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Beyond Music Psychology

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[–] Abstract and Keywords

This chapter traces the nature of music psychology as a field of interdisciplinary study, and how it has evolved since the 1970s. A brief analysis of the content of the four principal journals pertaining to this area of research is undertaken (*Psychology of Music, Music Perception, Musicae Scientiae*, and *Psychomusicology*), and the rapid expansion and increasing diversity of the field is noted. The relationship of music psychology to allied disciplines such as music education and music therapy is discussed, and the connections and contrasts with one area in particular—music theory and analysis—are considered. The epistemological challenges of interdisciplinary work are considered, and future trends are predicted.

Keywords: music psychology, music theory, music analysis, music education, music therapy

Although music psychology in the late twentieth century was dominated by the principles of cognitive-psychological thinking, these never completely drove or constrained this domain of research: even in the 1970s, 1980s, and 1990s, before the explosion of activity related to music and the cognitive sciences that has characterized the first two decades of the twenty-first century, music psychology did not function as a tightly defined discipline operating within a clear-cut epistemological framework. Why should this have been so? Partly, no doubt, as a consequence of the heterogeneous nature of musicological discourse, which provided a starting point for some who were seeking to adopt a psychological approach. Partly, on account of the relatively few participants who were active in the area, and their diverse disciplinary and institutional locations. Partly, because the concerns of some of those attracted to the field lay at the periphery of mainstream music-psychological work, but who could find no other home for their theoretical or empirical endeavors. And, partly, the very interdisciplinary nature of music psychology meant that as a conceptual territory it had extensive borders that offered many opportunities for intellectual interlopers to cross.

The first journal devoted to the subject (*Psychology of Music*, dating from 1973)[1] was founded by the (then) "Society for Research in Psychology of Music *and Music Education*,"[2] conferring on the publication a multidisciplinary focus that it has maintained. Today, the aim of *Psychology of Music* is to "increase scientific understanding of all psychological aspects of music and music education," through "studies on listening, performing, creating, memorizing, analysing, learning and teaching as well as applied social, developmental, attitudinal and therapeutic studies."[3] This breadth of intention has been reflected in the journal's content. Of the 679 papers published between 1973 and the first half of 2014, informal analysis suggests that only 241 (35%) fall within the realm of cognitive psychology (including the measurement of musical abilities, the perception of musical sounds, the cognition of musical structures, learning, memory, and the development of music-related skills). Ninety-eight (14%) explore aesthetics or affective response to music. Ninety-two papers (14%) are concerned with issues pertaining to performing (including improvisation and performance anxiety). Only 88 articles (13%) relate directly to music education or development, although a further 52 (8%) investigate the use and potential effect of music in wider educational or developmental contexts. Twenty-one (3%) involve research in music therapy or special

educational needs. Thirteen (2%) are primarily ethnomusicological in content. Eleven (2%) engage with issues of epistemology or methodology. Eight (1%) have a music-theoretical focus. The remaining 55 (8%) are not readily categorizable, by virtue of small numbers or idiosyncratic content.

Music Perception, which first appeared in 1983, while having cognitive-psychological research as its primary focus, was always more explicit than *Psychology of Music* about its wide-ranging academic purview, and today, *Music Perception* is overtly interdisciplinary in nature, seeking to publish "theoretical and empirical papers, methodological articles and critical reviews concerning the study of music" from a broad range of disciplines, including "psychology, psychophysics, neuroscience, music theory, acoustics, artificial intelligence, linguistics, philosophy, anthropology and cognitive science."[4] Similarly, *Musicae Scientiae*, the journal of the European Society for the Cognitive Sciences of Music (ESCOM), which first appeared in 1997, is interdisciplinary in nature too, although cognitive psychology is, once again, the predominant strand in its fabric. *Musicae Scientiae* accepts "empirical, theoretical and critical articles directed at increasing understanding of how music is perceived, represented and generated." Consideration is given to any empirical work "within the music-related domains of empirical musicology, psychology, sociology, cognitive science, music education, artificial intelligence, and music theory…. "[5, 6]

The broad church espoused by these three journals is reflected in the events organized by their editors, advisors, and contributors. Chief among these, the International Conference of Music Perception and Cognition (ICMPC), first staged in 1989, attracts a remarkable breadth of contributions.[7] For example, ICMPC 12 (2012) called for presentations on acoustics and psychoacoustics, aesthetics, cognitive ethnomusicology, the cognitive modeling of music, cognitive musicology, composition and improvisation, the computational modeling of music, cross-cultural studies of music, memory and music, musical development, musical timbre, music and emotions, music and evolution, music and language, music and meaning, music and movement, music and neuroscience, music and personality, music and well-being, music education, music performance, music therapy, perception and response, pitch and tonal perception, rhythm, meter, and timing, and the social psychology of music. These were realized in some 316 papers, posters, workshops, and symposia.

Surely, it could be argued, such eclecticism is a good thing, resulting in a rich cross-fertilization of ideas and approaches, yielding new, broad-based research that is rooted in a range of epistemologies and utilizing a variety of methodologies? Unfortunately, the position turns out to be much more complicated than this: conceptual cross-pollination often proves to be difficult to pull off; and where some see epistemological hybridization as a strength, others are wary of diluting the relative purity of purpose and procedure characteristic of a single discipline.

It is hardly surprising, then, that how music psychology could and should relate to its sister disciplines has exercised a number of those working in these fields. An early tension that emerged in *Psychology of Music*, which was articulated by John Sloboda (then editor) in his "open letter" of 1986,[8] was between music psychology and music education. There was an evident discomfort in his having to consider for publication certain music *education* research within the context of a music *psychology* journal, with its rather different perceptions of what constituted an appropriate level of rigor and objectivity. With their distinct epistemologies, could the two disciplines ever work together productively? A number of responses were made to Sloboda's letter, including one by David Hargreaves,[9] who, in looking back over the first decade of *Psychology of Music*'s output, acknowledged that "Contributions tend to be *either* psychological *or* educational, and those which combine theoretical and practical concerns tend to be few and far between." Hargreaves suggested that a fruitful way forward might lie in the *developmental* psychology of music, an area to which he gave impetus in the mid 1980s, and which has flourished ever since—particularly in relation to the early years (see, e.g., Deliège & Sloboda, 1996; McPherson, 2006) and, more recently, special educational needs (e.g., Ockelford, 2008, 2013). Beyond developmental psychology, in the 1990s, a number of new fronts opened up between music psychologists and educationists in what has proved to be a fertile union (Hallam, 2006; Parncutt & McPherson, 2002; Williamon, 2004). For example, research of relevance to those learning to perform has been undertaken in the areas of practice and the acquisition of expertise (Barrett, 2011; Hallam, 2001; Jørgensen, 2004), memorization (Ginsborg, 2007; Ockelford, 2013a,b), sight-reading (Mishra, 2014; Thompson & Lehmann, 2004), and improvisation (Kenny & Gellrich, 2002; Solis & Nettl, 2009).

Returning to the 1980s, further contributions followed in *Psychology of Music* on other interdisciplinary issues, including the report of a seminar held in London in 1987 concerning the relationship between music therapy and music psychology.[10] With echoes of the perennial quantitative/qualitative dichotomy, key elements in the debate

were the relevance to therapy of what was measurable in psychological terms, and, conversely, the psychological status of the inferences that therapists would accept as admissible evidence. It was agreed that what mattered was whether the insights so gained—which, ideally, should be couched within a theoretical framework—were relevant and interesting rather than ultimately "provable." The long-term impact of such thinking can be discerned in collected editions such as *Microanalysis in Music Therapy* (2007) edited by Thomas Wosch and Tony Wigram. Here, as Barbara Wheeler notes in the Foreword (p. 11), the common thread linking the contributions is a new-found rigor in analyzing therapy sessions, involving the study of "specific responses and experiences and precise musical and behavioral responses and interactions."

During the 1990s, comparable interdisciplinary discourse materialized in other areas too, leading, for example, to Elizabeth Tolbert's (2001) exploration of the evolution of musical meaning by bridging ethnomusicological and psychological approaches (between which she considered there had been little previous rapprochement). In particular, she pointed to differing perspectives on the relative importance of individual as opposed to collective meaning, and divergent views as to the significance of universal rather than culturally embedded musical processes and structures.

Arguably the interface about which there has been most vociferous debate in recent years, though, is that between music psychology and music *theory* (as it is generally known in the United States) or music *analysis* (the term most widely used in the United Kingdom). Why the contention? Perhaps because proponents from the two camps feel that they have an equal claim over a common territory: an understanding of how music "works." Their aims, though, are quite different, and this is where the difficulties arise. Writing in 1989, Eric Clarke put it like this:

> Broadly speaking, the aim of musicologists and composers in tackling issues of musical structure can be characterised as the attempt to formulate theories of the structural relations within and between musical works, and their origins, development and effectiveness as formal devices. A correspondingly brief summary of the aim of psychologists of music is the development of theories of the mental processing of musical events, or the relationship between the listener, performer or composer and the musical environment. In a number of respects these aims are quite complementary, but the different disciplines that they represent come into conflict in the way in which they describe their material, and in what they extract and evaluate as significant findings. (p. 1)

At times this conflict has become heated. For example, in his "Fortenotes" that appeared in *Music Analysis, 17*(2) (a tribute volume to the Yale music theorist Allen Forte, who introduced "pitch-class set analysis" to musicology in *The Structure of Atonal Music* (1973)), Jonathan Dunsby satirizes music psychologists as enforcers of a law dictating that musicological validity should necessarily equate to perceptibility:

> I cannot be alone in having taught,…. surreptitiously, "hunt the hexachord." That's the way you make a set complex work, asking a student to interrogate whether that embarrassing challenger-set really mattered so much and could not perhaps be excluded as a feature of the music, or whether there were not many more lurking hexachords that s/he had heard/seen (I am almost tempted to add "/played," but presumably in this forum I can write shielded from the Perception Police).
>
> (Dunsby, 1998, p. 179)

To understand how musical discourse could have become so polarized, one has to appreciate that groups within the music-theoretical community had felt under attack from music psychologists who had shown, for example, that the perception of octave equivalence in pitch sequences—a "given" in the composition of serial music and pitch-class set analysis—was by no means a "given" to the musical ear operating in the absence of a score (Deutsch & Boulanger, 1984),[11] and that the measures of similarity between pitch-class sets as developed by Robert Morris (1979–1980)—measures that lay at the heart of this music-theoretical enterprise—did not accord with similarity judgments made aurally.[12]

But the traffic was not all one way. Also on the subject of differing perceptions of similarity, in 1994, Nicholas Cook launched a scathing attack on Rita Wolpert's (1990) research, in which musicians and (so-called) nonmusicians were asked to compare a tune and accompaniment that was subsequently played (a) on a different instrument and (b) on the same instrument as the original, but with the accompaniment transposed down a fifth. The musicians consistently chose option (a) as being more like the original—for them, playing the accompaniment in the wrong

key made a bigger difference than playing the music on a different instrument—whereas the nonmusicians almost exclusively opted for (b): for them, the identity of the instrument outweighed any changes in the accompaniment. Wolpert construed these findings to mean that musicians do not listen in the same way as nonmusicians: their choice of instrumentation over correct harmonic accompaniment "suggests a profound overestimation of what most listeners hear." As Cook points out, however, this is a far-fetched conclusion: what Wolpert's experiment actually reveals is that listeners with different backgrounds respond in different ways to questions as to whether one musical extract is more or less like another (p. 68).[13]

These two examples show just how different the aims and values of music psychology and music theory continued to be in the years following Clarke's (1989) exhortation to researchers to establish a rapport. In 2003, David Temperley summarized the ongoing division thus: "music psychology tends to focus on how people typically hear (or play or compose) pieces, tending towards generalities or commonalities; whereas music theory and analysis usually seek to discover what listeners could (or should) hear, and bear largely on specific compositions."[14]

In similar vein, reviewing Kevin Korsyn's *Decentering Music* of 2003, Elizabeth Margulis (2005) wrote:

> Music cognition tends to explore those aspects of musical experience that are relatively robust and shared across large populations…. rather than those that are unique and more amenable to the committed introspection of a single listener….. Music analysts who rely on introspection as a methodology might manifest a commitment to music as an individual experience, constructed as fully by the listener as by the composer and performer. This vision elevates the specialist, and promotes the importance of training. Researchers who rely on empirical methodologies might reveal a commitment to music as more of a shared experience, with invariant features that characterize the hearing of a neophyte as much as a person with decades of training. (pp. 334, 335)

Joshua Mailman, in his review of Adam Ockelford's *Repetition in Music: Theoretical and Metatheoretical Perspectives* (2005a) refers to the music-cognitive approach as "populist," as opposed to the "progressive" tack taken by theorists and analysts, which seeks to extend the boundaries of musical understanding, rather than defining what may be "typical" or "usual." Mailman cites Joseph Dubiel (1999) in support: "The crucial condition for any increase in musical knowledge is to keep yourself ready to be struck by aspects of sound that you weren't listening for." This means that "the value of analyses will ultimately be their value as ear-openers" (p. 274).

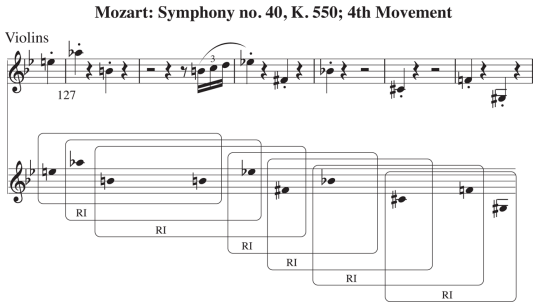

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Figure 1 'RICH' in Mozart, K. 550 (after Lewin, 1987, p. 220).

In accordance with this sentiment, Mailman takes Ockelford to task for his critique of David Lewin's analysis of the opening of the development section of Mozart's Symphony No. 40, K. 550, which had appeared in Lewin's landmark text *Generalized Musical Intervals and Transformations* (1987)—a mathematically based theory of musical structure. The passage in question, Lewin had observed, can be interpreted as a Retrograde Inversional CHain ("RICH"); see Figure 1.

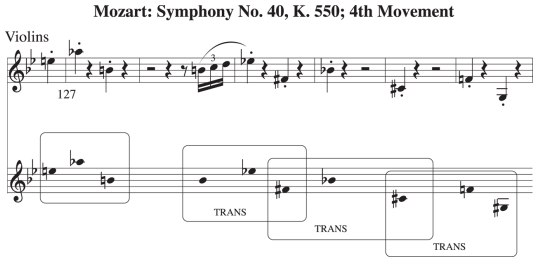

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Figure 2 More straightforward interpretation of the structure of the passage as a series of transpositions.

However, the ontological status of this pattern is unclear. As Ockelford (2005a, p. 99) asserts: "There is no evidence that Mozart conceived the passage in this way, nor that listeners perceive it so, nor even that analysts typically construe the sequence as being structured thus,[15] although there are precedents."[16] Ockelford hypothesizes that listeners would be more likely to make sense of the passage by (nonconsciously) modeling its structure as a series of transpositions: a more direct interpretation than Lewin's, which requires less cognitive manipulation of the musical information that is available (see Figure 2).

Mailman considers Ockelford's approach to the passage to be "too narrowly conceived" (Mailman, 2005a, p. 369), however, contending that he "overlooks what we gain from Lewin's discovery of RICH in Mozart's symphony: when we notice RICHs in Webern"s 12-tone works, we can relate these conceptually to the RICHs in Mozart—a lucrative inter-repertoire link.... Abstractions like RICH push beyond the everyday experience of repertoire that the 'populist' approach often assumes."

As Ockelford points out, though, in a conceptual thread that weaves its way through *Repetition in Music*, this line of thinking is problematic. To understand why, let us take a step back to the theory that lies at the heart of the volume: that all internal musical structure relies ultimately on repetition, in one manifestation or another. For example, as Sloboda (1985) observes, for music perception to "get off the ground," there needs to be a framework of discrete locations in pitch and perceived time, without which the dialectics of tension/resolution and motion/rest could not exist (pp. 154, 259). That is, for our perceptual and cognitive processing abilities not to be overwhelmed, composers have to work within tight constraints, whereby the number of different categories of pitch, melodic interval, and inter-onset interval is limited. Hence a high degree of "background" repetition is inevitable. Furthermore, while the burden of the musical message tends to be conveyed by characteristic combinations of pitch and rhythm, further background restrictions typically apply to timbre and loudness. These almost invariably fulfil a secondary role as "carriers" of the principal stream of information, and so tend toward coherence based on uniformity or incremental change—features which, once more, are founded on repetition.[17] Hence, behind the creation of every work lie constraints that mean that many musical events, and the relationships between them, will be the same, regardless of the subsequent choices of the composer. A key issue, therefore, for those trying to fathom how we make sense of musical structures is not so much about the discovery of sameness and similarity per se, but of analyzing the *significance of commonality in different contexts*.

To appreciate the scale of this issue, consider Chopin's Prelude in B minor, Op. 28, No. 6, which comprises 403 notes, typically played within a period of 2 to 3 minutes. If the relationships between (any) pairs of pitches the same are considered to be of potential structural significance, then the analyst is faced with around 13,000 candidates. If it is the relationships between pairs of *intervals* the same that are thought to be important, then there are around 500 *million* to choose from. And this is in just one domain: pitch.

Arresting statistics, one might think, but of no musicological value, since they ignore two key factors in the creation and cognition of musical structure: the sequence of events and their associated rhythm. Yet that is exactly what Allen Forte's set theory does. This was intended to offer a mechanism that would enable the structure of the atonal music to be explained systematically. Set-theoretical analysis assumes that all pitches and intervals (unlike those in tonal music) are potentially equal in structural terms. Hence the immediate analytical challenge posed reducing the available data to manageable proportions, and a method was devised that borrowed concepts from Arnold Schoenberg's "serial" compositional procedures. This holds that one set of pitches can be regarded as equivalent to another, irrespective of transposition or inversion, the octave in which pitch-classes are realized, whether or not they are repeated and the order in which they occur. Ferreting out equivalent sets (as the extract from Dunsby indicates) is fundamental to this type of analysis. But how is it to be done? Although some sets can be isolated as

units "by conventional means, such as a rhythmically distinct melodic figure" (Forte, 1973, p. 83), such techniques do not necessarily "adequately reveal structural components," since methods of segmentation may be "concealed" (p. 83). In order to uncover the hidden organization of pitch, Forte recommends a procedure termed "imbrication": "the systematic (sequential) extraction of subcomponents of some configuration"—that is, listing all the pitch-class sets contained within a passage in the hope of revealing relationships that were not otherwise apparent.[18]

While it is conceivable that such a process may uncover pitch structures that listening alone would have failed to detect (and which may inform subsequent audition), there are a number of problems with this technique. For example, sets may not initially have been apparent for the very good reason that they could not be extracted perceptually from complex aggregations of notes—and how, therefore, could they *ever* be structurally relevant to any listener, novice, or expert? And again, the scale of the enterprise presents a huge problem. Take Schoenberg's *Three Piano Pieces*, Op. 11, No. 1—one of the first atonal works to be composed. The opening 4½ bars comprise 24 events in the form of a right-hand melody supported with discrete chords and strands of counterpoint, together lasting no more than 10 seconds. Forte (1981) identifies 14 different pitch-class sets, occurring in total 28 times. But by adopting a systematic approach based on imbrication, it becomes apparent that all the 208 possible pitch-class sets are actually present! And these occur with mind-numbing frequency: for example, there are 262 appearances of three-note sets, 884 four-note sets, 3152 five-note sets, and (preliminary analysis suggests) over 10,000 six-note sets. How is the analyst ever to make sense of these data? Presumably by reverting to the musical intuitions that were abandoned in the interests of scientific rigor!

Although analysis of this type occupies only one region in the broad domain of music theory—arguably in an area that is furthest away in epistemological and methodological terms from music psychology—the issue of perceptibility applies to other music-theoretical approaches too. For example, Heinrich Schenker's multilayered analyses, which are based on the notion that, in the context of tonal music, some pitches and harmonies can structurally "prolong" others, are not contentious in music-psychological terms when the prolongations are relatively near the musical "surface" and last only seconds.[19] However, Schenker's application of the principle deep into the structural foundations of pieces, whereby it is asserted that single chords may control events lasting many minutes, has found no empirical support (see endnote 13). Unlike much pitch-class set analysis, however, it is conceivable, particularly for those with "absolute pitch," that pieces *could* be heard as Schenker analyses them—as long-term prolongations of tonic and dominant chords—if expert listeners chose to do so. The same applies to other music-analytical approaches too. For example, Rudolph Réti's modus operandi (1951) seeks to unearth (typically) "hidden" motivic relationships that exist within and between the movements of pieces, subconsciously unifying them in the ears of listeners. Again, despite the feeling that Réti may be confusing the "background" repetition that, as we have seen, is inevitable in any comprehensible piece, with the "foreground" that a composer may choose to overlay upon it, expert listeners can hear music in line with Réti's analyses if they elect to do so.

Where do approaches such as this leave the relationship between music psychology and music theory? Let us return to Clarke's proposed "rapport" of 1989, which, he suggests, could be achieved by developing a kind of description that recognizes the mutual relationship between a perceiver and her or his environment.

The aim of such an approach would be to describe musical events for a particular kind of perceiver (ranging, we may surmise, in Mailman's terminology, from a "populist" listener to a "progressive" theorist), taking account of the stimulus material, the perceptual systems that exist, and the cultural systems within which evaluations of musical function are made. This is in essence an argument for an ecological description, since it proposes that while there is an indefinite number of possible descriptions of the same state of affairs from a variety of different perspectives, and at a number of different levels, the kind of description that is of primary interest to us will be at a level, and of a breadth appropriate to human beings, their musical artifacts and activities, and the natural and cultural environment within which they are situated.

Ockelford (2005a) proposes a way in which such a description could be modeled. He suggests that all potential music-structural relationships[20] can be considered to exist on a continuum with three sectors: those that are (1) subconsciously processed and of direct relevance to the cognition of structure, (2) perceptible but of no direct significance to musical structure (arising, for example, by chance, as a result of "background" repetition), and (3) imperceptible or noncognizable. Inevitably, the boundaries between these sectors are fuzzy, since which potential relationships become reified in cognition, and the significance of these, is, as Clarke's ecological standpoint

indicates, liable to vary from listener to listener, and even with the same listener on different occasions. However, where a given relationship in particular circumstances (or in general terms) is likely to reside on the continuum could be predicted in relation to empirically verifiable cognitive constraints and preferences (Ockelford, 2002). A fourth condition—structural relationships that are consciously processed/conceptualized (by composers and theorists or analysts, for example)—is subject to even greater variation, having the potential to be overlaid anywhere on the other three sectors.

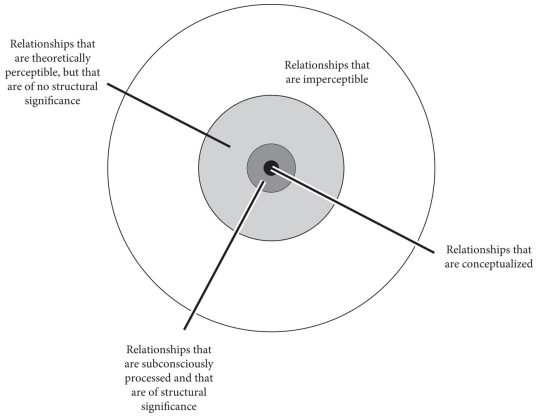

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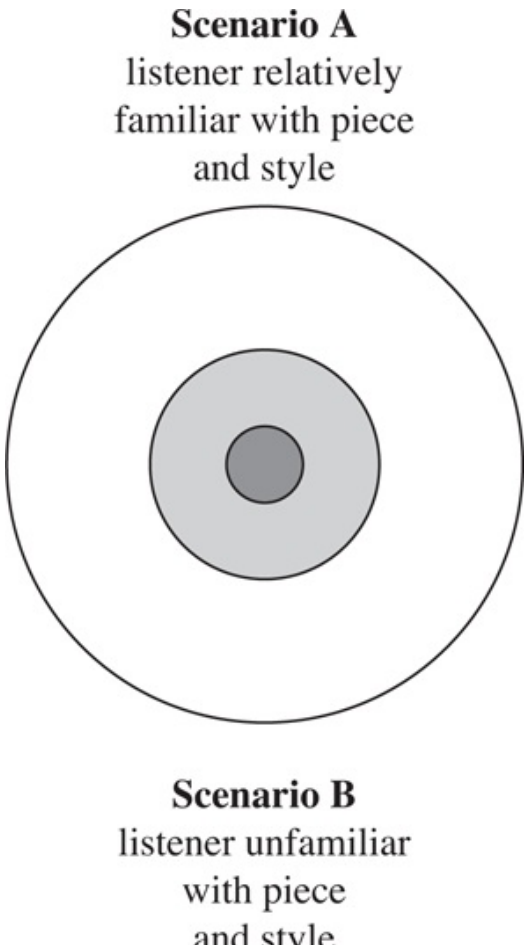
Figure 3 Representation through different shading of set of potentially structural relationships as they are hypothesized to exist in relation to mental processing.

This model is represented graphically in Figure 3. It is important to appreciate that there is an exponential growth in the number of potential relationships moving outward from the center. Using the model, it is possible to capture the epistemological issues that have been raised and clarify some of the misunderstandings that are reported—a necessary step in seeking to resolve them.



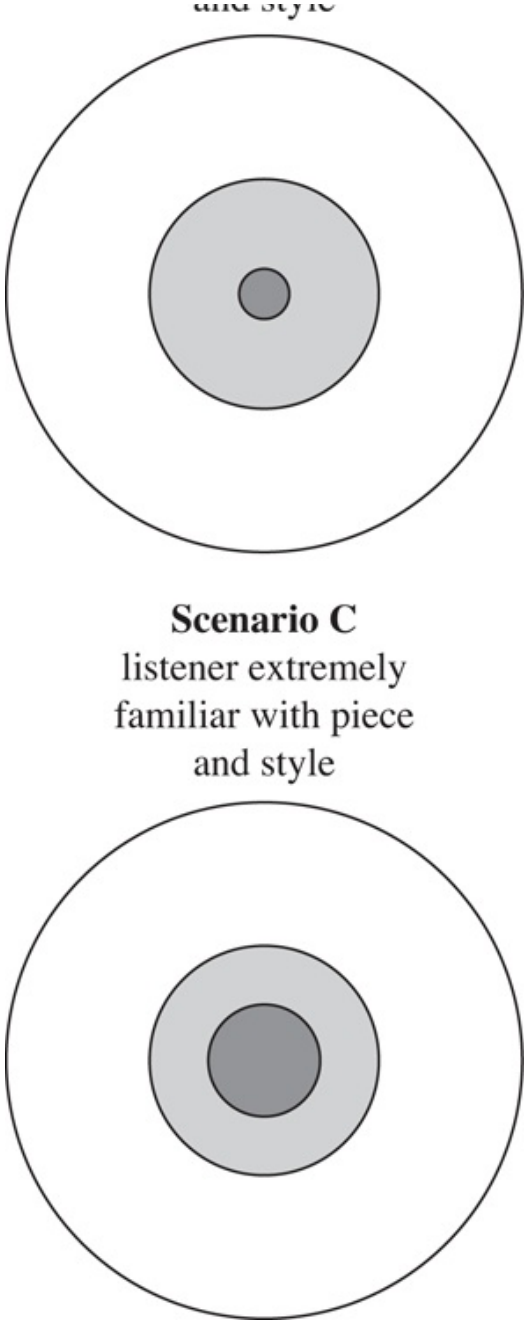


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Figure 4 Varying status of relationships hypothesized to exist in different scenarios pertaining to listening

First, take the case of a listener who is relatively familiar with a piece and its broader stylistic context, though not inclined to conceptualize what is heard (an example of Mailman's "populist" perceiver). Intuitively, the music makes sense to the person concerned, so we can surmise that he or she must be processing structural relationships subconsciously—a situation represented in Scenario A (shown in Figure 4). Turning next to Margulis's neophyte, it seems likely that she or he would pick up on rather fewer structural relationships, though still enough for the music to be recognizable as abstract patterns in sound. This is depicted in Scenario B. Notice that that Sector 1 is diminished in size. Conversely, the situation with an expert listener, who is attending to a piece without conceptualizing what is heard, may be illustrated with a somewhat larger Sector 1: Scenario C. It is important to appreciate that in Scenarios A, B, and C, the processing of musical structure can occur in the absence of description or analysis of the organization that is present—indeed, without the listener having had any formal musical education: the recognition of perceived sonic patterns being enabled purely through repeated exposure.

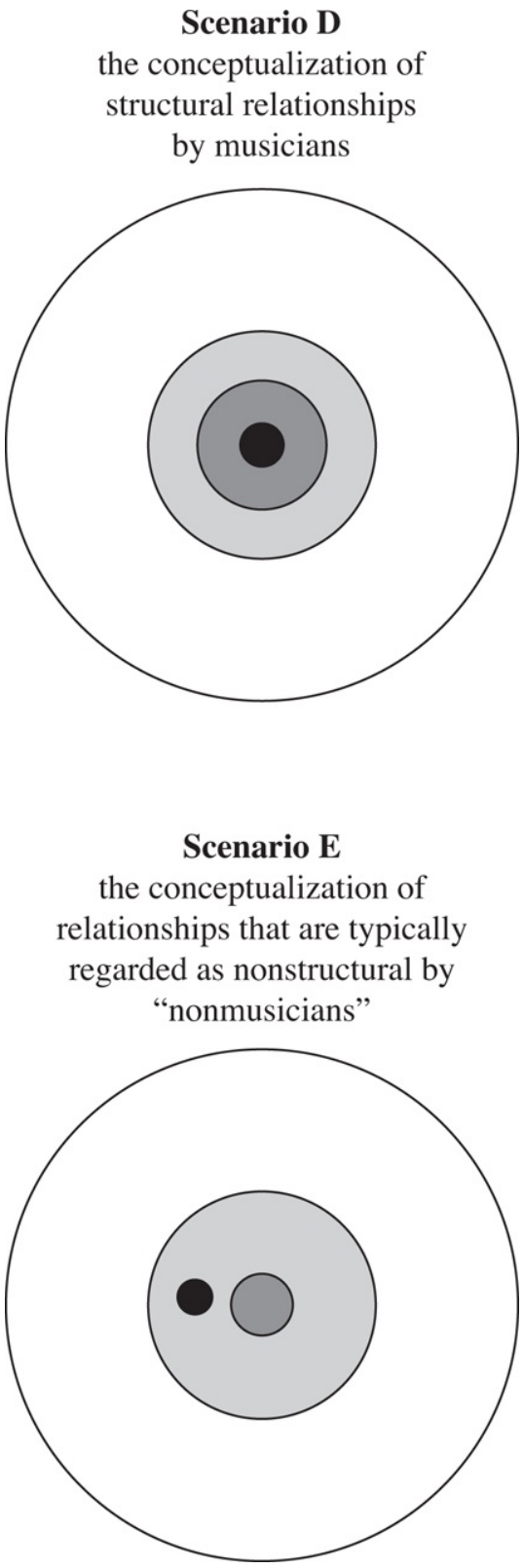

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Figure 5 Interpretation and representation of Wolpert's findings (1990).

When composers, performers, or listeners, whether functioning as psychologists, theorists, educators, therapists, or others, consciously *think about* music the situation changes. Take Wolpert's experiment. Her musicians were able to conceptualize structural relationships in the domains of pitch and perceived time that they would otherwise have been likely to hear subconsciously. Hence, the situation arose that is depicted in Scenario D (see Figure 5).

However, it appears that Wolpert's nonmusicians, when required to effect the same comparisons, were drawn by the nature of the task to conceptualize *different* perceptible relationships, in the domain of timbre, that are not generally considered by musicians to be "structural" (rather, residing in the musical "background"). Hence we have Scenario E. Clearly, both Scenarios D and E are valid (since they represent empirical findings), but the situations they model are different, and the danger occurs when the two are subjected to a common interpretational framework.

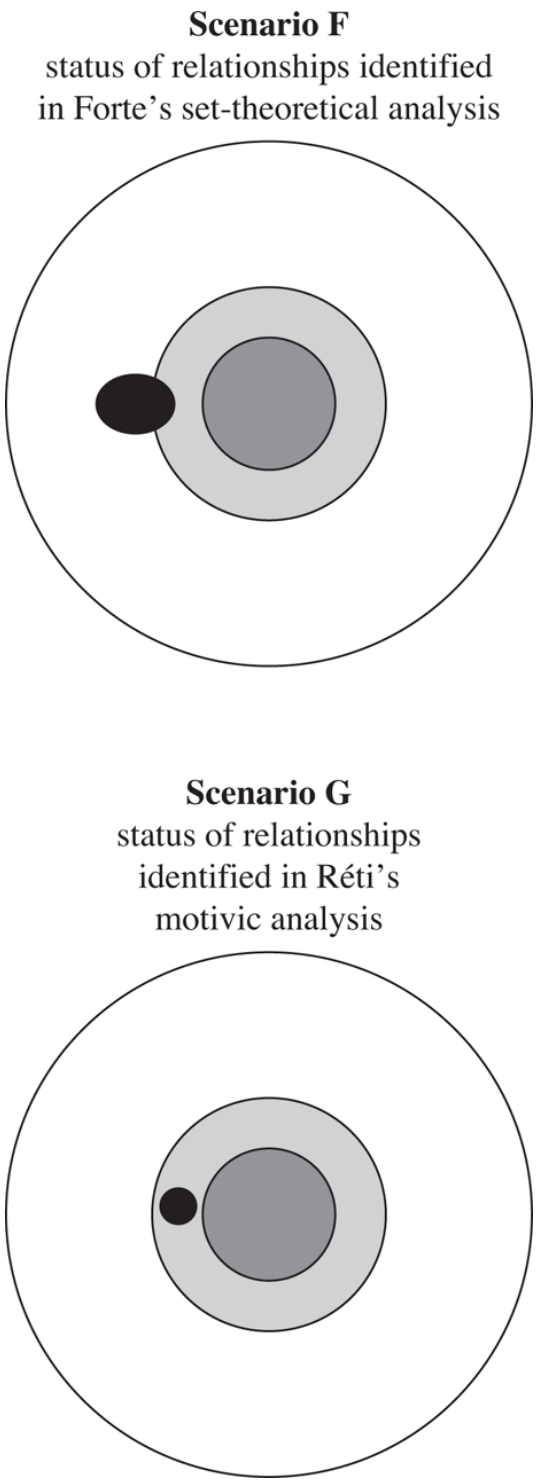

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Figure 6 Interpretation and representation of Forte's and Réti's styles of analysis.

We move next to the scenarios engendered by the music analyses that have been discussed, beginning with

Forte's account of Schoenberg's Op. 11, No. 1. It may be that some of the relationships between pitch-class sets of three notes, which we can assume pass the great majority of listeners by unnoticed, could be perceived with practice, although there are others that would appear to be inaudible, no matter how well prepared the listener: for example, when the analysis decrees that a pitch within a four-note chord should be heard as functioning in three different four-note sets simultaneously. Hence Forte's analysis spans Sectors 2 and 3—see Scenario F (in Figure 6). In contrast, Réti's analyses would generally be perceptible once they have been drawn to listeners' attention: Scenario G. However, these arguably imbue the regular warp and the weft of the musical fabric with significance over and above the melodic and harmonic patterns that composers have woven through it, and Réti's analyses have failed to gain general acceptance among musicologists or musicians.

A similar situation holds in relation to Mailman's critique of Ockelford's assessment of Lewin's late-Mozart analysis. In terms of the three-sector model, Lewin's approach, using the transformation "RICH," conceptualizes relationships that would typically be in Sector 2, whereas it is possible to assign the same musical structure to transpositional relationships, which exist in Sector 1. To return to Mailman's argument, however, if we are ever to *expand* Sector 1—to be "progressive," which he sees as a crucial part of music theorists' role—then we need to push out the boundaries beyond those that the ear would determine unassisted. That is, there is virtue in consciously seeking to claim structural territory from Sector 2. The implication is that conceptualization may affect perception and a migratory effect is possible, whereby relationships that were once in Sector 2 metaphorically shift to Sector 1. Within limits, this seems reasonable enough. The author can recall such an experience, when, having become acquainted with Schoenberg's analysis of Brahms's fourth symphony (1947/1975, pp. 405–408), motivic relationships became apparent that were subsequently embedded in listening experiences. But this is not to say that much of set-theoretical analysis could ever have intrinsically *musical* relevance, no matter how practiced the listener. Because all music is supersaturated with repetition, any piece contains a virtually infinite number of potential patterns. But the majority of these should not be conflated intellectually with *musical* structure. Rather, they exist as a byproduct of the way that music is put together in order for it to be comprehensible. And it is surely at this point that the music psychology's relationship with music theory reaches a boundary (and arguably where music theory itself becomes something rather different).

In summary, music psychology overlaps with a number of other disciplines, including music education, therapy, ethnomusicology, and music theory and analysis. There are tensions in each case, but benefits too for those who are prepared to explore with an open mind. Ultimately, however, music psychology cannot extend beyond the boundaries of its epistemological box, always granted that the sides are flexible and subject to change: indeed, such movement is likely to come about through the influence of adjacent disciplines. This has been shown, for example, in the groundbreaking work of Aaron Williamon and his colleagues at the Royal College of Music in London—the first UK conservatoire to establish a music-psychological research center, which has aimed to support students in improving their performance skills and managing the high levels of stress that are often induced by performing in public. In terms of the common space occupied by elements of music psychology and music theory, further developments may well mean having to accept that the initial research questions and the *evaluation* of data will be guided by musical intuitions, but that the gathering and *analysis* of data will be rigorous and undertaken with a "scientific" detachment. Two decades on from Clarke's appeal to "Mind the gap," there is now a greater clarity as to what this conceptual intersection might look like, how it might function, and even what it should be called: "empirical musicology." According to Honing (2006), empirical musicology, "grew out of a desire to ground theories on empirical observation and to construct theories on the basis of the analysis and interpretation of such observations." As Cook and Clarke put it: "Empirical musicology…. can be thought of as musicology that embodies a principled awareness of both the potential to engage with large bodies of relevant data, and the appropriate methods for achieving this" (2004, p. 5). One senses that in this sphere of activity the influence of music psychology may be keenly felt in the coming years.

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Notes:

([1]) Until that time, and since, publication was in mainstream psychology journals.

([2]) Italics added; from 2003 known as SEMPRE–—the Society for Education, Music and Psychology Research.

([3]) From the journal's "aims and scope," *Psychology of Music*, 2014, *42*(3).

([4]) From "Information for authors," *Music Perception*, 2014, *31*(4), 392.

([5]) From "Information for authors," *Musicae Scientiae*, 2007, *11*(1).

([6]) The interdisciplinary output of *Psychology of Music, Music Perception*, and *Musicae Scientiae* contrasts with that of the fourth specialist publication in the field, *Psychomusicology,* which, styling itself as a "journal of music cognition," first appeared in the United States in 1981 and continued to appear until 1997. Throughout these 16 years, *Psychomusicology* adhered closely to its initial editorial brief. Publication re-started in 2011 under the auspices of the American Psychological Association with the title *Psychomusicology: Music, Mind and Brain*, with the stated intent of reporting "important new scientific work in the area of music and cognitive science, neuroscience, and cognitive musicology."

([7]) See http://www.icmpc.org/organisation.html#history for a brief history of the ICMPC series.

([8]) *Psychology of Music*, 1986, *14*(2), 144–145.

([9]) *Psychology of Music*, 1986, *14*(2), 83–96.

([10]) *Psychology of Music*, 1988, *16*(1), 62–70.

([11]) See also the psychologically-inspired critique of serialism by Fred Lerdahl (1992).

([12]) Cheryl Bruner (1984).

([13]) Ironically, Cook himself comes in for comparable methodological criticism in relation to his foray into experimental psychology that investigated the perception of large-scale tonal closure (1987); see Gjerdingen (1999).

([14]) Personal communication to Adam Ockelford, cited in Ockelford (2005b).

([15]) See, for example, Abert (1990).

([16]) For instance, Keller (1966, p. 97).

([17]) See, for example, Boulez (1963/1971, p. 37).

([18]) See, for example, John Roeder's (1988) analysis of Webern's Piece for Cello and Piano, Op. 11, No. 3.

([19]) As the recent empirical work of Isabel Martinez shows (*The Cognitive Reality of Prolongational Structures in Tonal Music*, unpublished PhD dissertation, University of Roehampton, 2007).

([20]) That is, in terms of Ockelford's "zygonic" theory, between events the same, where one could conceivably be deemed to derive from the other.

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Adam Ockelford studied at the Royal Academy of Music in London, before embarking on a career that has embraced performing, composing, teaching, researching, writing, consultancy, and management. His Ph.D. drew together thinking from music theory and music psychology, in investigating how music intuitively makes sense to us all. Today, his research interests are in music psychology, education, theory and aesthetics–particularly special educational needs and the development of exceptional abilities; learning, memory and creativity; the cognition of musical structure and the construction of musical meaning. He has over 100 publications to his name, including 20 books. He is Secretary of the Society for Education, Music and Psychology Research ('SEMPRE'), Chair of Soundabout, an Oxfordshire-based charity in the UK that supports music provision for children and young people with complex needs, and founder of The AMBER Trust, a charity that supports visually impaired children in their pursuit of music.