

# Cross-Cultural Resonance in the Cadential Hemiola

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## INTRODUCTION

BY the time I entered graduate school for my MA in ethnomusicology in the late 1980s, the term “comparative musicology”—the original moniker of our field from the nineteenth century—had mostly been forgotten. More than just the passing of a terminological fad, Bruno Nettl notes how in the second half of the twentieth century the very concept of comparison took on a “questionable and even unsavory reputation” (2010, 71), most likely rooted in the perception that Western ethnomusicological academe didn’t know enough about the individual cultures and practices that were being studied, and that facile comparisons in the past had led to overly simplistic and/or racist conclusions. This is certainly the way I felt when embarking on my research of Japanese music in the early 1990s, though I would come to realize that it is impossible to talk about “other” musics and cultures without a common (Western in my case) point of reference, which by default relies on comparison.<sup>1</sup>

Many of the most exciting developments in music research in the past 25 years, however, show a return to the comparative method, namely human musicality, musical origins, and the findings of cognitive neuroscience, including beat entrainment behaviors. Though ethnomusicologists would contribute to all of these fields, many point to Michael Tenzer’s 2006 volume *Analytical Studies in World Music* as spearheading not only the resurgence of the comparative method in ethnomusicology, but also a rapprochement between ethnomusicology and the field of music theory and analysis that was sorely missing at the close of the twentieth century. This work led directly to the founding of the group and

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<sup>1</sup> And from the same chapter by Nettl, “Revisiting Comparison, Comparative Study, and Comparative Musicology,” he continues: “Another strand of conventional wisdom has been to present the history of ethnomusicology as moving away from comparison. I suggest, however, that while this conventional reading of history reflects the dominant rhetoric, in actual practice the attitudes toward comparison have been fairly consistent, and comparative study has played a significant if not dominant role throughout the century” (2010, 86). Nettl also acknowledged the previous work carried out on the history of comparative study in our field; see Clayton 2003, Grauer 2006, McLean 2006, and Schneider 2006.

online journal *Analytical Approaches to World Music* (AAWM), and later the follow-up *Analytical and Cross-Cultural Studies in World Music* co-edited with his colleague in music theory John Roeder in 2011.<sup>2</sup>

As anyone who has studied ethnomusicology and/or has had a passing interest in so-called “world music” has discovered, it becomes readily apparent that there exist a number of cross-cultural similarities between diverse musical structures that, in the West, are described as scale, mode, harmony, and meter. Musical-structural similarities in sound and style across cultures and time periods are always fascinating to ponder. What are the connections, if any? What gives rise to such similar phenomena? Over the years a number of theories have been proposed, including those based on shared social organization, religious beliefs or practices, local geography, attraction to certain numbers and their abstract ordering, and human cognitive constraints (see, as a representative example, Savage et al. 2015).

Interestingly, such findings were predicted by two central tenets of the anthropological comparative method, as noted more recently by meta-ethnographer James Clifford:

1. An established principle of the anthropological comparative method asserts that the greater the range of cultures, the more likely one is to find similar traits.
2. A second principle, that of the “limitation of possibilities,” recognizes that invention, while highly diverse, is not infinite. The human body, for example, with its two eyes, four limbs, bilateral arrangement of features, front and back, and so on, will be represented and stylized in a limited number of ways. (1988, 191)

While recognition and identification of such affinities on the level of what the cultural anthropologist John Blacking referred to as the “surface structure” (1971) is important in its own right, he (and others) are quick to point out that just because two scales or rhythms from different places might sound identical, it doesn’t mean they were generated with the same intentions, under the same conditions, or that they “mean” the same thing to both parties. While I recognize that structural similarity does not necessarily correlate to common meaning or function, in this article I explore the possibility of a similar, deeper cultural-

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<sup>2</sup> An earlier version of this article was read at the Fifth International Conference on Analytical Approaches to World Music in Thessaloniki, Greece in June of 2018. While there the input of Adam King, Andrew Killick, Tara Browner, David Locke, Jane Piper Clendinning, and Michael Tenzer was especially helpful.

performative resonance rooted in humanly shared cognitive propensities between two historically unrelated cultures in the process known in the West as the cadential hemiola.

The cadential hemiola as commonly understood in classical music began as a Baroque-period practice occurring at cadences, often marking section or piece endings, in which three beats were distributed over two measures in triple meter.<sup>3</sup> An oft-provided textbook example comes from the “Hornpipe” movement of the second suite (HWV 349) of George Frideric Handel’s *Water Music* (1717). Figure 1 is a piano reduction of the first ten bars; the first eight bars are grouped in threes (three half-note values per bar), followed by two bars in which gestures are grouped into twos (each gesture has a duration of one whole-note value) cutting across the bar lines to create a cadential hemiola: three whole-note groups across the span of two measures.

**Figure 1.** First ten bars of the “Hornpipe” movement of the Second Suite in D Major (HWV 349) from George Frideric Handel’s *Water Music* (piano reduction).<sup>4</sup>

<sup>3</sup> Willner 1991; see also Collins 1964 and chapter 4 of Mirka 2009.

<sup>4</sup> An excellent recording of this movement by the English Concert and Trevor Pinnock is found at: [https://www.youtube.com/watch?v=96Th\\_y6PGUg](https://www.youtube.com/watch?v=96Th_y6PGUg)

Over time other kinds of rhythmic grouping dissonances at cadence points would come to be similarly labeled as hemiola (even if the term originally referred specifically to a characteristic 3 against 2 pattern), such that we can now more broadly define a cadential hemiola as “a familiar form of grouping dissonance, in which the perceived value of the beat or the bar is changed leading into a cadence” (Biamonte 2014, paragraph 7.4). Biamonte identifies the practice in rock music of quadruple meter becoming triple as similarly representative of a cadential hemiola, and she provides such an example through notation with David Bowie’s “Changes” (*ibid.*, paragraph 7.5).

In this article I am interested in the existence of alternating—rather than simultaneous—successive rhythmic groupings of twos and threes occurring at formal, cadential junctures, specifically within musics that are commonly notated in staff notation as bars of 12/8 and 6/4 (12/4 and 6/2 at slower speeds), or a composite bar of 6/8 and 3/4 (Hiljeh 2016, 36). True to the second principle of the anthropological comparative method, it is not surprising to find various world traditions that play with the possibility of variously dividing a 12-pulse cycle into twos, threes, and fours. As the music theorist Justin London observed:

[T]he 12 cycle [12 eighth notes] is metrically rich relative to its cardinality, with seven possible beat cycles and nine distinct NI [non-isochronous] phase rotations. This, of course, stems from the fact that its prime factors ( $2^2 * 3$ ) engender various symmetries and additive patterns. ... Thus the 12 cycle is combinatorially privileged within the range of perceptually viable metric cycles. (London 2012, 169)

What is fascinating in the context of this research is that two very different genres and cultural traditions—Anglo-American indie/alternative rock and South Korean folk drumming—both choose to alternate between twos and threes at transitional sections and piece endings, as if to draw the listener’s attention to such formal markers through the temporary displacement of where the beat is or might be felt.

The implications of this cross-cultural similarity are multifaceted. First, it confirms what cognitive neuroscientists and music theorists have known for decades, namely, that the human aptitude for entrainment and the tendency to form metrical scaffolding leads to a metric mode of attending across cultures. This means that many listeners “actively seek and generate temporal structure through our attending behaviors” (London 2012, 24), such that

they come to expect regular beat and metrical structures until they are interrupted. Such interruptions—known as grouping dissonances and/or metric dissonances—may occur in many places and be achieved in many ways, but when configured as hemiolas they tend to signal transitional sections or piece endings (see Biamonte 2014, paragraph 1.3 and Krebs 1987). Takako Fujioka and her colleagues have demonstrated further how in the context of hemiolas that “meter-related timing mechanisms are used to predictively orient attention to future events” (Fujioka et al. 2014, 11), providing one strategy by which we are able to prepare ourselves for important structural moments in a performance/composition (texture and chord changes are others). They also noted that the specific change from ternary to binary groupings involves more complex mental activity and activates more areas of the brain than just processing such groupings in isolation (and that it happens right before the transition point, further strengthening its anticipatory nature; *ibid.*, 8–9, 11).

Second, the above findings are based in Western performance practice and research; in my analysis I will show that similar interruptions of metrical regularity at important structural points—with a special focus on switching between threes and twos—are also employed in South Korean folk drumming. Not only does this bolster the claims made by the above scholars and cognitive neuroscience in general, but it suggests the possibility of finding further hemiola-like figures in other world music traditions, creating a broader shared musical universe. It also supports the complementary idea of “deep structure” as understood by John Blacking (1971).

Lastly, while the research presented here on Anglo-American indie/alternative rock supports claims made by rock music theorists such as Nicole Biamonte who have identified small-scale metric dissonances as “creat[ing] a sense of accelerating motion toward the end of a phrase, or as a truncated link at the end of a formal section that provides momentum into the following section” (2014, paragraph 7.1<sup>5</sup>), and large-scale metric dissonances emphasizing sectional contrasts, it also expands upon the conception of the cadential hemiola. As will be shown in the pertinent rock example and its South Korean counterpart, cadential hemiolas are not always single, short events, but rather can be extended sequences in which a number of hemiolas are strung together.

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<sup>5</sup> The former is identified as a cadential hemiola, the latter as a transitional technique.

### ANALYTICAL SAMPLES AND NOTATIONAL CHOICES

In the discussion that follows I have chosen two sets of cross-cultural samples for analysis of the cadential hemiola. The first set will compare its use as a transitional section marker, the second as an extended ending of a composition or performance. The Western passages I have selected feature hemiolas whose distinctive rhythmic groupings are supplemented by harmonic changes, melodic movement, and text setting, thus reinforcing the structural norms and boundary markers of popular music, such as the move from verse to chorus, or the chorus to the bridge.

The South Korean percussion passages, in contrast, determine phrase and formal boundaries exclusively with rhythmic and timbral patterning. (Choreography sometimes contributes to phrase/formal boundaries as well, an issue to be discussed at the end of this article.) In the examples that I provide there is no accompanying text or melodic accompaniment, though both are occasionally found in some other regional variants. Nevertheless, the change in groupings and/or perceived shift in meter is identical to that we find in the Western samples, and so I trust my readers will accept this application of the Western terminology for the sake of ease of comparison.

Throughout my research I have employed staff notation as a convenient analytical tool and visual shorthand.<sup>6</sup> In Western music studies, including popular music, staff notation remains the norm for making basic observations about quantifiable phenomena such as pitch, chord progressions, and basic rhythm/meter. In ethnomusicology—and, by extension, cross-cultural comparative studies—however, its use continues to vex researchers and readers alike. Its connections to colonialism, class, visual orientation, and other perceptual biases cannot be overlooked, and while the pros and cons of adopting staff notation could fill a volume in itself, this is not the place to rehearse anew such debates. My choice to employ

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<sup>6</sup> On the advice of the ethnomusicologist and Africanist David Locke, I have discontinued my use of the phrase “Western staff notation” in favor of just “staff notation,” reflecting its changed analytical and geopolitical usage (personal communication, 2018).

staff notation, even with my Korean examples, is born of an amalgam of personal experimentation, local practices, and simple pragmatism.<sup>7</sup>

The history of notation in South Korean traditional music is rich, diverse, and complex, with numerous approaches based on hybrids of local and Chinese sources competing at any one time. Like much of East Asia, however, the twentieth century witnessed the slow but steady adoption of staff notation from Europe, at first by Western-trained musicians and educators for the imported repertoire, but soon thereafter by academics and later musicians working in traditional music genres. By the time I conducted fieldwork in South Korea in the mid-1990s, even folk drummers far away from academia and major urban centers were experimenting with Korean and Western notational systems, as well as finding ways of integrating aspects of orality into the written script (such as substituting oral mnemonics for note heads or other abstract symbols). In my own work I developed modified traditional box notation (*chǒngganbo*), and a hybrid box and staff notation with Western and Korean drum symbols.<sup>8</sup>

For the analysis in this article, however, I decided to continue to use staff notation for the Korean examples so that readers need only read and navigate one system. The simple fact is that most of my drumming teachers in Korea are conversant in staff notation and use it in their live instruction and textbooks, and that an overwhelming majority of Korean audiences are also fluent in its use. And while the Korean percussion tradition I will be drawing upon includes four different instruments (more on this below), for visual clarity I have only provided the *changgo* (“stick drum”) hourglass drum part in notation. Many, if not most, Korean teachers identify the *changgo* line as a microcosm of the central structural elements of any particular rhythmic pattern or cycle, and so we can think of it as a convenient shorthand for illustrative and analytical purposes.

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<sup>7</sup> The ethnomusicologist Andrew Killick has more recently developed a form of global notation to help with the visual representation of sound across various world traditions (<http://globalnotation.org.uk>).

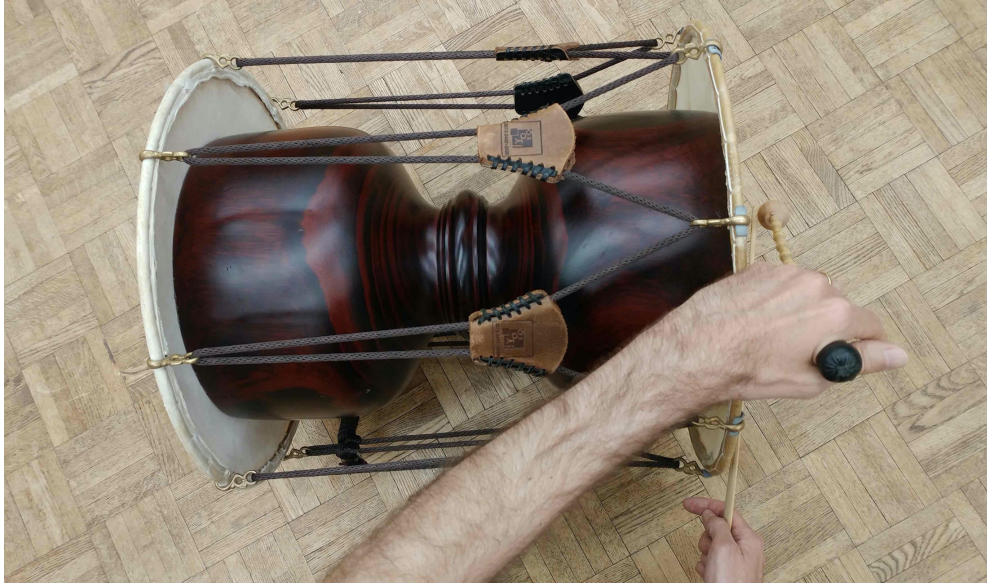
<sup>8</sup> See Hesselink 2004, 422 and Hesselink 2012, 71 for examples of my own work; see further Hwang et al. 2010 for a historical overview in English of notational practices in Korea.



**Figure 2.** “Home position” of playing the *changgo* (bass head on left, treble head on right).

The *changgo*'s construction is set up to amplify two contrasting pitches, one higher and one lower. These pitches are only relative; they are not tuned akin to what one finds with Indian *tabla* playing (for example). Told from a right-handed player's perspective, the left bowl of the body—the bass side of the instrument—is wider and shallower than the right bowl, with the left drumhead made from a thicker, cow-leather head (in white; refer to Figure 2). The left drumhead is ordinarily played by a mallet with the left hand, in what I have termed the “home position” for playing the *changgo*. The right drumhead, or treble side of the instrument, in contrast, is played by a thin stick with the right hand. The right drumhead is made from a thinner, more brittle horse-leather head (in brown); in combination with the drum shape and mallets or sticks used to strike the drum, it creates a beautifully contrasting pair of pitches and timbres.





**Figure 3.** Mallet hand crossing over to the treble/stick head.



**Figure 4.** Korean drum notation legend.

In addition to the home position of the left head (bass) played by a mallet, occasionally the *changgo* player is also called upon to move the mallet over to right drumhead (see Figure 3). The gesture adds an additional timbral layer to the drumming, as well as a visually captivating choreographic element to a rhythm's realization. All three strokes—stick on right head, mallet on right head, and mallet on left head—are accounted for in the drum legend provided in Figure 4.

I now turn to the first of the two larger categories of analytical comparison in this article, the use of the cadential hemiola as a transitional section marker. I begin with an American (US) alternative rock sample before moving to its South Korean drumming analogue.

**CADENTIAL HEMIOLA AS TRANSITIONAL SECTION MARKER****Foo Fighters, “Floaty”**

In 1994, after the death of Kurt Cobain, Nirvana drummer Dave Grohl formed the band Foo Fighters in Seattle, Washington, initially as a one-man project. His self-titled debut, *Foo Fighters* (1995), represented songs that he had worked on while touring with Nirvana, and with the exception of a guest guitarist on one track, Grohl was responsible for all of the instruments and vocals on the album. Over the years band members would come and go; but even with the multiple personnel changes, the band has recorded and toured ever since, selling millions of albums and earning eleven Grammy awards. In spite of their international fan base, they continue to maintain and nurture a strong association with the Pacific Northwest.

The Foo Fighters are a direct outgrowth of the grunge rock scene at the cusp of the commercialization of “alternative” rock. Like their predecessors Nirvana, they feature a guitar-based, back-to-basics sound and approach. However, the “simplicity” or “straightforward” compositional choices often associated with grunge, post-punk, and/or alternative rock masked the subtle sophistication of many of these groups, including modal and chromatic harmonies found on both Nirvana and Foo Fighters albums. Where the Foo Fighters distinguished themselves is in their delving into humorous themes—both musically and visually in videos—and their sense of irony (Covach and Flory 2018, 473-81; see also Schloss et al. 2012, 311-17).

A clear example of a cadential hemiola as transitional section marker appears on the first album, *Foo Fighters* (1995), in the sixth track, titled “Floaty.” The piece itself features the conventional formal sections common in pop-rock songs—intro, verse, pre-chorus, chorus, post-chorus, and outro—though the ordering of these elements and the metrical shifts that occur between sections provide some variations on established forms. As one can see from Figure 5, all elements of the song exhibit a 12/8 compound quadruple feel except for the pre-chorus, which is better described as 6/4, and thus acts as a cadential hemiola. The first appearance of the pre-chorus suggests that something different from the preceding verses is coming; it remains only a sonic teaser, however, as the hinted-at chorus does not immediately arrive, followed instead by two more verses. For the remainder of the song,

however, each appearance of the pre-chorus is true to its name, directly setting up the chorus that follows.

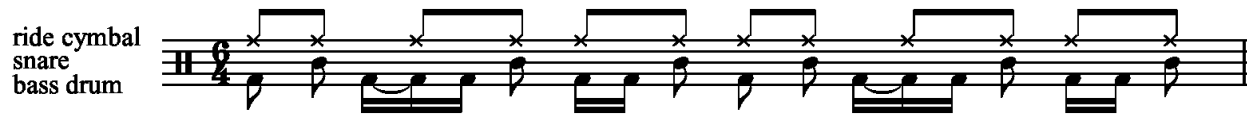
intro (12/8)  
 verse/refrain 1 (12/8)  
 verse/refrain 2 (12/8)  
**pre-chorus (6/4)**  
  
 verse/refrain 3 (12/8)  
 verse/refrain 4 (12/8)  
**pre-chorus (6/4)**  
 chorus (12/8)  
  
 verse/refrain 1 (12/8)  
 verse/refrain 3 (12/8)  
**pre-chorus (6/4)**  
 chorus (12/8)  
 post-chorus (12/8)<sup>9</sup>  
  
 verse/refrain 2 (12/8)  
 verse/refrain 4 (12/8)  
**pre-chorus (6/4)**  
 chorus (12/8)  
 bridge/outro (12/8)

Figure 5. Overall song form, “Floaty,” with cadential hemiolas marked in bold.



Figure 6. Basic drum pattern for verses, “Floaty” (such as that found at 0:39).

<sup>9</sup> I thank Jane Piper Clendinning for pointing out that this section is more properly considered a post-chorus, because of its musical-thematic ties to the chorus that precedes it (personal communication, 2018).



**Figure 7.** Basic drum pattern for pre-choruses, “Floaty” (first heard at 0:51).

Figure 6 reproduces the basic drum pattern for the verses, clearly felt in 12/8. We see a straightforward and even division of the beats in the ride cymbal grouped in threes, with regular backbeat snare drum hits on beats 2 and 4 (as well as the last eighth note of beat 4 in many instances). Rhythmic interest is created in the active and syncopated bass drum part.

As we move to the pre-chorus, as shown in Figure 7, the change in rhythm and texture is dramatic. Even though the ride cymbal continues at the same speed, now beamed into twos in my transcription, the snare “backbeat” switches to every other eighth note—the “and” of every beat if counted in 6/4—as the bass drum continues to play a syncopated line. The overall effect is that the piece’s tempo has accelerated significantly, even though the eighth note pulsation (or subactus in music theory terminology) has remained constant. The metric shift is obvious, and it would be hard to imagine a listener maintain the previous 12/8 feel through the pre-chorus because of the bass and snare drum patterning (it is also significant that the text drops out during this bar, drawing further attention to the rhythmic grouping shift). The shift and subsequent change in beat length clearly set up the listener for a transition to a new section.

### South Korean Drumming, *Kilgut*

The second example of cadential hemiola as transitional section marker comes from the South Korean folk drumming tradition known as *p’ungmul* (“wind objects”) or *nongak* (“farmers’ music”). *P’ungmul* is a centuries-old performance art originating in agricultural practices that initially was maintained by local, amateur musicians. Typically performed in the past by an ensemble of male villagers playing on gongs and drums with little or no distinctions made between performer and onlooker, *p’ungmul* served the important role of musical accompaniment in the often overlapping contexts of labor, ritual, fund-raising, and entertainment. Over time new contexts and elements were added, including the professionalization of the tradition and its expansion to include female participants. Today it



**Figure 8.** South Korean drumming troupe from Gyeonggi Province, from L to R (front row): small hand-held gong (*soe*), barrel drum (*puk*), large hand-held gong (*ching*), and hourglass drum (*changgo*) (photo credit: Nathan Hesselink, 2006).

is found in schools and concert halls throughout Korea, as well as among college and community groups abroad. A folkloristic drumming troupe is depicted in Figure 8.

*P'ungmul* is composed of a core ensemble of two drums and two gongs: a small hand-held gong (*soe*) and large gong (*ching*); and a barrel drum (*puk*) and hourglass drum (*changgo*), both strapped to the body of the performer. In older, more “traditional” contexts the ensemble could be as large as 35–40 performers, with anywhere between 5–10 individuals on the small gong, 10 or more individuals on each of the drums, and 1–3 performers on the large gong. Modern, concert-hall adaptations of the tradition can boil this equation down to just one player on each of the four core instruments. Importantly, both countryside and urban happenings feature musicians who are both dancers and drummers, with all instruments either held in the hand or strapped to the body while the percussionists simultaneously dance (see further Hesselink 2006 and 2012, and Lee 2018).

*P'ungmul* distinguishes itself from other South Korean performative arts in its central focus on rhythm. At its foundation are rhythmic patterns (often cycles) known as *changdan* (“long and short”) or *karak* (“finger/strand”), the building blocks from which all else is built.

Rhythmic patterns are based on models consisting of a series of accented and unaccented strokes or beats, various metrical and repeat structures, range of tempi, and lengths of phrases. A collection of rhythmic patterns makes up a movement (*madang*), a discrete and self-contained unit or piece in which the rhythms and their choreography are performed in order without fail. A collection of movements then makes up an entire performance. While not always recognized by local participants, the general arc of a movement begins with patterns with set footsteps and ground formations with little improvisation, moving to closing patterns that allow more freedom both choreographically and musically.

Having defined cadential hemiola as the conspicuous alternation of threes and twos (such as we find in the juxtaposition of 12/8 and 6/4 meters) at transitional sections and piece endings, it is essential that I briefly discuss and illustrate the underlying tension and/or play of threes and twos inherent in most compound-meter South Korean rhythms. More than 90% of this repertoire is, in fact, in compound meters, and so it is important that the reader will appreciate what is unique about the specific instances of cross rhythmic grouping that I am labeling here as a cadential hemiola. Figure 9 is a transcription of a representative *p'unngmul* rhythm (*chung samch'ae*). On the surface level the mallet hand (downward stems) articulates each dotted-quarter-note beat, lightly ornamented in measure two where the mallet adds an eighth-note pickup to beat 3. The stick hand (upward stems) pulls against the dotted-quarter feel by playing every quarter note to form a constant three against two pattern between the hands.

I must make clear that this basic formulaic pattern is *not* a hemiola from a Korean perspective. The rhythm is clearly danced and felt as a 12/8 rhythm, with the mallet strokes that divide the notated bar into 4 corresponding with the placement of the feet in the choreography—generally every dotted quarter (more on this below)—all while the stick

The figure shows a musical staff with a 12/8 time signature. The top part of the staff is labeled 'stick, RH' and the bottom part is labeled 'mallet, LH'. The mallet part consists of four dotted quarter notes per bar, with an eighth-note pickup on the third beat of the second measure. The stick part consists of four quarter notes per bar, creating a 3:2 cross-rhythm with the mallet part. The notation includes stems pointing up for the stick and down for the mallet.

**Figure 9.** Representative *p'unngmul* rhythm (*chung samch'ae*) showing underlying tension and/or play between threes and twos.

strokes in twos play against the embodied basic beat. While there are occasionally rhythms where the stick hand joins the mallet in articulating the dotted-quarter pulse, the mallet hand almost always remains within the framework of the quadruple dotted-quarter organization (and its triple subtactus). For a more evident change in grouping to occur—whether or not one considers it a metric shift—the mallet hand must reorganize itself to articulate half-note/whole-note pulsation, suggesting a slow triple pattern over the span of two notated bars (or eight dotted-quarters). In both instances in this article when such a realignment exists, it indicates the formal-boundary marker that I am calling a cadential hemiola.

The specific excerpt I have selected as an example of a cadential hemiola occurring as a transitional section marker is taken from the broader “left side” (*chwado*<sup>10</sup>) Chölla-province entertainment-oriented performance (the *p’an kut*; refer to Figure 10). Composed of eight independent movements (*madang*), the rhythmic pattern I am highlighting as a cadential hemiola is found in a section called *kilgut* (“road ritual”). Previously a processional rhythm, this pattern is now performed in the region without any direct references to walking or marching.

*Kilgut* begins with an opening phrase of two bars, both hands of the *changgo* player remaining squarely grouped in threes (dotted half notes), except for the last dotted-quarter gesture at the end of bar two where the stick hand suggests a bracketing into twos (refer to Figure 11). The third bar acts as a bridge or transition to the main repeated bar (bar four), switching initially to a strong sense of 6/2 with the mallet and stick hands playing in twos (half notes) for the first half of the bar, then settling into the typical mallet/stick relationship of 3:2. The fourth and last bar then internally repeats—akin to a vamp—as long as the director of the ensemble desires, before returning to bar one and repeating the entire sequence again. This repeat structure is unique to the South Korean drumming tradition.

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<sup>10</sup> *Chwado* refers to the eastern counties of North and South Chölla provinces.

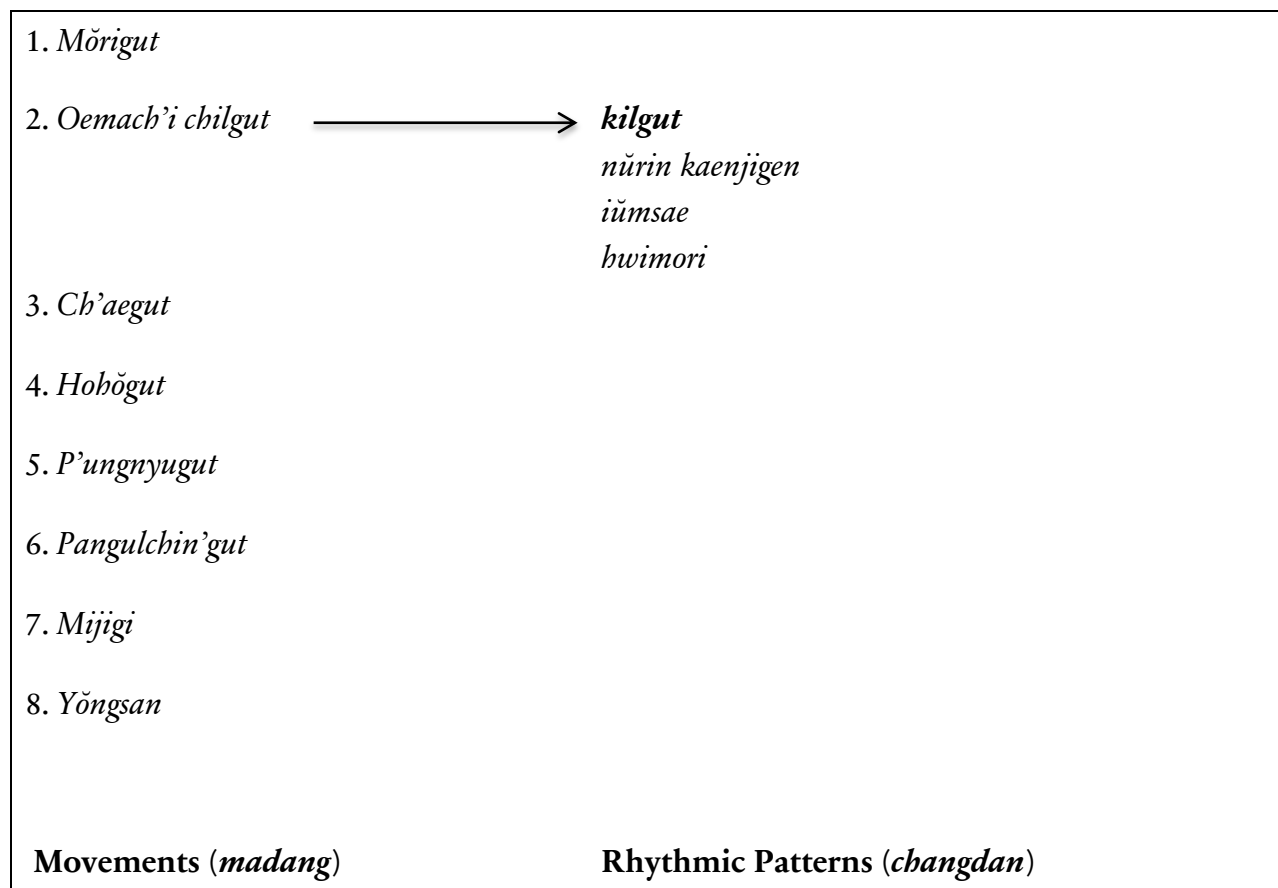


Figure 10. Structural diagram, “left side” entertainment-oriented performance, with placement of *kilgut* identified and bolded.

Figure 11. *Kilgut* rhythmic pattern (transitional section cadential hemiola begins at \*).

*Kilgut* can be thought of as its own micro-universe, even a “song” of its own. Using the nomenclature form of a Western pop song, *kilgut* mm. 1 and 2 would be an opening phrase



that serves as a “verse,” m. 3 is a transitional bar that can be interpreted as functionally equivalent to a pre-chorus, and the final bar is analogous to a chorus, extended by optional repetition. Although the analogy is questionable, it is significant that bar three, which is clearly transitional and a section marker of sorts setting up the last bar, shows the mallet hand clearly (and temporarily) switching to twos, which for any performer or listener conversant with Korean drumming will immediately feel as something different and special occurring. Such a shift in grouping indicates a transitional section cadential hemiola.

*Kilgut* and “Floaty” both exhibit the use of an interruption in beat length and metric expectation to help mark and prepare their respective listeners for something new to follow. With “Floaty” the shift is immediate, dramatic, and creates an intensification in mood and attentiveness. *Kilgut*, in contrast, unfolds slowly and is hinted at a half bar in advance (the second half of bar two). In both cases, however, the temporary change in meter is obvious to enculturated audiences, setting them up for a new section (I imagine with “Floaty” that even individuals unfamiliar with rock music norms will feel the change). Such parallels further support claims of universality in cognitive neuroscience, strengthening the existence of humanly shared cognitive propensities.

#### CADENTIAL HEMIOLA AS ENDING

##### **Bombay Bicycle Club, “Lamplight”**

Bombay Bicycle Club is a British rock band formed by high school friends in North London (UK) in 2005, borrowing their title from the now defunct Indian fast-food chain of the same name. Often pigeonholed as an “indie” band (and how they are still most often labeled), the band remains creative and difficult to pin down compositionally, especially with their second, acoustic “singer-songwriter” album *Flaws* (2011), and their fourth album that moved into world music sampling and influences, *So Long, See You Tomorrow* (2016). Active until 2016, then reforming again in 2019, the band has released five full-length studio albums, in addition to two EPs. They have received accolades from all of the major British trade magazines, and their fourth album reached #1 on the 2014 UK charts. The band is also known for having launched the career of the female singer-songwriter Lucy Rose, as well as solo projects by founding members Ed Nash (bass) and Jack Steadman (lead vocals, keyboards, guitars).

One of the longest and most obvious examples of an extended cadential hemiola closing out a piece is found in the song “Lamplight” from their debut album, *I Had the Blues But I Shook Them Loose* (2009). “Lamplight” is similar to the Foo Fighters track in its guitar-based instrumentation, as well as containing all of the elements of the typical rock song: intro, verse, chorus, transition/bridge, and outro. The ordering of these elements is standard, though the length of the bridge before the final chorus is longer and more complex metrically than what is normally found in rock (or pop) genres.

Figure 12 outlines the overall song form of “Lamplight.” The piece sits comfortably in 4/4 until the bridge, at which point the song shifts to an extended and concluding cadential hemiola region that encompasses the rest of the composition (marked in bold). The bridge is completely instrumental, which is typical of this song type. The voice does return in the final reprise of the chorus, though the texture is so dense at that point that the voice feels like just another instrumental line within the fray. Notably, the first two iterations of the chorus were in 4/4, where the final chorus alternates between 6/4 and 12/8.

A simplified drum rendition of the entire cadential hemiola region—bridge through the outro—is provided in Figure 13. This passage is an excellent demonstration of rhythmic play, highlighted by its extended alternation between 6/4 and 12/8, and its asymmetrical bar groupings of two bars in 6/4 and one bar in 12/8 in most of the bridge. Significantly, this resulting tension or pull is also played out at the level of the individual bar: toward the midway point (third system of Figure 13) and again the ending of the passage (sixth system of Figure 13) the drummer further accentuates the possibility of twos and threes by realigning the snare backbeat hits in the latter half of the bar. This gives the possible interpretation of a measure that begins in threes (6/8) but then changes its groupings to twos mid-way, suggesting a temporary move to 3/4 (both of these passages are marked in the score with numbers and brackets). Although in both cases the following bar continues in 12/8, these moments nevertheless provide listeners with additional places to entrain in personal or challenging ways that distinguish and highlight formal-sections—in this case, the extended ending.

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intro	(4/4)
verse 1	(4/4)
chorus	(4/4)
transition 1	(4/4)
verse 2	(4/4)
chorus	(4/4)
transition 2	(4/4)
<b>bridge</b>	(6/4) X2, (12/8) X1 (6/4) X2, (12/8) X1 (6/4) X2, (12/8) X1 (6/4) X2, (12/8) X1 (12/8) X3 (12/8) X3
<b>chorus</b>	(6/4) X2, (12/8) X2 (6/4) X2, (12/8) X2
<b>outro</b>	(12/8)

**Figure 12.** Overall song form, “Lamplight,” with extended cadential hemiola marked in bold.

ride cymbal  
hi-hat  
snare  
bass drum

X4

X2

[ 3 ] [ 3 ] [ 2 ] [ 2 ] [ 2 ]

X2

[ 3 ] [ 3 ] [ 2 ] [ 2 ] [ 2 ]

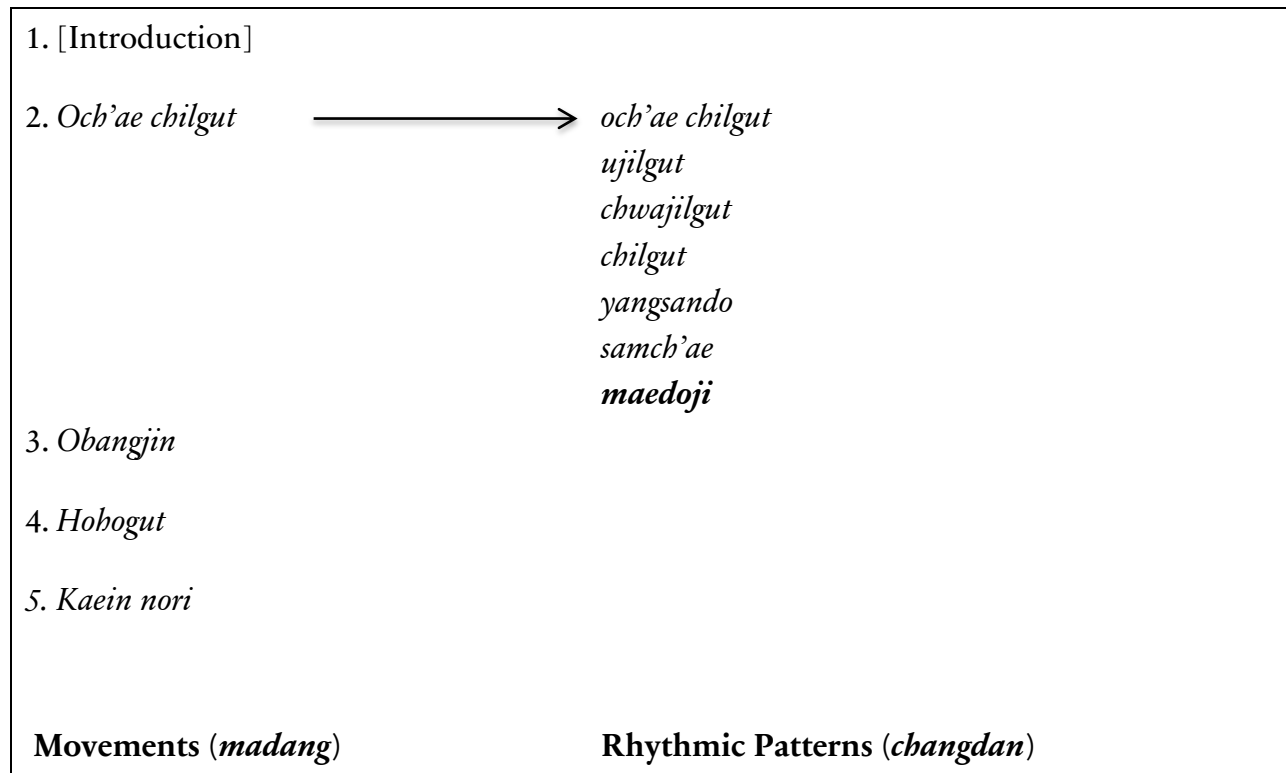
X4

X4

Figure 13. Complete cadential hemiola, “Lamplight” (beginning at 2:23).

### South Korean Drumming, *Maedoji*

A second example of an extended cadential hemiola signaling the end of a piece or performance is again found in an example from South Korean folk drumming. The rhythm selected, known as *maedoji*, generically refers to any cadential pattern found either as a transition or at the end of a movement in the “right side” (*udo*<sup>11</sup>) entertainment-oriented performance (the *p’an kut*) from Chŏlla province. The example I have chosen here is considered a template for a conclusion *maedoji*, found at the end of the movement *Och’ae chilgut* taken from a 1997 performance by Iri Nongak at the Seoul Norimadang (see Figure 14).



**Figure 14.** Structural diagram, “right side” entertainment-oriented performance, with placement of *maedoji* identified and bolded.

<sup>11</sup> *Udo* refers to the western counties of North and South Chŏlla provinces.

Figure 15. *Maedoji* rhythmic pattern.

All versions of closing *maedoji* begin in 6/4, an aural marker that distinguishes it from the 12/8 rhythms that invariably precede it. Further details are provided here, excerpted from my earlier work on this genre:

This cadential rhythmic pattern, which takes its name from the verb *maetta* (meaning to conclude, finish, or close), relaxes or unwinds the tension that has been built up by the previous patterns.... All forms of *maedoji* [transitional and conclusion] are played only one time through, and nearly all feature the alternation of duple and triple subdivisions of the beat, similar to a hemiola. This interplay of two and three is a common strategy for signaling a cadence in many Korean folk and ritual music genres. (Hesselink 2006, 166)

Figure 15 reproduces this distinctive *maedoji* rhythm in staff notation, clearly showing the alternation of groupings of twos and threes as the passage alternates between 6/4 and 12/8. The surface structure is determined by the predominant rhythm of the mallet hand, as was the case in the Korean drumming example in the previous section. The mallet's groupings of the basic eighth-note pulse in twos (each mallet strike) realizes the quarter note pulses in the 6/4 bars, reinforced by movement from the left drumhead (LH) to the right (RH). How it is that the surface structure matches up with the danced, embodied realization of the rhythms is the subject of the final analytical section of this article.

In both “Lamplight” and *maedoji* the cadential hemiola represents an extended sequence of rhythmic grouping dissonance, where the onset of this sequence suggests a transitional section marker, confirming for the attuned listener that something more

substantial is afoot. The frequent and overt switching between twos and threes at multiple levels of pulsation works to signal sectional boundaries and moments of transition only because the importance of metric attending and its forward-projecting assumptions of metric stability are established and prevalent in the surrounding material (hence special attention paid to interruptions). The identification of a much longer and multi-part cadential hemiola also expands upon conventional rock music scholarship,<sup>12</sup> while both examples further support claims of humanly shared cognitive abilities and propensities.

### BEAT-MOVEMENT INTERSECTIONS

At the beginning of this article I noted that the alternation between twos and threes at transitional sections and piece endings found in the cadential hemiola draws the listener's attention to such formal markers through the temporary displacement of where the beat is or *might be felt*. The question of where the performer and/or listener taps their (virtual) foot in an attempt to physically embody and enact the pulse is not a given. The result of the hemiola passages is that the surface structure of a rhythmic passage doesn't always dictate how one groups or feels the beat in choreographic or spontaneous physical motion. It also calls into question whether cadential hemiolas of a short duration—two to four bars, for example—are only “minimally disruptive,” and hence represent rhythmic rather than metric dissonances (Biamonte 2014, paragraph 7.4).

Rhythmic perception and grouping was a central concern of Mieczyslaw Kolinski, pianist, composer, and ethnomusicologist. Polish born, but later naturalized as a Canadian citizen, Kolinski was one of the great cross-cultural comparativists of the twentieth century, even if he isn't cited so widely anymore in the twenty-first. His analytical methods were often inspired by perceptual challenges to the performer and/or listener, and his influence on the field of ethnomusicology lives on his writings and impressive list of pupils (including the renowned Canadian ethnomusicologist Beverley Diamond and South Korean musicologist Song Bang-song). In 1982 a Festschrift was published in his honor, appropriately titled *Cross-cultural Perspectives on Music* (Falck and Rice 1982).

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<sup>12</sup> “Cadential hemiolas are usually of short duration and are only minimally disruptive, realigning with the meter after two or four bars; hence in many cases they can be interpreted as rhythmic rather than metric dissonance” (Biamonte 2014, paragraph 7.4).

Kolinski's research on cross-cultural approaches to meter and rhythm has been very influential on my own work with Korean drumming, especially as realized in his 1973 *Ethnomusicology* article "A Cross-Cultural Approach to Metro-Rhythmic Patterns." In this work he devised two broad categories of metric perception as relates to the experience of rhythmic signals that contradict, contrast, or disrupt the underlying metric framework (I've reset these in the context of drumming):

1) the meter—or series of pulses/beats by extension—does not change (in Kolinski's words, *regular metric framework*), but the drum/gong strokes play or pull "against" it (what Kolinski refers to as *contrametric*)

2) the meter changes (*irregular metric framework*) so that strokes are playing with the beats (*commetric*)

In many cases, evaluation of such metric and rhythmic perceptions is based on the experience of the subjective listener sitting still. In the case of South Korean drumming, the drummer is also dancing with the placement of their feet a strong determinant—perhaps *the* determinant—of where the beat is felt, especially for listeners who are also watching or participating in the movement.

Figure 16 revisits our first Korean rhythm *kilgut*, adding an additional staff to indicate placement of the footsteps according to the surface structure.<sup>13</sup> For the first two bars the feet land every three quarter notes, matching the rhythmic groupings of three (this is true primarily because of the organization of the strokes by the mallet). In bar three, the mallet and the stick strokes bracket into half notes (twos) for the first half of the bar, then the stick continues with this pattern for the remainder of the bar, extending into the fourth, repeated

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<sup>13</sup> I thank Tara Browner for her advice to indicate the placement of footsteps precisely on the score. While I don't follow her convention exactly of indicating the dance steps with R (right foot) and L (left foot) as she has done in Browner 2009, 5, her work did inspire what I created here.



The figure consists of three systems of musical notation. The first system is labeled '12/4' and includes four staves: 'right foot', 'left foot', 'stick, RH', and 'mallet, LH'. The second system is marked with a '3' and an asterisk, showing a change in the footstep pattern. The third system is marked with a '4', showing a return to the original 12/4 feel.

Figure 16. Footsteps in *kilgut* rhythmic pattern placed according to surface structure.

bar. Having witnessed the learning of this rhythm with multiple dance classes with students of various ages and skill levels, I can report that almost everyone I observed initially followed the ordering/timing of their footsteps with what I have illustrated in Figure 16, switching their footsteps to every half note beginning in bar three so that the feet and hands would align. This was a culturally “natural” reaction, as for every other rhythm they had learned the feet matched the placement of the mallet strokes. (Some students continued with this footing in bar four, as I’ve notated here; others switched back to the 12/4 feel.)

Where the importance of knowledge of the choreography comes into play—and, by extension, Kolinski’s concern with contrametric vs. commetric rhythmic perception—is in the placement of the footsteps according to proper performance practice, as indicated in Figure 17. The significant difference is found in bar three, where the drummer’s feet continue at the same regular pulse (in 12/4), but where the first right foot step now lands where there are no strokes: in between the beats. Novice students quickly learn they have to keep their feet moving at the same speed throughout the rhythmic pattern (every three quarter notes), with the sensation of the strokes at the beginning of bar three pulling against where they feel the strong groupings. The first half of bar three, if not the entire bar, then, is

Figure 17. Footsteps in *kilgut* rhythmic pattern placed according to proper performance practice.

a prime example of a contrametric framework. This discovery is subtle but profound, because it both reveals how a cultural insider is feeling and moving to the beat, as well as provides an alternative way for the “outside” listener to hear the rhythm (who can choose to hear the entire rhythm in 12/4 if they so choose, or even all of bar three and four as 6/2).

Turning to the second Korean rhythm—the cadential ending *maedoji*—we see a different relationship established between the feet and the hands, and thus how the beats are felt. Figure 18 reproduces the *maedoji* rhythm with the added footsteps of the *changgo* player. The entire rhythm is an example of a commetric framework, as the feet switch to twos or threes directly influenced by the surface structure (every quarter note in 6/4, every dotted quarter note in 12/8) as established by the mallet pattern. The only ambiguity occurs in bar four where I have indicated two arrows: these symbols indicate the movement of the left knee upwards, which are probably felt as syncopated in a 6/4 context because of the preceding 6/4 bar (but this could differ from performer to performer). Again, an “outside” listener can choose to hear the entire passage as being either exclusively 6/4 or 12/8, but with the knowledge of how local performers feel and move to the beat.

The musical score consists of three systems, each with two staves. The first system is labeled 'right foot' and 'left foot' on the top staff and 'stick, RH mallet, RH' and 'mallet, LH' on the bottom staff. The first measure is in 6/4 time, the second in 12/8, and the third in 6/4. The second system is in 12/8 time and features upward-pointing arrows on the top staff. The third system is in 6/4 time and includes a fermata over a note in the top staff and a double bar line at the end.

**Figure 18.** Footsteps in *maedoji* rhythmic pattern placed according to surface structure and proper performance practice (arrows represent movement of the left knee upwards).

*Maedoji* is a clear example of the possibility of short cadential hemiolas strung together as an extended sequence signaling embodied changes in meter, and hence can be conceived of as metric dissonances (rather than rhythmic ones). With the Korean samples the placement of the feet leaves little or no room for interpretation of the perceived beat; with the rock music excerpts, in contrast, we do not have the same access to such unambiguous indicators of feel. (I approached both of the rock bands whose music is analyzed in this article for an interview, but to no avail.) Nevertheless, from the perspective of the performing rock drummer the placement of the snare backbeat can be thought of as a rough analog of choreography; most knowledgeable audiences will “dance” along according to this roughly shared sense of metric time.

## CONCLUSION

Similarities in the rhythmic-formal play of the cadential hemiola across disparate cultural traditions suggest a cognitive basis for such cross-cultural resonance in musical composition and performance practice. There are many different ways that a music can

signal a transition, sectional break, or ending of a piece or performance, but the evidence here points to the strength and potential of toying with listener expectation set up by entrainment, beat grouping, and metric attending. Temporarily changing where, and at what rate, one feels the beat is a simple, powerful, and elegant way of drawing a listener's attention to a particular passage, and to signal that something important is about to happen. The samples in this article were brief and relied mostly on my own perspectives as a musician trained primarily in the Western classical and pop traditions, but with significant experience in South Korean drumming and dancing; further research that includes additional samples from diverse global musics and that is informed by local insights will help refine and broaden the explanatory power of cognitive neuroscience and its use in musical scholarship.

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