Musical Forces: Motion, Metaphor, and Meaning in Music

Steve Larson. Indiana University Press, 2012.

reviewed by
DANIEL SHANAHAN

As a chronic procrastinator, I frequently rely on the future tense to express myself. On any given day, I can be heard uttering "I will grade those essays," "I will plan that lecture," or "I will prepare that presentation" before swiftly retiring to my couch. Like many native English speakers, I learned to distinguish between the present and future tense at an early age, and I take such a distinction for granted. Many languages, however, do not make such a distinction. For example, Mandarin uses the same word and grammatical structure for both the immediate future and a recently completed action. A literal translation of "I will grade those essays" might simply be "I grade those essays." Finnish makes a very similar distinction (Chen 2013). Interestingly, this likely plays a very large role in how we live our lives.

In a recent article published in the *American Economic Review,* UCLA economist Keith Chen performed a correlational study on the spending and health habits of the speakers of languages that treat this distinction differently. The study found that speakers of languages with a "weaker" future-time reference (such as Mandarin or Finnish) save more, retire with more wealth, smoke less, and are less obese. The study hypothesizes that the habitual delineation between future and present tense encourages speakers to associate their "future self" as different from their "current self," whereas the identification of "future" as similar to "current" encourages a greater understanding of the consequences of one's actions. It is an example of the Sapir-Whorf hypothesis, which, put simply, states that language affects our behavior, and that our native language has consequences on how we think (Sapir 1929). It might therefore be logical to assume that language affects the creation, perception, and understanding of music. For example, Judith Becker (1981) has studied how the organization of gamelan music is connected with the Javanese notions of time, and Steven Feld (1981) has discussed the connections between the conversational habits of the Kaluli people of Papua New Guinea and their music.

Such studies suggest that the metaphors that we frequently take for granted in music might display a fair degree of variability across cultures. The pitch-height metaphor, for example, is hardly universal: Farsi speakers refer to pitch as "thick" or "thin," (Dolscheid *et al.* 2013) while the Kpelle people in Liberia employ the duality of "light" vs. "heavy" (Stone 1981). Yet it is unlikely that musical metaphor is entirely culturally dependent.

Eitan and Timmers (2010) presented many cross-cultural alternatives to the pitch height metaphor to several participants, and asked them which term was likely referring to the higher pitch, and which was likely to refer to the lower pitch. The metaphors included "feminine/masculine," "light/dark," "light/heavy," "young/old," and even "crocodile/ those who follow crocodiles." Interestingly, participants were overwhelmingly able to correctly state which metaphor applied, suggesting that it is not simply language that shapes our thoughts on pitch, but also a possible biological underpinning behind our association of metaphors.

The cognitive and linguistic underpinnings of musical metaphor are the foundation of Steve Larson's *Musical Forces: Motion, Metaphor, and Meaning in Music* (2012). Larson writes that he "embraces the metaphorical status of those musical forces as central to, explanatory for, and constitutive of both our discourse about music and our experience of music" (2). He argues that, because we tend to speak of music in terms of physical motion, we might also experience music through various metaphorical constructs of motion, such as physical gravity, magnetism, and inertia.

Musical Forces is divided into two parts, with the first part setting out to examine how musical forces might be fully operationalized. Larson argues that we understand music through a constant interaction of musical forces, specifically three types of melodic forces and two types of rhythmic forces. The melodic forces include melodic gravity ("the tendency of notes above a reference platform to descend"), melodic magnetism ("the tendency for unstable notes to move to the closes stable pitch"), and musical inertia ("the tendency of pitches or durations, or both, to continue in the pattern perceived") (2). The rhythmic forces include rhythmic gravity and metric magnetism. The second part of the book attempts to find converging evidence for the theory of musical forces, and discusses the role of visual psychology, computational models, and experimental work. The interdisciplinary nature of the book allows for a more thorough understanding of Larson's theory, and an encouraging example of the role of empirical methods in music-theoretical research.

In discussing the notion of conceptual metaphor in relation to musical motion, Larson's builds upon the works of both Douglas Hofstadter (1979) and George Lakoff and Mark Johnson (1980). Specifically, Larson draws on Hofstadter's work on the central role of pattern recognition in perception and consciousness, and the parallels between visualization of metaphors and the auralization of musical ideas (35). The broader notion of conceptual metaphor, in which metaphor is one of the most "basic, common devices we have for abstract conceptualizing and reasoning" (47), is derived from the work of Lakoff and Johnson (1980). At the heart of this research is the role of cross-domain mapping, in which a "source domain" serves as the grounding for the

understanding of a "target domain." For example, the physical laws of gravity serve as the source domain for the notion of melodic gravity.

The third chapter, co-authored by Mark Johnson, expands on this when discussing the moving music metaphor, suggesting that "speed of motion" might be a source domain for tempo, the "location of an observer" might be the source for a "present musical event," and the "path of motion" might be a source for a musical passage, among others (68). In a section entitled "Two Perspectives: Participant and Observer" (71–73), Larson and Johnson discuss the act of listening as if one is "metaphorically *in* the piece" and the "musical landscape metaphor" in which the listener is simply an objective observer (72). The authors argue that the latter perspective introduces a sense of intentionality in a musical work: tones "want to resolve," melodies "seek" and "strive," etc. (73), while the former perspective allows the listener to "look ahead" to a specific point in the music and "approach" certain points. This distinction leads to a discussion on the pluralities of experiencing musical metaphor, which both provides an in-depth background on the role of conceptual metaphor theory and aids in the construction of Larson's larger theory of musical forces, in which "the metaphorical logic of musical motion is based upon the spatial logic of physical motion" (68).

Melodic gravity is arguably the aspect of Larson's theory that has been most discussed amongst music theorists, linguists, and ethnomusicologists. In speech, utterances quite frequently exhibit a downward trajectory, which linguists refer to as "declination" (t'Hart and Cohen 1973; Vassière 1983). Declination is ubiquitous in melodic construction. Sachs (1962) refers to "tumbling" melodies, and many theorists have explicitly made the connection between musical and physical gravity. David Huron (2006) performed a corpus study using the Essen Folksong collection (Schaffrath 1995) and found that a melodic "arch" is the most common melodic form in pieces from across many cultures. Similarly, Larson argues that musical gravity has an affect on "melodic pattern completion, and the frequencies with which patterns appear in compositions, improvisations, and analyses." He argues that gravity might not be as identifiable on a local level, but is nevertheless important on a global level (88).

It is this willingness to examine musical forces, which sit within the interstices of both global and local levels, that allows for unique analyses of expectation and attraction that not only examine immediate implications in melodies, but also alternative expectations. Larson examines the listener's ability to auralize musical "traces," in which previously sounding instances continue to be present in a listener's consciousness after they have finished sounding. For example, when a melody moves by step, the second note will often supplant the first, but in a melodic leap the second note will often serve to support the "trace" of the first note (120). These auralized traces allow Larson to speak

about elaboration and prolongation in a way in which other theorists discussing melodic expectation are rarely able to. Although the notion of a melodic idea allowing for parallel expectations of multiple melodic ideas is also present in Narmour's "shadow graphs," found in *Beyond Schenkerism* (Narmour 1979), the commonality between two authors end there. Larson is critical of Narmour's Implication-Realization model, accusing it of committing the "atomist fallacy," which he describes as "a sort of pseudo-scientific approach to music that says 'we can't assume anything' and proceeds to assume that only the most atomistic elements count" (17).

The second part of the book (Chs. 8–13) focuses on the empirical background behind the theory outlined in the first part. Larson attempts to find converging evidence through the examination of experiments in visual perception, composition and improvisation, "music-theoretical misunderstandings," as well as his own experimental and computational work. Larson draws on the work of Rudolf Arnheim (1974), a psychologist who examined the role of symmetry and projected motion in visual art. Additionally, Larson draws on the work of Finke and Freyd (1985), which studied the role of representational momentum (217–18), as well as visual psychologist Timothy Hubbard's (1990) work on "representational gravity," which creates the sense of physical pull in a static image. In the latter work, participants' memories of objects were often displaced, frequently depending on the implied inertia or implied gravity associated with that object. Larson discusses these studies as a way of pointing to work on the perception of other domains that have found evidence that supports the notion of an analogue between physical and visual forces. Although the chapter is entitled "Evidence from Visual Perception and Neuroscience," Larson doesn't engage with much work carried out that pertains to the cross-modal association between visual forces and musical forces. That's not to say it isn't there: for example, Eitan and Granot (2006) discussed how listeners associate musical change to physical space and bodily motion. This chapter does not discuss this, nor the many other studies that work to connect visual and musical motion, instead favoring a discussion on the perception of motion in the visual domain alone. While such interdisciplinary discussion is welcome, it falls short of "evidence" for Larson's theory of musical forces. Had the chapter began with the mid-century work of Rudolf Arnheim and culminated in the cross-modal work examining physical, visual, and auditory motion (such as Lewis et al, 2000; Meyer and Wuerger, 2001), the chapter would have perhaps served to support the argument more.

Despite Larson's seeming affinity for the theories of gestalt psychology in the visual domain, he distances his own theory of musical forces from the gestalt-influenced work of Leonard Meyer. In the chapter entitled "Evidence from Music-Theoretical Misunderstandings" Larson concedes that Meyer's notion of "good continuation" is a

"correct *description* of what happens in many pieces, [but] it is an incomplete (and, in fact, misleading) *explanation* of the operation of musical forces" (263, emphasis in original). For Larson, the notion of a melody striving toward a goal is undermined by the fact that there are melodies in which musical inertia allows for continuation beyond the goal. Through analyses of Haydn's *Piano Sonata* in D major (Hoboken XVI:19), the opening of the "Bourée" from Bach's *English Suite* in A minor, the opening of Chopin's *Impromptu* in A♭ major (op. 29) and "My Country 'Tis of Thee"/"God Save the Queen," Larson identifies points in which melodic continuation does not cease simply because it has reached a logical melodic endpoint. For Larson, these are instances of melodic inertia superseding melodic gravity, and serve as a falsification of the "good continuation" theory of melodic expectation. This hypothesis is supported by the experimental work presented later in Ch. 12, which also points to the influence of melodic inertia on melodic expectation. These analyses of instances in which "good continuation" might not be sufficient is not brought up as a way of disparaging Meyer's work, but as a way of creating an analogue between how "theoretical misunderstandings" are shaped and discussion the notion of "naïve physics," which is described as when "representational momentum works in different ways than actual physical motion" (233).

The idea of naive physics refers to the findings in which there was often a disparity between the expected trajectory of visual objects and their actual physical trajectory (Hubbard, 1990), which Larson argues is analogous to the presence of instances in which melodies continue past stable harmonic points. Larson argues that these parallels "indirectly provide further evidence for the theory of musical forces" (263). It's unclear, however, how a misunderstanding of physical motion – albeit a cross-domain misunderstanding – might serve to provide evidence for any theory of auditory misconceptions, without any discussion of work on cross-domain relationships. A misplaced conflation of representational distance and actual distance, as well as a corresponding musical miscalculation, does little to demonstrate how Larson's theories of musical gravity, inertia, and magnetism might be any more valid. Instead, the evidence for the theory is presented in the form of the argument that inaccuracies in participants' judgments found in a controlled experiment might somehow be correlated with instances in which specifically picked melodies do not conform to general theories.

Although the studies discussed in Chs. 10 and 11 might be seen as too disjunct to be considered supporting evidence for Larson's theory of melodic forces, the empirical studies discussed in Chs. 12 and 13 allow the author to discuss the intricacies of the theory in both an experimental and a computational setting. In Ch. 12, Larson discusses an experiment (Larson and Van Handel 2005) in which listeners were presented with a tonal context, followed by a question about how well a second note in a melody led to the third

note. For example in two melodies such as $\hat{5}$–$\hat{6}$–$\hat{5}$ and $\hat{5}$–$\hat{6}$–$\hat{8}$, the participants were asked how strongly they felt the $\hat{6}$ led to $\hat{5}$ as opposed to $\hat{6}$ leading to $\hat{8}$. The study then isolated how the ratings correlated with the three aspects of Larson's theory of melodic forces (gravity, magnetism, and inertia). A multiple regression showed that a large amount of the variance (95%) found in the ratings can be accounted by examining inertia, gravity, and magnetism (269). Although magnetism was not a statistically significant factor, when a new model that incorporated a preference for ending on $\hat{1}$ was created, magnetism, inertia, and ending on the first scale degree became significant factors, but gravity was no longer significant. Larson further operationalizes his theory in the penultimate chapter of the book (Ch. 13), which focuses on computational approaches to examining the role of musical forces. He constructs computational models from experimental data to compare the efficacy of his theory of melodic forces to that of Narmour's Implication-Realization model (1990, 1992). In doing so, he finds that the models constructed out of the theory of musical forces have a higher degree of accuracy rating than those constructed from the Implication-Realization model.

Larson's engagement with experimental work allows the reader to better understand some of the empirical underpinnings to his theory, and he presents the material with both clarity and depth. The discussions of the various experimental designs, computational models, and the role of artificial intelligence in such work are insightful, and it is with these final chapters that the second half of the book, focusing on the search for converging evidence to support the theory of musical forces, culminates into a nicely formed discussion that bridges computational methods, experimental research and music-theoretical discussions.

Discussions of the relationship between music and motion, as well as the metaphors that might facilitate our own connections between the two, are not a novelty. For example, in 1938, Alexander Truslit published a monograph entitled *Gestaltung und Bewegung in der Musik* (*Shaping and Motion in Music*), in which he constructs a theory of the relationship between motion and inertia in both physical and musical domains. For instance, he writes that "[m]usical shaping is the shaping of movement. Every *crescendo* and *decrescendo*, every *accelerando* and *decelerando*, is nothing but the manifestation of changing motion energies, regardless of whether they are intended as pure movement or as expression of emotion" (translated in Repp 1993, 268). This work also discusses the "comprehension and identification of musical motion," in which the "most obvious motion trajectories" are discussed (1993, 268). Bruno Repp points out that Truslit's writings predated work that would later focus on the role of natural motion in both perception and the visual/musical analogue of motion (1993, 277). Truslit's work, however, was predominantly speculative, and was (perhaps more detrimentally) simply

lost or ignored in the decades after its original publication. Although Larson's *Musical Forces* makes no mention of Truslit's monograph, it nevertheless seems to grow out of the same underlying curiosity.

Musical Forces provides an engaging discussion of the seemingly ineffable notions of metaphorical motion in music, as well as a healthy methodological rigor, which serves not only as a form of support for Larson's larger theory, but also allows for a transparency and openness for future work. Larson, who passed away in 2011, concludes with a discussion of studies that might be tackled by interested scholars. The clarity of writing in conjunction with the methodological transparency of the experiments discussed in Part 2 ensure that work on Larson's theory of musical forces will continue.

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