of think-aloud lecture involves explicitly pointing out which features an experienced analyst would use as

33 In Caplin’s (1998, 69–70) terminology, this is a “compound sentence” because it is sixteen measures long instead of eight; his analysis of this excerpt appears in his Ex. 5.17.

34 Such a conversation would likely involve discussion whether the V⁷–I in mm. 7–8 is an authentic cadence. This is an excellent example of a moment that a “novice” would likely label as an IAC (since it contains all of the “textbook” features of such a cadence), but an “expert” would likely not. Such an expert’s analysis would likely be informed by their recognition of the conventional features of a sentence.

35 This piece works especially well to introduce transposing instruments since nearly all of the notes needed for a harmonic analysis can be found in the piano part. As such, it provides the opportunity to introduce the concept conceptually with less of an analytical hurdle.

clues to identify harmonic phenomena as well as a discussion of how to navigate “more complicated” textures. In short, this strategy suggests that theory instructors should approach their in-class engagement with repertoire as an opportunity to answer the question: “When we study a score, what exactly are we ‘listening for’ and ‘looking at’?” Such a metaexplanation might involve encouraging students to employ different kinds of active listening strategies, perhaps attuning to the bass line for one listening and then focusing their attention on translating the melody line into solfège on the next. This conversation also provides an opportunity, per Lovett’s advice, for instructors to explicitly highlight connections between harmony topics and to point out the more generalized features (such as those in Example 4b) that they might use as rationale for their analytical decisions.

Consciously employing this type of metacommentary while engaging with musical examples provides yet another opportunity that I believe is crucial to getting students from “novice” to “expert” understanding of harmonic phenomena: it allows us to draw attention to the ways that harmony intersects with other features of the surrounding tonal rhetoric. These rhetorical characteristics often go unacknowledged in harmony textbooks, likely because their specific instantiations vary greatly from piece to piece. Though some aspects of rhetoric, such as registral shape, are related to pitch, others are not, as Daniel Harrison acknowledges in *Pieces of Tradition* (2016, 42):

Traditional rhetoric also has recognizable “figures of music” involving secondary parameters of dynamics, tempo, and timbre. The trope of “climax,” for example, can be enacted by *crescendo*, *stringendo*, and *col 8va/b*, working cooperatively, with length and intensity proportioned according to formal purpose. “Announcement,” to take another example, may depend on *rit.* and a *fermata* while holding forth on active scale-degrees.

In our attempts to simplify content or carve out clearly defined learning objectives in our pedagogy, it can be easy to overlook the significance that these kinds of components of the musical surface play in our identification of harmonic patterns. I believe that one of our main goals while engaging with repertoire in our courses should be to make students more aware and more sensitive to such details. The following two vignettes—both of which contain cadential six-four chords in “more complicated” contexts—demonstrate how we might model awareness of these rhetorical features in our classroom conversations.³⁶

³⁶ Thanks to Stephen Gomez-Peck for suggesting both of these examples.

Mozart: “An Chloe,” K. 524

Many students may find it challenging to identify the cadential six-four chords in the opening of Mozart’s “An Chloe” (Example 8) due aspects of both harmonic syntax and texture. Curiously, the difficulty contributed by syntax results from a *lack* of complexity: the move directly from tonic to cadential six-four (mm. 3–4) seems simple on the surface but might be more confusing to a student than if there were a predominant chord establishing the expectation for a dominant-function chord to follow. The textural segmentation in mm. 4–5 presents an even greater challenge. Students would likely expect each change in texture to correspond to a different chord, and the registral changes throughout these measures mask the standard voice-leading relationships associated with the resolution of the cadential six-four.

If I were teaching this passage in class, I would begin by asking students to sightsing the vocal line, subsequently asking them to identify the places where they felt phrase endings. We would locate these three moments on the score (m. 11 and m. 16, as well as the end of the piano introduction, m. 6), and then sing again and/or listen to determine whether each phrase ending feels open or closed. After discussing, I would ask the students to study the bass line and annotate a **T** or **D** under each bass note within these brief passages to indicate whether it suggests a tonic or dominant harmonic function.

The intention behind these steps is to model two specific aspects of the way that an “expert” engages in analysis. First, it encourages students to begin by identifying and studying notable moments like phrase boundaries by ear, as opposed to marching visually through the score from left to right attempting to label each chord. Second, it guides them towards using the bass line to determine a plausible harmonic function, rather than cataloguing every note in the chord and calculating the corresponding Roman numeral.³⁷ Only after completing these steps would I ask the students to provide a Roman numeral/figured bass harmonic analysis of those cadential moments and, eventually, the remainder of the passage. Though at this point we would have successfully identified the harmonies in the passage, our engagement with this excerpt would be far from complete.

We might turn our attention towards the vocalist’s melodic line, noticing how its construction explores the space of the tonic triad, and how the arpeggiated leaps (B $\flat$ –E $\flat$, G–B $\flat$) set up the expectation for a rise from E $\flat$ to G at each of the cadential

³⁷ My suggestions here align with Michael Rogers’s steps in his chapter on teaching musical analysis: “Look for the big picture first; don’t start by moving from beat to beat and measure to measure” ([1984] 2004, 85).

Allegretto

1 2 3

p

E^b major: *p*

4 5 6 7 8

Wenn die Lieb' aus die - nen blau - en,

f *p*

cad₄⁶

9 10 11 12

hel - len, off - nen Au-gen sieht, und vor Lust, hin - ein zu

cad₄⁶

13 14 15 16

schau - en mir's im Her - zen klopft und glüht;

cad₄⁶

Example 8

Wolfgang Amadeus Mozart, "An Chloe," K. 524 (1787), mm. 1-16.

moments (mm. 4, 10, and 15). We would compare the way that each of these moments engage with that motivic expectation: the pianist's virtuosic right-hand flourish in mm. 4–5, the steadier eighth-note ascent of the vocalist's line in m. 10, and the slight chromaticism and rhythmic variation explored in mm. 14–15.

We might also observe the hypermetric implications of the vocalist's repeated B's in m. 1. This repetition feels like a pickup that leads to a strong arrival at the beginning of m. 2, ultimately creating a five-bar phrase and leading to the strong-weak hypermetric pattern (across mm. 4–5) that corresponds with the placement of the first cadential six-four. We might also notice how the A-natural in m. 14 (a mere passing tone) provides a gentle melodic nudge towards the dominant function of the cadential six-four's arrival in the next measure.

Notice how these observations concerning melodic shape, rhythmic and metric nuances, and motivic expectation are all intertwined with the harmonic structure of the passage and our identification of those cadential six-four chords. Any convincing “professional” musical analysis would acknowledge how these aspects of the musical rhetoric help to shape our sense of tonal expectation, but they can easily go overlooked in our undergraduate courses if we prioritize harmony at the expense of other parameters.

Haydn: String Quartet in G minor, op. 74, no. 3, “Rider,” 2nd movement

In the second movement of Haydn's “Rider” Quartet (Example 9), the combination of an augmented sixth chord and a modulation to the dominant make it challenging to identify the cadential six-four in m. 9. A student attempting to examine this passage chord-by-chord would likely get stuck in m. 8 while trying to identify the German augmented sixth. Unlike in Hensel's “Ich kann wohl manchmal singen”—where the augmented-sixth chord is the best clue signaling the cadential six-four—this augmented sixth is the first sonority that cannot be easily analyzed in the piece's initial key. Those who skip over it locally (that is, without hearing the cadence in B major and then working backwards) would likely try to label m. 9 with a Roman numeral in the key of E major.

Even those who hear the modulation may be confused by the texture in mm. 8–10. Though the instrumentation makes it quite easy to identify the horizontal streams, the rhythms in those measures obscure the harmonic rhythm. For example, since m. 10 is the first place since mm. 1–4 where the violins and viola join together with the same rhythm, students might be inclined to treat the triple suspension as a single chord (e.g., “V⁷ over a tonic pedal”) and identify the “I” chord as arriving on beat 3.

Largo assai

mezza voce

2 *ten.*

3

4 *ten.*

5

mezza voce

mezza voce

mezza voce

mezza voce

E major:

6 *cresc.*

7

8 *ff*

9

10 *p*

cresc.

cresc.

cresc.

cresc.

ff

ff

ff

ff

p

p

p

p

B major:

Ger⁶₅

cad⁶₄

V⁷

I

Example 9

Joseph Haydn, String Quartet in G minor,
op. 74, no. 3, "Rider" (1793), 2nd movement, mm. 1-10.

The features of the cadential six-four itself provide little help in its identification. Though the chord is spelled as a "I₄⁶" with $\hat{5}$ clearly in the bass and doubled, both inner voices ascend, contradicting the cadential six-four's conventional voice leading. The first violin's sixteenth notes further complicate the matter, as many students would be

unsure how to decide which of the sixteenth notes belong to the chord.

While introducing this piece in the classroom, I might begin by drawing attention to the overall proportions and structure of the phrase, observing that mm. 1–10 are organized as a sentence. We would make note of how the features of the basic idea are intensified during the repetition (the larger melodic leap and increased harmonic dissonance) and how the continuation is expanded from its expected length of four bars to six. In relation to the phrase's overall trajectory, we would notice the unexpected emphasis on the sonority in m. 8: the contrast of the opening's *mezza voce* instruction with this *fortissimo* arrival, and the motivic link connecting m. 2, m. 4, and this climax in m. 8.

This context concerning the phrase's overall trajectory would serve as a segue towards a discussion of the cadence. Guiding the students towards the outer voices, we would acknowledge the modulation and make note of the $\downarrow\hat{6}-\hat{5}-\hat{1}$ bass line. This would lead to the hypothesis that m. 8 serves as some kind of chromatic predominant. We would confirm this suspicion by noticing how the first violin approaches the F# from a half step below, working in tandem with the cello to form the interval of an augmented sixth (G $\flat$ –E#) that intensifies the motion towards the dominant-function chord in m. 9. Once we have successfully identified m. 8 as a German augmented sixth chord, we would use that piece of knowledge to inform our expectation that the following sonority will likely be a cadential six-four. At this point, we would compare the features of m. 9 with our expectations for a cadential six-four chord.

Conclusion: Implications for Curricular Reform

The goal of this essay has been to interrogate the pedagogical challenge of how to equip students with the skills needed to recognize harmonic sonorities in “more complicated” analytical contexts. By situating this pedagogical bottleneck in relation to the differences between the knowledge structures of experts versus novices, I have suggested that, when teaching in harmony-focused curricula, our pedagogical priorities should be to: (1) guide students towards developing deeper, more connected, understandings of harmony concepts and (2) draw attention to the ways that harmony interacts with other features of the surrounding tonal rhetoric. I have argued that we should design our courses in such a way that prioritizes close reading and comparison of individual pieces of repertoire—specifically a mix of both “textbook” examples and “messier” cases—as opposed to the classic topic-based organization suggested by many textbooks.

I have intentionally situated this topic within the narrow context of a traditional

harmony-focused curriculum because I believe there is much to be gained from carefully dissecting a familiar pedagogical scenario. Nonetheless, I believe that the questions asked in this essay are even more relevant in the context of curriculum reform: when we embark on curricular redesign, we not only get to decide *how* to organize the knowledge of a course, but we also get to choose *what* even constitutes that knowledge. In a traditional harmony-focused core curriculum, the basic building blocks of “knowledge” are often assumed to be different types of sonorities. As we begin to reimagine what it means to teach music theory in the twenty-first century, one question we might ask is: what other kinds of things can constitute the “knowledge” in music theory class, and how do we want students to relate those things to one another?

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Appendix: Scores for Repertoire in Example 7

Joseph Bologne (1745–1799): Violin Sonata No. 1 in B $\flat$ major, op. 1a, 2nd movement, mm. 1–18.

[https://imslp.org/wiki/3_Violin_Sonatas%2C_Op.1a_\(Saint-Georges%2C_Joseph_Bologne\)](https://imslp.org/wiki/3_Violin_Sonatas%2C_Op.1a_(Saint-Georges%2C_Joseph_Bologne)).

Tempo di Menuetto

2 3 4 5 6 7 8

B $\flat$ major:

basic idea repetition continuation

9 10 11 12 13

14 15 16 17 18

(T) (D) (PD) (D) (T)

Marianna Martines: (1744–1812): Keyboard Sonata in A major (1765), 1st movement, mm. 1–3

[https://imslp.org/wiki/Keyboard_Sonata_in_A_major_\(Martinez%2C_Marianne\)](https://imslp.org/wiki/Keyboard_Sonata_in_A_major_(Martinez%2C_Marianne))

Allegro

A: IAC

A major: I vii^{o6} I⁶
expanding tonic

(T) (PD) (D) (T)

Ludwig van Beethoven (1770–1827): String Quartet in D major, op. 18, no. 3, 1st movement, mm. 1–10.
[https://imslp.org/wiki/String_Quartet_No.3,_Op.18_No.3_\(Beethoven,_Ludwig_van\)](https://imslp.org/wiki/String_Quartet_No.3,_Op.18_No.3_(Beethoven,_Ludwig_van))

Allegro 2 3 4 5 6 7 8 9 10 D: IAC

D major: I V_3^4 I^6 IV cad_4^6 V^{8-7} I

(T) *expands tonic* (PD) (D) (T)

Marianna Auenbrugger (1759–1782): Keyboard Sonata in E $\flat$ major, 3rd movement, mm. 1–20.
[https://imslp.org/wiki/Keyboard_Sonata_in_E-flat_major_\(Auenbrugger,_Marianne\)](https://imslp.org/wiki/Keyboard_Sonata_in_E-flat_major_(Auenbrugger,_Marianne))

Antecedent
(sentence) basic idea repetition continuation E $\flat$: HC

Rondo Allegro 2 3 4 5 6 7 8

E $\flat$ major: I V^7 I V^7 I vi ii^6 V

(T) *expands tonic* *expands tonic* (PD) (D)

Consequent
(expanded sentence) 9 10 11 12 13 14 15 16 (E $\flat$: DC)

(T) V^7 vi

(PD) (D) (T⁺)

17 18 19 20 E $\flat$: PAC

V^7 I

(PD) (D) (T)

Wolfgang Amadeus Mozart (1756–1791): Trio in E $\flat$ major, K. 498, “Kegelstatt” (1786), 1st movement, mm. 1–16.

[https://imslp.org/wiki/Trio_in_E-flat_major,_K.498_\(Mozart,_Wolfgang_Amadeus\)](https://imslp.org/wiki/Trio_in_E-flat_major,_K.498_(Mozart,_Wolfgang_Amadeus))

basic idea

Andante

Clarinet in B $\flat$

Viola

Piano

E $\flat$ major: I

repetition

continuation

12 (E $\flat$: DC) *crusc.*

ii $\bar{5}^6$ (P)
ii $\bar{7}$
cad $\bar{4}$ (D)
V $\bar{7}$
vi (T)

13 14 15 16 (E $\flat$: PAC)

IV (P)
cad $\bar{4}$ (D)
V $\bar{7}$
I (T)