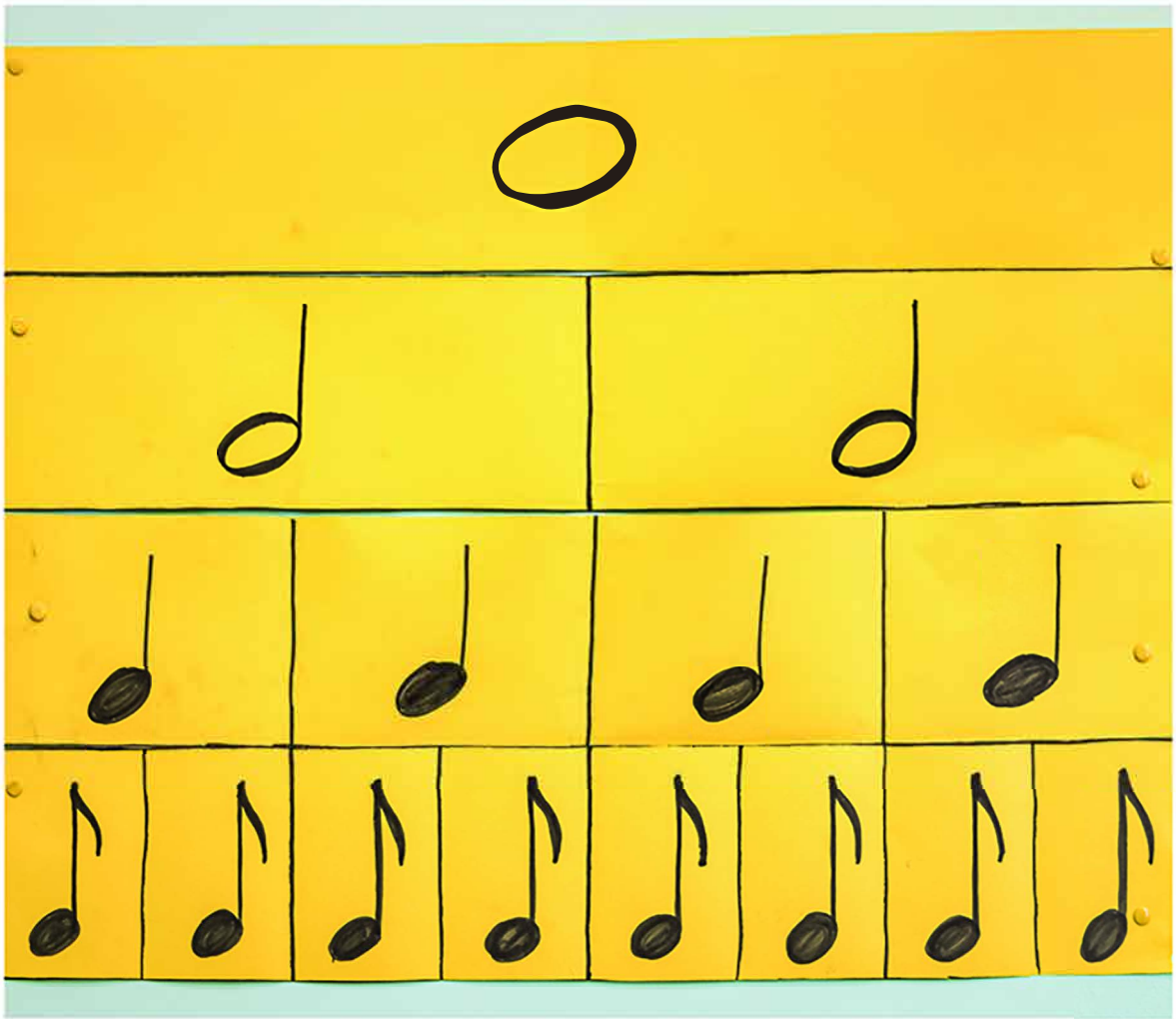
ROUTLEDGE

The Routledge Companion to Music Theory Pedagogy



Edited by Leigh VanHandel

THE ROUTLEDGE COMPANION TO MUSIC THEORY PEDAGOGY

Today's music theory instructors face a changing environment, one where the traditional lecture format is in decline. *The Routledge Companion to Music Theory Pedagogy* addresses this change head-on, featuring battle-tested lesson plans alongside theoretical discussions of music theory curriculum and course design. With the modern student in mind, scholars are developing creative new approaches to teaching music theory, encouraging active student participation within contemporary contexts such as flipped classrooms, music industry programs, and popular music studies.

This volume takes a unique approach to provide resources for both the conceptual and pragmatic sides of music theory pedagogy. Each section includes thematic "anchor" chapters that address key issues, accompanied by short "topics" chapters offering applied examples that instructors can readily adopt in their own teaching. In eight parts, leading pedagogues from across North America explore how to most effectively teach the core elements of the music theory curriculum:

- Fundamentals
- Rhythm and Meter
- Core Curriculum
- Aural Skills
- Post-Tonal Theory
- Form
- Popular Music
- Who, What, and How We Teach

A broad musical repertoire demonstrates formal principles that transcend the Western canon, catering to a diverse student body with diverse musical goals. Reflecting growing interest in the field, and with an emphasis on easy implementation, *The Routledge Companion to Music Theory Pedagogy* presents strategies and challenges to illustrate and inspire, in a comprehensive resource for all teachers of music theory.

Leigh VanHandel is Associate Professor of Music Theory at Michigan State University.

ROUTLEDGE MUSIC COMPANIONS

Routledge Music Companions offer thorough, high-quality surveys and assessments of major topics in the study of music. All entries in each companion are specially commissioned and written by leading scholars in the field. Clear, accessible, and cutting-edge, these companions are the ideal resource for advanced undergraduates, postgraduate students, and researchers alike.

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PREFACE

> Think about your favorite lesson plans – the ones that you look forward to teaching every year. The ones that always work, and that are time- and battle-tested. The ones that use some creative teaching aspect to convey the information. Now imagine a volume *full* of immediately useful lesson plans like that – that's what I'm hoping to put together!

That was the email I sent out to multiple lists of music theory teachers, asking for proposals on their favorite lesson plan. I received an overwhelming response of over 220 proposals, ranging from fundamentals topics all the way to post-tonal, from aural skills to curricular design, and everything in between.

The enthusiastic response to my call for proposals tells me several things about music theory pedagogy. First, music theory instructors take pride in their teaching and in developing lessons and materials that help students learn. Second, there's a continuing growth in interest in music theory pedagogy – not only as a practical element of our teaching positions, but also as a research area. And third, contemporary discussions in music theory pedagogy – flipped classrooms, music industry programs, music cognition, keyboard-based studies, non-Western music in the classroom, public music theory – have had a dramatic effect on how many of us are teaching, and on what and how our students are learning.

Trends

Several trends emerged as I was reading through proposals and ultimately through the lessons selected for inclusion. First, it appears as though the traditional lecture format is dying in music theory, if not already dead; all of the lesson plans involve students participating actively in their learning. In many cases, the music drives the theory rather than the other way around; many instructors have found that allowing students to experience a concept in music and then discover the details is an engaging and effective pedagogical strategy. There also appears to be a movement away from relying on the score and towards understanding and analysis by ear, from individual chords all the way to large forms.

Quite a few chapters discuss providing students with practical skills – finding tonic, error detection, improvisation, assignments requiring creation and editing of video and podcasts, and performance and analysis. Many chapters provide suggestions for how to approach individual topics or chords in music theory using non-canon repertoire: chromatic mediants through film music,

enharmonic augmented sixth chords through Sondheim, and mode mixture through popular music all help instructors provide diverse examples that resonate with their students.

Diversity of repertoire is also present in other ways. A chapter on integral serialism in Roberto Gerhard's String Quartet No. 1 provides an opportunity to explore a piece from a Hispanic composer outside the usual serial canon, and a chapter on form in Latin American popular music illustrates that formal principles transcend the Western canon. A lesson on rhythm in Hindustani *Tāl* provides instructors with materials to discuss meter in non-Western music, and a project-based lesson on using the Roland TR-808 to replicate rap beats illustrates principles of rhythm and meter using rap songs from the 80s and 90s. And many chapters provide examples of music by women composers, ensuring their voices are heard in the theory classroom.

In addition to lesson plans, there are also chapters focusing on the diversity of our student body. How and what should we be teaching to students who are interested in the music industry more than a performing career? What are the strategies used by and curricular challenges faced by instructors who have recently revised their curricula? What are the unique challenges of teaching at a community college or small school where you may be the only theorist? How can we include students in their learning process by including them in designing assessments? How can we make music analysis and aural skills accessible to all of our students? And how can we encourage our students to develop the skills to communicate, whether about music in general or music theory in particular? It's exciting to see diversity becoming a critical component of instruction from individual lesson plans all the way to curricular considerations.

The authors themselves represent every career stage from graduate student all the way to senior faculty, and are from a wide variety of institutions – community colleges, conservatories, and small liberal arts schools, all the way to large research universities – North and South America, Europe, and Australia. Some are theory specialists, some are composers, and for some theory is just one of the many things they're responsible for. This multiplicity of viewpoints ensures that there is something in this book that will appeal and apply to everyone.

How to use this book

My goal was to provide a volume of practical, immediately useful resources for instructors of music theory – specialists and non-specialists, folks teaching at the high school, community college, college, and university level – to use in the classroom or adapt for their own purposes. Many of the lesson plans in this volume can be immediately used in the classroom for specific topics, and the online Supplemental Materials (available at www.rctmtp.com) provide links to scores and recordings, resources, excerpts, handouts, assignments, and answer keys for instructor use. My goal with the Supplemental Materials is to ensure that all materials needed for each lesson are available to the instructor, so that the lessons are as easy as possible for an instructor to implement.

In addition to lesson plans on specific topics, there are also chapters that discuss types of activities or exercises an instructor can include in a curriculum: one chapter discusses how to implement the melodica into the fundamentals classroom; another provides suggestions for incorporating keyboard skills into a post-tonal course; yet another encourages error detection exercises in the aural skills curriculum. These chapters provide broader curricular suggestions for instructors to consider, providing sample lesson plans as illustration and inspiration and encouraging the instructor to develop more materials for inclusion in their own classrooms.

There are also thought-provoking chapters on the larger questions of who, what and how we teach. Our students are curious digital natives who turn to YouTube for instruction as easily as they open a textbook (perhaps more easily!), and they are more diverse than ever, with equally as diverse interests and goals. Chapters on curricular design and revision can help as we consider our students' needs and goals and how that affects our contemporary instructional priorities.

ACKNOWLEDGMENTS

This book would not have been possible without the assistance of many people. First, I have to thank everyone who submitted a proposal; the enthusiastic response confirmed this was a project worth doing. To the authors who contributed their time, expertise, and materials to this volume, thank you for being willing to share your resources with the music theory pedagogy world.

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Genevieve Aoki at Routledge has been a gentle guide from the very beginning when I came to her with this crazy idea. I can't thank her enough for trusting me with this project.

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I also owe thanks to an amazing network of colleagues and friends. If I try to name everyone I'm going to forget people, so let me say that if I have ever talked to you about this project, or about pedagogy in general, or if you have ever written about music theory pedagogy, you have supported and influenced me, and I'm grateful. Thank you for inspiring me to keep thinking about music theory pedagogy.

Most of all, I have to thank my mother, Barbara, for being my first model of excellence in teaching, and my husband, Dan, for supporting me throughout this crazy project.

SUPPLEMENTAL MATERIALS

The Routledge Companion to Music Theory Pedagogy has extensive Supplemental Materials available online at: www.rctmtp.com.

On the website, you will find scores, examples, links to recordings, additional examples, handouts, assignments, instructor answer keys, slide presentations, and other materials that allow for easy implementation of the lesson plans.

PART I

Fundamentals

1

MUSIC THEORY AND WORKING MEMORY

Leigh VanHandel

In 2012, I published an article in the *Journal of Music Theory Pedagogy*, "What can music theory pedagogy learn from mathematics pedagogy?", in which I examined the relationship between achievement in written music theory fundamentals and mathematics ability. I discussed research showing that the best predictor of success in the music theory fundamentals classroom was performance in math-related areas, suggesting math and music may have similar underlying cognitive properties; I also provided some teaching strategies from mathematics pedagogy research for use in the music theory fundamentals classroom.

Since writing that article, I've become increasingly convinced of the critical role of memory, and specifically working memory, in education in general and in music theory learning in particular. In this chapter, I discuss how working memory works, why it is important, what happens when a student has a working memory deficit, and what we as instructors of music theory can do to minimize the working memory burden on our students to help them learn more effectively and efficiently.

Further Evidence for a Math/Music Connection

In my 2012 article, I investigated the relationship between the cognitive processes involved in learning mathematics and learning music theory fundamentals. This relationship is supported by research into factors contributing to student success in the music theory classroom; there is a strong correlation between student performance in mathematics, specifically the math portion of the Scholastic Aptitude Test (SAT) exam, and performance in first-year written music theory classrooms.

Additional evidence of the music theory–mathematics connection has been found in recent studies conducted by researchers at Florida State (Rogers and Clendinning 2015; Barroso et al., 2019), where they studied a wide spectrum of potential factors influencing performance in undergraduate music theory courses; their factors included high school grade point average, scores on standardized tests, prior theory knowledge and experience, measures of confidence and anxiety for both math and music theory, a measurement of spatial skills, and an music "aptitude test" designed to test recognition of music notation and ability to complete notation-based pattern-matching tasks. They found that the best predictor for performance in the first-year music theory curriculum was the American College Test (ACT) math score.[1] They also found that performance on the music aptitude test predicted performance in both semesters of first-year theory, while traditional placement tests measuring existing music theory knowledge only predicted performance in the first semester of music theory.

Working Memory, Math, and Music

There are different kinds of memory, each with different but related functions. Long-term memory is our stable, durable reference memory for information and skills. Short-term memory and working memory are similar to each other, but with one critical difference: short-term memory is our capacity for holding a small amount of information in our minds for a short period of time; working memory is our capacity for holding *and manipulating* a small amount of information for a short period of time. For example, immediate recall of a list of words uses short-term memory, while the ability to recall the list of words in reverse requires working memory.

While long-term memory is theoretically unlimited, working memory has limitations in both amount of information and the duration it can be held (Miller 1956). If those limits are exceeded, the higher the likelihood of forgetting information or making an error. Learning happens when there are enough mental resources available to process information in working memory *and* integrate it into pre-existing knowledge in long-term memory; in order to get information into long-term memory, it has to go through working memory first.

Baddeley and Hitch (1974) proposed a model of working memory with three components: the *central executive*, which controls the flow of information to the other components; the *visuospatial sketchpad*, which is responsible for visual and spatial information, and the *phonological loop*, which is responsible for verbal and other auditory information. Later, Baddeley (2000) updated the model to include the *episodic buffer*, which facilitates the communication between working memory and long-term memory.

Working memory ability is important for learning in a number of ways. It correlates with performance on higher-order cognitive tasks including reading comprehension, complex learning, and reasoning (Engle 2002). Deficits in working memory are considered to be a primary source of cognitive impairments, and students with working memory deficits are more likely to get distracted during a task or be labeled as disruptive or inattentive (Klingberg 2009). Working memory deficits may make learning new facts or skills more difficult; the burden on working memory is always the greatest at early stages of skill development because the material is unfamiliar (Kyllonen and Christal 1990, 427). Students with working memory deficits may have difficulties processing new information or skills, and may face challenges incorporating new knowledge into long-term memory.

There is a strong correlation between mathematics performance and working memory ability in general. Visuospatial skills are an important contributor to and predictor for mathematics ability, both in children and adults (Bull and Espy 2006; Peng et al. 2016); however, there is some indication that as mathematics expertise is developed, the role of visuospatial working memory appears to decrease (Dehn 2008, 112).

Reading, writing, and interpreting music notation also require visuospatial processing, which is not surprising given that music's symbolic notation system is fundamentally dependent on a two-dimensional space, with time represented on the x-axis and pitch on the y-axis. Studies have shown that music reading tasks activate the visuospatial network – areas of the brain active during spatial localization, visuospatial attention, spatial memory tasks, and attentionally demanding tasks (Gromko 2004; Sluming et al. 2007). Thus it appears as though visuospatial working memory is important for reading and interpreting musical notation; this is supported by the findings of Barroso et al. (2019), who found students with better performance on the spatial skills assessment and the pattern-matching music aptitude test tended to have higher grades in first-year written music theory. Students with low visuospatial processing and/or working memory in general may be at a disadvantage in the written music theory classroom.

Memory and Schema Development

The goal for learners is to create a *schema,* or a representation of information in long-term memory, which may contain a large amount of interconnected information. Having material available in a schema avoids the limitations of working memory by treating the schema as one single automated source of information (Paas and Ayres 2014, 192). A student with working memory deficits, however, may have difficulties forming a schema, instead relying on more inefficient or less accurate strategies for coming up with basic information.

Working Memory and Schema Illustration

In music theory, a schema might contain related fundamentals topics such as notes, scales, key signatures, intervals, chords, and chords in a key – information that must be available for immediate recall and manipulation.[2] Expert musicians may find it difficult to remember or understand what it's like to have your working memory taxed by something as simple as theory fundamentals. This is known as the "curse of expertise" (Hinds 1999), in which experts in a topic routinely underestimate the difficulty novices face in completing a complex task and the time it will take a novice to complete the task. This is due to *anchoring* and *adjusting,* in which experts anchor their difficulty estimates on their own abilities and fail to adjust for the novice. In the fundamentals classroom, this can take the form of instructors not allowing enough time on a timed test, not spending enough time on a topic, or assuming students will be able to figure something out on their own.

One of my favorite parts of a presentation I've given on this topic is when I ask the audience to engage in an activity illustrating what it's like to have your working memory challenged. Expert musicians have a fully formed schema, so there's very little working memory burden if you're asked to spell a D major chord; however, one small tweak can disrupt your schema.

Instead of the familiar note names, A B C D E F G, change those to:

H I J K L M N

Normal chord-spelling rules apply; use every other note name to create a triad, wrap around when you reach the end, and keep the concept of root, third, and fifth of the triad. Also, no cheating; cover up the letters above and do this just in your head.

How would you spell a triad if:

I is the root
H is the third
K is the fifth

When I've done this demonstration in presentations, there's usually a few people who are able to do this relatively quickly, but most people hesitate and count through the alphabet each time ("H *I* J *K* L *M* … so it's I-K-M?"). For the second question, they often begin to spell the triad with H as the root, then realize that H is given as the third; they have to start over and eventually realize they need to wrap back around to the next to the last letter in the sequence to find the root. Most people find this task quite challenging; it places a burden on your working memory because you are unfamiliar with manipulating this collection of note names.

Next we try a more challenging task. I ask the audience to spell a triad in the same way, using our new note names, and provide them with a target word. If the target word has one letter in it that is also in the chord, they have to circle the middle note of the chord, even if it's

not the letter that was in the target word. If the target word has two letters that are also in the chord, they have to circle the first and last notes of the chord, even if those aren't the letters in the target word.

Consider an example back in our comfort zone: if the triad was spelled C-E-G, and the target word was *camel,* there are two letters in common between the target word and the chord (C and E), so you would circle the first and last notes of the chord – C and G.

Imagine this is a timed quiz; how long does it take you to come up with the answer to all three of these questions? Challenge yourself: don't look at the new note names, and only write down the answer!

Chord	*Target word*
I is the root	liked
H is the third	jails
K is the fifth	hijab

Again, there are a few people who can do this relatively quickly, but for many it's a very challenging task. After providing the answers, I ask the audience to think about their thought process and the steps they had to go through to complete this task. Some report that even though they noticed the requested chords were the same as the first task, they didn't remember the three groups of note names they came up with about a minute earlier. Frequently, someone will say they came up with the three note names they needed, looked at the target word, and immediately forgot what the three note names were and had to recalculate those again. There's always at least one person who forgot which notes they were supposed to circle under which circumstances.

This task places an even *larger* burden on your working memory, because you had to hold one piece of information in your memory (how to spell the chord) while considering new information (the target word) and then manipulate the original information based on the new.

The goal of this demonstration is for expert musicians to realize (or remember) how challenging it can be for students to complete a task like spelling a chord if they're relatively unfamiliar with the material – i.e. if their schema isn't fully formed yet. If they are asked to spell an F minor triad, for example, first they have to come up with the letters F, A, and C, and if they're still unfamiliar with chordal letter combinations it can take them a while just to come up with those three letters. Then they have to think about their strategy to solve the problem, and their inner narrative might go like this: should I think of the key signature of F major, or F minor? It said minor. Okay, does F minor have flats or sharps? And how many? Where is it on the circle of fifths? Let me think about the circle of fifths. Okay, F minor has four flats. What are they? Four flats mean B♭, E♭, A♭, and D♭. Do any of those apply to this chord? Wait, what were my letter names again?

That thought process might be an exaggeration – but then again, for a student who has a tenuous grasp on the topics, there are a lot of steps to go through to calculate the answer, which places a huge burden on working memory. If a student has a working memory deficit on top of that, it can be extremely challenging.

Identification and Intervention

Students with low working memory can be difficult to identify. According to Gathercole and Alloway (2008), students with low working memory often have difficulty processing multi-stage directions or activities; they'll forget critical pieces of information about what to do next. They often have trouble keeping track of progress in a complex activity, constantly losing their place. They also have difficulty in activities requiring the simultaneous processing of some information

and recall of other material. They may appear to have a short attention span, or be easily distracted, especially when an activity is challenging. They do not usually have behavioral problems, although they may be reserved in larger group activities or may not fully engage in classroom activities.

Working memory deficits are implicated in other cognitive disorders, including Attention Disorder Hyperactivity Deficit (ADHD), but there are some important differences between an ADHD student and a student with working memory deficits. Students with low working memory often perform well on the first few steps of a complex task, but then lose focus and begin making mistakes or forgetting important information; with ADHD, performance is much more variable. Students with low working memory typically exhibit reasonable social adjustment, whereas problems with social integration, hyperactivity, or impulsive behavior are often characteristic of ADHD. ADHD students may also change behavior based on medication level, time, amount of sleep, or mood, whereas working memory levels are more stable, so student behavior is more consistent over time (Gathercole and Alloway 2008).

There are brain training programs, such as Lumosity or Cogmed, that claim they can help improve working memory and cognitive function. The research surrounding these programs is controversial and conflicting. Studies funded by companies making brain training programs tout their effectiveness, but independently conducted research tends to find little to no support for the claims made by the companies (Shipstead, Hicks, and Engle 2012; Etherton et al. 2018).

Jaeggi et al. (2014) extensively reviewed interventions designed to improve working memory and found that results are inconsistent. Some studies have found an effect of working memory training on near transfer (similar) tasks; however, results are very mixed but generally negative when it comes to far transfer (unrelated) tasks. Gathercole et al. (2019) found specific performance tasks involving working memory – for example, memorizing a string of numbers – could be improved through training. However, improvement on individual tasks did not have any effect on any other type of working memory task, especially if it was in a different domain (verbal to visuospatial or vice versa). They concluded that working memory training would have little impact on skills required to improve educational achievement. Thus if a student does some general brain training in hopes of increasing their working memory, they may improve at specific working memory tasks, but that improvement will likely not transfer to other tasks necessary for learning, and almost definitely will not transfer to music theory.

Cognitive Load

Since working memory training is unlikely to improve a student's working memory capability, we as instructors can help reduce demands on their working memory by reducing *cognitive load*. Cognitive load refers to the amount of information your working memory is required to process in order to learn something or complete a task; it's divided into *intrinsic* load, the inherent difficulty of the task itself, and *extraneous* load, elements irrelevant to the task that demand working memory resources.[3] Students with a strong working memory are better able to direct their attention to the intrinsic information and ignore extraneous information. Students with working memory deficits often have difficulty determining what information is important to the task and may allocate their working memory resources to the wrong information. Worse, the combination of intrinsic and extraneous load may overload their working memory entirely. This overload causes the symptoms instructors see in the classroom; students may complete part of a task and then lose focus, or may have difficulty completing complex tasks with multiple steps without forgetting required information. It also leads to students not being able to process the intrinsic information of the task itself, which means information does not make it into the memory system and will not become part of a schema.

Why Reduce Cognitive Load

Reducing cognitive load will help students who have lower working memory capabilities be able to focus their attention appropriately, which will help them process information and learn material more efficiently. However, well-designed adaptations reducing working memory burdens for assessments or presentation of material will help all students learn, not only those with working memory difficulties. This follows the principles of Universal Design for Learning (UDL), where making information more accessible to some ultimately benefits everyone.

Strategies for Reducing Cognitive Load

One of the best ways to reduce a student's individual cognitive load is to increase the amount of information they have available for immediate recall in their schema. The more information they are able to recall from their schema, the less of a burden placed on their working memory to complete a task.

In the fundamentals classroom, developing students' schemas may involve explicitly helping them develop strategies for practicing and learning the material. Students are notoriously poor judges of when they are learning and when they are not, and they may not know any study strategies other than "read it again," which is one of the least productive study methods (Brown, Roediger, and McDaniel 2014). As an example, when students are learning the circle of fifths, some of them may try to learn it by just staring at the diagram in the textbook; often, this strategy will leave them unable to reproduce it or recall specific information when asked. This is an error in familiarity versus fluency; the student may be familiar with the circle of fifths but is not fluent with it. Instead of telling students to *memorize* the circle of fifths by rote, encourage students to figure out strategies for *generating* the circle. If they develop a deeper understanding of how the circle of fifths relates to scales and key signatures, it will become part of their schema, and it will be much easier for them to recall the information from the circle or generate it if they can't recall it. Students may need to be shown a variety of strategies using information they already know: for some, it may help them if they recognize that each key on the circle is based on the fifth scale degree of the one counterclockwise to it (B♭–F–C–G–D–A–E, etc.); for others, it may help them to recognize that the order in which sharps appear in the major scales (FCGDAEB) is reproduced in the circle of fifths (starting at one flat and moving clockwise for the major circle), as is the order of flats (B♭E♭A♭D♭G♭C♭F♭) starting at two flats and moving counterclockwise.

Some students will naturally gravitate toward mnemonic devices to help them recall and process information. They may write note names next to every notehead, draw a piano keyboard or the circle of fifths on every assessment, or write out the inversion symbols for triads and seventh chords as a phone number (664–765–4342). These are all ways students are *offloading* their cognitive load; if they have a written reference, it theoretically lessens the burden on their working memory. These strategies work for a while, but eventually these tricks become a crutch that the student may become dependent on, slowing down their thought process. If students don't consciously learn the material and incorporate it into their schema, they won't have the information immediately available for use, and they will still have to go through the steps of checking their reference. There are two types of students who may do this: one is the student trying to lighten their cognitive load because they are struggling with the material, their schema, or their working memory; the other is the perfectionist, who may know the material but is so scared of getting something wrong that they rely on multiple ways of double- and triple-checking their work. With both types of students, I've found it helpful to talk with them, find out why they're using that device, and offer them strategies for the material if they need them. I then ask them

to practice *not* using their crutch on a few very low-stakes assessments, promising them that if they do poorly, they'll have the opportunity to re-do those assessments. Usually after a couple of successful assessments without using the mnemonic device, they realize they don't need to use it, and by that point they may have had enough practice that the material has been incorporated into their schema.

Instructors can also help students develop chunking strategies. As the chord-spelling activity illustrated earlier, not having chunks of information in your schema means that the information must be generated anew each time. For example, if a student can create chunks for A–C–E, B–D–F and so on, that is less to hold in working memory as they're spelling chords. There may be an element of rote rehearsal for developing chunks like this; what is critically important is that an explicit connection is made to other knowledge so it gets added to the schema. When encouraging students to learn triad chunks, one strategy is to have them sing triad arpeggios up and down a major scale on the letter names (E–G♯–B–G♯–E; F♯–A–C♯–A–F♯; etc.), and doing it in several different keys, highlighting that the basic groups of letters (CEG, DFA, EGB, etc.) are always the same. In addition to creating chunks, this activity can help reinforce scales if you start on different tonics, aurally reinforce different triad qualities, and set the groundwork for introducing chords in a key.

An important way an instructor can reduce cognitive load for everyone is to be aware of how information or instructions are presented to students. A frequent scene in a music theory classroom may go like this: the instructor provides verbal instructions for an activity by saying, "Turn to page 218; focus on measures 5–15, identifying passing tones – both diatonic and chromatic, and accented and unaccented – and appoggiaturas. Oh, and neighbor tones." Seven seconds later come the student reactions – "Wait, what page? What measures? What are we looking for?" – and the instructor has to repeat the instructions again. And probably again.

Instructions or information presented aurally cease to exist after sounding; this is known as the *transient information effect,* because the only thing to refer to is what was successfully stored in working memory. What difficulties could the earlier instructions present to students?

- Because the instructions are relatively long, a student could forget the information presented first – the page number and/or the measure numbers. That information could be pushed out of working memory or forgotten because of the amount of information coming afterward.
- If a student was deliberately rehearsing the page number and measure numbers in their head in order to *not* forget that information, they may miss the following instructions of what specifically to look for, and they may not be able to successfully complete the task.
- The list of items is presented inefficiently. The student may remember they're supposed to identify passing tones, but they may not remember all of the different *types* of passing tones specified. Given the instructor's afterthought of "Oh, and neighbor tones" at the end, the student may not make the connection that the different types of passing tones also apply to neighbor tones. Or they may forget everything when they hear "appoggiatura," as they try to recall what that word means.
- Even if the student does initially remember the page number, the measure numbers, and the list of items, the intrinsic load of studying the example will place a burden on working memory as they're completing the task, and they may forget the instructions after beginning the task and have to ask for guidance partway through.
- If a student is attempting to remember the instructions by rehearsing it mentally and the instructor begins speaking again, the student now has to remember the information, process the task at hand, *and* attempt to process the information the instructor is providing all at the same time.

Instructors can avoid the transient information effect by ensuring that the information is presented in a way that facilitates retention:

- When presenting information or instructions aurally, divide the information into smaller chunks.
- Keep similar material together; in the earlier example, it would be better to group passing tones and neighbor tones together, and then provide the different options that apply to both.
- When possible, provide written instructions, or at least written reminders. In the earlier example, the instructor could write the page number and measure numbers on the board, and either provide the list of non-chord tones on the board for the students or have the students generate the list themselves, which could happen in different ways:
    - Ask students, "What non-chord tones have we studied?" and list student responses on the board. Having students list the non-chord tones requires them to recall the types of non-chord tones they've learned; writing them on the board provides a reference list that students can refer to during the activity. It also provides an opportunity for a quick review by asking the student who suggested each answer to define it quickly.
    - Instead of giving the students a long list of things to look for, ask them to study the example and generate a list of what non-chord tones are present, and then discuss their findings. This is a more cognitively demanding and open-ended version of the task, and requires enough familiarity with the material for the students to recall the types on their own, but it can generate useful class discussions.
- When possible, avoid talking or playing unrelated music while students are working. The intrinsic load of the task combined with the phonological loop being engaged by hearing and interpreting additional auditory stimuli may result in an overload.

  I have found talking during activities to be especially problematic when playing analysis examples during a test; if a student is deeply engaged in a thought process and the instructor says, "Okay, I'm going to play Example 1, so please turn to that page and here's the excerpt," the student has now lost all of the mental work that went into what they were working on. Instead, I quietly give my students a pre-warning, asking them to finish up the thought they're currently working on and make note of where they are, and I give them about 15 seconds to do so before I play an audio example.

Other ways to reduce the extraneous cognitive burden of instructional materials are to consider the level of reading comprehension required, the length of the instructions, and the clarity of the terminology used. A study on written instructions for mathematics questions determined that complex sentences in instructions decreased accuracy, questions with longer instructions were perceived as being more difficult even if they were not, and questions with words with multiple or ambiguous meanings were answered incorrectly more frequently (Walkington et al., 2015). This last finding can be especially challenging in music theory, as we use the same or similar terms to mean different things; for example, the word *compound* can refer to the division of a beat unit or to an interval larger than an octave. One potentially problematic issue is the difference between $\hat{7}$, vii°, V^7, and "seventh"; especially when spoken, the similarities can be very confusing for a student.[4] It is much better for the instructor to explicitly say "scale degree seven," "the seven chord," "the five-seven chord," and "the chordal seventh," every time they are referring to one of those items in spoken communication, to be equally as clear in written instructions, and to reinforce that students do the same. If a student says or writes, "It's the seven," it's not clear if they are referring to $\hat{7}$, the vii° chord, or a chordal seventh, and they may not be sure either.

When to Minimize Cognitive Load

Because the working memory burden is greatest when material is unfamiliar, it is most important to minimize cognitive load when introducing new ideas. At this stage, students should be concentrating on the material itself and on making connections to knowledge they already have, not on the language used for instructions. It may also be desirable to reduce intrinsic load when introducing material; this is the basis of scaffolding difficulty by starting instruction with simpler tasks (for example, generic intervals) before moving to more complex tasks (interval quality). As fluency with material increases, the intrinsic difficulty of the tasks can be increased. As this happens, the instructor should still be aware of the extraneous load on students because added task complexity reduces the amount of extraneous information students can process, and reduces opportunities for incorporating new information into their schema.

Conclusion

Evidence of a link between cognitive processes important to both music theory and mathematics continues to grow; recent research linking spatial processing skills and pattern matching to success in written music theory courses indicates that music theory and mathematics share cognitive resources. Working memory is important to education in general; it allows information to be retained and manipulated, and it facilitates the transfer of information to long-term memory. Working memory is important in mathematics education, because it allows for the storage and manipulation of information; evidence suggests that it may be important in music theory as well. Without a strong working memory, music theory students may have difficulty creating a schema to provide them with the necessary fluency with fundamentals materials. Research into best practices in mathematics pedagogy, grounded in cognitive science, may be able to help music theory instructors ensure all students are able to learn with or without a strong working memory. Future research should more specifically explore the relationship between working memory and success in the music theory classroom.

Notes

1 Both the SAT and ACT are standardized tests given nationwide to high school students and are often considered in college admission applications. The tests cover similar material, though the scoring scales differ.
2 In my 2012 article, I suggested strategies that can help students develop their schema from the beginning, to help them create their network of information for music theory fundamentals.
3 There is also *germane* load, which are the cognitive resources students use for learning or problem solving.
4 This can be especially challenging for someone for whom English is a second language.

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2

PUTTING THE MUSIC IN "MUSIC FUNDAMENTALS"[1]

Melissa Hoag

Introduction

Readers of this volume will doubtlessly agree that music fundamentals are of paramount importance to all music students. It is also, in my view, the most difficult of topics to teach well, and the easiest to teach badly (and, perhaps the most damaging topic to teach badly). Without careful thought about the pedagogy underlying their teaching (ordering, presentation, scaffolding of difficulty), an instructor might unintentionally present this essential material in a confusing or contradictory fashion. Or, an instructor's approach might lack rigor; they may give too few graded assignments, return them too slowly, grade too leniently, or grade without specificity, so that students never master the material. An instructor might rush through fundamentals in order to get to the "good stuff," like counterpoint and analysis, likewise resulting in students who get lost, and are left to build the rest of their knowledge on shaky footing. An instructor might themselves be bored with the material, and rely solely on isolated spelling and recognition drills to get students to learn key signatures, intervals, and chords.

At worst, these scenarios can damage students' confidence and success throughout their musical careers. At best, they result in bored, uninspired students, who, in their disillusionment, think of music theory as a chore, rather than a magical set of keys, capable of unlocking thrilling musical mysteries. As someone who teaches music theory to graduate students, I encounter students lugging what I call "theory baggage" every semester, and I consider it my calling to ensure that these students exit my course not only with sharper skills but also newfound appreciation for the subject. It is imperative that instructors of music fundamentals grasp their solemn duty: they are entrusted with offering instruction that balances rigor and practice with musical engagement and inspiration, so that students not only gain a solid fluency with music fundamentals but also understand why they are learning this material and how it applies to real music.

Contrary to the earlier examples, effective music fundamentals instruction should invite students on a journey filled with musical discovery by placing real musical examples and experiences at the center of their learning. Effective music fundamentals instruction must meet students where they are, not only in needing to gain fluency with this material but also in needing to understand how vital this material is to everything else they will do as musicians. Effective music fundamentals instruction should summon students to share their experiences and knowledge, both by enlisting students to help choose repertoire for the course and in respecting their intellect by posing open-ended questions on assignments whenever possible. Finally, effective music fundamentals

instruction should model a genuine sense of wonder regarding the machinery of music fundamentals, because if students witness authentic intellectual curiosity in their instructor, they are more likely to develop authentic intellectual curiosity for the subject.

Two Approaches for Success

Generally, two approaches govern how I teach all music theory, but especially music fundamentals. I have found that these dicta rarely lead me astray.

Connect Everything with Sound, Constantly

I have a conviction that all music theory courses are really aural skills courses, even when written and aural courses are taught and graded separately. Students in my written theory classes sing as often and as musically as possible, beginning on the first day of class. Singing not only brings what might otherwise be abstract concepts to life but also engages and encourages those for whom voice is their primary instrument, who perhaps most frequently have little music theory background and who may be most at risk to lack confidence in written skills. I also invite students to use their burgeoning skills to figure things out by ear as much as possible, and to begin to apply names and terminology to what they hear.

Integrate Repertoire as Much as Possible

The second prong of my approach centers on repertoire. A music fundamentals course has the potential to shape a student's perception of what music theory is, what kinds of music can be addressed by music theory, and, concomitantly, how broadly applicable and relevant the study of music theory is. Therefore, the use of diverse examples is perhaps nowhere more important than in music fundamentals. By "diverse," I mean not only popular music, jazz, and musical theater examples, but also Western art music, which – depending on the institution – can be the style with which students are the least familiar. I also refer to diversity of underrepresented groups. My own philosophy is that I will use any music that exemplifies the topic at hand, and I make a concerted effort to use a wide variety of music.

One example of my focus on repertoire can be demonstrated by the manner in which I begin every class. As do many other instructors, I find that students respond well to playing music before class that is directly germane to the topic of the day. I display thought-provoking questions that will get students thinking about the piece, and begin class with a brief discussion that ideally segues into the day's topic. Sometimes we perform a brief aural skills exercise with this music – we might attempt to notate part of it, describe the meter, or figure out part of it on solfège.[2] We also discuss possible composer/genre, style characteristics, and other details.

Another aspect of my focus on repertoire has to do with how I use texted music. Whenever I use music with text, I always provide the text in its original poetic format along with a translation, and I usually ask students to describe some concrete ways in which the musical setting reflects or adds interpretation to the text. I don't expect publication-level descriptions; after all, their analytical language is in its formative stages. But, asking such questions gives students the chance to be creative, and to flex their nascent interpretive muscles. Perhaps most importantly, asking students to think interpretively about the music they are studying demonstrates that music theory can lead to meaningful insights rather than just labels.

Essentially, while I acknowledge that drilling isolated scales, chords, and intervals can sometimes be the most efficient way for students to practice and for instructors to assess understanding,

I find that students are more motivated to learn if I make the effort to place music – both the musical experience and actual musical compositions – at the center of their learning. For me, any assignment that includes drill will also include meaningful engagement with a piece of music, preferably an entire movement.

The remainder of this chapter will provide examples of how I incorporate these mindsets into my teaching to make music fundamentals engaging for students. It is loosely structured by the order in which I teach various items. (Note: meter is placed at the end, not because I teach it last, but because it is somewhat more flexibly moved around than scales/intervals/chords.)

Practical Applications

Scales

When I first introduce the major scale, I have students sing it on solfège, and accompany the scales with lush, chromatic accompaniment. I specify crescendos and decrescendos, and different rhythms and articulations. My goal is for students to experience the basic architectural componentry of music as inherently musical. As they gain confidence, students sing scales on note names as well as solfège, and later, they sing scales in canon without accompaniment. Finally, once they've learned all of the minor scale types, we will sing them all in canon together along with major, which results in some delicious dissonances – and even if they find this dissonance off-putting, I make a show of rapturously enjoying it. These are quick activities that make students happy and engaged.

I have several repertoire-focused activities for scales, but this one is perhaps the student favorite. After the class has learned major and minor scales, we study the first five measures of Vivaldi's Concerto for Two Violins in A minor, RV. 522 (see the Supplemental Materials for a link to the score and two recordings). The ritornello features ample variance of $\hat{6}$ and $\hat{7}$, and therefore provides an ideal way for students to understand how these varied scale degrees function in a piece of music. Before playing the segment several times in its entirety without the score, I direct students' listening toward the scales in the solo violin part, because we are going to be figuring this out by ear and then singing it. After playing the segment several times, I stop every few seconds of the recording (roughly, at each measure boundary), and encourage students to hear the solfège in their heads before we sing it aloud together. As we sing each bit, we discover the various minor scale segments that appear in the example, and why Vivaldi used various versions of $\hat{6}$ and $\hat{7}$. For instance, in measure 1, raised $\hat{7}$ is used because G♯ is headed back up to $\hat{8}$; on beat 3 of measure 1, however, lowered $\hat{7}$ and $\hat{6}$ are used because the scale proceeds downward from tonic. In measures 2 and 3, raised $\hat{6}$ and $\hat{7}$ are used because the scale is moving toward $\hat{8}$ again. In measures 4 and 5, lowered $\hat{6}$ is featured because $\hat{6}$ continually falls back to $\hat{5}$. Gradually, we figure out the whole passage, and then sing it on solfège while I realize the continuo from the keyboard. (Of course, I instruct them to do their best impersonations of violins.) Finally, I reveal the score, and we examine the other parts. In particular, we look for other appearances of $\hat{6}$ and $\hat{7}$, which leads to a discussion of the cello part's repeated use of raised $\hat{6}$ and $\hat{7}$ in measures 2 and 3, despite its descending scalar passages. I ask students why they think Vivaldi might have chosen to go against the typical melodic minor tendencies at this point. To demonstrate what it might have sounded like otherwise, we slowly sing the bass line – first, as written, with raised $\hat{6}$ and $\hat{7}$, and then with the lowered $\hat{6}$ and $\hat{7}$, while I play the upper parts. Of course, it is immediately clear that raised $\hat{6}$ and $\hat{7}$ sound much better than the lowered versions, and I try to lead them to verbalize why raised $\hat{6}$ and $\hat{7}$ work here. (Ultimately, I try to help them hear that it is all about the harmony – that it needs to be a major dominant leading to a tonic – and demonstrate both progressions.) We sing it once more, now with the score.[3]

Intervals

I begin by introducing the numerical aspect of interval labeling, and provide students with some identification practice. Fanny Hensel's brief vocal duet "Der Strauss" is a compact piece with which students can practice all levels of interval identification, both melodically and harmonically. On a first encounter with the piece, students identify the numerical labels only; then, which intervals are perfect and/or major; and, finally, all of the intervals. Throughout the process, students also consider broader issues surrounding the work. If this piece is used in class, it is simple enough for students to sing, with some guidance about the chromatic solfège.[4] Then, I introduce interval quality, using the major scale as a starting point, and ensuring that students sing as much as possible. First, I differentiate among intervals that can be perfect (1, 4, 5, and 8), and those that cannot (2, 3, 6, and 7). Then, I ask students to sing a given major scale on note names, which I notate on the board as they sing. I explain that all intervals above the tonic pitch of a major scale are either major or perfect. We then sing each interval ascending from the tonic, starting with the perfect intervals, and then moving on to the major intervals. Identifying major and perfect intervals is an important step that must be allowed to percolate thoroughly before moving on to minor, augmented, and diminished intervals. At this stage, the instructor might also wish to introduce how to deal with intervals built above pitches that are not tonics of major scales (i.e. G♯, A♯, D♯, E♯, and F♭), before matters are complicated by the other interval qualities.

Please see the online Supplemental Materials for a worksheet that asks students not only to label intervals but also to make some observations about what kinds of melodic and harmonic intervals occur the most, and why they think that might be the case. I have also included isolated interval recognition and spelling drills to ensure ample examples in different clefs, as well as intervals built above pitches that are not tonics of major scales. In addition, the Supplemental Materials include links to biographical information, a score, and a recording.

Once students are secure in their abilities to identify major and perfect intervals, they can learn to recognize and write the other qualities. Students can return to the Hensel duet and analyze all of the intervals.[5] Please see the Supplemental Materials for a worksheet addressing all of the interval qualities, along with some open-ended, big-picture questions regarding the piece and its setting of Goethe's text.

Triads

After I initially introduce the four triad types, students sing them, first as notated in Figure 2.1, and then as blocked chords. (For blocked-chord singing, I devise groups and instruct each to sing the root, third, or fifth.) As with scales, I also provide piano accompaniment the first few times the class sings this exercise. As with the scale singing, singing triads in this way can be more than just an exercise: it allows students to *experience* these triad qualities firsthand.

When learning such foundational material as triads, it is important that students confront the material in a variety of ways: different clefs, performing forces, voicings, and textures. There is

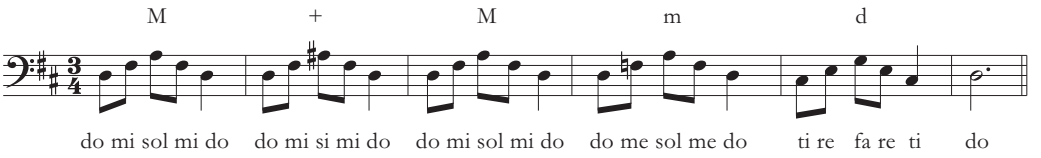

Figure 2.1 Chord singing exercise.

a window of time during fundamentals when chromatic music (at least that which is primarily composed of triads) is more accessible than it will be once Roman numerals have been introduced. This presents an unusual opportunity to dig into some of the juiciest music that the sixteenth and seventeenth centuries have to offer. I have found that homophonic late-Renaissance and early Baroque music of composers like Orlando di Lasso, Maddalena Casulana, and Carlo Gesualdo offers many options for identification of triad types using lead-sheet symbols. Students also happen to really love this music, and few have had any exposure to it.[6]

Orlando di Lasso's motet "Christe Dei soboles" offers good practice for triad analysis; a link to the score and recording as well as a worksheet are available on the Supplemental Materials website. Although most of its harmonies are in root position, it features many chromatic chords in addition to a key signature, so students must pay careful attention to the accidentals. There are also few embellishing tones; the only embellishment on the first page is a suspension in measure 30, and it is simple enough to mark it as something for students to disregard. The instructor should be aware that there are occasionally incomplete triads. Again, these can easily be marked. Because it is so long, I have sometimes assigned segments of this motet for group work, and then had students present their analyzed segments to the class.

This version is excellent for practice because it is on four staves, thus offering students an opportunity to develop their score-reading abilities. The instructor might wish to prod students' imaginations regarding the text, which was originally secular – so secular, in fact, that the original version was censored and the text was changed after Lasso's death.[7] The worksheet provides the texts and translations of both versions. Slightly less chromatic, but featuring more inverted triads, is the beginning of Maddalena Casulana's madrigal "Amor per qual cagion" (please refer to the Supplemental Materials website for an assignment using this piece). Though few today know her name, Casulana (ca. 1544–ca. 1591) was the first woman to have her music printed and published, and was renowned during her lifetime as a composer of madrigals.[8] As in the Lasso example, there are occasional instances of incomplete harmonies and embellishing tones, which have been marked. Instructors can choose to discuss the incomplete harmonies with their students or ignore them altogether. Aside from labeling chords, the assignment also asks students to consider some questions related to the madrigal's text, which is included with the assignment. The first few chords of Carlo Gesualdo's madrigal "Moro, lasso, al mio duolo," and similar passages throughout the piece, also offer great practice for triad analysis. If identifying textural types is part of the fundamentals curriculum, this piece works well as an example of alternation between homophony and imitative polyphony. See the Supplemental Materials for a link to the score, recording, biography, and text translation.

Meter

When introducing basic meter types (simple versus compound, duple/triple/quadruple) I initially avoid any discussion of notation and meter signatures. Instead, I introduce basic conducting gestures for duple, triple, and quadruple meter. I then play a plethora of examples of simple meter while students conduct to determine whether the meter is duple, triple, or quadruple. Table 2.1 has been carefully curated to include only examples that are clearly emblematic of each meter type; please see the Supplemental Materials for links to specific recordings. By conducting, students are already determining two levels of meter: beats and beat groupings.

By beginning with sound and inviting students to share their observations about what they are hearing, I aim to lead them along a path of discovery, instead of introducing the topic with a pedantic lecture about meter signatures. The discovery method takes longer, but the end goal is worth it: students learn to approach the study of meter full of fascination, not obsessing about the mechanics of meter signatures.

Table 2.1 Simple Meter Examples

Simple duple
William Schwenck Gilbert and Arthur Sullivan, "I Am the Very Model of a Modern Major General," from *Pirates of Penzance*
Janelle Monáe, "Tightrope"
John Philips Sousa, *The Stars and Stripes Forever*
Simple triple
Johannes Brahms, "Finstere Schatten der Nacht," no. 2 from *Neue Liebeslieder-Walzer*, op. 65
Wolfgang Amadeus Mozart, "Meine Liebsten schöne Wangen" (from Mozart's first opera, *Bastien und Bastienne,* K. 50)
Richard Rodgers and Oscar Hammerstein (performed by Sarah Vaughan), "My Favorite Things"
Simple quadruple
Paul McCartney, "Hey Jude"
Wolfgang Amadeus Mozart, "La Vendetta," *Le nozze di Figaro*
Otis Redding (performed by Aretha Franklin), "Respect"
Kurt Weill, "My Ship," from *Lady in the Dark*

I use listening to introduce compound meter as well. I first play a clear simple meter example ("The Stars and Stripes forever"), and then a clear compound meter example in roughly the same tempo ("Seventy-Six Trombones"), and ask students how the meters in these examples differ. It is fascinating to hear how students articulate the differences between simple and compound meter before they have the terminology to do so.[9]

It is only after this process of guided discovery that I introduce terminology: beat (e.g. "the 'beat' constitutes each point [each *ictus*] of the conducting gestures you've been performing all this time!"), beat groupings (duple/triple/quadruple meter), and beat divisions (whether each beat is divided into halves or thirds, and is therefore simple or compound). After listening to some compound meter examples from Table 2.2 (and determining whether each is duple, simple, or quadruple), I begin to mix up simple and compound examples, and students try to figure out meter types by ear.

Only after we spend ample time listening do I broach meter signatures. Even in a fundamentals course, some students will have absorbed the maxim that the top number indicates the number of beats in the measure, and the bottom number indicates the note that gets the beat. This axiom works well for simple meters, but some reprogramming must take place for compound meter signatures, in which the top number communicates the number of *beat divisions* in a measure, and the bottom number designates the note value that receives the *beat division*. Because students have experienced these concepts through listening and conducting, they have rudimentary terminology in place to understand these ideas. If they forget, we can always go back to listening and conducting some examples.

The takeaway is that the actual introduction to meter signatures, which can seem far removed from the music, goes much more smoothly when I put the musical experience first. After listening to such a diverse array of compelling examples, students are excited about and invested in learning about meter. Beginning with listening can also lead to productive conversations about the effect of tempo and performance on perception; at slower tempos, compound meter can sound like several measures of simple triple, and simple triple meters performed quickly can sound like compound meters. (I usually demonstrate this at the piano with "Amazing Grace," "My Bonny Lies Over

Table 2.2 Compound Meter Examples

Compound duple
The Beatles, "Norwegian Wood"
Kelly Clarkson, "Breakaway"
Franz Joseph Haydn, String Quartet in E♭ major, Op. 33/2, "The Joke," finale
Meredith Wilson, "Seventy-Six Trombones," from *The Music Man*
Richard Rodgers and Oscar Hammerstein (performed by John Coltrane), "My Favorite Things"
Compound triple
Johannes Brahms, "Denn alles Fleisch es ist wie Gras," *Ein deutsches Requiem*, ii
Ronnie Shannon (performed by Aretha Franklin), "I Have Never Loved a Man"
Compound quadruple
John Lennon and Paul McCartney, "Oh! Darling"
John Lennon and Paul McCartney, "You've Got to Hide Your Love Away"
Fanny Hensel, "Nach Süden," from *Fünf Lieder,* op. 10, no. 1
Alicia Keys, "Fallin'"
Queen, "We Are the Champions"

the Ocean," or something similar.) I also admit that *there are times when a single performance can be heard in more than one way*. Rather than opening a can of worms, I have found that it's important to let students know that the answers in music theory are not always black and white, that we are dealing with a fluid art form that does not always neatly fit a single label, and that there is room for disagreement and debate.[10]

Best Practices

In addition to connecting concepts with sound and repertoire integration, I keep several other best practices in mind.

Repetition Counts

Keep including fundamentals questions on assessments even after the fundamentals section of the course or fundamentals course has concluded. For instance, when sight-singing or performing rhythms in aural skills, students might be required to describe the meter type before they perform. In written theory, students should expect fundamentals on every assessment during the first year. These should not be basic questions that should be memorized by now (e.g. C-E-G=major triad), but rather questions that require more thought, like descending augmented or diminished intervals from notes that are not the tonics of major keys.[11] These questions are adjusted depending on upcoming topics. For instance, as I prepare to introduce secondary-dominant and leading-tone chords at the end of Theory II, I emphasize spelling isolated chords so that students don't become complacent by spelling diatonic harmonies within keys.

Consistency and Rigor Matter

Grade extremely consistently and embrace rigor. Allow little leeway for sloppiness in notation, such as accidentals on the wrong line or space, or note heads so large that it is impossible to determine the pitch, etc.

More Assessment Opportunities Are Better Than Fewer

Provide many assessment opportunities (approximately one graded assignment per week, plus quizzes and other assessments), both so that students have access to frequent feedback and so that students' grades are not decimated by a single assignment, exam, or quiz. I am also a fan of dropping the lowest quiz or assignment grade(s).

Prompt Grading and Specific Feedback Are Important for Learning

Return graded work quickly so that students have a chance of remembering their thought processes when they were completing the assignment, and so that they can use this feedback to succeed on the next assignment. Go over common errors when assignments are returned. If a student makes the same type of error throughout an assignment, summarize the issue on the assignment in addition to marking the errors.

Involve Students in Finding Examples of Various Techniques

Ask students to go on treasure hunts for specific techniques. I always have students on the lookout for examples of various things, from minor-mode pop songs in compound triple meter to musical theater pieces that use a particular sequence type. I use their contributions in class whenever possible, and they know that it makes my day when they find something really good.

Most Importantly: Have Fun!

Make it fun, even silly! For instance, as we approach the end of fundamentals, I put students in groups of two or three students, and give them somewhat more difficult questions. Please see the Supplemental Materials for a handout of "theory twisters" – for every groan, I hear at least three giggles.

Instructors of music fundamentals courses bear a serious responsibility: they are tasked with helping students develop important skills and thought processes that will stay with them for a lifetime. But instructors of music fundamentals also enjoy a unique opportunity. It is up to them to set the tone for the study of music theory by making the experience as enriching and inspiring as possible for the student, while still offering ample rigor and drill.

Notes

1 I use the phrase "music fundamentals" – not "music *theory* fundamentals" – because I want to communicate to students and other music faculty that concepts taught in music fundamentals are foundational to all music study. I reiterate the broad applicability of these skills to students throughout the course.
2 Throughout this chapter, I refer to solfège because that is what I use (specifically, moveable-*do* solfège), but any system of solmization will do – singing on numbers, fixed *do*, or la-minor *do*.
3 This example is particularly useful because I can return to it many times during the first year of music theory. The ritornello is immediately followed by a descending-fifths sequence using seventh chords, so when seventh chords are introduced, we label each harmony with lead-sheet symbols. When sequences are introduced in the second semester of study, we sing the bass line and observe the typical voice-leading that appears in this example. (I compare this sequence to Gloria Gaynor's performance of Freddie Perren and Dino Fekaris's "I Will Survive," which features a minor-mode descending-fifths sequence in the same key.)
4 I am of the mind that there is no need to hide slightly more advanced concepts from students, especially when it comes to the occasional chromatic pitch in singing. One cannot go into secondary dominants at this point, of course, but I briefly explain the chromatic pitches and their solfège, and tell them to do their best. It may help to sing it in sections, perhaps with the piano playing along.

5 The second movement of Kaija Saariaho's *Duft* for solo clarinet ("Blühend") also offers ample practice for identifying melodic intervals. Some of these are compound, which the instructor could opt to exclude for the fundamentals course. There are also a couple of doubly diminished intervals, which could either be fodder for discussion or extra credit. (Example: B♯ to F♮ in measure 27 is a doubly diminished fifth.)

6 Some might dispute the practice of framing Renaissance and early Baroque music as being composed of triads, because composers in these eras did not think of music as bass line oriented or, indeed, as triadically oriented at all. While I acknowledge this point of view, I think there is much to be gained by exposing students to this music before they study it in a history course, and I am not willing to let the perfect (=waiting until they understand Renaissance modal and contrapuntal mindsets to use this music in a theory course) be the enemy of the good (=exposing students to this music and fostering their interest in it). In addition, I maintain that, even for those who are intellectually aware of the conceptual constraints within which these composers were operating, the shockingly distant harmonic progressions are still most likely to capture the ears of twenty-first century listeners.

For a good source of triad analysis from the twentieth century, the polychordal music of William Schuman offers similar benefits, in particular the second movement of the *Three-Score Set*.

7 See David Crook, "A Sixteenth-Century Catalogue of Prohibited Music," *Journal of the American Musicological Society* 62/1 (2009), pp. 24–27, which includes a translation of both the original text and the religious replacement text; and William Mahrt, "Lasso as Mannerist: Adoramus Te, Christe," *Sacred Music* 134/1 (2007), p. 41.

8 More information about Casulana's life can be found on Wikipedia and in various print sources. Of particular interest is the inscription in her first book of madrigals: "[…]not only to give witness to my devotion to Your Excellency, but also to show to the world (to the degree that it is granted to me in this profession of music) the foolish error of men who so greatly believe themselves to be the masters of high intellectual gifts that [these gifts] cannot, it seems to them, be equally common among women" (Thomas W. Bridges, "Casulana [Mezari], Maddalena," Oxford Music Online, 20 January 2001).

9 Inevitably, a student will tell me that "Seventy-Six Trombones" is "in $\frac{6}{8}$." I simply remind such students that I did not ask about the meter signature label – I asked for a description.

10 Of course, if students will be expected to aurally identify meters for a grade, instructors should not only be careful to choose the clearest examples, but should also reassure students that they will be flexible in considering their answers.

11 Essentially, I choose questions that require something like what Leigh VanHandel dubs a "decomposition" strategy, in which students must rely on memorized information to help them extrapolate the solutions to more difficult questions ("What Music Theory Pedagogy Can Learn from Math Pedagogy," *Journal of Music Theory Pedagogy* 26 [2012], pp. 199–202).

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3
A CORNUCOPIA OF ACCIDENTALS

Paula J. Telesco

Topic: Accidentals and enharmonic notation.

Goal: Students will be able to understand and notate accidentals in various contexts, and learn about enharmonic notation.

Background: The ability to read music in bass and treble clefs; some familiarity with triads helpful.

Teaching Accidentals

Most music theory instructors likely know the frustration of searching for just the right musical example to illustrate a point, and not being able to find one quickly. During a class period, it is always easier and more efficient to explain topics with the fewest number of musical works possible, both to save class time, and to keep students focused on a single composition. This also allows for more extended playing of a composition or section thereof.

One source that is truly a compendium of accidental usage is the first movement of Beethoven's Piano Sonata in C major, Op. 53, the "Waldstein," which provides examples of almost every type of accidental usage one would ever encounter or wish to teach their students; most make their first appearance within the exposition. Since the sonata is in C major, no accidental is used to cancel a sharp or flat from the key signature. For the few examples not found in the Waldstein, I turn to Chopin's Nocturne in D♭ major, Op. 27 No. 2.

Part and parcel of teaching accidentals is teaching the concept of enharmonic notes. This is not usually difficult for students when it involves the dual nature of the black notes on the piano (e.g. G♯/A♭), but grasping the concept and purpose of B♯, E♯, C♭, and F♭ and double sharps and flats can be considerably more difficult. The pitches B♯, E♯, C♭, C𝄪, and F𝄪 are all found in the "Waldstein" sonata, while those pitches plus F♭, E𝄫, A𝄫, and B𝄫 are all in the Nocturne. Thus, these works provide a great opportunity to let the music lead the discussion of a topic with which most students think they are already familiar, though often they are not.

This close examination of accidentals can also serve as a brief introduction to topics typically covered later in the theory sequence such as leading tones, triad spelling, secondary dominants, borrowed chords, Neapolitan chords, and augmented-sixth chords. One can then return to these compositions for more in-depth study as those topics arise.

Once the basic information about accidentals has been presented, students can be shown examples in the Beethoven Sonata and Chopin Nocturne, and then be directed to further examples, giving them an opportunity to examine and discuss how and why the composer notated them as such.

Beethoven's "Waldstein" Sonata

Below are 11 principles or categories of examples of accidentals present in the sonata. These can be taken in any order; often, the students' comments or questions determine the order of presentation. And, I always ask the students for their observations before I explain what something is. A link to a score of the Waldstein is provided in the online Supplemental Materials.

1. **Accidentals remain in force throughout a measure, notated only on their first appearance**. There are numerous examples throughout the movement, but early instances appear in mm. 2 (RH), and 5–6 (RH and LH). Measure 2 affords an opportunity to introduce the concept of a leading tone. I perform the first three measures with both an F♮ and an F♯ in the soprano. As students listen to both versions, we compare the effect of each. They can hear that the F♯, a half step below G, propels or *leads* the music up to G in the following measure, unlike the F♮, a whole step below. The same is true of the C♯s in mm. 4 and 17, and the F♯ in m. 15.
2. **Rewriting an accidental in the following measure if it is to remain in effect**. Measures 5–6 illustrate this, as do mm. 9–10 (RH and LH). I play through the first seven measures so students can experience the palpable lowering of the music by a whole step through the use of the B♭s, which create a chord that does not belong in C major – a borrowed chord, or a non-diatonic chord.[1] Even though students likely have not yet learned about diatonic versus borrowed chords, they can experience and recognize the effect of such a chord.
3. **Writing an accidental in all clefs and registers within a measure to alter a single pitch on all occurrences within that measure**. Students sometimes mistakenly believe that a single accidental applies to all like pitch classes in that measure. Measures 8, 12, and 22–23 demonstrate this principle. Measure 22 has an added benefit: the A♯ creates an Italian augmented sixth chord, so playing through mm. 19–23 can sensitize students to the colorful sound of this chromatic chord, and thereby spark their curiosity and anticipation of its later study.
4. **Canceling a single sharp or flat within a measure** (mm. 4, 17). Here again, one can point out the effect of the C♯ leading tones. I play these measures with and without the C♯, both in the ascending and descending passages so students can hear the different effects and discuss them.
5. **Changing an accidental within a measure**: (a) from a natural to a sharp and back to a natural (m. 4); (b) alternating between sharps and naturals (m. 24). The second half of m. 24 also presents a chromatic scale segment.
6. **Cautionary (or courtesy) accidentals** (m. 8, B♮; m. 10, B♮, m. 11, A♮; m. 14, E♮; m. 18, F♮). As non-diatonic accidentals accumulate in a work, it becomes ever more necessary to include cautionary accidentals.
7. **Accidentals tied across a barline:** Measures 122–23, 124–25, 126–27, and 128–29 illustrate that such accidentals are not rewritten, contrary to those that must otherwise be written when crossing a barline, as in mm. 5–6 and 9–10. I ask the students why they think that is. These measures also contain examples of accidentals being applied to pitches in multiple registers.
8. **Enharmonic pitches, not including double sharps or flats**: B♯, E♯, and C♭ all appear as chord tones, not merely embellishing tones or in a chromatic scale passage (although E♯ does appear in the chromatic scale passage in m. 42). Focusing on these pitches allows for a preview of chord tones versus non-chord tones (or embellishing tones), and even secondary dominants if the instructor wishes. At its simplest, all triads contain three notes of every other letter name (or three successive line or space notes) and must be spelled that way. The B♯ in mm. 36, 40, and 48 is part of a G♯ major harmony on beats 1–2. I point out that if Beethoven notated the B♯ as a C♮, it would violate the triad-spelling rule and make notation and

harmonic comprehension confusing – triad spelling must be consistent. The E♯ occurs in m. 197 in the parallel passsage of the recapitulation, part of a C♯ major triad. Similarly, if the E♯ were spelled as an F♮, it would violate the triad-spelling rule.[2]

The C♭ in m. 105, within the development section, is part of a C♭ major harmony, tonicized by the preceding G♭ dominant $\frac{4}{2}$, both a Neapolitan sixth chord in the fleeting key of f minor, and a secondary dominant of C♭. Discussion of the colorful Neapolitan chord and the harmonic flux of a development section is well beyond the topic of accidentals, but these passages can serve as tantalizing examples of topics to come. And while students may not yet know what a development section is, it is of heuristic value to ask them for their observations.

9. **Double sharps** (F𝄪, mm. 42–43, F𝄪 and C𝄪, mm. 45–47). Double sharps once again raise the specter of enharmonic notes, and students invariably ask why Beethoven would use them. These passages provide another opportunity to discuss enharmonicism and preview both leading tones, and chord tones versus non-chord tones. The F𝄪 in m. 42 is part of a chromatic scale passage; it is not too difficult for students to accept that when ascending, chromatic scales use sharped notes. I then point out that beats 1–2 of mm. 42–43 present an E major triad, which contains a G♯; by notating an F𝄪 rather than a G♮, Beethoven clarifies the pitch's function as an embellishing tone and a leading tone to the following G♯ in m. 43. The F𝄪 in m. 43 is similarly a leading tone to G♯. If Beethoven had notated the F𝄪s in mm. 42–43 as G♮s, it would make notation and harmonic comprehension confusing. Similarly, m. 45 contains a B dominant seventh chord; to notate the C𝄪 (a leading tone to D♯) as a D♮, against the B dominant seventh chord, would be confusing.
10. **Canceling a double sharp, returning to a single sharp** (mm. 43, 45–47). This notation, a natural sign followed by a single sharp, is likely unfamiliar to many students, but it appears three times in the span of four measures.[3] I explain there is a B major triad on beat 3 of m. 43, and it contains an F♯. Students can now articulate why the F𝄪 must be lowered to a single sharp. I also ask students if all the Gs in mm. 43 and 46–47 remain sharped, and reinforce that the sharps must appear in all registers. The same situation occurs in m. 46, and a similar one in m. 45.
11. **Accidentals renotated enharmonically across a barline** (G♭ is renotated as F♯, mm. 125–126). While this passage involves a topic far more advanced than accidentals, the simple answer is that G♭ fits in the chord in m. 125 (E♭ minor), while F♯ fits in the chord in m. 126 (F♯ dominant seventh).[4] Students are always curious, so I explain that this is covered in the later topic of enharmonicism – something to look forward to!

After discussing all the earlier passages, I play a YouTube performance (Pletnev) of the exposition, sections of the development (starting at 4:33), including the retransition (m. 142, 5:54) and the beginning of the recapitulation (6:16). Please see the Supplemental Materials for a link to this video, which scrolls the score so students can see what they are hearing.

This composition always piques the interest of my students, often eliciting interesting comments and discussions, particularly when seeing all the double sharps, and then listening to the passages as they fly by at lightning speed. It is ideal for illustrating all these categories of accidental usage, previewing more advanced topics, and providing students an opportunity to find similar examples.

For further in-class work, or for an assignment, the instructor could isolate passages not studied in class and ask students to identfy and explain the various kinds of accidental usage. Given the movement is in sonata form, the recapitulation contains many of the same passages found in the exposition (where most of my examples are drawn from), some in different keys; the development, too, contains many examples. For example, one could ask students why there is a D♮ in m. 60 or m. 74, or why there are so many natural signs in m. 106. One might also ask students why Beethoven wrote so many D♭s in m. 249, or perhaps ask them to find more instances of what appear

to be leading tone accidentals. Many of these activities will depend on the level of students in the class. For many, having taken such a careful and exciting stroll through this exhilarating movement will be sufficient.

Chopin, Nocturne in D♭ major, Op. 27 No. 2

Chopin's Nocturne contains almost every accidental usage found in the Beethoven movement, with the exception of tying a non-diatonic accidental across a barline, and canceling a double sharp; rather, there are cancelations of double flats. There are also accidental usages not found in the Beethoven movement, which drive home the point of some of the principles listed earlier.

As the Nocturne is a much more complicated work, it is not ideal for the initial presentation of the topic, and I don't spend a lot of time on it. I use it primarily to illustrate F♭ and double flats, to compare the cancelation of a double sharp to that of a double flat, to have students find cautionary accidentals, and to look at a few of the more complex usages. Nevertheless, I list below some of the many measures where each of the earlier categorized usages occur. Instructors may wish to use these with more advanced students or as additional assignments or extra credit work.

1. **Accidentals remaining in force throughout a measure**: m. 5, A♮; m. 16, C♭; m. 37, C♯; m. 39, G♯.
2. **Rewriting an accidental in the following measure**: mm. 22–23 C♭; mm. 49–52, C♭.
3. **Writing an accidental in all clefs and registers**: m. 5, A♮; m. 19, B𝄫 and F♭; m. 37, C♯, A♮; m. 39, C♯ and G♯.
4. **Canceling an accidental from the key signature**: m. 5, A♮. I start by asking if anyone can see a relationship between the accidentals in mm. 4 and 5. I then point out that this is part of a modified sequence of leading-tone relationships. The E♮ cancels out the flat in the key signature, and acts as a leading tone to the following F♮; the C♮ is a leading tone to D♭, and the A♮ in m. 5 (canceling the key signature's A♭) is a leading tone to B♭ in m. 6. This passage can also be used as an assignment, since it is relatively easy for students to grasp.
5. **Changing an accidental within a measure**: m. 17, D♮ cancels out the key signature's D♭, then returns to D♭; m. 44, C♯ changes to C♮; m. 50, F♯ changes to F♮.
6. **Cautionary accidentals**: m. 10, G♭; m. 44, A♮.
7. **Enharmonic pitches, not including double sharps or flats:**

   a) chromatic passing tones: B♯, m. 35, m. 39; E♯, m. 39;
   b) chord tones: F♭, mm. 19, 21; C♭, mm. 22–23, 41; B♯, m. 38. The simplest explanation is again that they fit in the chord. To spell F♭, C♭, or B♯ as E♮, B♮, or C♮, respectively, would violate the triad-spelling rule.

8. **Double sharps**: C𝄪, m. 39 (part of an inner-voice chromatic scale segment starting on G♯ and ending on F♯ in m. 40).
9. **Double flats**: B𝄫, mm. 8, 17–18 (LH), mm. 21–22. I point out that B𝄫 fits the chord; to spell it as A♮ would violate the triad-spelling rule.[5]
10. **Cancelation of double flats**: m. 32, B𝄫 to B♭ to B♮; m. 72, B𝄫 to B♭; m. 52, E♮ to E♭ to E𝄫 to E♭. Here I emphasize that while double sharps go from the double sharp to a natural followed by a single sharp (𝄪 to ♮♯), double flats go directly from the double flat to a single flat (𝄫 to ♭).
11. **Accidentals renotated enharmonically**: m. 23, C♭ rewritten as B♮; m. 24, C♯ rewritten as D♭, A♮ rewritten as B𝄫. The simple explanation is that the pitches, as spelled, fit the given chords. However, mm. 18–26 involve both notational and actual enharmonicism, so the instructor may wish to return to this later.[6]

Finally, a usage not encountered in the Beethoven involves two versions of a pitch sounding against each other. These examples reinforce the point that accidentals must be notated in every register. In m. 15, there is a B♭ in one octave against a B♮ in another; in m. 13, an A♭ abuts an A♮ in the same register. My students rarely have seen this type of notation, so it generally astonishes them, and they immediately want to hear these passages played. They always expect them to sound crazy and are surprised that they do not!

I finish the discussion by playing sections of the Nocturne from a YouTube recording (Rubenstein) that scrolls the score as the music plays; please see the Supplemental Materials for a link to the video.

For extra in-class discussion or out-of-class work that is not too difficult, the instructor can ask students why Chopin wrote a C♭ in m. 63, or a B𝄫 in m. 64, or a G♮ in m. 73.

This is always a favorite lesson plan of mine and seemingly of the students as well. It helps them understand the various roles of accidentals in context, and gets them excited about the topic and the music, which is what I always strive to accomplish.

Notes

1 This is actually a IV/IV(iv), and part of a descending tetrachord progression from mm. 1 to 9.
2 The G♯ and C♯ major harmonies are secondary dominants tonicizing vi in the temporary keys of E major and A major, respectively. These are also both instances of a V^7/vi moving to a IV chord, which in actuality should be viewed as a V^7/vi moving to a VI/vi, a deceptive resolution. One can preview the concepts of tonicization and modulation here, or return to these passages when those topics arise.
3 Some variation does exist on the cancelation of a double sharp; some editorial practices exist where a double sharp is canceled through the use of a single sharp by itself. (See the section on cancelation of double flats later in this lesson.)
4 This is a great example to return to when discussing actual enharmonicism. These measures occur at the end of the development section. Preceding m. 125 the music has been cycling through a harmonic sequence, arriving at E♭ minor in m. 124. The switch to an F♯ dominant seventh chord in m. 126 (where one might have expected a G♭ dominant seventh) sets up the retransition back to C major for the recapitulation.
5 I do not discuss the B𝄫 in m. 18 or 20 (RH) in this lesson.
6 These measures are in D♭ minor, including a circle of fifths in mm. 21–26, cadencing in D♭ major in m. 26. In actuality, the E^7 in m. 23 is F♭, ♭III/D♭, and the A major chord in m. 24 is B𝄫, ♭VI/D♭. These are instances of notational enharmonicism – enharmonic respelling for ease of reading. However, the c^{o7} in m. 22 is exploited for its enhamonic possibilities: it functions both as a vii^{o7} of D♭ and a vii^{o7} of F♭.

4

CONTOURING AS A POWERFUL TOOL FOR PITCH AWARENESS

Jan Miyake

Topic: Contouring and minor scales (natural, harmonic, melodic).

Goals: Introduce the skill of contouring to develop mastery of the whole- and half-step patterns in melodic, natural, and harmonic minor scales.

Background: Knowledge of whole and half steps.

Singing different kinds of minor scales can be difficult for some new aural skills students; it can also be tortuously easy for others. This activity provides an effective twist that will engage a wide range of skill levels in addition to developing a tool that is easily transferred to other aural skills assignments. Specifically, this set of lesson plans teaches minor scales by embodying pitch space, a technique called contouring.

About Contouring

Contouring is a pedagogical strategy that allows a student to physically model something that is subtle and difficult to see: the physical process for changing pitches.[1] Vocal folds control the sound's frequency (pitch), but this part of our anatomy is tiny (1.25–2.5 cm) and its physiology is observable only with technology. Contouring takes the subtle, hidden physical process of controlling pitch and embodies it. Here is how I use it: start by imagining a ladder of half steps in front of your body. Then, face your palm toward the floor, making its plane parallel to the floors. Finally, move your hand up and down the rungs of your imagined ladder to mimic moving through pitch space. Without words, we can now demonstrate our understanding of two key pitch-related questions: did the pitch ascend or descend? By how much (relative to the pitches around it)? This strategy has many payoffs. For students, it helps them with memorization, transcription, and silently rehearing a melody. For instructors, it helps diagnose problems in a student's processing of sound. Additional benefits include an entry point for kinesthetic learners and a tool of unlimited nuance.

Contouring reminds me of other systems involving connections between pitch and the hand, specifically the Guidonian hand and Kodály method. One great benefit of contouring, however, is that there is no need for specialized training on the instructor's part. Furthermore, it is a classroom technique simple enough that it can be taught almost solely through demonstration.

One of the earliest opportunities to use contouring occurs in the teaching of minor scales. It works well with this content because scales occur early in a curriculum, move only by step, tend to be familiar to students, and can be explored without relying on traditional Western notation.

While I describe the use of this technique in the aural skills classroom, it can also be effective in the music theory classroom. The setup for aural skills classes where I have used this lesson plan is 12–15 students from a wide variety of musical backgrounds, with seats arranged in a horseshoe shape, one keyboard, and enough room for everyone to conduct without bumping into one another, but not enough room to do most eurhythmics exercises.

Description of the Activities

The activities for the first class (of two) take 25–30 minutes. In class, I start by investigating the major scale and confirming where the half steps occur. I use several activities to solidify this knowledge. We sing slowly, snapping or clapping right before the completion of every half step: "$\hat{1}$, $\hat{2}$, $\hat{3}$, <snap>, $\hat{4}$, $\hat{5}$, $\hat{6}$, $\hat{7}$, <snap>, $\hat{1}$, <snap>, $\hat{7}$, $\hat{6}$, $\hat{5}$, $\hat{4}$, <snap>, $\hat{3}$, $\hat{2}$, $\hat{1}$." I visually reinforce the location of half steps by pointing them out within a C major scale on a picture of a piano keyboard projected onto the overhead. Students assist in modeling the pattern of whole and half steps by linking half and whole steps together on the classroom piano in keys of my choosing while their colleagues sing. And, a favorite activity is to space eight bodies across the room to show the pattern of whole and half steps, leaving gaps big enough to hold another person between the whole steps and standing close together for the half steps.

Next, I have all able-bodied students stand because this provides them more access to the vertical space in front of their body. I model, using a call-and-response format, simultaneously contouring and singing segments of a major scale to show how the vertical space in front of us can be used to differentiate between half and whole steps. I start with $\hat{1}$, $\hat{2}$, $\hat{3}$ to establish a distance for a whole step. Then, I extend this to $\hat{1}$, $\hat{2}$, $\hat{3}$, $\hat{4}$ in order to highlight the smaller space of the half step between $\hat{3}$ and $\hat{4}$. I also spend time on the top tetrachord and descending segments of the scale. A particularly challenging segment to sing is the one bookended by $\hat{4}$ and $\hat{7}$ because it contains only whole steps. We build up the length of these segments until the class is singing complete major scales (ascending and descending) while contouring in front of them.

During this process, students will learn to start low in the vertical space in front of them and will work out how much of that vertical space a whole and a half step should take. In my experience, they will adjust their space in order to avoid bending their knees to reach the low pitches and raising their arms past their forehead to represent the high pitches. I watch students to see who I can assist in adding clarity to their contouring; typically, they need to use more of the vertical space in front of them. With their permission, I take their hand and move it up and down in a way that I find clearer. Alternatively, pairing students up to mirror each other while singing and contouring quickly cleans up their representation of whole and half steps.

Once the major scale is clearly represented in their contouring, students sit down to work with a handout; a sample copy is available in the online Supplemental Materials. The purpose of the handout is to compare the whole and half steps of a major scale with the natural minor scale by aligning the scale steps with accuracy. For example, the following could be provided as a handout (adjusted to use your curriculum's system for singing scale steps):[2]

Major scale:	$\hat{1}$	$\hat{2}$	$\hat{3}$	$\hat{4}$	$\hat{5}$	$\hat{6}$	$\hat{7}$	$\hat{1}$
Natural minor scale:	$\hat{1}$	$\hat{2}$	$\hat{3}$	$\hat{4}$	$\hat{5}$	$\hat{6}$	$\hat{7}$	$\hat{1}$

Ask students to take note of where the half steps are in a natural minor scale, perhaps by circling them, and also take note of which scale steps do not move. A particularly visceral way to notice which pitches move and which are anchors is to have students stubbornly sing a major scale while I play a natural minor scale on the piano.

After students have experienced and intellectualized this change in placement of half steps, I ask them to stand up again, if possible. We review the major scale by contouring it while singing, and I specifically ask them to direct some attention to where the anchor pitches $\hat{1}$, $\hat{2}$, $\hat{4}$, and $\hat{5}$ lie in their contouring because this will add clarity to their contouring of a minor scale. When we transfer the contouring to a natural minor scale, I remind students to hold invariant the major-mode positions of $\hat{1}$, $\hat{2}$, $\hat{4}$, and $\hat{5}$ and only shift $\hat{3}$, $\hat{6}$, and $\hat{7}$.

Finally, we transfer this skill to harmonic and (ascending) melodic minor. I start by returning to a handout to help students envision the intervals by having them complete two new rows on their handout. This part of their handout might look like this:

Major scale:	$\hat{1}$		$\hat{2}$		$\hat{3}$	$\hat{4}$		$\hat{5}$		$\hat{6}$		$\hat{7}$	$\hat{1}$
Natural minor scale:	$\hat{1}$		$\hat{2}$	$\hat{3}$		$\hat{4}$		$\hat{5}$	$\hat{6}$		$\hat{7}$		$\hat{1}$
Harmonic minor scale:	$\hat{1}$												$\hat{1}$
Ascending melodic minor:	$\hat{1}$												$\hat{1}$

At the end of working through the handout, it would look like this:

Major scale:	$\hat{1}$		$\hat{2}$		$\hat{3}$	$\hat{4}$		$\hat{5}$		$\hat{6}$		$\hat{7}$	$\hat{1}$
Natural minor scale:	$\hat{1}$		$\hat{2}$	$\hat{3}$		$\hat{4}$		$\hat{5}$	$\hat{6}$		$\hat{7}$		$\hat{1}$
Harmonic minor scale:	$\hat{1}$		$\hat{2}$	*$\hat{3}$*		$\hat{4}$		$\hat{5}$	*$\hat{6}$*			*$\hat{7}$*	$\hat{1}$
Ascending melodic minor:	$\hat{1}$		$\hat{2}$	*$\hat{3}$*		$\hat{4}$		$\hat{5}$		*$\hat{6}$*		*$\hat{7}$*	$\hat{1}$

I like to take a moment with the students to point out something that they cannot see as easily in musical notation: the different patterns of whole and half steps created by $\hat{6}$ and $\hat{7}$'s placement in each scale. Since notation on a five-line staff makes all steps equally far apart in the vertical dimension, it can obfuscate just how big that augmented second is, or how the top tetrachord of an ascending melodic minor scale is the same as that of the major scale. Pointing out what the layout of the handout reveals is another way to make the differences between the scales more salient.

For the final part of the lesson plan, I ask the able-bodied students to stand again and explore the vertical space in front of them as they navigate each type of minor scale. I continue to stress holding invariant the pitch and vertical space for $\hat{1}$, $\hat{2}$, $\hat{4}$, and $\hat{5}$. In my experience, it is efficient to spend some time targeting just the top tetrachord of each scale.

For homework, students practice contouring the three "flavors" of minor scales, in addition to working through intonation problems with the piano or a piano app. The stated goal of their individual contour practice is to develop enough nuance in their contouring that they can coax their classmates into perfectly singing a scale, or a scale fragment, without them knowing ahead of time which scale or which fragment it would be.

Before the next class, I prepare multiple slips of paper with the name of one of the four scale types (major, natural minor, harmonic minor, and melodic minor) written on them and place the slips of paper into a container. I also prepare a second container with slips of paper that involve a higher degree of difficulty. These slips of paper take the form of *scale type ascending/descending* from *scale step* (e.g. "harmonic minor ascending from $\hat{4}$"). In these cases, the class will sing on a neutral syllable instead of scale steps, and the silent leader will guide the class to $\hat{1}$ and then switch directions to complete a full octave of the scale. In my experience, one of the most difficult slips of paper requests "melodic minor ascending from $\hat{3}$." It is likely that this particular scale fragment is a train wreck because it creates four consecutive whole steps, which is challenging when out of context.

During this second class, students take turns picking a scale type out of the container with easier requests. After I play a tonic pitch, the student leader stands *silently* in front of the class and has their colleagues mirror their hand position while they sing the pattern of half, whole, and augmented steps necessary to produce the scale on the slip of paper. At the beginning, I explain why the student leader needs to be silent; if they sing when they lead, their colleagues will simply match their pitch instead of processing their contouring. Finally, as students get used to the exercise, I start changing the tonic note with each new student leader, and eventually invite students to explore the contents of the second, more challenging container. I allow students to "opt out" of choosing from the more difficult container, providing them the opportunity to self-differentiate.

Common Pitfalls

Students vocally make their half steps too small. This situation typically occurs because they are paying close attention to the difference between whole and half steps and overcompensate on the half steps. To combat this problem, remind them that in each of these four scales, the vocal and spatial placement of $\hat{1}$, $\hat{2}$, $\hat{4}$, and $\hat{5}$ remains the same.

Students can sing the scales in common keys, but not in less common keys. Students have far more practice singing notes represented by white piano keys than they do notes on black piano keys. This fact becomes even clearer when working in minor keys because the chromatic alterations guarantee that every minor key will engage black piano keys. Be sure to practice in a wide range of keys and to scaffold the keys from most common to least common.

Students suddenly cannot sing the whole step from $\hat{1}$ *to* $\hat{2}$. This situation happens because they are thinking ahead to $\hat{3}$ being lower than its major-mode counterpart and it impacts their pitch on $\hat{2}$. I take them back to contouring and singing the first three notes of a major scale, paying particular attention to how their muscles in their throat feel on $\hat{2}$. When we flip to the minor scale, I ask them to recreate the feeling their muscles had on $\hat{2}$ in addition to keeping the contouring identical from $\hat{1}$ to $\hat{2}$.

Final Thoughts

There is great benefit to putting students in a position of leading their colleagues because they reflect differently on the quality of their work when they need to elicit specific responses. Nuances of hand position evolve throughout this exercise because students are desperate to get their classmates to sing correctly in the least amount of time possible. These nuances greatly enhance the understanding of the intervals in the top tetrachord of minor scales. Most commonly, students show $\hat{6}$ and $\hat{7}$ with a hand angled down or up at an almost 45-degree angle to the floor, depending on which version of $\hat{6}$ and $\hat{7}$ is needed. I allow these nuances to evolve because it embodies students' understanding of the positions for $\hat{6}$ and $\hat{7}$.

Students who are typically reluctant or shy to perform in front of their colleagues usually do well with this exercise. The combination of being able to practice ahead of time with being instructed *not* to sing helps. In addition, I sometimes invite students to just stand where they are instead of coming forward and facing the class. Even the most bored of students seem to enjoy the exercise and learn about clarity of representation.

The nuance available in contouring can be transferred to some voice-leading issues. Angling the hand upward for leading tones and downward for chordal sevenths mimics the resolution of those tones. An effective way of working with this idea is to take the note C and have students sing on note names (or fixed *do* solfège) and contour a C scale. Then contour C's resolution within these contexts: as $\hat{4}$ in a G scale, harmonizing C within the V^7 chord, D^7; and as $\hat{7}$ in a D♭ major scale, harmonizing C within the V^7 chord, $A♭^7$.

This lesson plan is easily transferable to later aural skills classes for modes (Dorian, Phrygian, Lydian, Mixolydian, and Locrian) as well as collections (whole tone, octatonic, hexatonic, double harmonic).

Consistent use of contouring in a variety of settings builds a connection between silent recall and hand position. Students who invest care into the process do better in dictation because they memorize tunes quicker and with greater accuracy as they contour silently during dictation.

Notes

1 I learned this technique from Arnie Cox, who describes it as an outgrowth of his interest in mimetic processes. Specifically, it is a "deliberate, overt, cross-modal imitation, producing a visual-spatial-motor representation of pitch relations." Arnie Cox, email to author, October 23, 2018. For more background, see Cox, "Embodying Music: Principles of the Mimetic Hypothesis," *Music Theory Online* 17, no. 2 (July 2011), www.mtosmt.org/issues/mto.11.17.2/mto.11.17.2.cox.html and *Music and Embodied Cognition: Listening, Moving, Feeling, and Thinking* (Bloomington: Indiana University Press, 2016).

2 A monospaced font like Courier, in which every character takes up the same amount of horizontal space, is essential to the handout because columns of characters must be consistently aligned. Alternatively, you could handwrite this handout.

5

INCORPORATING MELODICAS INTO THE MUSIC THEORY CLASSROOM

Chelsey L. Hamm

Topic: Melodica usage in music theory classes.

Goal: Students will be able to better conceptualize pitch space via kinesthetic engagement with melodicas.

Background: Basic Keyboarding and Music Literacy Skills

First-year undergraduate music majors often enter college with a subpar conception of pitch space. Such students will have difficulty in music theory classes, beginning with music fundamentals. Topics such as enharmonic equivalence and qualities of intervals, triads, and seventh chords frequently prove difficult for these students, resulting both in an inordinate amount of time spent on homework and feelings of frustration. Even after passing beginning theory courses such students are prone to repeating mistakes related to poor conceptions of pitch space such as forgetting to raise the leading tone in minor, neglecting to add proper accidentals to chromatic harmonies and modulating passages, and not fully comprehending enharmonic reinterpretation of advanced chromatic harmonies.

One way that this problem can be addressed is to engage music theory students kinesthetically with a keyboard-centric curriculum. Since it is not typically feasible for students to have access to pianos or electronic keyboards during music theory classes, both because of cost and space, one solution is to employ melodicas – small, pitched, wind-operated keyboards that have a timbre similar to an accordion (Figure 5.1).

Melodicas are typically made of plastic and are consequently low cost, averaging around $30 each online; they could therefore be considered reasonably accessible for a variety of populations, including private students, high schoolers, and undergraduates at liberal arts colleges, public universities, or music conservatories. They also have the advantage of providing tactile engagement, containing raised keys like an acoustic piano, and are consequently easier to play than piano keyboard applications on cellular devices. Furthermore, melodicas allow users to play multiple notes at once, whereas some keyboard applications only allow for one note at a time.

I have utilized melodicas in my music theory classrooms for over five years in multiple institutions, including private liberal arts colleges and four-year public universities. In this chapter, I will consider a variety of topics related to my experiences with melodica usage in the music theory classroom. First, I will discuss several options for obtaining a classroom set of melodicas, including the details of a grant proposal with which I experienced success. Second, I will explore a few

Figure 5.1 The author playing a melodica.

different usages of melodicas in an undergraduate music theory curriculum, and I will provide samples of exercises and activities for beginning and more advanced students. Finally, I will discuss the primary benefits of melodica usage for students, especially an increased interdependence between students' written work and their audiation abilities.

There are several different ways to procure a set of melodicas in a music theory classroom. Perhaps easiest for an instructor is to simply assign melodicas as a required supply and have each student purchase their own. I have worked with two bookstores at different private liberal arts institutions to achieve this, and each bookstore was able to stock the melodicas in their on-site locations with fairly minimal effort on my part. Likewise, one could instruct students to purchase melodicas from an online vendor such as Amazon.com. As of the time of this chapter's publication, several different brands of melodicas could be purchased online for under $30, with a guaranteed arrival date of three business days or less.

I have also taught at a four-year state university where it would have been financially challenging for many students to purchase a melodica in addition to their textbook. Due to this situation, I applied for a competitive grant for teachers from a local philanthropical arts society. I detailed my rationale, a description of the melodicas (including a photograph), a breakdown of the costs, and discussed the anticipated impact of the purchase on students. Please see the Supplemental Materials website for additional details of this grant proposal such as specifics about wording. I was awarded the full cost of a set of 32 melodicas, as well as storage containers – about $700 total. Students were each assigned one of the melodicas and were asked to purchase their own mouthpiece, which cost less than $5. I kept the original mouthpieces that came with the melodicas, and distributed a few of them to the students for whom even $5 proved prohibitive. I chose to store the melodicas in the music theory classroom (in agreement with my colleagues who also used the room), instead of allowing the students to bring them home. I felt this was the surest way

to know the location of each instrument at all times. However, written student agreements could be employed to allow students to bring melodicas home, in order to play homework assignments. At the end of each semester I cleaned the melodicas with antibacterial wipes; however, especially dirty instruments (or the tubing that connects the mouthpiece to the instrument) could be submerged in a soapy bath with no damage.

Many universities and colleges have grants or funds for instructional faculty who wish to improve their classroom teaching. These funds are often called "Development Grants" and are primarily used for the purchasing of equipment, the expansion of undergraduate research, or for pedagogically oriented professional development activities. Furthermore, such funds are not typically limited to full-time and/or tenure track faculty, meaning that adjunct instructors and sometimes even graduate students can apply for them. I would encourage interested instructional faculty to discuss the possibilities of funding with their department chairs or Provost. If no internal funding is available, outside funding sources can be found via local or national arts societies, government institutions such as the National Endowment for the Arts (NEA), and private companies; in addition, crowd sourcing from websites such as www.donorschoose.org or www.gofundme.com could also prove fruitful.

Melodicas can be used throughout an undergraduate music theory curriculum, from the simplest music fundamentals lesson to advanced courses on counterpoint, post-tonal theories, or even form and analysis. In music fundamentals courses, melodicas are especially useful for aiding students in clef reading, major and minor scale construction, and the identification of qualities of several different harmonic structures, amongst other topics.

Melodicas are also invaluable for constructing a kinesthetically based conception of enharmonicism and pitch space. At the beginning of a fundamentals course, an instructor could introduce melodica usage by teaching students to label "white keys" on blank paper keyboards. Students could immediately reinforce this visual by playing the same notes on their melodicas, using their labeled paper keyboards (or one projected on a document camera) for reference. As a follow-up (after students have learned about the staff and clefs), an instructor could project various "white keys" in different clefs; the instructor could then point at the notes and the students would play them. A variation on this activity would be to have a simple and well-known melody (such as "Mary Had a Little Lamb") projected arrhythmically on a staff and to point to the notes in a rhythmic fashion (presuming the students have not yet learned to "read" rhythms). For students struggling with this lesson, the instructor could point to letter names displayed without a staff; taking out the burden of initially reading different clefs and staff notation can make the exercise easier. A more difficult variation could add in "black keys" after accidentals have been learned. After all notes are mastered, an instructor could ask questions phrased to test enharmonic equivalence (e.g. "now play an E♯; now a G𝄫").

I have taught all additional pitch topics in music fundamentals – scales, intervals, and triad/dominant seventh chord construction – with the usage of melodicas. In general, I find that teaching these topics with the addition of melodicas is more effective than without. This is especially true for students who lack music literacy when they enter college, either because they are non-music majors or because they have simply not encountered much written notation in their previous musical experiences. For non-music majors or students who lack music literacy, I tend to teach scales, intervals, and primary triads (I, IV, V, and V^7) in certain keys only, favoring major and minor keys up to two or three sharps or flats (depending on the institution). Students who first learn like this become very familiar with these keys, first mastering these major scales and then their corresponding relative minor scales. Students next study major, minor, and perfect intervals in these same keys, before learning primary triads. It should be noted that such an approach is very different from that of most group keyboarding classes, which usually introduce scales based

upon similarity of fingerings. In my music fundamentals classes, I do not strive to teach proper fingerings for scales, nor do I focus on playing them "hands together." My goal is to have students conceptualize pitch space in the most effective and quickest manner possible; I leave the teaching of proper piano technique to the more qualified keyboarding faculty. Although I have not attempted to teach music fundamentals with a focus on playing in all of the major and minor keys, I do think this could be done at an institution with a student population who had a more advanced understanding of musical literacy upon entering college, or perhaps at the beginning of a Theory 1 course.

In a more advanced music theoretical course, such as one primarily pertaining to diatonic or chromatic harmony, melodicas can be used to teach voice-leading, to practice figured bass realization, and to illustrate the need for accidentals in chromatic constructions. I find that there is a disconnect for most music undergraduates between connecting chords with proper voice-leading and with performance. This may be the result of many music undergraduates entering college with less formal piano training than students of the past, or perhaps because current students simply learn voice-leading less frequently in middle and high school. Either way, teaching students to connect chords kinesthetically results in a greater understanding of voice-leading connections. I begin this practice at the earliest stages of part-writing, by having students connect first I and V and then I and V^7 on their melodicas. By feeling how to play these connections students are less likely to make leaps between harmonies, avoiding a plethora of voice-leading problems in the process.

An added benefit of this exercise is that the students instantly hear the harmonies that they are producing, resulting in fewer missed accidentals (if one is forcing the student to play the harmonies before notating them). This means that students are also more likely to raise the leading tone in the dominant harmony in minor, since they will instantly hear that the harmony sounds incorrect when the leading tone is unraised. In addition, the need for an incomplete harmony when connecting the tonic and dominant seventh chords also becomes more readily apparent when approaching this topic kinesthetically. Students can physically feel the parallel fifths that result from playing both of these harmonies in a complete fashion, providing a much clearer illustration than staff notation, in which parallel fifths – especially between non-adjacent voices – are often quite difficult for students to see.

There are numerous benefits of melodica usage for students. First and foremost is that students are better able to conceptualize pitch space when they engage kinesthetically with melodica keyboards. Most students enrolled in a collegiate music class are both familiar with and competent at kinesthetic engagement. After all, almost all music students will have had previous experience with playing an instrument or with singing – highly physical pursuits. This previous experience translates well with the kinesthetic engagement of musical instruments in a classroom. Second, there is an increased interdependence between students' written work and their audiation abilities. Students are much more likely to correct wrong accidentals or part-writing errors when they are able to immediately hear an audible result. I would argue that this is a much more musical method of teaching part-writing than the often dry, hearing-free (or hearing-limited) technique that is sometimes currently taught. Third, playing melodicas is an engaging activity for students. Making music is our students' passion, and we should celebrate that passion in the theory classroom. In addition, melodicas have another built-in benefit: because they are breath powered, students cannot talk while playing them, making them less likely to engage with one another and more likely to remain absorbed by the lesson. At the end of the day, melodicas provide a cost-effective option for our students to make music, engage kinesthetically, and hear the results of their written work quickly in the theory classroom – worthy goals that we as music educators value.