Conclusion

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To conclude, we will reflect where the interdisciplinary field of applied musicology, set out here extensively for only the second time (following Ockelford, 2012), sits in relation to other modes of thinking used in music education and music psychology research, and sketch out some potential future areas of work.

A central question for music psychologists in particular is how a certain person (or a given group of people) perceives, processes, responds to and recalls music. The approach that has been adopted by researchers most frequently over the years has been to elicit retrospective verbal responses from those participating in the research. Investigators have then interpreted these responses using further language to conceptualise, analyse and report on what they have found. Hence much of the academic discourse about the experience of music

> is what may be termed a 'second-level metanarrative': it is *about* what people think *about* music, rather than being directed at our perception of the sounds themselves. Of course, this is perfectly appropriate: in epistemological hybrids of the arts and social sciences … one would expect people's accounts of what of they perceive, of their feelings and preferences, and of how they learn, acquire and share expertise, to be presented as headline acts on the main stage of intellectual action. But the human activity in which we are interested is ultimately engagement with *music* – and all too often there appears to be a reluctance to get to grips with the world of organised sound that lies at the heart of things. (Ockelford, 2012, p. 3.)

Adapting the model developed in Chapter 5, this process can be illustrated as follows (see Figure 6.1). In terms of zygonic theory, listeners are responding at the level of whole pieces, or Sounds of Intent Level 5 (see Chapter 2, this volume).

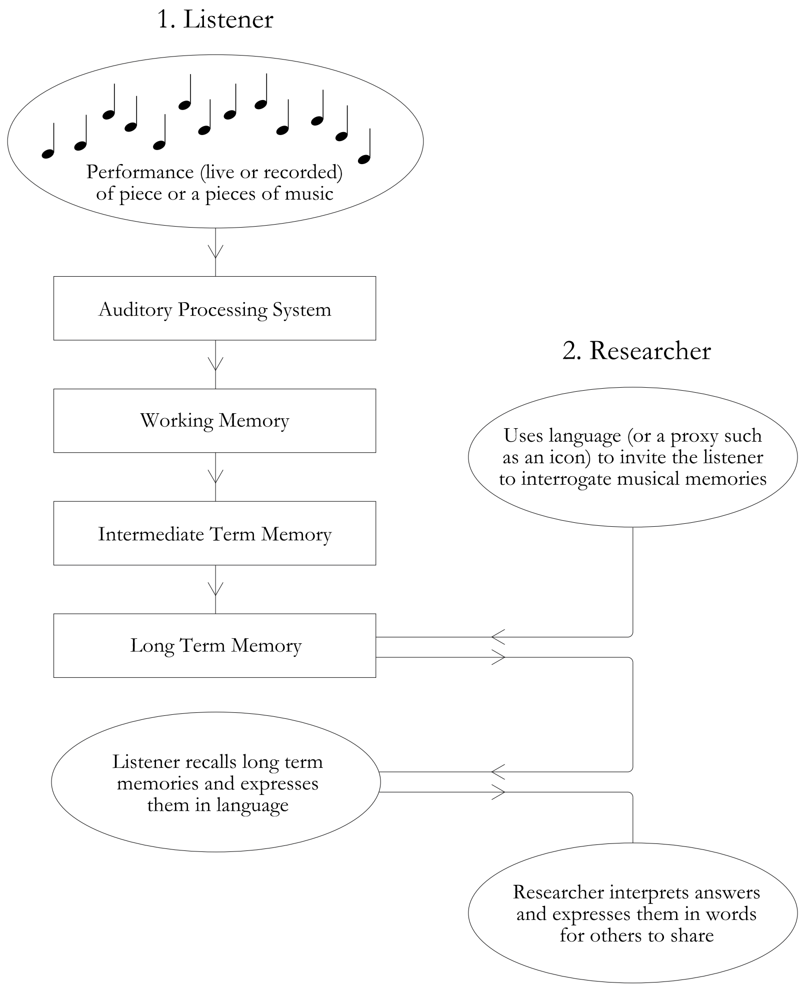

Figure 6.1 Model of one of the traditional approaches adopted in music psychology and music education research, functioning at Sounds of Intent Level 5, which produces a 'second-level metanarrative'.

The chief advantage of this approach, which can be conceptualised as a 'retrospective verbal response' strategy, is that it enables thoughts and feelings about music to be accessed that could only be captured in words. However, it may also be the case that, traditionally, many researchers working in the fields of music psychology have lacked the necessary music-theoretical expertise to do anything except adopt an 'other-than-musical' approach to their work. And, conversely, most music analysts and musicologists have, until recently, refused to countenance considering how most people make sense of music most of the time, preferring rather to adopt the stance of an 'elite listener'.

Around the turn of the century, though, a new wave of thinking crystallised in what Eric Clarke and Nicholas Cook (2004) termed 'empirical musicology', which exhorted those working in the field of music theory to take on board data sets beyond their immediate intuitions as sophisticated listeners. Around the same time, Richard Parncutt was advancing the cause of 'systematic musicology', which, again, is primarily empirical and data-oriented (Parncutt, 2007). It was in this epistemological context that the notion of ‘applied musicology’ was born (Ockelford, 2013a), drawing on a scientific approach to music analysis to inform music education, music psychology and music therapy research.

To function, applied musicology needs data that derive from identifiable features in the fabric of musical design. The type of retrospective verbal responses modelled in Figure 6.1, which are drawn from listeners’ long-term memories music, and involve cognitive processing at Sounds of Intent Level 5, are too general in nature to provide sufficient traction for applied musicological analysis to get underway. But what of other approaches to music-psychological research that have asked listeners to make more immediate responses to identified *chunks* of music, thus operating at Sounds of Intent Level 4? For sure, verbal descriptions produced in this way are specific enough for researchers to gain some insight into the manner in which elements of musical structure and content are processed. Examples are to be found throughout the relatively short history of music-psychological research, from the early work on music and emotion undertaken by Kate Hevner (for instance, 1936), to the seminal paper by John Sloboda in the early 1990s, which sought to connect affect to specific features of music.

> Eighty-three music listeners completed a questionnaire in which they provided information about the occurrence of a range of physical reactions while listening to music. Shivers down the spine, laughter, tears and lump in the throat were reported by over 80% of respondents. Respondents were asked to locate specific musical passages that reliably evoked such responses. Structural analysis of these passages showed that tears were most reliably evoked by passages containing sequences and appoggiaturas, while shivers were most reliably evoked by passages containing new or unexpected harmonies. (Sloboda, 1991, p. 110.)

In order to undertake this metacognitive activity, listeners would ‘often take the trouble to find musical scores and find precise bars numbers’ (Sloboda, *op. cit.*, p. 112), and would therefore have had to re-hear performances in their imaginations, or re-played the music physically so that the required passages could be located. Hence, Sloboda’s research participants appear to have been drawing principally on intermediate term memory (informed by long-term memory, and populated by working memory) to make their responses. See Figure 6.2.

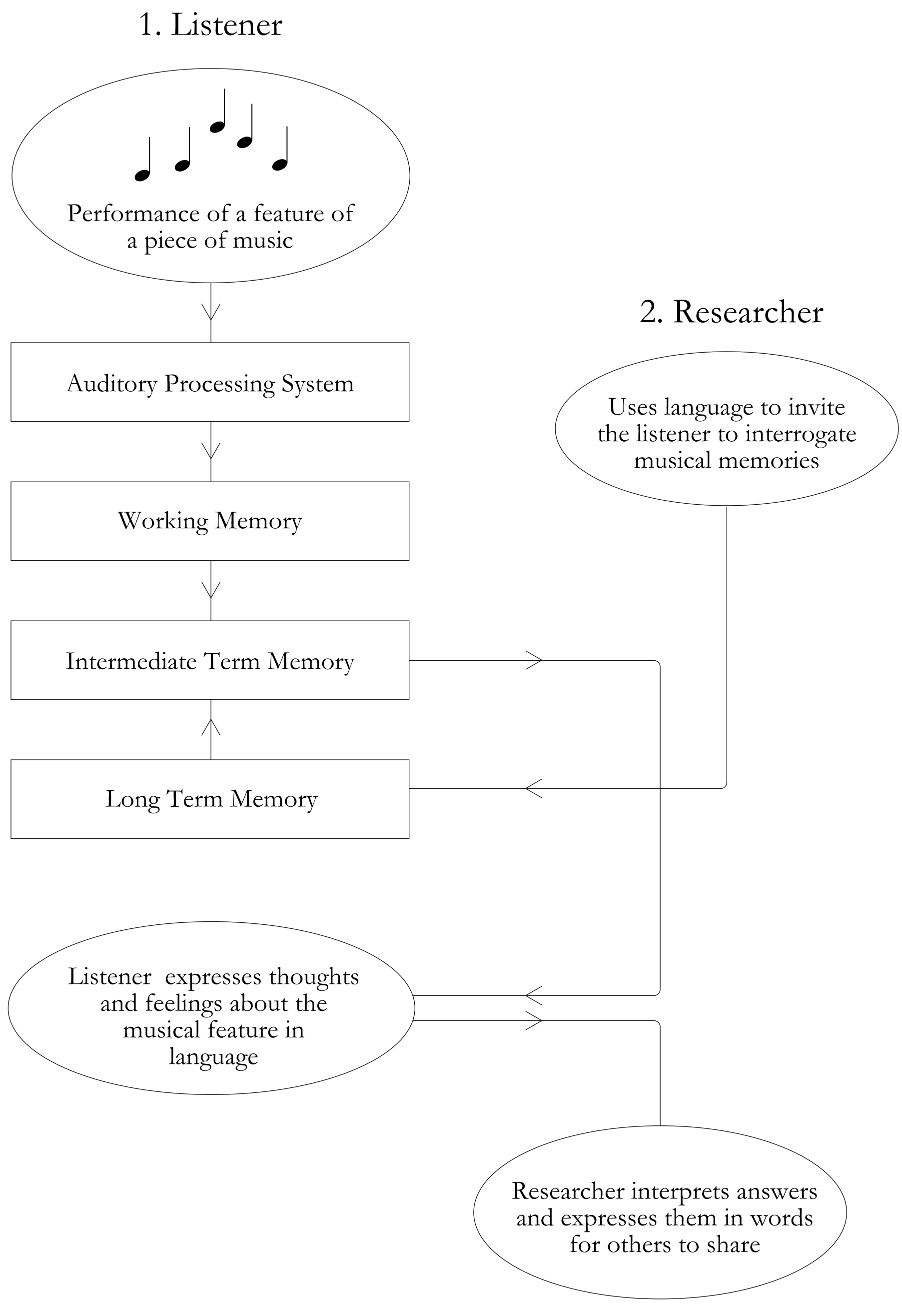

Figure 6.2 Model of listeners responding to more specific features of music, at Sounds of Intent Level 4.

While the results of Sloboda's study and others similar offer a more nuanced picture of how we hear music, by requiring listeners to respond retrospectively to *groups* of musical sounds, the data still do not reveal precisely how listeners are processing music, event by event, in real time – that is, at Sounds of Intent Level 3. A number of different approaches have been adopted that address this issue. One has been to obtain direct physical correlates of changes in pitch and rhythm that are heard. These may be produced through participants being asked to recognise or produce visual representations of sound, in the form of drawings (for example, Bamberger, 1995;

Bonetti and Costa, 2019) or, in the case of blind children, raised diagrams (Welch, 1991; Ockelford, 2008).

Jeanne Bamberger (2013, p. 10) set children the task of putting down on paper whatever they thought would help them remember a rhythm the following day, or to help someone else to play it. And her strategy worked: a rhythm improvised by Henry was notated by seven-year-old Jessica, who was able to reproduce it, assisted – at least in part – by her invented notation, 24 hours later (see Figure 6.3).

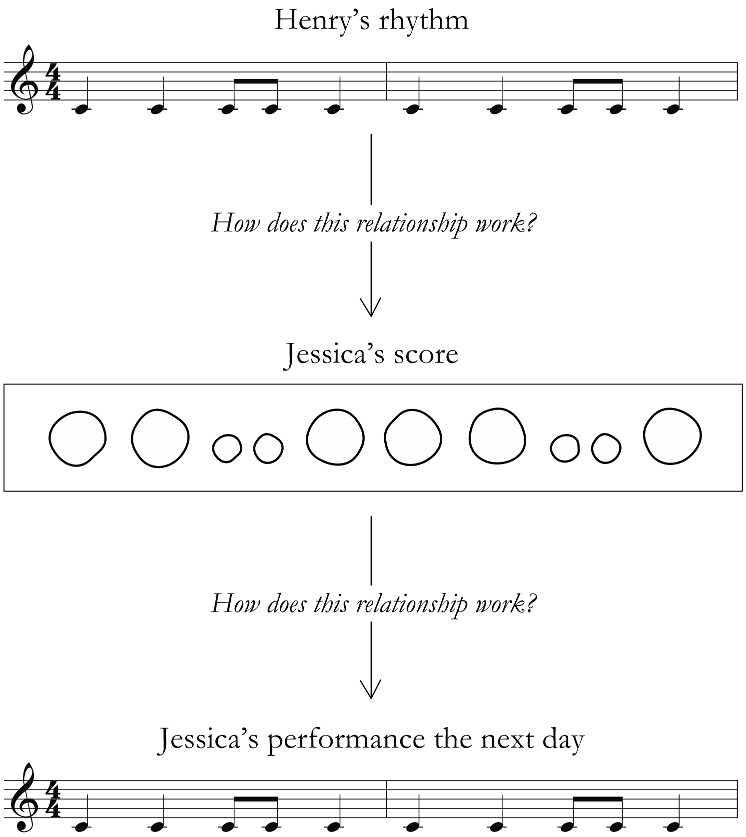

Figure 6.3 Jessica's transcription of Henry's rhythm using circles of different sizes to represent long and short notes.

What logical and cognitive processes can we assume are in play here? Bamberger herself describes Jessica's approach to rhythmic representation as 'formal', in that she attempts to show the relative distances in time between the events by matching them with circles of two different sizes (Bamberger, *op. cit*, p. 12). This interpretation implies a consistent and coherent connection between duration and diameter, which, in terms of zygonic theory, equates to regular cross-modal mapping (Figure 6.4; see also Chapter 3, this volume).

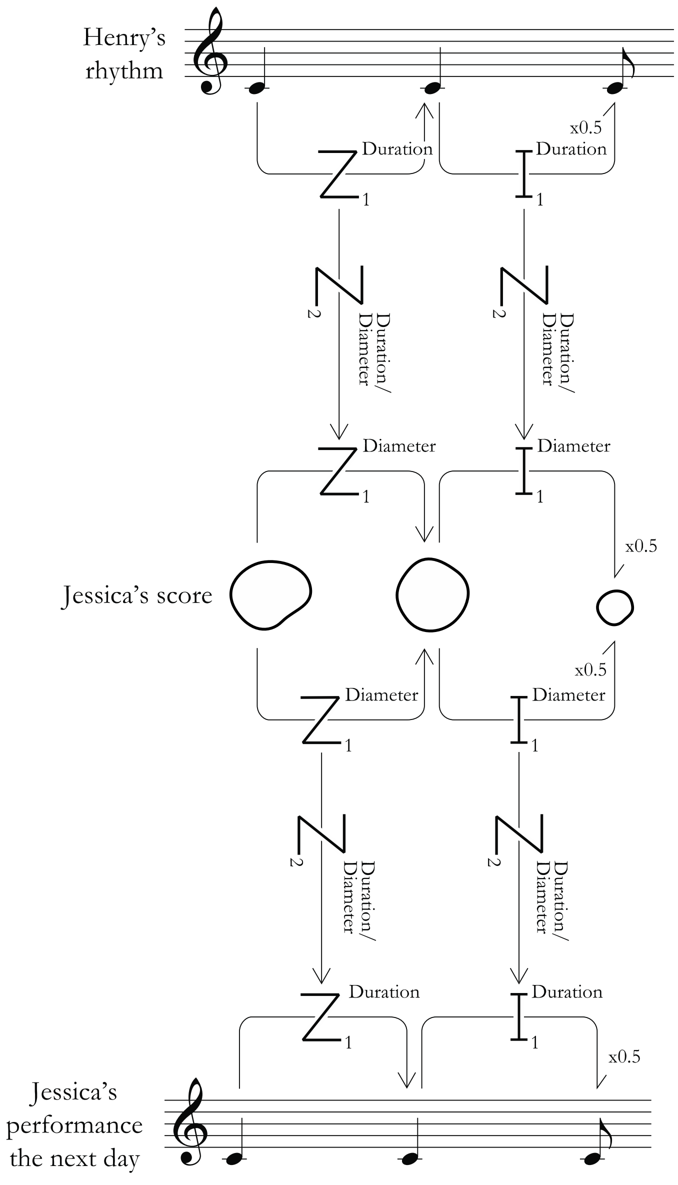

Figure 6.4 The cross-modal mapping implied in Jessica's transcription of Henry's rhythm using circles of different sizes to represent long and short notes.

In terms of cognitive processing, what does this imply? It would seem reasonable to assume that the 'episodic buffer', as conceived by Alan Baddeley in his model of working memory, which is said to link the visuospatial sketchpad with the phonological loop, thereby connecting information from the visual and auditory domains (Baddeley, 2012), has a role to play in the necessary cross-domain mapping. Hence in making the transcription, we can postulate the following. Jessica initially perceived Henry's sounds through her auditory processing system (APS), before they entered a music module in her working memory (WM) – this being a refinement of Baddeley's 'phonological loop' that was proposed by Berz (1995) and Ockelford (2007). The data were transferred to the episodic buffer, where non-domain-specific information was abstracted (in the form of relationships of ratio or identity – that is, zygonic relationships), which could be used supramodally (see Thorpe, 2016). This resulting pattern was sent to the visuospatial sketchpad, which provided Jessica with the necessary information to create her score. At the same time, the auditory and visual information was directed to intermediate-term memory (ITM) and long-term memory (LTM). Bamberger, who heard Henry's improvisation and saw Jessica's score, was able to use these two sources of information to surmise how Jessica modelled the simple rhythmic pattern in cognition (see Figure 6.5).

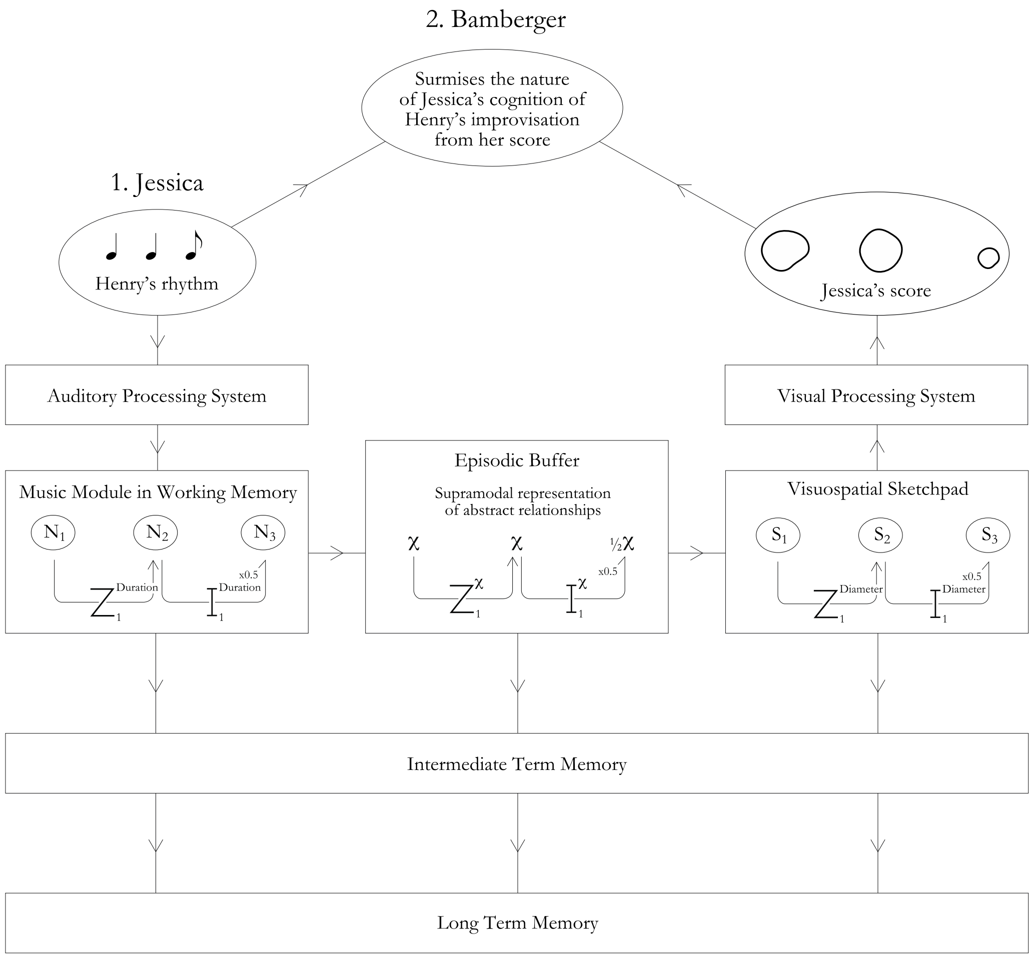

Figure 6.5 Model of Jessica's cognitive processing in relation to the creation of a graphic score from Henry's improvisation.

When Jessica performed the improvisation the following day, the process was reversed, confirming for Bamberger the efficacy of Jessica's method of notation and her internal representation of rhythm (Figure 6.6).

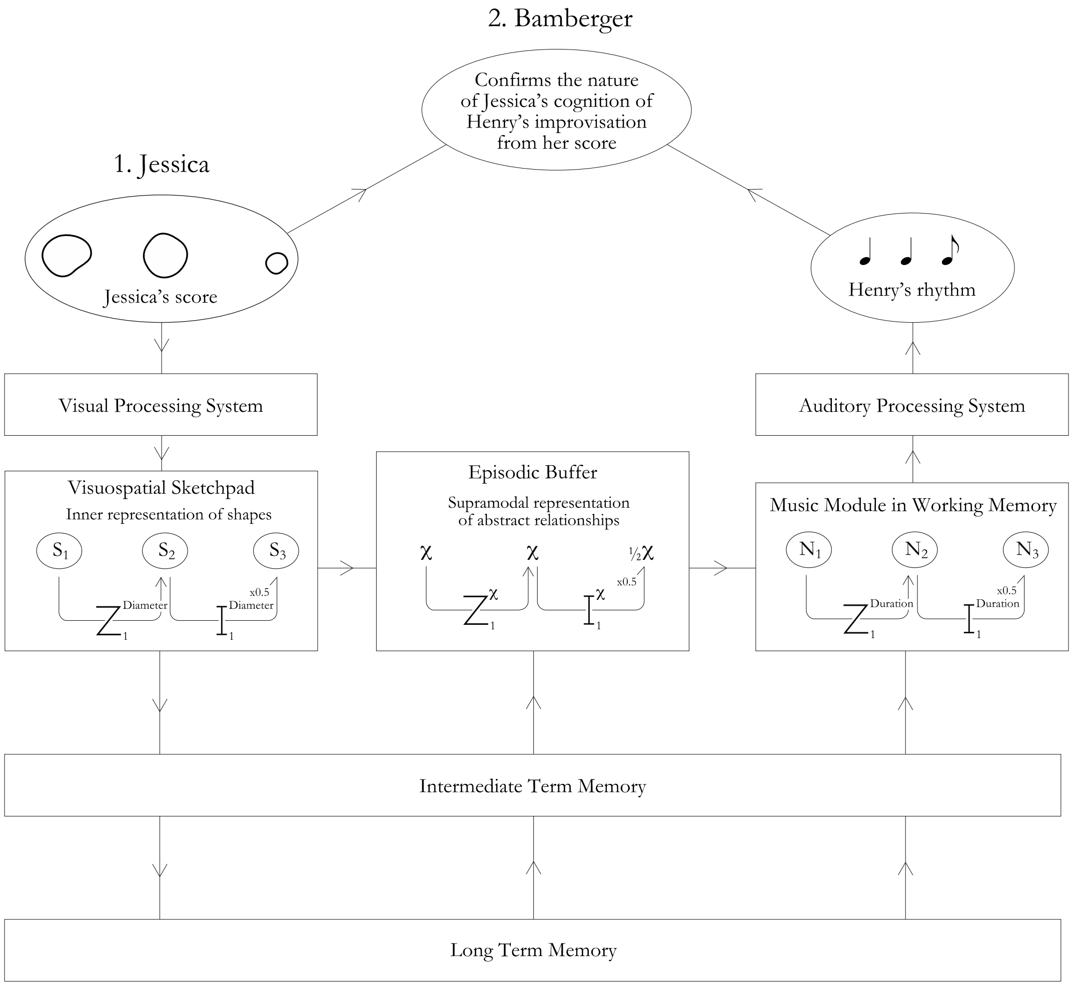

Figure 6.6 Model of Jessica's cognitive processing in relation to the re-creation of Henry's improvisation from her graphic score.

Another method of seeking to understand how listeners process music that can be used in applied musicological analysis is to elicit movement from them in response to sequences of notes (see, for instance, Himonides, 2011; Goodchild, Wild and McAdams, 2019), and this is the approach that was adopted by Hayley Trower in her research reported in Chapter 5 of this book. To understand the logic behind the supposition that the position of a listener's finger on a touch-sensitive strip can offer an analogy of their feelings of musical expectation, we will again draw on the thinking set out in Chapter 3, which used the Sounds of Intent model to investigate creative activities in other-than-musical domains.

As we saw in Chapter 5, the occurrence of a particular musical event is retrospectively felt to have been more or less probable according to its relationship with previous notes and groups of notes, and its position within tonal and metrical frameworks. Expectation is perceived to exist on a continuum, which can be thought of as a linear scale. Hence, through cross-modal mapping – which occurs at Sounds of Intent Level 3 – it is possible to represent varying degrees of expectation (retrospective or prospective) as different positions along a line (the touch-sensitive strip). The situation pertaining to the listener and the researcher can be modelled as shown in Figure 6.7.

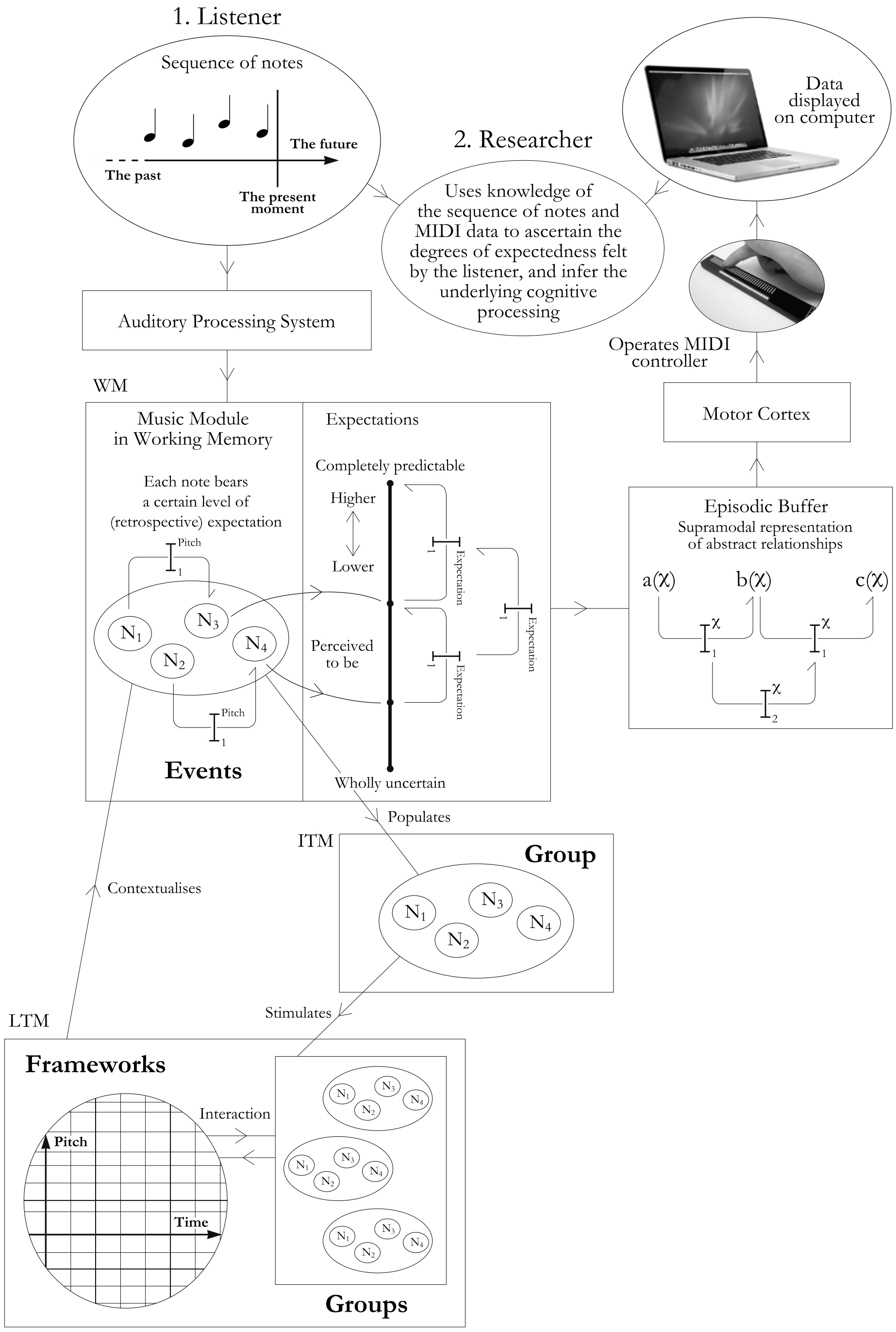

Figure 6.7 Model of the neurological and technological processes underlying the use of a touch-sensitive MIDI strip to gauge musical expectation.

Listeners' responses to music may be observed even more directly through taking measurements of physiological change (for example, Rickard, 2004; Kim and André, 2008) or neurological activity, through EEG (for instance, Baumgartner, Esslen and

Jänke, 2006) or fMRI (for example, Mitterschiffthaler *et al.*, 2007), and, again, the data produced may be susceptible to applied musicological analysis.

Finally, it is possible to gauge how people process music by having them respond to what they hear (or have heard) by producing musical sounds themselves (see Figure 6.8). Notwithstanding the approaches illustrated above, this strategy is the one that is core to applied musicological research (Ockelford, 2013a). Of course, such an approach has its limitations. Listeners tend to be incapable of reproducing much of what they can evidently hear in their heads: they may be able to recognise a melody without being able to sing it, for example, or be capable of distinguishing between several different interpretations of a piano sonata without being able to play a note of it themselves. Nonetheless, people tend to underestimate their capacity for making music, and can often produce fragments (by humming or tapping a rhythm, for instance) much more effectively than they believe. And there are particular groups of people – some children on the autism spectrum, for example – whose capacity to interact musically may offer a unique window onto their thinking, given a paucity or even a complete absence of language. Indeed, in certain circumstances, gauging intentionality and influence in musical interaction may offer proxy measures of communicative intent. Hence, the familiar scenario of words being used to describe musical engagement may be reversed, and music may itself be employed to explicate and share thoughts and feelings that would usually be captured and conveyed by language.

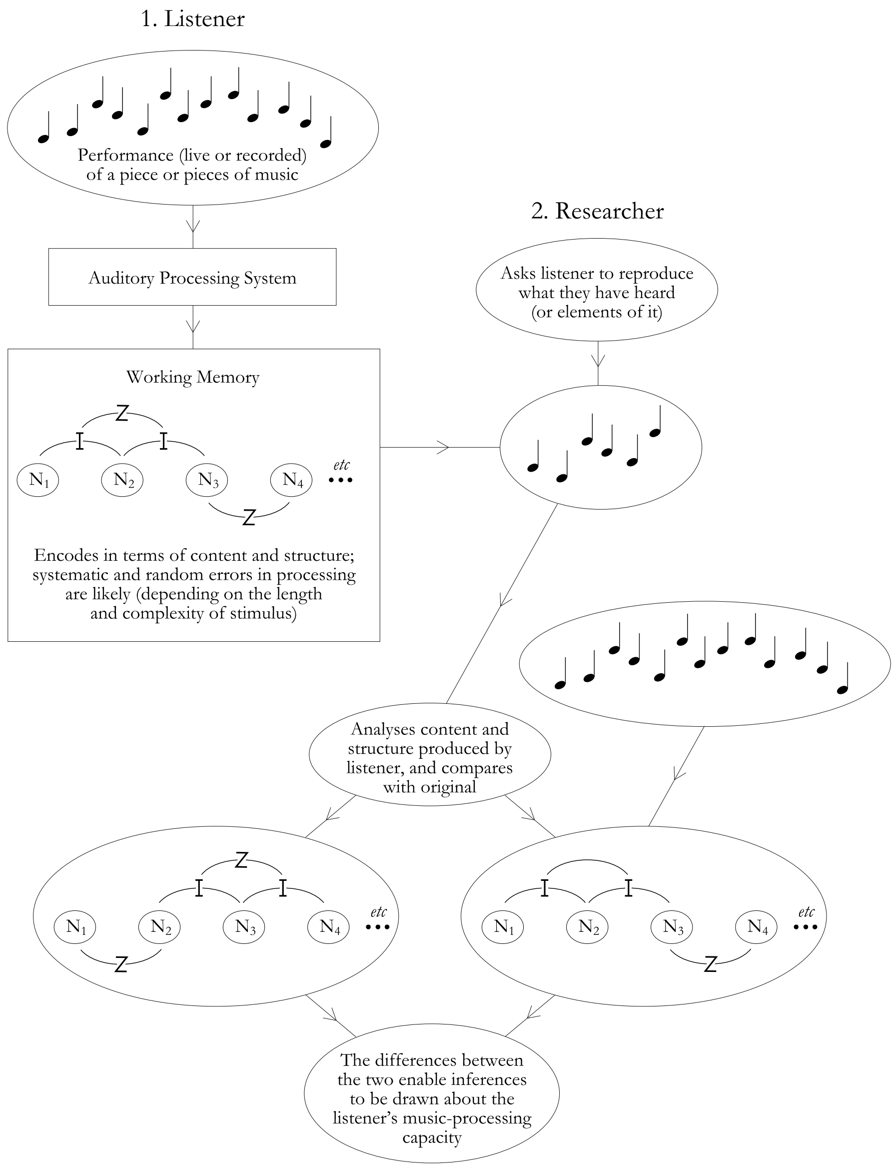

Figure 6.8 Model of the core approach of applied musicology: producing a musical response to a musical stimulus.

To summarise: research in music psychology and music education has used a variety of methodologies that can helpfully be conceptualised in terms of the Sounds of Intent framework – as pertaining to Level 3, 4 or 5. Each has different implications for the nature of the cognitive processing involved, particularly in terms of memory: WM, ITM or LTM. And different strategies for eliciting information about listeners' or performers' engagement with music are variously effective at different levels. 'Applied musicology' forms a distinct subset of such approaches, which uses data pertaining to the fabric of music itself to interrogate our understanding and appreciation of music, and to gauge intentionality and patterns of interaction in improvisation. See Figure 6.9.

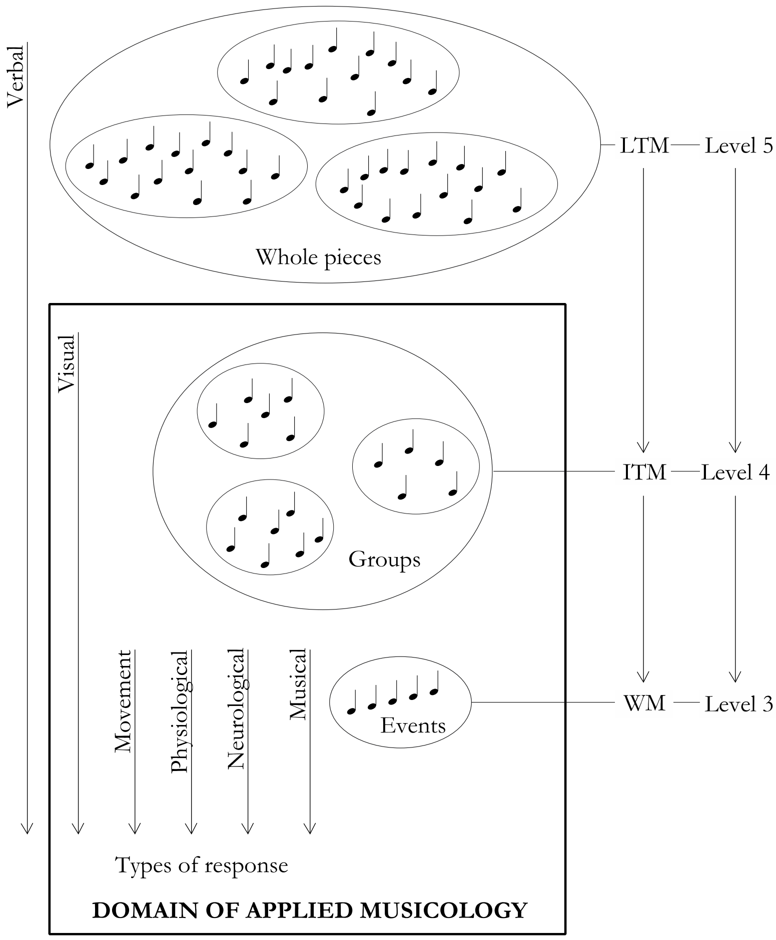

Figure 6.9 The domain of applied musicology functions principally at Sounds of Intent Levels 3 and 4, utilising WM and ITM.