CHAPTER 16

MUSICAL TENSION

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INTRODUCTION

The arts offer a rich and largely untapped resource for the study of human behaviour. This collection of essays points to the potential of studying the various art forms from a variety of disciplinary perspectives. The present essay describes a project involving a music theorist-composer and a cognitive scientist who conducts empirical research on music.

From a psychological point of view, the arts can extend our understanding of the physical, sensory, and perceptual processes that enable us to apprehend the world around us. Art works are special cases that, at a somewhat higher level, can yield insights into processes such as memory and attention, and show how knowledge shapes our interactions with, and interpretations of, artistic objects. At a still higher level, they raise questions about emotional, social, and cultural factors at work in the aesthetic realm. Finally, perspectives from neuroscience, genetics, and evolutionary theory illuminate questions about the underpinnings of artistic creativity.

Over the last 30 years, the cognitive science of music has become a mature field with different branches. One important impulse has come from the intersection of music theory and experimental psychology. Empirical studies have demonstrated that music theory provide a description not only of structural regularities in music but also the way music is perceived, organized, and remembered by listeners. Descriptions of music employ a set of terms such as scale, chord (harmony), key (tonality), melody, and melodic contour. These terms are defined in the glossary at the end of this chapter (Thompson 2009; see also Melcher and Zampini, Chapter 14, this volume).
With the development of music cognition, these questions have moved from well-established theoretical concepts such as harmony and tonality (see, for example, Krumhansl 1990, *Cognitive Foundations of Musical Pitch*; abbreviated CFMP) to newer music-theoretic proposals (Narmour 1990; Lerdahl 2001: *Tonal Pitch Space*, abbreviated TPS). For these, empirical research acts not only to test a theory but also to suggest modifications that more accurately describe how the music is perceived. Before we present one such theory and one of its tests, we provide some background on how this project relates to more general concerns.

**Music and emotion: expectation and tension**

The first question that anyone who engages with music in any way (and that is most everyone) asks is why music has such a powerful emotional effect. This is a question discussed widely in philosophy and musicology, cognitive and biological science, evolutionary theory, and psychoacoustics (the branch of auditory research concerned with physical properties of sound and its sensory processing).

One line of argument, from psychoacoustics, is that musical sounds are inherently pleasing because of the intervallic relationships that produce consonant sounds. Another position is that music has an emotional effect because it has been paired previously with significant events in an individual’s life. Yet another is that music has characteristics such as tempo, amplitude, and contour that are also found in emotional speech. Still another thread speculates about how music might have evolutionarily advantages as a means to increase group cohesion and enhance courtship and religious ceremonies, with consequent emotional effects (see Madison, Chapter 17, this volume). A full explanation of musical emotion likely includes all these elements and others.

A somewhat different perspective comes from Leonard Meyer’s *Emotion and Meaning in Music* (Meyer 1956). This seminal book has stimulated considerable experimentation. One attraction to psychologists is that it builds on important theoretical concepts in psychology, particularly *Gestalt principles of organization*¹ and *information theory*.² The theory makes the important shift from the question ‘Why does

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¹ Gestalt principles of perception describe our tendency to group elements so that they provide ‘good form’, including principles such as grouping by similarity or proximity. Many of these principles apply in both visual and auditory modalities and may interact in audiovisual perception.

² Information theory, developed by Claude Shannon (*A Mathematical Theory of Communication*, 1948), is a set of theories and principles developed to describe the transmission of a message. These ideas, which came out of work in Bell Labs during studies of the transmission of signals over telegraph or telephone wires, have been expanded upon and used in a variety of applications, ranging from psychology to data compression (such as MP3).
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music produce emotions?’ to ‘How does music produce emotions?’ This step draws attention to the way music is constructed. The question thus becomes more focused; it asks what patterns in music produce emotion. Also, the perceptual response that becomes of interest is the moment-to-moment experience of the ongoing flow of the music, rather than generalized ‘real-life’ emotions such as happy, sad, and tender that are engendered by passages or entire pieces of music.

The essential claim of Meyer’s theory is that music produces emotions because the listener actively responds to music (mostly unconsciously) by generating expectations for what is to follow. Meyer emphasizes three sources of expectation, although he does not claim that they are exhaustive. The first is the listener’s knowledge of the styles, sometimes called extra-opus knowledge (Meyer 1956, 1989; Narmour 1990). These are patterns that are characteristic of a musical style, as the first phrase of the familiar song ‘Over the Rainbow’, shown in Fig. 16.1, will illustrate.

Expectation as extra-opus knowledge is exemplified in bars 7–8 by the V-I (or V7-I) cadence in the tonic key of C major. The pattern I . . . V-I appears in a large percentage of phrases in tonal music. A further extra-opus feature of this phrase is its internal grouping structure, shown by the brackets beneath the music: two bars of statement and two bars of counterstatement, followed by a four-bar continuation and cadence. This so-called ‘sentence form’ is common in a variety of tonal styles.

For knowledge of this sort, Meyer draws on information theory and its use of probabilities. ‘We have stated that styles in music are basically complex systems of probability relationships in which the meaning of any term or series of terms depends upon its relationships with all other terms possible within the style system’ (Meyer 1956, p. 54). Empirical studies demonstrate that listeners can use information about patterns that appear with high probability to orient themselves to a novel style (e.g. Castellano et al. 1984; Krumhansl et al. 1999, 2000), and recent music theory has discussed how probabilities function in learning and recognizing musical patterns (Huron 2006; Temperley 2007).

The second source of expectation comes from the experience of a particular piece of music, called intra-opus knowledge. These are expectations that depend on the characteristics of that work. Even on first listening, a listener might expect that if a
particular motive or theme appears early in the piece, the same motive or theme will recur later in the piece, or reappear in variation. Figure 16.1 illustrates intra-opus knowledge of ‘Over the Rainbow’ by its motivic structure, shown above the music by the labelled brackets. The succession ‘a’ to ‘b’ in bars 1–2 creates the expectation that this pattern will follow later in the phrase. After the varied repetition of ‘a’ in bar 3, however, the whole note G in bar 4, marked ‘c,’ belies this expectation. Bars 5–7 compensate for this move by stating ‘a’ again and following it by two ‘b’ s before the music comes to rest in bar 8 on ‘c’. Meyer’s third source is the role that Gestalt principles of organization play in generating expectations. These principles are assumed to function in all individuals, not based on specialized training, and only rarely influenced by prior experience. Some consequences of these principles are that a simple well-organized melody will be remembered better than an irregular one, that a pattern will be expected to continue in a manner similar to how it began, and that a large pitch jump will lead to an expectation that the next pitch will fill in the gap. In this tradition, Narmour (1990) proposed five principles for melodic expectations that have been tested using a fairly wide variety of musical styles and listeners in different cultures (e.g. Krumhansl 1995; Thompson and Stainton 1998; Krumhansl et al. 1999, 2000).

‘Over the Rainbow’ is a classic example of a gap-fill melody. Figure 16.1 shows this by the small notes in the top staff, which strips away relatively ornamental pitches to reveal the phrase’s melodic skeleton. After the opening upward leap from C to C an octave higher, the melody slowly descends down the C major scale until the original C is reached.

According to Meyer, these various kinds of expectation lead to waves of tension caused by the relationship between the expectations and what actually occurs in the music. ‘Thus in a very general way expectation is always ahead of the music, creating a background of diffuse tension against which particular delays articulate the affective curve and create meaning’ (Meyer 1956, p. 59). If the expectation is fulfilled, no strong response occurs. However, when the expectations are not fulfilled, this produces a feeling of tension. Or, in the words of the then contemporary behavioural psychology, ‘emotion and affect is aroused when a tendency to respond is arrested or inhibited’ (p.14). The feeling of tension is not necessarily negative, nor is the feeling of resolution necessarily positive. Rather, the response depends on the particular way expectations are fulfilled, perhaps in an especially artful way or through an unexpected delay.

**The Tension Model**

Complementary to Meyer’s approach is another tradition, that of pitch attractions, articulated in psychological terms by Bharucha (1984, 1996) and developed in music-theoretic models by Larson (2004) and Lerdahl (1996, 2001). According to this tradition,
which in music theory can be traced back to the early nineteenth century, some pitches or chords seem to want to go to other pitches or chords, such as the leading tone to the tonic pitch. This tonal urge elicits an expectation: a dominant seventh chord is expected to resolve to the tonic chord, for example, and motion to another chord is felt as a denial of that expectation. A strong attraction-expectation can also be expressed as a kind of tension.

Thus each event in ‘Over the Rainbow’ generates some degree of expectation felt as a kind of attractive tension. The strongest attraction in Fig. 16.1 occurs in bar 7 at V₇, which ‘wants’ to resolve to the tonic I. Specifically, the pitches D and B are strongly attracted to C, F is strongly attracted to E, and G is strongly attracted to C, expressing the urge for V to resolve to I. These resolutions indeed take place (with the B surreptitiously displaced to G).

In addition to this tension caused by attraction, there is another kind of tension based on tonal stability and instability. The tonic is stable and relaxed, whereas a pitch or chord distant from the tonic is experienced as unstable and tense. Suppose, for the latter case, that ‘Over the Rainbow’ resolved away from the tonic, creating tension through instability. In Fig. 16.2, the melody moves to C, as before, but C is supported by an unstable harmony, V/V (that is, the D-F#-A-C form a dominant-seventh chord in the key of the dominant, G major). Such a ‘deceptive’ cadence away from the tonic would create tension and the expectation for a further continuation that would bring the expected tonic close.

Intuitions of tension based on attraction and stability both depend on the structural schemas of tonality uncovered in CFMP and related empirical studies. TPS provides a music-theoretic account of both. The schemas address a specific, learned level of cognitive organization. At present, it is an open question as to whether these structural schemas can be learned through extra- and intra-opus probabilities as proposed by Meyer.

We have collaborated in an empirical study (Lerdahl and Krumhansl 2007) to test this double account of tonal tension. It is important, in this connection, that the TPS model makes quantitative predictions, so that these can be compared with experimental observations, which most often take quantitative form. Because of the variability of human behaviour, the quantitative data need to be processed by statistical

![Fig. 16.2 A deceptive cadence for the ‘Over The Rainbow’ phrase.](image)
techniques to uncover the underlying regularities and assess whether these regularities conform to predictions.

In general terms, the stability-tension theory creates a tree-structure that describes the hierarchical structure of the music—it is somewhat like diagramming a sentence in terms of nouns, verbs and adjectives. It builds, first, on what is called the *prolongational component* in Lerdahl and Jackendoff’s *Generative Theory of Tonal Music* (1983; abbreviated GTTM) and, second, on the theoretical and empirical measures of distances between musical elements (tones, chords, keys) described in CFMP. These two factors combine (together with two other theoretical components briefly described later) to produce precise predictions about the relative tension and relaxation of each event in a musical passage. This is a complex theory, and only a few of its essential elements are presented here; but it is important to note that musical complexity necessitates theoretical complexity and that empirical methods are available to test such subtle and precise theoretical predictions.

GTTM considers prolongational organization as a psychological phenomenon that consists of nested patterns of tension and relaxation. These nested patterns are depicted in an inverted tree notation, illustrated abstractly in Fig. 16.3. Right branches stand for a tensing motion (or departure from stability), left branches for a relaxing motion (or return to stability). At a local level, Event 1 tenses into Event 2, Event 3 relaxes into Event 4, and Event 5 relaxes into Event 6. At a higher level, Event 1 tenses into Event 4, Event 6 relaxes into Event 7, and Event 1 relaxes into Event 7.

Added to the tree structure is a method to compute distances between any pitch or chord in one key and any pitch or chord in the same or any other key. The hypothesis is that greater distances between events contribute to greater experienced tension. CFMP summarizes experiments investigating the perceived distances between

![Fig. 16.3 Hypothetical tree structure showing tension (t) and relaxation (r).](image-url)
tones, chords, and keys. These results have been replicated in several laboratories, using a range of musical contexts, participants with varied training, and different task instructions.

One empirical result of interest in connection with the TPS model is the tone profiles of Krumhansl and Shepard (1979) and Krumhansl and Kessler (1982). Those experiments found a hierarchy of tones headed by the tonic, followed by the fifth and third degrees of the scale, then the remaining scale tones, and finally the non-scale tones. TPS proposes a similar, theoretically motivated, tone hierarchy, called the basic space, shown in Fig. 16.4. The basic space and its transformations represent the levels of pitch, chord, and key and their distances within a unified and quantified formalism.

These two components of the TPS model, the prolongational tree structure and operations on the basic pitch space, are combined in the following way. A prolongational tree for a segment of music is constructed based on a number of precise principles or rules (GTMM and TPS). This tree structure determines which distances are computed. The distance of any given event is computed from the event that is superordinate to it in the tree. For example, in Fig. 16.3 the distance for Event 1 is computed from Event 7. When an event has two or more superordinate events, its distance is the sum of the distances along the paths leading to the root of the tree. For instance, Event 2’s distance is first computed from Event 1, and then it inherits the distance from Event 1 to Event 7. Generally, an event that is deeply embedded in the tree—that has many superordinate events—will have a large distance value associated with it.

These distances are combined with two other components of the theory. Briefly, one is a treatment of surface or sensory dissonance. This measure is largely psychoacoustic: the interval of a seventh is more dissonant than a sixth; a non-scale tone increases dissonance, as does a chord not in root position; and so on. The other component in the model is the tension caused by attraction as mentioned earlier. Listeners experience the relative pull of pitches toward other pitches in a tonal context, especially more stable pitches that are nearby. The factors of proximity and relative stability together generate a quantitative prediction of the degree of tension caused by

![Fig. 16.4 Diatonic basic space, set to the tonic of C major. 0 = C, 1 = C#, and so on.](image)

3 Theoretically consistent patterns have been found on these three levels of musical structure (e.g. Krumhansl and Kessler 1982, for tones and keys; Bharucha and Krumhansl 1983, for chords).
attraction for each event in the passage analysed. These are then compared with the judgements of tension that listeners make in the experiments.

**Testing the model**

To study the rise and fall of tension, real-time measures have been developed in which listeners move a device to indicate the amount of tension they experience throughout the course of a piece (e.g. Nielsen 1983; Fredrickson 1995; Krumhansl 1996). In some preliminary results (Krumhansl 1996) these judgements were found to be quite consistent across listeners, independently of musical training and of degrees of familiarity with a piece.

We undertook a series of experiments to provide a quite comprehensive test of the model’s predictions over a range of musical styles. The participants made tension responses for Wagner’s Grail theme from *Parsifal* in both its diatonic and chromatic versions, a Bach chorale, *Christus, der ist mein Leben*, Chopin’s *E Major Prelude*, and the opening of the fifth movement of Messiaen’s *Quartet for the End of Time*. (The beginning of the first movement of the Mozart *Piano Sonata, K. 282* was also analysed similarly; see Krumhansl 1996; Lerdahl 1996.) We present here only the experiment using the Chopin Prelude; the other experiments are described in Lerdahl and Krumhansl (2007).

Chopin’s *E major Prelude* was analysed in Chapter 3 of TPS. It divides into three phrases corresponding to Figs. 16.5–16.7. It is a highly chromatic nineteenth-century piece; the degree of chromaticism is reflected in the number of sharp, flat, and natural signs in the score, especially in the second and third phrases. As such, it presents analytic and perceptual complexities that make it an interesting test case. One complexity that we decided to avoid in the experiment is the textural ornamentation in the melody. Thus, the prelude was presented in block chords as shown. The chords were presented at a slow rate of one chord per two seconds, giving listeners ample time to respond to each event.

Following are some technical details of the TPS model applied to the Chopin Prelude. Readers may prefer to continue reading from the ‘Summarizing the findings’ section.

**Details of the TPS model applied to the Chopin Prelude**

Figs. 16.5–16.7 each contain a number of different kinds of information. Events are numbered in order above the staves. Between the staves are Diss., which refers to
Fig. 16.5 Analysis of the first phrase of Chopin’s E major Prelude.

Fig. 16.6 Analysis of the second phrase of Chopin’s E major Prelude.
the degree of surface dissonance, \( T_{\text{tier}} \), which refers to the tension in the hierarchical prolongation component computed down the branches of the tree plus dissonance, and Attr., which refers to the degree of attraction of each event to the successive event. Below the staves is a harmonic analysis. Despite the chromaticism, the Chopin prelude remains diatonic in the sense that its harmonic progressions refer to diatonic scale degrees, even though they are chromatically altered. Also, as can be seen, the piece moves through a number of different keys (or regions), from E major to C major to F major, and so on.

Of most interest here is the degree of tension computed down the branches of the prolongational tree. At the most global level (not shown), Event 1 attaches to Event 47, then Event 17 attaches to Event 1, and then Event 33 attaches to Event 17. All these are tonic chords in E major, so there is zero distance between them and zero sums down the branches to the beginning event of each phrase. To this is added the dissonance value of 1 for Events 1, 17, and 33 because the melodic note of chord is not on the tonic scale degree, giving \( T_{\text{tier}} = 1 \) for these three events. Together with the presence of the closely associated dominant (V) chords, the predictions of tension for the beginnings of all three phrases are relatively low.

In contrast, let us consider the section of music just preceding the end of the final phrase (Fig. 16.5), where predicted tension is high. Event 43 attaches to Event 41 (with distance 7); Event 41 attaches to Event 37 (with distance 10); Event 37 attaches to Event 33 (with distance 18); and (as before) Event 33 attaches to Event 45 (with distance 0).
The sum of these distances is $7 + 10 + 18 + 0 = 35$, to which a dissonance value of 1 is added giving a total of $T_{\text{Tot}} = 36$.

Before considering how well the predictions fit the tension judgements made by listeners, one aspect of the predictions should be mentioned. At three places in the prolongational component (Events 13, 28, and 44) two alternatives are indicated (with one indicated by a dashed line in the tree). These alternatives are both consistent with the TPS model. In these cases, the question is whether the event is heard with respect to the preceding event or the following event. The data can be used to select between the alternatives. The data suggest that Event 13 is heard with respect to Event 12; that Event 28 is heard with respect to Event 29 (giving a sharp peak in predicted tension); and that Event 44 is heard with respect to Event 45 (the familiar dominant-tonic progression). In this way, theory and data interact resulting in a more accurate formulation of how the TPS analysis corresponds to the perceptual data.

**Summarizing the findings**

Figure 16.8 plots the predicted tension (dashed line) and the judged tension (solid line). The disparity at the beginning of the piece reflects the fact that the slider listeners use to make the tension judgements is initially set to 0, so it took a few events before the listeners’ judgements reached the level of the predictions. It should also be noted
that the scale of the predicted values in this graph is adjusted so that it matches the
tension judgements as well as possible. Nonetheless, it can be seen that the predictions
for the second phrase are generally below the judgements and the predictions for the
third phrase are generally above the judgements.

This discrepancy suggests that the model is missing an important factor. Observe
that in the first two phrases the judged tension rises and falls in waves that correspond
to the rise and fall of the melody (its contour). In this case the melody consists of
the highest tones. Although the harmony here is complex, the shape of the melody
is simple. To add the factor of melodic contour to the analysis, we quantified it and
used it as an additional predictor to the statistical analysis. The results are shown in
Fig. 16.9, with a clearly better match between prediction and data (which is substanti-
ated by statistical tests that evaluate how well the data match the predictions). 4

This example illustrates the process through which listeners’ experience of ten-
sion and release of tension can be modelled precisely in terms of a specific music
theoretic model. The other examples we tested each raised a number of interesting
issues that arose in the interaction between theory and data. Various alternative hier-
archical analyses were tested, leading to a better understanding of which choices, within
the constraints of the TPS model, more accurately describe listeners’ responses.

Fig. 16.9 Tension graph for the TPS analysis of the Chopin prelude after
melodic contour was added to the statistical analysis.

4 The statistical analysis describes how much of the data (ratings by the listeners) could be
predicted by the theory. A basic assumption in psychology is that a theory is more likely to be correct
if it can successfully predict human behaviour.
DISCUSSION AND CONCLUSIONS

The degree to which the model proved successful in its various tests suggests that it provides a largely adequate account of how complex interactions between the sounded events and the listeners' cognitive system give rise to the experience of tension. In part because of Meyer's (1956) emphasis on how expectations produce continually varying degrees of tension, we have emphasized the component of the TPS model that makes the largest contribution to predicting tension, the hierarchical prolongational component.

The tree representation in this component shows many branches connecting to events that are not adjacent. In other words, the theory proposes that listeners hear each event not only in relation to immediately adjacent events, but also in relation to events at a distance. In language, such relationships are called non-adjacent dependencies and are held to be a special aspect of language structure and unique to humans (Chomsky 1957; Hauser et al. 2002; Fitch and Hauser 2004). Although the present results are neutral with respect to the question of whether hierarchical structure is unique to humans, they suggest that music and language are similar in their hierarchical organization.

Just as people are not often aware of the hierarchical structure of language, even though they implicitly use this knowledge in understanding and producing language, it is likely that listeners are not aware of the complex hierarchies in music: they only feel the tensions created by the structure in the music. By asking participants to rate the tension in music, rather than asking for their explicit knowledge of the structure of the music, our method was able to uncover important aspects of the underlying structure of the music.

Effects of expectation and tension in music have also been found in other indirect measures, such as changes in emotion physiology. Some of these physiological changes (such as changes in heart rate, breathing, and sweaty palms) are associated with 'real-life' emotions, although the correspondences are far from perfect (Cacioppo et al. 1993). This raises the possibility that emotion physiology may suggest some connection between patterns of tension and relaxation and the more everyday emotions. However, the connection is likely to be complex, especially given the different time scales of the moment-to-moment variations in tension and the more sustained moods associated with other emotional events.

One study reporting physiological reactions to music was Sloboda’s (1991) questionnaire study in which respondents reported specific physiological reactions. These occurred at points in the music, selected by the respondents, where they reported especially strong reactions. Sloboda found that different physiological reactions corresponded to different kinds of expectancy violations as analysed in music-theoretic terms. For example, he found that tears were associated with an extended melodic and/or harmonic sequence, shivers down the spine with a sudden change of dynamic (loudness) or timbre (the characteristic sound of an instrument), and heart racing with a prominent event arriving earlier than expected.
In an exploratory study with real-time measures, judgements of tension in the study of Krumhansl (1997) correlated with changes in emotion physiology over time. In addition, the tension judgements correlated with real-time judgements of fear, but judgements of happy and sad also made contributions. Changes in emotion physiology showed a similar pattern. This suggests that tension is a multivalent quality with contributions of different reported emotions. Supporting this, another study (Krumhansl and Schenck 1997) showed tension judgements were virtually identical with judgements of the total amount of emotion. Krumhansl (2002) summarizes additional studies relating real-time measures to emotion responses. Thus, tension does not map uniquely to a single emotion (see essays by Madison, Chapter 17, and by Melcher and Zampini, Chapter 14, this volume).

A growing number of studies using measures of neural activity have shown brain responses when musical expectancies are violated. For example, a functional magnetic resonance imaging (fMRI) study by Koelsch et al. (2005) found responses to unexpected chords. In another fMRI study, areas of secondary auditory cortex were active when listeners heard violations of expectations for pitch and rhythm (Krumhansl 2005), even when the listeners were not performing a task, suggesting that the responses to expectations are automatic. Studies using electroencephalography (EEG) (Besson and Faita 1995; Janata 1995) have found early event-related correlates of the degree to which expectations are violated, a result replicated in other studies (e.g. Koelsch et al. 2000).

Some studies also suggest that music can activate the same brain structures that are involved in emotional responses in other situations. In the Koelsch et al. (2005) study cited earlier, the unexpected chords elicited orbital frontal cortex activation, an area known to support emotional processing (see Calvo-Merino and Haggard, Chapter 27, this volume, for the role of this brain region in 'rewarding' behaviours such as listening to music, looking at preferred visual artworks or even eating chocolate). Blood and Zatorre’s (2001) PET study showed brain responses at specific listener-identified moments of strong emotions, as well as other physiological changes. And, finally, a recent study (Steinbeis et al. 2006), found tension, subjective emotionality of the music, and early negativity event-related potential (ERP) response, and electrodermal activity (EDA) increased with harmonic unexpectedness, thus demonstrating connections between all four kinds of responses.

In summary, empirical evidence, using a variety of behavioural and neurocognitive measures strongly supports the idea that listeners develop constantly changing expectations while listening to music, and these give rise to waves of tension and relaxation. Here we described one music-theoretic model that is able to identify musical patterns that give rise to tension. At present, however, it appears that these moment-to-moment responses do not map in a simple way onto the traditional emotional states studied within psychology. Although the emotions evoked by music...
may be different or more complex than 'real-life' emotions, they are fundamental to the musical experience.

**Glossary**

- **Chord**: in a musical context, a chord is a collection of tones that are played simultaneously or near simultaneously. The most common chords in Western music are major and minor chords (called triads because they consist of three tones).
- **Chord (or harmonic) hierarchy**: the hierarchical stability of chords established by the key. The most stable chord is the chord built on the first scale tone (the tonic chord), followed by the chord built on the fifth scale tone (the dominant chord), and then the chord built on the fourth scale tone (the subdominant). These are also usually the most frequent chords in a musical composition.
- **Key**: a concept describing the organization of a passage of music. A sense of key is determined by the establishment of two features: a scale and a tonal centre.
- **Melody**: the melody is the change in pitch in a passage of music. If it is organized according to musical conventions and perceptual principles, it is well-remembered.
- **Pitch**: the psychological quality of periodic sounds that extends from low to high (pitch height). In the context of music it is called a **tone** and when it is written down it is called a **note**.
- **Scale**: the set of tones that represent a musical composition, and from which most or all tones in the music are drawn. In Western music, the most common scale is the major (seven-tone) diatonic scale.
- **Tonality**: the quality of music that involves the use of a key or keys. Its perception involves sensitivity to a complex system of relationships, including the relationships between tones, chords, and keys and the tonal and harmonic hierarchies.
- **Tonal centre (or tonic)**: the tone that functions as a point of maximum stability and minimum tension. It often appears most frequently in the music and gives the name to the scale, e.g. C is the tonal centre for the key of C major.
- **Tonal hierarchy**: the hierarchy of stability of tones established by the key. The most stable tone in a major key is the first tone of the scale (the tonic), followed by the fifth tone of the scale (dominant), and the third tone of the scale (mediant); the tones that are not in the scale are the least stable.

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6 The following definitions are taken in large part from *Music, Thought and Feeling* (Thompson 2009) which can be consulted for additional information.
References


