

Review

On Repeat: How Music Plays the Mind. By Elizabeth Hellmuth Margulis. Oxford and New York: Oxford University Press, 2014, xi + 204 pages.

REVIEWED BY LAWRENCE M. ZBIKOWSKI

A bit over twenty years ago, the eminent music psychologist Carol Krumhansl published an article in this journal that explored the relationship between music theory and music psychology.¹ According to the view developed by Krumhansl, the role of music theory was to set forth accounts of musical organization that could then be tested by music psychology. As an illustration, Krumhansl described the outcome of experiments that explored the theory of melodic organization elaborated by Eugene Narmour in *The Analysis and Cognition of Basic Melodic Structures*.² The choice of Narmour's theory was not by chance: one of Narmour's principal goals was to develop a theory of music built upon assertions about cognitive functions, the claims of which could then be proven true or false.³ In the conclusion of her article, Krumhansl noted that the experiments she and others conducted supported the general claims of Narmour's theory, and thus suggested the potential rewards of further empirical study. This then led to a framework through which music theory and music psychology could interact: "Music-theoretic proposals that are oriented toward psychological issues and informed by the experimental literature are valuable resources for the psychological study of music. In exchange, the experimental results can serve to refine the theoretical proposals, offer complementary techniques, and explicate the psychological foundations underlying musical structure."⁴

Although Krumhansl believed this framework had promise, it is not one that has been broadly pursued over the past two decades. True, there have been other empirical studies of theoretical approaches. For example, Irène Deliège, and Bradley Frankland and Annabel Cohen based experiments on the ideas set out in Fred Lerdahl and Ray Jackendoff's *A Generative Theory of Tonal Music*, and Krumhansl worked together with Lerdahl to test the theory of tonal tension set out in the latter's *Tonal Pitch Space*.⁵ For the most part, however, music theorists have not chosen to devote themselves to claims that might admit of empirical verification and music psychologists have not tended to build their experimental protocols around music-theoretical work. To some extent, this is not surprising: as

Krumhansl observed, the methodologies of music theory and music psychology are quite different from one another. Nonetheless, one could argue that there is a missed opportunity here: music psychologists could benefit from the insights into musical organization developed by music theorists, and music theorists could benefit from the insights into musical behavior developed by music psychologists.

A rather different view of the relationship between music theory and music psychology is evident in Elizabeth Margulis's *On Repeat*. Margulis's approach—which is not dissimilar from that taken by Justin London in his *Hearing in Time*⁶—is to use the study of human behavior to inform the kind and cast of questions music theorists would ask. As is London, Margulis is concerned with the apprehension of music as it unfolds in time, although her focus is on a process that arguably takes music *out* of time: repetition. Through restating what has already been stated, repetition interrupts the flow of musical events, holding them up for reflection and thus suggesting that those events—or perhaps the conditions for their emergence—are in some way significant. Margulis is particularly interested in why music, perhaps more so than any other expressive form, exploits repetition to the extent that it does, not least because behaviors associated with repetition point toward an emphasis on process over product.

It bears mention that Margulis is not the first to note the apparent uniqueness of music's reliance on repetition. For instance, in the opening of the second section of "Der Geist der musikalischen Technik" of 1895 Heinrich Schenker observed,

Our understanding of musical technique would have advanced much further if only someone had investigated the questions of where, when, and how its most striking and distinguishing feature—namely, the feature called repetition—incorporated itself into the art of music. Clearly, all the arts that relate or represent a story have no reason to repeat individual motives. . . . The question is: Where did music get the idea of subjecting portions of melodies—some short, some long—to repetition, when language, its model, prefers exactly the opposite—namely, a continuous, nonrecurring flow?⁷

As does Schenker, Margulis takes as her point of departure the prevalence of repetition in music and its near-total absence in language. Moving forward from this, however, Margulis proceeds with a much richer appreciation of the complexity of musical and linguistic utterances, as well as of the cognitive and psychological substrates that enable and constrain such utterances. For Margulis, then, repetition is not simply a riddle of musical technique but key to the very possibility of music in the first place.

Although the basic notion of repetition is in itself simple—"to say or state again"—its musical manifestations are quite

¹ Krumhansl (1995).

² Narmour (1990).

³ For a synopsis of the goals of Narmour's book, see Zbikowski (1993, 177).

⁴ Krumhansl (1995, 79–80).

⁵ Lerdahl and Jackendoff (1983), Deliège (1987), Frankland and Cohen (2004), Lerdahl (2001), Lerdahl and Krumhansl (2007).

⁶ London (2012).

⁷ Heinrich Schenker, "The Spirit of Musical Technique" (Der Geist der musikalischen Technik), translated by William Pastille, an appendix to Cook (2007, 320–21).

diverse, and shaped by both technology and musical practice. With regard to the former, technologies that began to emerge around 150 years ago made it possible to record ephemeral events—a performer’s rendering of a specific musical work, for instance, or the sight of a man sneezing—such that those events could be revisited again and again. While the first hearing or viewing of the recording of such events will be experientially different from the second (or third, or fourth) hearing/viewing, the recording itself will, in most cases, not have changed (although degradations of the medium on which the event is recorded may affect subsequent hearings or viewings). This, then, is repetition in its most precise form. There is also, of course, repetition as manifested in musical practice, the typical example being the restatement of portions of musical materials as part of the design of a musical work. This appears to be what Schenker had in mind when he drew a contrast between music and language, and straightforward examples are provided by various notational conventions (the repeat sign, instructions such as *da capo*, or signs such as \curvearrowright), by the formal strategy manifested in a parallel period, by rondo forms, and by sonata-form recapitulations. What is remarkable in each of these cases is what Peter Kivy called literal repetition: the note-for-note replication of previously heard musical events.⁸ It bears mention, however, that musical repetition could also be understood to embrace note replications less exact and at different levels of scale. Replications of this sort, and their significance for our apprehension of musical organization, were brought out in Lerdahl and Jackendoff’s discussion of parallelism, which was the focus of one of their grouping preference rules. As they observed,

The importance of parallelism in musical structure cannot be overestimated. The more parallelism one can detect, the more internally coherent an analysis becomes, and the less independent information must be processed and retained in hearing or remembering a piece. However, our formulation of GPR 6 [Grouping Preference Rule 6, which pertains to parallelism] still leaves a great deal to intuition in its use of the locution “parallel.”

When two passages are identical they certainly count as parallel, but how different can they be before they are judged as no longer parallel? Among the factors involved in parallelism are similarity of rhythm, similarity of internal grouping, and similarity of pitch contour. Where one passage is an ornamented or simplified version of another, similarity of relevant levels of the time-span reduction must also be invoked. Here knowledge of the idiom is often required to decide what counts as ornamentation and simplification.⁹

Indeed, if the notion of repetition is sufficiently generalized, as happens with some of the algorithmic approaches to the discovery of repeated patterns discussed by David Meredith and his colleagues,¹⁰ it becomes very difficult to say in advance

what would count as a meaningful repetition and what would not. Margulis wisely avoids this complication by concentrating in the main on repetition in its technological and literal forms, and on the psychological reasons these kinds of repetitions are so attractive when realized through sequences of patterned nonlinguistic sound.

There remains the question of why music, unlike language, exploits repetition to the extent that it does. In her introductory chapter, Margulis engages this question by first considering the advantages repetition bestows on musical expression. She observes, “Music takes place in time, but repetition beguilingly makes it knowable in the way of something outside of time. It enables us to ‘look’ at a passage as a whole, even while it’s progressing moment by moment. But this changed perspective brought by repetition doesn’t feel like holding a score and looking at a passage’s notation as it progresses. Rather, it feels like a different way of inhabiting a passage—a different kind of orientation” (7). This orientation—which, arguably, subtends the impression that there are musical objects that we can use to anchor our apprehension of music—is one that allows us to build up expectations of what might happen next in a musical work. From a cognitive perspective, the reification of ephemeral events that repetition facilitates contributes to the formation and reinforcement of the schematic structures upon which memory relies,¹¹ and that musicians have long exploited to organize musical expression.¹² Margulis notes that the repetition of sequences of musical events also encourages an embodied perspective on music (12). Although such a perspective is more or less obvious to a performer who, through the repetition of motor movements involved in preparing a piece for performance, inscribes the music on her body, empirical studies have shown that simply listening to familiar music activates portions of the motor system.¹³ In this way, repetition can provide a foundation for a sense of participation on the part of both musicians and listeners, as there is good evidence that shared motor processes that are correlated with musical repetitions contribute to social bonding.¹⁴ Again, repeated instances of a given sequence of musical events have the potential to turn that sequence into a quasi-object for contemplation, but they also afford an opportunity to reflect on somewhat less-immediate properties of the sequence. In consequence, repetition can encourage what Margulis calls an aesthetic mode of attending, one in which there is “a willingness to notice and believe in connections and meanings that may not be instantly apparent” (13) and that can also be seen to be in operation in Diana Deutsch’s well-known speech-to-song illusion (16–17).

¹¹ Bartlett (1932, 199–200).

¹² In previous work I called such schemata conceptual models, but I did not link them explicitly to memory function; see Zbikowski (2002, 96–113) and Zbikowski (2004, 272–97). Schematic structures have, of course, been central to Robert Gjerdingen’s work. See Gjerdingen (1988) and Gjerdingen (2007).

¹³ Janata (2009, 2588).

¹⁴ See McNeill (1995), Overy and Molnar-Szakacs (2009), and Kirschner and Tomasello (2010).

⁸ Kivy (1993, 328).

⁹ Lerdahl and Jackendoff (1983, 52).

¹⁰ Meredith, Lemström, and Wiggins (2002).

Pulling all of this together, Margulis identifies three roles for repetition that are specific to music. The first relates to learning: by drawing attention to specific musical materials and supporting the retention of those materials in memory, repetition makes it possible to build knowledge of a work simply through the act of listening to it.¹⁵ The second role of repetition pertains to segmentation: as Margulis notes, when a listener is confronted with unfamiliar music, repetition often provides the first hints as to what counts as a unit, and what kind of events should be grouped together and treated as an entity (23). The third role relates to expectation: through bringing specific sequences of musical events to prominence repetition helps to shape our expectations as to what might happen next. Such expectation serves to guide our understanding of music and also, as Leonard Meyer originally proposed and David Huron has more recently reinforced, inform our affectual responses to music.¹⁶

With this perspective in place, Margulis, in her second chapter, proceeds to explore what research in cognitive science, neurophysiology, and music psychology can tell us about our apprehension of repeated sounds and the part they play in musical organization, building on her own empirical studies and those of others. She begins with the simple fact that our apprehension of sonic phenomena is always framed by context. On the one hand, this means that even acoustically identical sounds will not always be regarded as functionally identical. On the other hand, to construe two different sonic events as functionally identical is to move toward abstraction: what becomes important are the similarities between these two events, and what is deprecated are their differences (even if those differences are only a matter of the divergent temporal moments they occupy). Coming to terms with the way repetition affects listeners requires developing an understanding of the factors that motivate the listener to regard two different sonic events as equivalent, and thus the second as a repetition of the first. These factors include the correlation of local events with larger structural concerns (such as those suggested by Lerdahl and Jackendoff in their discussion of parallelism), the sense that a given musical element rises to the level of a sense-making unit (which tends to exclude, for instance, repetitions of a single pitch), and whether the musical design highlights the repetition as an intentional restatement of previously-heard material (as is the case with the repeated sections that typify many dance forms). A further factor concerns whether repetition is understood to be the *raison d'être* of a given musical form: in the early nineteenth century, for instance, chains of waltzes provided dancers with an uninterrupted succession of

distinctive rhythmic patterns to which they could match the spinning steps of the dance,¹⁷ and in the late twentieth century varieties of electronic dance music provided clubbers with highly repetitive patterns that contribute to what Luis-Manuel Garcia called process pleasure.¹⁸ Each of these factors suggests a different approach to empirical study—while the investigation of how listeners understand details of musical organization will admit of one set of protocols, another will be required for musical experiences in which the emphasis is on the overall process of musical events—as well as the different ways repetition is recruited in the service of musical expression.

Repetition, in addition to being deployed in the design of musical utterances, is also a distinctive feature of musical behavior: although linguistic utterances are not often repeated, it is a rare musical utterance that is *not* repeated. Such repetitions run the gamut from repeated performances of musical works (“encore,” after all, was originally a request for the immediate repetition of a show-stopping number), to repeated encounters with the same musical works over longer spans of time (as occasioned, for instance, by the jazz “standard” or, as it is known in Europe, “evergreen”), to repeated listenings to the same work. Margulis turns her attention to this behavior in her third chapter, noting in the first instance its connection to ritual, and to the social bonding and cultural cohesion that ritual makes possible. Margulis also discusses the neurophysiological systems associated with repetitive behaviors, many of which implicate motor routines. Repetitive behaviors—manifested in musical cultures as a means to acquire the skills necessary for the mastery of an instrument and also in various activities in which movement is synchronized with music—thus point to the deeply embodied aspect of musical knowledge. This aspect is particularly prominent when the repeated patterns of music come to totally dominate conscious experience (as in musically-induced trance states, or the absorptive state Mihaly Csikszentmihalyi called “flow”).¹⁹ As Margulis observes, “When a musical passage is repeated and encoded more and more robustly as a sequenced unit, it serves as a literal hook, compelling a person to execute the sequence imaginatively until a resting point is reached. Music, in these cases, can seem to play the person” (74).

Perhaps the clearest demonstration of this sort of hook is provided by the phenomenon of the earworm, in which a person finds some portion of a piece of music playing again and again in her or his memory. In her fourth chapter, Margulis explores this phenomenon, and also the way technologies facilitate verbatim repetition. To be sure, unvarying repetition can be a source of anxiety: earworms are often regarded as a pathological condition and, as Walter Benjamin observed in his now-classic essay, mechanical reproduction has the potential to change the social and cultural context of

15 Marvin Minsky, who was one of the seminal researchers in artificial intelligence, offered a similar perspective some years ago: as he saw it, a work cast in sonata form represented a kind of teaching machine that, through the repetition of musical materials, taught the listener what sorts of things—that is, themes, motives, and the like—were important in the work. See Minsky (1982, 2–5).

16 Meyer (1956) and Huron (2006).

17 McKee (2012).

18 Garcia (2005).

19 On trance states, see Becker (2004); on “flow,” see Csikszentmihalyi (1990).

art.²⁰ Margulis's interest, however, is in the way the cognitive capacities of humans constrain the musical uses of verbatim repetition. Perhaps most important here are limits on memory: the typical earworm, for instance, involves a short musical fragment of the kind that is easily retained in memory (and may have its basis in the limits of working memory storage²¹), that affiliates easily with motor movements, and is drawn from music that has already been encountered (82). On another timescale, however, repeated listening to entire recordings (rather than simply an internal loop of a musical fragment) typically leads to satiation; as Margulis notes, "repetition doesn't seem to enamor us more and more of a piece *indefinitely*; rather, at some point, our affections reach a maximum and then decline with further repetition" (93).

In most situations, repeated listening to a musical work brings people pleasure (setting aside the Christmas tune or the advertising jingle that we cannot abide). As Margulis explains in her fifth chapter, this pleasure has its own contour and conditions: repeated exposure initially increases hedonic value, which then falls away as a work becomes more and more familiar (96). Empirical research has demonstrated that there are a number of factors that shape the specific features of this process, including an individual's openness to new experiences and familiarity with the repertoire in question. Margulis's own research has further suggested that repeated listening changed the way those who participated in her experiments responded to a musical work: as the participants became more and more familiar with the work they began to anticipate the arrival of moments of peak tension and, in so doing, reshaped their sense of the time course of the composition (102). Since it appears that humans are readily disposed to correlate motor routines with sequences of musical sound, repeated listening to a musical work also makes it possible to solidify such motor routines. This eventuality leads Margulis to suggest that musical understanding may be much more deeply embodied than previously thought. She observes, "It's ironic that after scholars worked hard to make music seem language-like and win acceptance as a legitimate domain of scientific inquiry, applying scientific methods to the study of music might reveal that it's closer to another nonsense than another language, that its appreciation might lie in the body as much as in the mind, and that the idea that we 'feel' music may be nearer to the truth than the idea that we 'think' it" (115).

If repeated listening invites us to consider why the resources exploited by music—and the way these are organized—encourage repeated encounters with musical works, the repetitions built into most musical works present a somewhat different challenge for the performer, one that Margulis considers in her sixth chapter. As she shows, empirical research provides convincing evidence that musicians can be remarkably consistent from performance to performance. Given this, to what end should variation be introduced into successive iterations of

the same passage? In much music of the Western tradition from the seventeenth and eighteenth centuries, the assumption was that repetitions offered an opportunity to introduce expressive variations—extending, of course, to a variety of ornamental embellishments—but that practice died out over the course of the nineteenth century. What remains is an opportunity to use repeated passages to build musical rhetoric through nuances of interpretation, something Margulis illustrates with an analysis of Grigory Solokov's recording of Chopin's Polonaise in A Major, Op. 40, No. 1 (130–32). Repetitions of a musical section thus become an opportunity to reconfigure relationships among musical materials and thereby draw the listener more fully into both the progress of the piece and its sonic tapestry.

The role of repetition in providing an infrastructure for participation among members of a musicking community is explored in Margulis's seventh chapter. In some cases, such as the singalongs that performers often instigate when performing a well-known song, or the mass singing that occurs at sporting events, the participation will be explicit and grounded in repetition (at the very least, of a familiar song or portion thereof). In other cases, the invitation to participation offered by musical repetition is more implicit: although the music itself may not be participatory in its conception, the structured regularity of repetition again provides an opportunity for actual or virtual engagement of the motor system, and thus a sense that the listener is participating in its production (148).

In her concluding chapter, Margulis returns to the different ways language and music use repetition. In the case of language, with the important exception of infant-directed speech, the repetition of complete units is relatively rare and used chiefly for rhetorical ends. In music, by contrast, the basic phenomenon of repetition is so common as to be unremarkable and is only noticed when it becomes pathological (as in the case of earworms) or when the repetitions stall the progress of the musical argument (as when an improviser steadfastly repeats a phrase verbatim to build tension). What this suggests is that—*pace* the Schenker of the "Geist" essay—language may *not* be the model for music, not least because music is built on quite different communicative principles.

As should be evident, Margulis's is a wide-ranging study that engages with musical repetition in both its production and reception through experimental studies that she and others have conducted, through reflections on the cognitive capacities of humans (including the neurophysiological substrates of such capacities), and through a consideration of some of the roles music plays in cultural and social interactions. Returning to Schenker's observation about the importance of repetition to musical design, it does indeed seem remarkable that nearly 120 years had to pass before a scholar gave sustained attention to this feature of musical organization. That said, scholars' tendency to focus on the score—rather, than, say, on recordings or performance—has made the bare fact of musical repetition uninteresting: it is, after all, quite easy for the analyst to ignore notated repeat signs entirely, or to pass over the reprise of

²⁰ Benjamin (1968).

²¹ Cowan (2001).

musical material that, in terms of structural design, adds little to the apparent meat of musical discourse. It is thus not surprising that the investigation of musical repetition fell to a scholar interested in ways cognitive capacities shape musical understanding, one who was also able to undertake empirical studies that have demonstrated the role of repetition in listeners' apprehension of musical works.

As Margulis notes on a number of occasions, the topic of repetition is a potentially vast one; she has, in this book, wisely limited her consideration to literal and (in the case of technologically-informed repetition) verbatim cases, leaving to one side the tangled issues raised by parallelism writ large. That said, her treatment of the topic invites us to consider what we might learn about musical repetition were we to engage with more general manifestations of the phenomenon. As noted, Margulis proposes that repetition has three main—and perhaps unique—functions: learning, segmentation, and expectation. The first relates to how a listener's comprehension of musical events is built up, the second to the way music constructs meaning (although not, perhaps, "meaning" in a fully semiotic sense), and the third to affectual responses to music. How might such functions be realized in music in which there is no exact repetition, such as a fugue by J. S. Bach? Of course, Bach fugues do make use of repetition: in a four-voice fugue with a real answer (such as the D major fugue from the first book of the *Well-Tempered Clavier*) the opening exposition has four statements of the subject. However, none of the three statements that follows the first is an *exact* repetition: the second statement (as a real answer) is transposed up a fifth from the first and accompanied by a countersubject; the third statement is an octave transposition of the first, and accompanied (in the case of the D major fugue) by free counterpoint in the first and second voices; and the fourth statement is an octave transposition of the second, accompanied by the countersubject and free counterpoint in the other two voices. Clearly, repetition is a rather more complicated affair in environments such as this. Learning, segmentation, and expectation will all (presumably) operate in such environments, but how they operate may not be as evident as it is in works that follow a simpler compositional design and that eschew complex polyphony for a more straightforward melody-and-accompaniment format. In my own work (which is duly noted by Margulis), I prefer to approach the organization of musical materials not from the vantage point of repetition but from that provided by research on processes of categorization. From this perspective, the different versions of the subject from the D major fugue would be viewed as belonging to the same cognitive category, with some exemplars more typical of the category than others.²² Such an approach can embrace the broad scope of parallelism contemplated by Lerdahl and Jackendoff (with judgments of parallelism becoming equivalent to evaluations of degree of membership in the category), and it also provides a way to think about what Kivy called literal repetitions (since

repeated statements of identical members of the category suggest that they are in some way more significant than other members). On the one hand, it has to be acknowledged that conceiving of repetition in terms of processes of categorization makes empirical investigation of the phenomenon of repetition more complicated; on the other hand, processes of categorization are intimately associated with memory processes and similarity judgments, both of which contribute to the distinctiveness of human cognition.²³

Margulis's project is an ambitious one and sets out in a clearly comprehensible way issues that need to be more carefully considered by music theorists and music psychologists alike. I should nonetheless like to point out two areas in which the approach she offers is somewhat more limited than it need be. The first concerns Margulis's treatment of the relationship between cognitive processes and embodiment, which reflects an approach to the relationship between mind and body that developed starting in the late 1980s.²⁴ This approach—radical for its time—argued that embodied experience was central to understanding the operation of the brain and nervous system, and that any account of the mind that left out the body was simply inadequate. The difficulty was that mind and body still remained somehow separate (a separation that, as much as anything, reflected a centuries-old approach to the topic). More recently, researchers in cognitive science have preferred to speak in terms of grounded cognition, adopting the view that embodied experience grounds a wide range of cognitive processes.²⁵ To speak of embodied processes *and* mental processes—which is what Margulis often does in her book—is to enforce a distinction that has no substantive basis in the realities of how the brain, nervous system, and body interact. A second aspect that limits the perspective Margulis would wish to develop is her assumption that music is unique among human communicative media in its use of repetition. Much depends, of course, on how one defines a communicative medium, but there is good evidence that both gesture and dance serve communicative ends. It is also quite apparent that both gesture and dance make use of repetition at least as much as music does, suggesting that the use of repetition within each of these media has more to do with the way they are used to structure the social and cultural interactions of humans than it has to do with the material communicative resources they employ. A study of repetition thus affords an inroad not only into understanding humans' capacity for music but also into their capacity for other nonlinguistic modes of communication.

²² Zbikowski (2002, Chapters 1 and 4).

²³ A useful introduction to music and memory is provided by Snyder (2000). For a discussion of relationships between processes of categorization and similarity judgments, see Medin, Goldstone, and Gentner (1993).

²⁴ Early work on the embodied mind includes Johnson (1987) and Varela, Thompson, and Rosch (1991). Wilson (2002) and Gibbs (2006) provide helpful overviews of embodied cognition as a whole.

²⁵ For discussions of the notion of grounded cognition, see Pecher and Zwaan (2005), Barsalou (2008), and Semin and Smith (2008).

Perhaps the most decisive move in Margulis's *On Repeat* comes at the beginning of her third chapter, subsequent to her discussion of acoustic and perceptual aspects of repetition. The chapter begins, "To this point [in this book], musical repetition has been viewed as a particular kind of *object*. But it can also be viewed as a particular kind of *behavior*" (55). In making this shift, Margulis tacitly adopts a viewpoint taken by Wilhelm Wundt in his *Völkerpsychologie*, which was aimed at the study of psychological phenomena that were culturally constituted (and which for Wundt included language, myth, and tradition).²⁶ The focus of study accordingly changes from phenomena that can be measured and quantified in the laboratory to ones that are rather closer to those typically studied by music theorists. This move goes hand in hand with a changed relationship between music psychology and music theory that guides Margulis's research, and that shapes *On Repeat*: rather than looking to music theory for claims that might admit of empirical investigation, the aim is instead to use the study of human behavior to inform the questions music theorists would ask. What emerges is not only a novel approach to music psychology but a new possibility for music theory, one in which the aim is not to pin down all observable musical facts like so many butterflies in a lepidopterist's display case but to develop an understanding of how sequences of patterned nonlinguistic sound become the basis for the communicative medium we call "music." While developing such an understanding might require an increased familiarity with the cognitive capacities that make such an apprehension possible, it will also be enhanced—as will music psychology—by close and careful readings of musical works of the sort to which music theorists have long been committed. Music psychologists, with their emphasis on experimental protocols, and music theorists, with their emphasis on generalized accounts of musical organization informed by close readings of musical works, will almost certainly still carve separate paths through a scholarly landscape that is shaped in powerful ways by the traditions of intellectual exchange and the structure of institutions. With luck, however, they may find more opportunities for collaboration and cooperation as they seek to develop further understanding of music's influence and impact on human life.

WORKS CITED

- Barsalou, Lawrence W. 2008. "Grounded Cognition." *Annual Review of Psychology* 59: 617–45.
- Bartlett, Frederick C. 1932. *Remembering: A Study in Experimental and Social Psychology*. The Cambridge Psychological Library. Cambridge: Cambridge University Press.
- Becker, Judith. 2004. *Deep Listeners: Music, Emotion, and Trancing*. Bloomington: Indiana University Press.
- Benjamin, Walter. 1968. "The Work of Art in the Age of Mechanical Reproduction." In *Illuminations*. Ed. Hannah

- Arendt. Trans. Harry Zohn. 217–51. New York: Schocken Books.
- Cook, Nicholas. 2007. *The Schenker Project: Culture, Race, and Music Theory in Fin-de-siècle Vienna*. Oxford and New York: Oxford University Press.
- Cowan, Nelson. 2001. "The Magical Number 4 in Short-Term Memory: A Reconsideration of Mental Storage Capacity." *Behavioral and Brain Sciences* 24 (1): 87–185.
- Csikszentmihalyi, Mihaly. 1990. *Flow: The Psychology of Optimal Experience*. New York: Harper & Row.
- Deliège, Irène. 1987. "Grouping Conditions in Listening to Music: An Approach to Lerdahl & Jackendoff's Grouping Preference Rules." *Music Perception* 4 (4): 325–60.
- Frankland, Bradley W., and Annabel J. Cohen. 2004. "Parsing of Melody: Quantification and Testing of the Local Grouping Rules of Lerdahl and Jackendoff's *A Generative Theory of Tonal Music*." *Music Perception* 21 (4): 499–543.
- Garcia, Luis-Manuel. 2005. "On and On: Repetition as Process and Pleasure in Electronic Dance Music." *Music Theory Online* 11 (4). Accessed January 3, 2017. <http://www.mtosmt.org/issues/mto.05.11.4/mto.05.11.4.garcia.html>.
- Gibbs, Raymond W., Jr. 2006. *Embodiment and Cognitive Science*. Cambridge: Cambridge University Press.
- Gjerdingen, Robert O. 1988. *A Classic Turn of Phrase: Music and the Psychology of Convention*. Studies in the Criticism and Theory of Music. Philadelphia: University of Pennsylvania Press.
- . 2007. *Music in the Galant Style*. Oxford and New York: Oxford University Press.
- Huron, David. 2006. *Sweet Anticipation: Music and the Psychology of Expectation*. Cambridge, MA: MIT Press.
- Janata, Petr. 2009. "The Neural Architecture of Music-Evoked Autobiographical Memories." *Cerebral Cortex* 19 (11): 2579–94.
- Johnson, Mark. 1987. *The Body in the Mind: The Bodily Basis of Meaning, Imagination, and Reason*. Chicago: University of Chicago Press.
- Kirschner, Sebastian, and Michael Tomasello. 2010. "Joint Music Making Promotes Prosocial Behavior in 4-Year-Old Children." *Evolution and Human Behavior* 31 (5): 354–64.
- Kivy, Peter. 1993. *The Fine Art of Repetition: Essays in the Philosophy of Music*. Cambridge: Cambridge University Press.
- Krumhansl, Carol L. 1995. "Music Psychology and Music Theory: Problems and Prospects." *Music Theory Spectrum* 17 (1): 53–80.
- Lerdahl, Fred. 2001. *Tonal Pitch Space*. Oxford and New York: Oxford University Press.
- Lerdahl, Fred, and Jackendoff. Ray 1983. *A Generative Theory of Tonal Music*. Cambridge, MA: MIT Press.
- Lerdahl, Fred, and Carol L. Krumhansl. 2007. "Modeling Tonal Tension." *Music Perception* 24 (4): 329–66.
- London, Justin. 2012. *Hearing in Time: Psychological Aspects of Musical Meter*. 2nd ed. Oxford and New York: Oxford University Press.

²⁶ Wundt (1900–09).

- McKee, Eric. 2012. *Decorum of the Minuet, Delirium of the Waltz: A Study of Dance-Music Relations in 3/4 Time*. Musical Meaning and Interpretation. Bloomington: Indiana University Press.
- McNeill, William Hardy. 1995. *Keeping Together in Time: Dance and Drill in Human History*. Cambridge, MA: Harvard University Press.
- Medin, Douglas L., Robert L. Goldstone, and Dedre Gentner. 1993. "Respects for Similarity." *Psychological Review* 100 (2): 254–78.
- Meredith, David, Kjell Lemström, and Geraint A. Wiggins. 2002. "Algorithms for Discovering Repeated Patterns in Multidimensional Representations of Polyphonic Music." *Journal of New Music Research* 31 (4): 321–45.
- Meyer, Leonard B. 1956. *Emotion and Meaning in Music*. Chicago: University of Chicago Press.
- Minsky, Marvin. 1982. "Music, Mind, and Meaning." In *Music, Mind, and Brain: The Neuropsychology of Music*. Ed. Manfred Clynes. 1–19. New York: Plenum Press.
- Narmour, Eugene. 1990. *The Analysis and Cognition of Basic Melodic Structures: The Implication-Realization Model*. Chicago: University of Chicago Press.
- Overy, Katie, and Istvan Molnar-Szakacs. 2009. "Being Together in Time: Musical Experience and the Mirror Neuron System." *Music Perception* 26 (5): 489–504.
- Pecher, Diane, and Rolf A. Zwaan (eds.). 2005. *Grounding Cognition: The Role of Perception and Action in Memory, Language, and Thinking*. Cambridge: Cambridge University Press.
- Semin, Gün R., and Eliot R. Smith (eds.). 2008. *Embodied Grounding: Social, Cognitive, Affective, and Neuroscientific Approaches*. Cambridge: Cambridge University Press.
- Snyder, Bob. 2000. *Music and Memory: An Introduction*. Cambridge, MA: MIT Press.
- Varela, Francisco J., Evan Thompson, and Eleanor Rosch. 1991. *The Embodied Mind: Cognitive Science and Human Experience*. Cambridge, MA: MIT Press.
- Wilson, Margaret. 2002. "Six Views of Embodied Cognition." *Psychonomic Bulletin & Review* 9 (4): 625–36.
- Wundt, Wilhelm Max. 1900–1909. *Völkerpsychologie: Eine Untersuchung der Entwicklungsgesetze von Sprache, Mythos und Sitte*. Leipzig: W. Englemann.
- Zbikowski, Lawrence M. 1993. Review of Eugene Narmour's *The Analysis and Cognition of Basic Melodic Structures*. *Journal of Music Theory* 37 (1): 177–206.
- . 2002. *Conceptualizing Music: Cognitive Structure, Theory, and Analysis*. AMS Studies in Music. Oxford and New York: Oxford University Press.
- . 2004. "Modelling the Groove: Conceptual Structure and Popular Music." *Journal of the Royal Musical Association* 129 (2): 272–97.