

The Commutation Test and Chris Bacon's Score for *Source Code* as a Framework for Film Music Pedagogy

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The cinema, whether experienced at the neighborhood multiplex or streamed at home, is arguably the medium through which today's college-age Americans are most likely to encounter newly composed symphonic music. Given the ubiquity of the film-viewing experience, students are often eager to learn the tools and methodologies that can equip them to critically assess and more fully comprehend the function of music in movies. The film *Source Code* (2011), directed by Duncan Jones and scored by Chris Bacon, provides a particularly effective starting point through which this process can begin.¹ This article will discuss the pedagogical potential found in the film's main titles and the impact of applying a commutation test to this sequence. Although here I address one specific example, the methodology of the commutation test is easily adaptable to other circumstances, as the theoretical foundation will make clear. While variations on the commutation test are a regular occurrence in many film music classrooms, this essay aims to present an introductory primer that may be of use to instructors interested in an entry point for incorporating film music studies into their teaching. With that in mind, the appendix presents one suggestion for how to create film clips for classroom use.

The value of this classroom activity extends beyond providing students with an engaging and memorable learning experience. By situating this analysis

I wish to express my gratitude to the many students at Towson University whose feedback and enthusiastic classroom participation, along with suggestions from the anonymous reviewers, helped me to refine the pedagogical approach described in this essay. An early version of these ideas was first shared as a "lightning-talk" demonstration at the AMS Pedagogy Study Group's 2015 Teaching Music History Conference in Cincinnati, Ohio.

1. Chris Bacon (b. 1977) studied composition at Brigham Young University and film scoring at the University of Southern California. He entered the industry as an assistant to James Newton Howard, working as an orchestrator, conductor, synthesizer programmer, and contributor of "additional music." *Source Code* was his first major score for a wide-release blockbuster film. He has since primarily composed for several TV series, including *Bates Motel* and *Smash*. In 2012 he received an Emmy nomination in collaboration with songwriter Marc Shaiman for his work on *Smash*. Director Duncan Jones (b. 1971) is the son of David Bowie; the sci-fi film *Moon* (2009), which he both wrote and directed, was his first full-length feature film.

within Claudia Gorbman's theoretical construct of "narrative film music" and drawing upon primary-source commentary from both the composer and director, *Source Code* offers a rigorous and multifaceted basis for introducing students to the study of film music. In my own classroom, I have configured this content as both a single-lecture active-listening "experiment" and as an opening activity within a stand-alone unit on film music. The avenues for additional study that arise from *Source Code*'s opening credits and the commutation process could perhaps sustain an entire course on film music.

Claudia Gorbman succinctly formulated the motivating question for this activity in her seminal 1987 study, *Unheard Melodies*: "What is music doing in the movies, and how does it do it?" She explains, "[t]he moment we recognize to what degree film music shapes our perception of a narrative, we can no longer consider it incidental or innocent." Audience members thus willingly subject themselves to emotional manipulation through the musical choices of a film's director, editor, music supervisor, and score composer. Gorbman observes that "whatever music is applied to a film segment will *do something*, will have an effect." What exactly that "something" is proves more difficult to assess, as music's impact upon filmic images is often subconscious in nature, and intentionally so. To examine this effect, a test of some sort is needed, hence Gorbman suggests that to "demonstrate the interdependence of music and filmic representation, we can borrow from linguistics the tool of commutation."²

A commutation test hypothetically substitutes or replaces one element (such as a word, concept, image, or individual—or in the context of film scoring, a music cue) for another to evaluate how this change alters or affects meaning. This is an inherently speculative act that pursues imagined "what ifs," but it is nonetheless an invaluable tool for critical inquiry. In a pedagogical context, the commutation test provides a creative and participatory pathway that invites student engagement and compels critical thinking.³ Indeed, as James Buhler and David Neumeyer observe, "[t]here is no easier way to confirm our explanation of music's role in the sound track and its narrative functions in a scene than by seeing (hearing) what happens when we substitute other music."⁴ Michel Chion

2. Claudia Gorbman, *Unheard Melodies: Narrative Film Music* (Bloomington: Indiana University Press, 1987), 2, 11, 15, and 16.

3. Additional discussion involving various commutation tests in film music studies can be found in Colin Roust, "Creating Illusions: Practical Approaches to Teaching 'Added Value' in Audiovisual Artworks," *Engaging Students: Essays in Music Pedagogy* 1 (2013), <http://flipcamp.org/engagingstudents/roust.html>; Marianne Kielian-Gilbert, "Listening in Film: Music/Film Temporality, Materiality, and Memory," in *The Oxford Handbook of Film Music Studies*, ed. David Neumeyer (Oxford: Oxford University Press, 2014), 509; and Ronald H. Sadoff, "An Interview with Royal S. Brown on Film Music Pedagogy with Course Syllabus," *Music and the Moving Image* 5, no. 2 (Summer 2012): 59.

4. James Buhler and David Neumeyer, *Hearing the Movies: Music and Sound in Film History*, 2nd ed. (New York: Oxford University Press, 2016), 30.

instead describes this process of music substitution as a “forced marriage” and notes that the method “dramatically illustrates the phenomena of added value, synchresis, [and] sound-image association,” thus helping viewers to “become conscious of the fundamental strangeness of the audiovisual relationship.”⁵ By experimenting with commutation in the classroom setting, one can simulate the kind of decision-making that occurs throughout the filmmaking process. Casting decisions and the creation of a music temp track (which generally occurs prior to the composition of an original score) are both practical iterations of commutation prevalent in the film industry.⁶

The main title sequence from *Source Code* supplies especially fertile territory for experimentation along these lines. If one considers the visual aspects in isolation—that is, after muting the audio content—the near absence of emotive content or plot exposition is particularly striking.⁷ Aerial views of downtown Chicago are intercut with footage of a commuter train heading into the city from the suburbs. The city is first seen from a vantage point somewhere over Lake Michigan, while subsequent shots are filmed from above the city streets and in between the skyscrapers. The commuter train, meanwhile, is shown passing through the suburbs and commercial zones, crossing a bridge, and running alongside a pond. The images resemble stock footage in their genericness, as none of the plot’s characters have yet appeared on screen. Other than establishing the film’s locale (Chicago), time period (present day), and the centrality of the commuter train as a setting, the nature of the film remains a mystery. Unless one has had a particularly memorable (or traumatic) experience in the city of Chicago, the viewing experience will likely be neutral if not outright boring. This sequence could lead into any genre of film, populated with any type of characters, who might portray any range of emotions. Clearly, the musical accompaniment must provide the determining factor.

For a variety of reasons, this opening credits sequence is the perfect candidate for a commutation test. It provides a commercially produced example from a relatively contemporary Hollywood release, in which the impact of any music substitution is measurable against the effectiveness of the film’s finished soundtrack. The use of a silent film excerpt would be unnecessarily archaic and potentially off-putting, given the average student’s range of cinematic familiarity. The use of actual stock footage, although offering the advantage of a truly

5. Michel Chion, *Audio-Vision: Sound on Screen*, trans. Claudia Gorbman (New York: Columbia University Press, 1994), 187–8.

6. The link between casting and commutation is examined in John O. Thompson, “Screen Acting and the Commutation Test,” *Screen* 19 (1978): 55–69.

7. Michel Chion refers to this separation of sound and image as the “masking method,” which enables viewers to “see the image as it is, and not as sound recreates it.” He proposes that this approach “will dispose us most favorably to keep our listening and looking fresh, open to the surprises of audiovisual encounters” (Chion, *Audio-Vision*, 187–8).

“blank slate,” cannot allow for comparison with filmmakers’ final intentions, hence students might perceive this to be a more artificial target for commutation. Here, the ultimate “reveal” of the finished cinematic experience is the culmination of this experiment. While some students may already be familiar with *Source Code*, the sequence’s footage is so generically neutral that they can easily set aside their knowledge of the plot. Moreover, Chris Bacon’s orchestral score almost exclusively occupies the audio content of the sequence: dialogue is entirely absent, while the few diegetic sound effects—railroad crossing bells, a quacking duck—are brief and scarcely audible. Thus, when silencing the original and applying a substitute musical accompaniment, no essential audio elements are lost.

Kathryn Kalinak notes that a film score operates by “reinforcing one meaning out of many possible meanings, anchoring the image to specificity.”⁸ In effect, it “polices the ways in which the audience perceives narrative ... position[ing] the audience to receive the narrative in the way intended by the filmmakers.”⁹ Likewise, Rick Altman has used the term “establishing sound” to refer to “sound that establishes, from the very beginning of a scene, the general character of the surroundings.”¹⁰ In the context of this film, we might instead listen for establishing *music*, given that the score must contribute the “general character” to otherwise non-dramatic footage. Bacon’s music is the key element that must orient viewers’ expectations for what they are about to witness. The commutation test demonstrates just how many different possible “surroundings” music can create.

Having laid out the theoretical underpinnings of this activity, focus can now shift to the technical considerations involved in managing a *Source Code*-based commutation test in the classroom. The coordination of simultaneous video and audio playback, as required to combine the film’s footage with alternative musical accompaniments, is the primary technological hurdle, but this need not present an unapproachable barrier. The simplest procedure could involve playing the relevant clip directly from the commercially available DVD or Blu-ray and either silencing or sounding the audio track as necessary. Substitute

8. Kathryn Kalinak, *Film Music: A Very Short Introduction* (New York: Oxford University Press, 2010), 18.

9. Kalinak, *Film Music*, 19. See also the chapter “A Theory of Film Music” from the same author’s *Settling the Score: Music and the Classical Hollywood Film* (Madison: University of Wisconsin Press, 1992), 20–39.

10. Altman notes that establishing sound can be either on-screen or off-screen. For instance, a shot of Times Square might logically be paired with the sounds of the area’s traffic. Alternately, that same traffic noise, if it accompanies a shot of an apartment interior with the curtains drawn, could likewise establish Times Square as the location. See Rick Altman, “Afterword: A Baker’s Dozen Terms for Sound Analysis,” in *Sound Theory/Sound Practice*, ed. Altman (New York: Routledge, 1992), 250.

audio could be played from a secondary source. This approach is not optimal, however, as the commutation test will require viewing the same sequence repeatedly from a starting point that does not correspond with a video chapter mark. Valuable classroom time could be lost while advancing playback to the correct cue point for each iteration of the test. Instead, I recommend extracting the relevant clip from the DVD as a separate video file.¹¹ (Please see the appendix for one suggestion about how this can be done.)

Source Code begins with 35 seconds of production company logos before the first wide-angle aerial shot of downtown Chicago appears. Alternating views of the commuter train and the city continue until the 2 minute 15 second mark. The opening credit sequence concludes as the footage suddenly cuts to a shot aboard a passenger car of a sleeping Colter Stevens (actor Jake Gyllenhaal), the film's lead character. The commutation test will be applied to the segment that runs from 0:00:35 to 0:02:15, either whole or in part, thus omitting the initial production logos. Should you choose to extract a video clip from the disc, this is the required portion. Bacon's composition for the main titles, however, begins with the appearance of the first corporate logo. I prefer to use a video clip file for the commutation process, while showing the full sequence from the disc itself.

Regardless of the video source, one must still decide how best to play alternative music cues simultaneously with the filmed images. Editing software could be used to silence the original soundtrack and re-combine a video clip file with substitute audio, but this particular exercise encourages the flexibility to freely experiment with new musical pairings, thus such an effort is likely a waste of time. If conducting the commutation test from a video clip, the simplest solution is to mute the audio from *within the software* used to play the clip, rather than muting the entire computer's sound output. It is then possible to play alternative audio using either a different piece of software on the same machine or a separate audio device (iPod, CD player, etc.). The effectiveness of this activity is not dependent upon precise synchronization of image and audio, so it is unimportant if (silenced) video and (substitute) audio playback do not

11. The Center for Media and Social Impact, part of American University's School of Communication, suggests that the creation of a video clip file from a copyrighted video source for this purpose would fall within the principles of fair use. The video clip involved in this activity is for educational (non-commercial) purposes. The video clip's duration is only a small portion of the whole. It functions as an illustration or example; in this sense, it is similar to working with a quotation of copyrighted text. The eventual combination of the clip with an alternative audio accompaniment is "transformative." (Note that the Center's guidelines, as referenced here, specifically pertain to the use of a video clip in the context of posting such material online.) See "Code of Best Practices in Fair Use for Online Video," Center for Media and Social Impact, accessed 9 September 2017, <http://cmsimpact.org/code/code-best-practices-fair-use-online-video/>.

quite begin simultaneously. With both video and alternative audio playback now prepared, the *Source Code* commutation test is ready for the classroom.

If an introductory reading assignment is desired, one could make use of the commentaries by Gorbman or Kalinak previously cited. I, however, typically start by presenting a concise foundation shaped by both authors' ideas as an introduction to the concept of "narrative film music."¹² I direct students' thinking toward the ways in which music contributes to a film's storytelling by asking them to focus on two points: 1) Music acts as a guide, *shaping and manipulating* a viewer's responses to the events depicted in a film; and 2) Music can supply viewers with an *additional stream of interpretive information*, alongside the dialogue, sound effects, and visuals. Students are generally eager to share examples from their own viewing experiences that illustrate these functions of music in cinema. Likewise, the binary pair of "congruity" and "incongruity" is another easy-to-grasp initial concept, particularly as it helps alert students to the need for critical thinking. I encourage them to consider this question: "Does the music *heighten* the emotions of the images, or does the music *contradict* what the images reveal to viewers?" The former, of course, suggests congruity and the latter incongruity.¹³ Thus equipped, I invite students to participate in an in-class "experiment" that will allow us to gauge the impact that music can have upon filmed images. (Defining the jargon of the commutation test seems unnecessary.) I explain that we will watch the main titles sequence from a popular motion picture, but that we will first experience the image content alone, in silence. This leads to an initial viewing of the opening credits sequence, omitting the production company logos. Even if a few students may recognize the movie, we discuss how generic the images are and how little about the film this introductory footage reveals, when shorn of its music.

Now the commutation test begins. I ask students to focus their thoughts on this key question: *How does musical style reshape your expectations for the film you are about to watch?* Encouraging students to respond to this question in the form of a hypothetical Hollywood "pitch meeting" is a particularly effective way to inspire creative observations. I explain that we will continue to review this same footage again, but that it will now be paired with different musical

12. In addition to Gorbman's *Unheard Melodies* and Kalinak's *Settling the Score*, further discussion of the narrative function of film music is in Jerrold Levinson, "Film Music and Narrative Agency," in *Post-Theory: Reconstructing Film Studies*, ed. David Bordwell and Noël Carroll (Madison: University of Wisconsin Press, 1996), 249–82.

13. Michel Chion notes that "[b]y observing the kinds of music the image 'resists' and the kinds of music cues it yields to, we begin to see the image in all its potential signification and expression" (Chion, *Audio-Vision*, 189). For an empirical examination of the impact of incongruous film music, see David Ireland, "Deconstructing Incongruence: A Psycho-semiotic Approach toward Difference in the Film-Music Relationship," *Music and the Moving Image* 8, no. 2 (Summer 2015): 48–57.

selections. Volunteers can then describe their imaginary plot for the movie that is to follow to the other students in the class, based on the ramifications that my music choices imply. The video clip will be played repeatedly, each time paired with an alternate “film score.” Likely one need not show the sequence in its entirety. The pace of the music tends to dictate how long of a repeated viewing is required; slower music demands a longer duration to leave an impact.

For a more compelling series of commutation tests, one should select music drawn from a diverse span of style idioms, genres, and chronological periods. I recommend choosing examples that will point in the direction of topics and issues that a unit or course on film music might subsequently revisit. With these guiding principles in mind, I typically select four examples for commutation: [1] a Classical-era chamber work, [2] a Modernist or avant-garde composition, [3] a Bluegrass, hillbilly, Americana, or old-time music selection, and [4] a chart-topping pop song from Billboard’s current “Hot 100” list. It is intentional that none of these examples come from actual film scores, as I wish to avoid imposing specific plot associations upon the images. The *Star Wars* fanfare, for instance, while offering a potentially intriguing incongruity, would perhaps too strongly narrow the range of plot ideas that students might envision.

Luigi Boccherini’s so-called “Celebrated Minuet”—the third movement from his String Quintet in E major, op. 11, no. 5—is an effective opening example.¹⁴ It has remained ubiquitous enough that most students will recognize the piece, even though few might know the source or its composer. Perhaps some students will half-remember having encountered this music in another film or TV show before. With a pleasant melody, a formal yet dance-like rhythmic tread, and clearly balanced phrases, Boccherini’s music likely conjures wealthy, typically White, upper-class protagonists in students’ imaginations. They may envision the individuals that inhabit the penthouse floors of the Chicago skyscrapers seen in the aerial montage or someone riding in one of the train’s first-class compartments. The music’s unmistakably eighteenth-century atmosphere, however, is perhaps incongruous with the footage of a contemporary American city and a modern mode of transportation. The opening movement from Mozart’s *Eine kleine Nachtmusik*, K. 525, or “Pachelbel’s Canon” would have a similar effect. The sense of familiarity engendered by these hackneyed pieces tends to result in a more immediate student response than an unfamiliar, anonymous-sounding example from the period might yield.

To redirect the students’ imaginings, I next combine the images with one of Krzysztof Penderecki’s dissonant, cluster-based, avant-garde compositions

14. Readers can listen to audio recordings of the examples used for commutation in this Spotify playlist: <https://open.spotify.com/user/musicologist09/playlist/1x6Bzf5v1FcSXCvVWIkLi>. Account creation is required, although one need not sign up for a paid subscription.

from the 1960s or early 1970s. *De Natura Sonoris II* is a perfect choice.¹⁵ The section that begins around the four-minute mark in Penderecki's own 1973 recording of the work corresponds with particular effectiveness to the *Source Code* sequence. This music introduces the grinding dissonances, unnatural timbres, and jolting dynamic contrasts familiar to viewers from many a horror film soundtrack, hence it is worth emphasizing that this music originates as a composition for concert performance. Students typically imagine that a scene of death and gore awaits when we finally see inside the train, or that perhaps Chicago has been overtaken by the undead. Scored with this music, the footage seems empowered to elicit apprehension and dread. The city is transformed into a threatening locale.

The third and fourth audio substitutions, since they come from popular or vernacular idioms, provide a counterbalance to the two "classical" selections. For a markedly incongruous pairing, one could try Grandpa Jones' wildly aggressive 1947 clawhammer banjo classic, "Mountain Dew." The previous feelings of fearfulness and suspense quickly melt away, as many students now envision some sort of a Beverly Hillbillies situation. Perhaps it is the protagonist's first trip to the "big city"—surely comedic misunderstandings will transpire. Or I might instead play a more sedate, old-time string band rendition of a familiar folk song ("Shenandoah" or "Lorena," for instance). The incongruity remains, but ideas about the film's genre may shift. When accompanied by folk music, some students predict that the film could be a documentary that explores how modern urban life threatens the preservation of an earlier American cultural heritage.

The final music selection is the most changeable by design (and thus not included in my sample Spotify playlist). I prefer for this last pairing to be of the moment—as contemporary and popular as possible—according to the current Billboard Hot 100 chart.¹⁶ I look for a fast, danceable, catchy, "upbeat" pop hit, preferably one that has gained enough currency to be broadly and immediately recognizable. Regardless of the song selection, students are now generally convinced that the film will be a comedy, or perhaps specifically a romantic comedy. Students often assume that the vocalist's gender or race, as heard in the recording, points in the direction of the protagonists' gender or race too.

15. The *Threnody for the Victims of Hiroshima* or any of Penderecki's other sound-mass compositions would have a similar effect, but I find the broad range of orchestral colors in *De Natura Sonoris II* to be especially impactful.

16. Billboard updates the Hot 100 chart weekly. The list ranks the current popularity of songs from any commercial genre by combining "radio airplay audience impressions as measured by Nielsen Music, sales data as compiled by Nielsen Music, and streaming activity data provided by online music sources." ("How it Works," Billboard, accessed 19 February 2018, <https://www.billboard.com/charts/hot-100>.)

Imagined plot pitches often involve either a bachelor(ette) party or, since the setting is downtown Chicago, a profligate shopping spree.

This exercise vividly illustrates the capacity of music to reshape viewers' perception of filmic images. While designed as an active and engaging in-class learning experience, one might gather some immediate feedback for assessment via an assignment in which students would select additional musical pairings, for either *Source Code* or another film of their choice, and explain the ramifications of their decisions in a written response. Furthermore, since my musical selections are premised upon their potential for additional critical analysis, the *Source Code* commutation test could also serve as a starting point for a self-contained unit or even an entire course on film music. Issues arising from the relationship between the conventions of musical idiom and representations of social class, age, gender, and race are particularly germane.¹⁷ Analysis of films with multiple or alternative musical accompaniments can encourage an understanding of how commutation plays out across a larger scale.¹⁸ One could continue to explore the commutation process through a critical examination of additional studies that make use of the method.¹⁹ Studying films that incorporate pre-existing music can likewise broaden a student's perspective beyond the

17. Relevant journal articles for further study might include Guthrie P. Ramsey, Jr., "Muzing New Hoods, Making New Identities: Film, Hip-Hop Culture, and Jazz Music," *Callaloo* 25 (2002): 309–20; Christopher Letcher, "Mbaqanga, Bollywood and Beethoven on the Beachfront: A Composer's Perspective on Representation and Identity in the Film *My Black Little Heart*," *Ethnomusicology Forum* 18 (2009): 21–36; Gayle Sherwood Magee, "Song, Genre, and Transatlantic Dialogue in *Gosford Park*," *Journal of the Society for American Music* 2 (2008): 477–505; and Janet K. Halfyard, "Love, Death, Curses and Reverses (in F Minor): Music, Gender, and Identity in *Buffy the Vampire Slayer* and *Angel*," *Slayage: The Journal of Whedon Studies* 1, no. 4 (December 2001), http://www.whedonstudies.tv/uploads/2/6/2/8/26288593/halfyard_slayage_1.4.pdf.

18. For examples from the silent-film era, see K. J. Donnelly and Ann-Kristin Wallengren, eds., *Today's Sounds for Yesterday's Films: Making Music for Silent Cinema* (New York: Palgrave Macmillan, 2016). For examples from modern cinema, see Aaron Ziegel, "Reshaped and Redefined: Watching Cocteau's *La Belle et la Bête* with Auric and Glass," *Music Research Forum* 26 (2011): 45–74; David W. Patterson, "Music, Structure and Metaphor in Stanley Kubrick's *2001: A Space Odyssey*," *American Music* 22 (2004): 444–74; and the chapter "Evolution and Amnesia in the Soundtrack of *2001: A Space Odyssey*," in Kate McQuiston, *We'll Meet Again: Musical Design in the Films of Stanley Kubrick* (New York: Oxford University Press, 2013).

19. David P. Neumeyer offers subjective observations about the result of pairing Arnold Schoenberg's *Begleitungsmusik zu einer Lichtspielszene*, op. 34, with 1930s horror films in "Schoenberg at the Movies: Dodecaphony and Film," *Music Theory Online* 0, no. 1 (February 1993), <http://www.mtosmt.org/issues/mto.93.0.1/mto.93.0.1.neumeyer.html>. Empirical approaches from the perspectives of cognitive science and social science respectively are found in Miguel Mera and Simone Stumpf, "Eye-Tracking Film Music," *Music and the Moving Image* 7 (2014): 3–23; and Andrew P. Nosal and Elizabeth A. Keenan, et al., "The Effect of Background Music in Shark Documentaries on Viewers' Perceptions of Sharks," *PLoS One* 11 (2016), <http://dx.doi.org/10.1371/journal.pone.0159279>.

relatively localized framework of *Source Code*'s opening credits.²⁰ This exercise also illustrates how Hollywood filmmakers, through the consistent application of particular musical idioms to recurring plot types, have trained viewers to perceive a film's genre through stereotypical signifiers.²¹ Any of these areas are ripe for further exploration through the study of specific films alongside supporting scholarly literature and across a range of methodologies.

Now that the commutation test is complete, the class is ready to view the filmmakers' final version of *Source Code*'s entire main title sequence.²² Chris Bacon's composition opens with the distant ringing of synthesized bell sounds, heard above sustained harmonies from the lower instruments of the orchestra. Only in hindsight might the viewer identify these sounds as a distorted, dream-like transformation of railroad crossing bells—a real-world sound that is one of only two diegetic sound effects to enter the otherwise exclusively musical audio mix during the sequence. Since the music's opening underscores production company logos, any sense of referentiality is further obscured. A tonic bass pedal point subtly joins the soundscape alongside scattered rhythmic motives in the woodwinds and upper strings. These elements crescendo toward an unexpected *subito piano* that precisely coincides with the first aerial images of downtown Chicago. Now the body of the cue begins in earnest. Bacon establishes a minor-mode rhythmic ostinato in the lower strings, above which the upper strings, winds, brass, and percussion carry out a vividly orchestrated dialogue. The pulse moves with a slow, steady tread, while the ostinato's sextuplet subdivision of the beat maintains an unflagging rhythmic impetus. This music

20. Studies involving selections from the Western art music canon include Melanie Lowe, "Claiming Amadeus: Classical Feedback in American Media" *American Music* 20 (2002): 102–19; Mark Clague, "Playing in 'Toon: Walt Disney's *Fantasia* and the Imagineering of Classical Music," *American Music* 22 (2004): 91–109; Jeongwon Joe, "Reconsidering *Amadeus*: Mozart as Film Music," in *Changing Tunes: The Use of Pre-existing Music in Film*, ed. Phil Powrie and Robynn Stilwell (Burlington, VT: Ashgate, 2006), 57–73; and David Larkin, "Indulging in Romance with Wagner: Tristan in Lars von Trier's *Melancholia*," *Music and the Moving Image* 9, no. 1 (Spring 2016): 38–58. Examples involving vernacular musics include Ronald Rodman, "The Popular Song as Leitmotif in 1990s Film [*Pulp Fiction* and *Trainspotting*]," in *Changing Tunes*, 119–36; Ann van der Merwe, "Music, the Musical, and Postmodernism in Baz Luhrmann's *Moulin Rouge*," *Music and the Moving Image* 3, no. 3 (Fall 2010): 31–8; Jordan Stokes, "Rock Composition and Recomposition in *The Departed*'s Soundscape," *Music and the Moving Image* 6, no. 2 (Summer 2013): 3–20; and James M. Doering, "I Never Planned Anything in My Life': The Music of *Cool Hand Luke*," *Journal of the Society for American Music* 11 (2017): 257–83.

21. Genre-specific film music monographs and edited collections are rapidly proliferating. One useful source is the "Genre, Music, and Sound" series, ed. Mark Evans, from the Equinox imprint, which to date has issued volumes on horror films, animation, fantasy cinema, and comedy.

22. The original soundtrack recording of this cue is also included in the Spotify playlist that accompanies this article: <https://open.spotify.com/user/musicologist09/playlist/1x6Bzf5v1FcSXCvVWIKLi>.

expresses a suspense-filled suppression of nervous energy and creates an ominously foreboding mood. Many cuts between the downtown aerial footage and shots of the commuter train coincide with downbeats in the music—enough to emphasize an intentional congruity without becoming predictable. Contrast arrives in the form of a sustained, lyrical violin melody high in the instruments' tessitura. The ostinato passes to flutes and piccolo, to which the lower strings add a counterpoint below. French horns briefly reiterate the violins' lyrical melody before the primary ostinato resumes with an even greater sense of propulsion and urgency. The prominence of the sextuplet subdivision is now exaggerated by a snare drum, which given the on-screen context, seems to imitate the sound of a charging train's wheels. A bass drum hit on the downbeat brings the cue to its sudden end, as the synthesized bell sounds reverberate into silence. There is no doubt that danger awaits. The music invites viewers into a world of action and suspense, and thus, as Kalinak puts it, the images are now "anchor[ed] to specificity."²³

Viewers in the class might subconsciously perceive some of what I have just described in analytical detail. Consequently, the next stage involves guiding students to reflect critically on what they have seen and heard, helping them to recognize the significance of some of Bacon's compositional choices. They might observe how the decision to begin the music cue with the production company logos helps to ease viewers into the fictional world of the film. The music encourages viewers to anticipate the story they are about to witness rather than focusing on the logos themselves. Issues of mixing levels and diegetic sound likewise deserve close attention, as the sound mix generates a continuum that spans actual railroad crossing bells, synthesized bells, an orchestral imitation of train sounds, and pure music composition. If the students are musically literate, an analytical discussion of orchestration, formal design, and rhythmic impetus is warranted. In these aural surroundings, the honking of a Canada goose (taking flight from a pond as the train passes) stands out as the lone exception to the rule. Furthermore, the editing decision to align the music's phrasing with the timing of visual cuts might only be apparent to students once brought to their attention.

This activity likewise encourages further study of the logistics of film music production and the collaborative nature of the filmmaking process. Interpreting *Source Code*'s main titles need not rely upon subjective observation alone. Various interviews with director Duncan Jones and composer Chris Bacon, excerpted below, offer insights into the genesis of this sequence and a glimpse into how the contemporary film music industry functions.

23. Kalinak, *Film Music*, 18.

Chris Bacon was not Duncan Jones's initial choice of collaborator. Because of conflicts with prior commitments, composer Clint Mansell withdrew from the film late in the post-production process, thus sending Jones in search of someone who could take on the project at short notice.²⁴ The director explained the circumstances:

Chris came in I think it was a day after his wife had given birth and he looked like a zombie. He was absolutely exhausted, and we said, we would love to hear what you could do with our film, and we played him the film with the temp score in it and he kind of got where we were going. We talked a little bit about the Hitchcock influences that we had tried to invest in to the film on a visual level and he got it from both that and from the temp score. And four days later, with a wife, with a day-old baby, he came back with this piece of music which was the opening credits music. And it's hardly changed from that first thing that he delivered. So he was our guy.²⁵

In a separate interview, Bacon recounted how his compositional process began:

After that meeting, that night, they [director Duncan Jones and film editor Paul Hirsch] sent me away to write the ending and to write the main titles. It wasn't explicitly laid out as an audition, but basically ... it was as *de facto* audition. So I went away and wrote about seven minutes of music and sent it to them a couple of days later, and it was kind of full steam ahead from there.²⁶

He ultimately completed the entire score in "about four weeks," motivated by "a healthy amount of fear."²⁷

The speed and efficiency required of film score composers, not just at this "audition" stage, but indeed throughout the entire project, is a distinctive characteristic of this line of work. These remarks from Bacon and Jones can lead logically to a discussion of film music's inherently collaborative nature. The model of a composer-genius—toiling away all alone—that we might imagine for much of Western music history, clearly does not apply in these

24. See Ben Garman, "Clint Mansell No Longer Scoring *Source Code*," *Collider*, last modified 15 December 2010, <http://collider.com/clint-mansell-source-code-chris-bacon/>.

25. Matt Goldberg, "Duncan Jones Interview: *Source Code*," *Collider*, last modified 2 April 2011, <http://collider.com/duncan-jones-interview-source-code-3/>. See also Owen Nicholls, "Duncan Jones on *Source Code*, Beards, and Rebellious against Music," *NME* [New Musical Express], last modified 30 March 2011, <http://www.nme.com/blogs/the-movies-blog/duncan-jones-on-source-code-beards-and-rebellious-against-music-775587>.

26. "Composer Interview: Chris Bacon (Part 1)" [audio recording], 10:05, *Film Music Media*, last modified 11 August 2011, <http://www.filmmusicmedia.com/interviews/composerinterviewchrisbacon>.

27. "Composer Interview: Chris Bacon (Part 1)," 10:35.

circumstances. Bacon's creative act of composition is just one small facet of a much larger undertaking. Orchestration, the creation of printed parts, musician contracting, rehearsing the orchestra, conducting the recording sessions, editing the takes, and mixing the music into the final film are likely completed by many additional individuals.²⁸

From his interviews, it is clear that Bacon set out to create main title music that would serve the explicit purpose of preparing an audience to experience the film. He saw this sequence as "a great opportunity to do something bold (a-la [Bernard] Herrmann) to introduce what is, in a lot of ways, a very intimate movie."²⁹ The chance for his music to become the primary driving force, even if only for a few minutes, presented Bacon with a rare gift. The composer explained:

[I]t's kind of fun to have a main title. They seem to be becoming less common—where you have a dedicated two, three, four minutes of film where there is nothing happening. ... And in this case that's what it is: it's two-and-a-half minutes of aerial photography outside of Chicago. So let's write music that sets it [the film's plot] up. ... To have that opportunity to turn something that doesn't inherently have tension ... and try to give it some weight and some heft and create some drama for that—so that was kind of the goal of the main titles.³⁰

One wonders if in fact Bernard Herrmann's music was a part of the "temp score" that accompanied Bacon's initial viewing of the film. The director's acknowledgment of Hitchcock's influence certainly justifies the creation of a Herrmann-esque score.³¹ This presents compelling opportunities to pursue a compositional style comparison between Bacon's score for *Source Code* and its ostensible models, while at the same time illustrating the longevity of certain style idioms across decades of Hollywood history.

Students may also enjoy the opportunity to explore the YouTube "trailer mix" phenomenon, in which scenes from popular motion pictures are re-edited as two-minute trailers that prepare viewers for a film of an entirely different genre. Some of the most sophisticated examples are produced by the media and entertainment company Mashable. Among their most creative efforts are

28. The end credits of *Source Code* acknowledge Pete Anthony as conductor and supervising orchestrator; two additional orchestrators are named as well. The audio recording technical staff, music score preparation team, and music librarian all receive credits, along with the names of every orchestra musician heard on the soundtrack.

29. "Interview with Chris Bacon," *8DIO*, last modified 4 August 2014, <http://8dio.com/blog/interview-with-chris-bacon/>.

30. "Composer Interview: Chris Bacon (Part 2)," 1:24, *Film.Music.Media*, <http://www.filmmusicmedia.com/interviews/composerinterviewchrisbacon>.

31. For further reading on the Hitchcock-Herrmann collaboration, see Steven Rawle and K. J. Donnelly, eds., *Partners in Suspense: Critical Essays on Bernard Herrmann and Alfred Hitchcock* (Manchester, UK: Manchester University Press, 2017).

reconfigurations of *The Silence of the Lambs* as a romantic comedy, *Dumb and Dumber* as an Oscar-worthy drama, and *The Revenant* as a silent film (with a period-appropriate solo piano score).³² Students could select an example “trailer mix” and write a brief analysis paper that explains music’s role in redefining the film’s new genre. In either case, the writing should focus specifically on musical style traits and how changing that parameter modifies the impact of the images. The most technologically adept students, if they have access to video and audio editing software, might even be inspired to create examples of their own.

Ultimately, we arrive back at the point from which we began—with memorable demonstrations of narrative film music’s ability to reshape the viewing experience. *Source Code*’s main titles sequence is not only the perfect site for experimentation via the commutation test, but it is ripe with potential for analytical inquiry supported by primary source evidence. The specific examples discussed in this essay illustrate several of many possible pathways for study that arise from using *Source Code* as a starting point. In this article, I have sought to describe an accessible path of entry for instructors wishing to incorporate an engaging film music-based learning activity into their classroom teaching. The adaptable framework around which this lesson is constructed will, I hope, inspire further applications with other films. The pedagogical possibilities of the commutation test are indeed manifold.

32. Mashable Studio’s CineFix playlist on YouTube includes fifty examples and has amassed nearly one million views as of Fall 2017; see <http://on.mash.to/TrailerMix>.

Appendix: Creating a Video Clip from a DVD

Readers are likely familiar with the process of “ripping” audio from a compact disc—a simple, automated function via iTunes, Windows Media Player, or any number of open-source software products. However, content management and copy protections on DVDs typically prevent the direct ripping of video files. Although software claiming to extract video clips from DVDs does exist, most options range from erratic to inoperable. Within the Microsoft Windows environment in particular, I recommend using the “record clip” function of the VLC Media Player. Available as a free, open-source, cross-platform download, this software can play most mainstream audio and video file types in addition to audio CDs and DVDs.³³ It also provides a practical, simple solution for any task that requires the creation of video clip files. As explained in footnote 11 above, the procedure described here should fall within the copyright principles of “fair use” when undertaken for educational purposes from a physical copy that you legally own. (Please note that Blu-ray media are structured entirely unlike DVDs. In an industry effort to limit pirating, Blu-rays include more robust Digital Rights Management than DVDs, and computer software options even for basic playback are limited. The few programs that claim to be able to extract video clips from Blu-ray discs are unreliable and overly technical. For most users as of early 2018, I recommend working with DVD discs.)

The VLC Media Player permits the real-time *recording* (rather than ripping) of a video clip, thereby offering a work-around to the typical DVD copy protections. In the Windows version of the software, note that the necessary “Record” button does not automatically appear in the user interface. Instead, one must navigate to the “View” menu and then check the option to display the “Advanced Controls.” This will add an extra row of function buttons located immediately above the default playback controls (play, stop, next, and previous). The “Record” button now shows near the bottom left corner of the software interface. Anytime the record function is available (i.e., while playing a DVD), the button appears as a red circle; at other times the circle will be greyed out. In the Mac version, the “Record” function is found within the “Playback” menu but does not appear as a button anywhere in the software’s interface.

The recording process in VLC Media Player unfolds as follows: while the disc is playing, simply click the record button (Windows) / select the record function (Mac) at the desired starting point for the clip while allowing the film to continue to play. Once the desired ending point has been reached, hit the record button/function again to stop the recording. The clip is automatically

33. The software is available for Windows, Mac, Linux, Android, and iOS devices at <http://www.videolan.org/vlc/>.

saved as a video file with the .mpg extension in the default "Videos" folder in Windows or the "Movies" folder in Mac OS. Find the file and play it back to verify that the correct segment has been successfully recorded. Further editing of the clip is unnecessary, assuming that the recording's beginning and ending points have been timed appropriately. If not, it may be easier to repeat the process and aim for more precise timing than to use video editing software to trim the length of the file. Once confirmed, the file can be renamed, relocated, and played back as needed. The .mpg file type (which in this instance contains MPEG-2 video data) is widely compatible across platforms and the most commonly installed media players.

(One final disclaimer: even with software as reliably and frequently updated as the VLC Media Player, recording a clip from a DVD may not always work. This feature has been "broken" in some version updates in the past. Patience, experimenting with older versions of the software, or a search for an alternate solution may be required.)